

RECLAMATION

Managing Water in the West

Calendar Year 2012 Report to the Rio Grande Compact Commission

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Introduction

The Albuquerque Area Office of the Bureau of Reclamation (Reclamation) is responsible for operation, maintenance, and oversight of four projects on the mainstem of the Rio Grande and its upper basin tributaries. These projects are: the *San Luis Valley Project*, the *San Juan – Chama Project*, the *Middle Rio Grande Project*, and the *Rio Grande Project* (Figure 1).

The *San Luis Valley Project* consists of the Conejos and Closed Basin Divisions. The Conejos Division, which includes Platoro Dam and Reservoir, provides water for approximately 86,000 acres within the Conejos Water Conservancy District. The Closed Basin Division is a ground water salvage project located near Alamosa, Colorado, which pumps water from the shallow unconfined aquifer primarily to assist Colorado in meeting its commitment under the Rio Grande Compact.

The *San Juan – Chama (SJ-C) Project* consists of a system of storage dams, diversion structures, tunnels and channels for transbasin movement of water from the San Juan River Basin to the Rio Grande Basin as a component of the Colorado River Storage Project. The SJ-C Project provides water for municipal, domestic, industrial, recreation, fish and wildlife purposes, and supplemental water for irrigation. Another component of the project is the Pojoaque Irrigation Unit and Nambé Falls Dam. The Pojoaque Irrigation Unit provides water for approximately 2,800 acres in the Pojoaque Valley.

The *Middle Rio Grande Project* consists of El Vado Dam and Reservoir and irrigation and drainage facilities in the Middle Rio Grande Valley. The project also entails river channel maintenance from Velarde, New Mexico, southward to Caballo Reservoir, and the Low Flow Conveyance Channel (LFCC) south of San Acacia, New Mexico. Irrigation water is provided to the Middle Rio Grande Conservancy District (MRGCD) which supplies water to 50,000 to 70,000 acres of land.

The *Rio Grande Project* includes Elephant Butte and Caballo Reservoirs and Percha, Leasburg, and Mesilla Diversion Dams. The Project stretches from the lower Rio Grande Valley of southern New Mexico to just south of El Paso, Texas. The Rio Grande Project provides an agricultural water supply for approximately 178,000 acres of land within the Elephant Butte Irrigation District in New Mexico and the El Paso County Water Improvement District No. 1 in Texas. Water is also provided for diversion to Mexico by the International Boundary and Water Commission - United States Section according to the terms of the 1906 Treaty between the United States and Mexico. Drainage waters from the Rio Grande Project lands provide a supplemental supply for approximately 18,000 acres of land within the Hudspeth County Conservation and Reclamation District No. 1 in Texas. Elephant Butte Dam also generates electrical power for communities and industries in southern New Mexico. Reclamation transferred title to the canal and drainage facilities to the districts in a 1996 operating agreement.

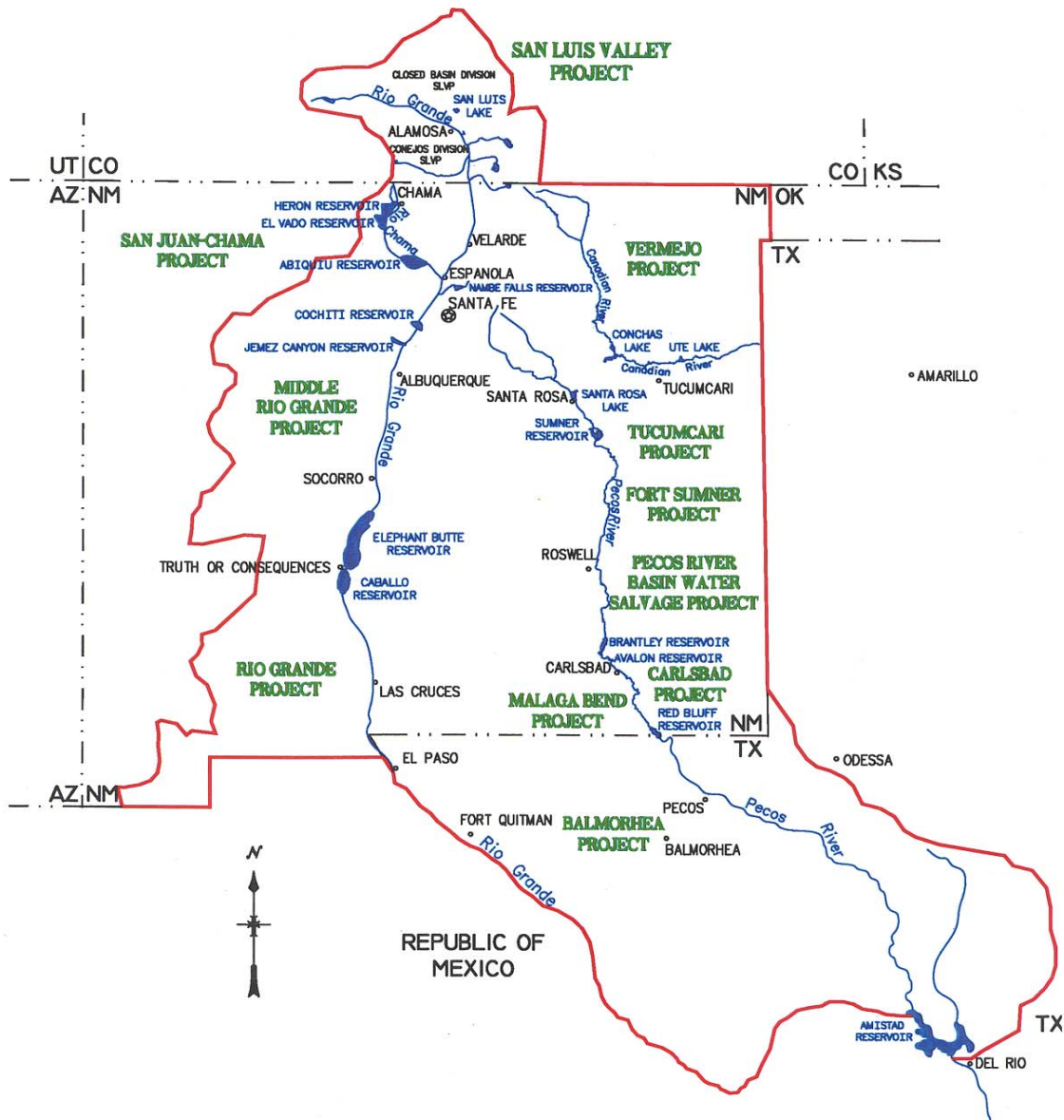


Figure 1: Project Map of Reclamation's Albuquerque Area Office

San Luis Valley Project, Colorado

Conejos Division, Platoro Reservoir

The Conejos Water Conservancy District (CWCD) operates Platoro Reservoir, which provides storage for approximately 86,000 acres associated with the San Luis Valley Project (Figure 2). The CWCD’s office is located in Manassa, Colorado.

Platoro Reservoir began January 1, 2012, at elevation 9,973.82 feet AMSL, with a content of 15,098 ac-ft. The September 30, 2012, elevation was 9,961.2 feet, with a content of 9,267 ac-ft. Of that content, 20.4 ac-ft was direct-flow storage and none was Compact water. On December 31, 2012, the elevation was 9,959.87 feet, with a storage content of 8,710 ac-ft, none of it Compact water.

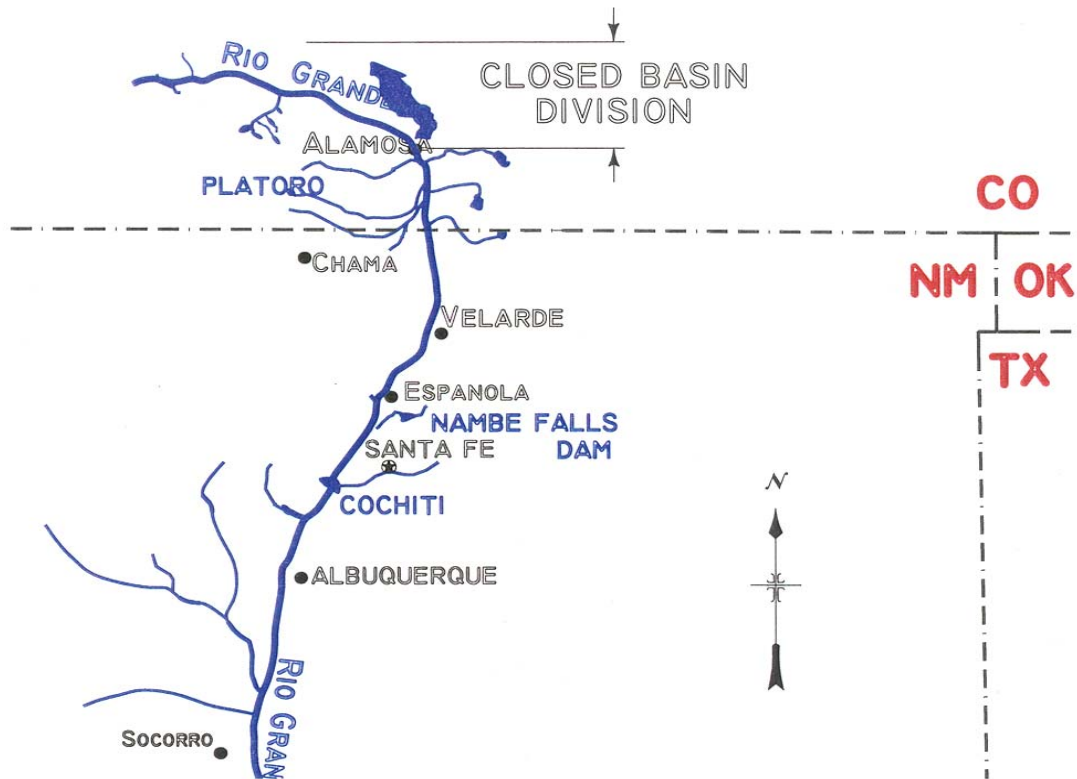


Figure 2: Area Map of San Luis Valley Project

Platoro Dam Facility Review and Safety of Dams Programs

There were no major issues with the operation and maintenance at Platoro Dam, other than aging infrastructure. Accomplishments in 2012 included:

- The dive exam for the 2013 Comprehensive Facility Review (CFR) was completed in September with no significant issues.
- The mechanical exam for the 2013 CFR was completed in November with no significant issues.
- The civil portion of the CFR will be conducted in the spring of 2013.
- The Annual Site Inspection was completed in October 2012.
- The Facility Review Rating was updated and Platoro fell in the Good category.
- Two Security recommendations were completed in 2012.
- There are currently three incomplete O&M recommendations.

Closed Basin Division

The Alamosa Field Division of the Albuquerque Area Office operates and oversees the maintenance of a water salvage project constructed in the Closed Basin area of the San Luis Valley, Colorado (Figure 2). The purpose is to salvage unconfined ground water from the Closed Basin that would otherwise be lost to evaporation and evapotranspiration. The salvaged water is pumped from up to 170 salvage wells and delivered through a conveyance channel to the Rio Grande to assist Colorado in meeting its commitment under the Rio Grande Compact. The project also delivers mitigation water to the Alamosa National Wildlife Refuge and Blanca Wildlife Habitat Area, and stabilization of San Luis Lake. Reclamation continues to work under the guidance of the Closed Basin Division Operating Committee in management of Closed Basin operations and water deliveries. The last Review of Operations and Maintenance examination (RO&M) was conducted in October of 2011. The next RO&M examination is scheduled for 2016.

Closed Basin – Operations and Maintenance

Operations

Closed Basin water deliveries in Calendar Year (CY) 2012 included deliveries to the Rio Grande, Blanca Wildlife Habitat Area, South San Luis Lake Complex and Alamosa National Wildlife Refuge.

A total of 13,283 ac-ft of project water was delivered in CY2012. Total deliveries of Compact water to the Rio Grande for CY2012 were 9,409 ac-ft. Total water deliveries to the Bureau of Land Management (BLM) Blanca Wildlife Habitat Area for CY2012 were 800 ac-ft for annual mitigation and 8.5 ac-ft was leased water from the Division of Wildlife. Total water deliveries to South San Luis Lakes Complex were 406.1 acre feet. Total water deliveries to the Alamosa National Wildlife Refuge for CY2012 were 2,660 ac-ft for annual mitigation.

Natural inflows to San Luis Lake (SLL) are measured by the SLL inlet flume or estimated at the spillway and culverts. Natural inflow to SLL during CY2012 totaled 0.0 ac-ft. Closed Basin Division water accounting for the 2012 calendar year is summarized in Table 1.

Table 1: San Luis Valley Project - Closed Basin Division Water Accounting (units are acre-feet)

MONTH	BLANCA WILDLIFE HABITAT AREA (BWAH)			PARSHALL FLUME		ALAMOSA NATIONAL WILDLIFE REFUGE (ANWR)			DELIVERY TO THE RIO GRANDE				PROJECT TOTALS
	CH03 STA.	CH04 STA.	MONTH TOTALS	TOTAL PASSING FLUME	CREDITABLE AMOUNT AT FLUME	CH01 CHICAGO TURN-OUT	CH02 MUM TURN-OUT	PUMPING PLANT	MONTH TOTALS	TOTAL AT FLUME MINUS DEL. TO ANWR	CREDITABLE AMOUNT TO RG AND NOT USED BY ANWR	NON- CREDITABLE @ LOBATOS	
	730+00	798+60		(4)	(5)	(6)	(7)	(8)		(9)	(10)	(11)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	
JAN	0	0	0	1,280	1,280	0	0	0	0	1,280	1,280	0	1,280
FEB	0	0	0	1,210	1,210	0	0	0	0	1,210	1,210	0	1,210
MAR	0	0	0	1,210	1,210	223	337	373	933	277	277	0	1,210
APR	50	52	102	1,150	1,150	106	104	20	230	920	920	0	1,252
MAY	0	0	0	1,340	1,340	177	149	0	326	1,014	1,014	0	1,340
JUN	33	0	33	1,150	1,150	111	93	0	204	946	946	0	1,183
JUL	212	109	321	914	914	0	0	0	0	914	914	0	1,235
AUG	177	124	301	920	920	214	171	0	385	535	535	0	1,221
SEP	25	18	43	1,140	1,140	243	234	0	477	663	663	0	1,183
OCT	0	0	0	528	528	48	57	0	105	423	423	0	528
NOV	0	8	8	522	522	0	0	0	0	522	522	0	530
DEC	0	0	0	705	705	0	0	0	0	705	705	0	705
ANNUAL	497	311	808	12,069	12,069	1,122	1,145	393	2,660	9,409	9,409	0	12,877

NOTE: Delivery to South San Luis Lake was 406.1 ac-ft of leased water from the Colorado Division of Parks and Wildlife.

The project continues to provide Priority 1 (Compact) and Priority 2 (Mitigation) water deliveries. The San Luis Valley is in the midst of a severe drought and the water table in the unconfined aquifer has dropped significantly in some areas. Pumping levels remain stable to allow the water table to recover while minimizing impacts to the surrounding area and preserving the integrity of existing project wells. Wells turned off at the recommendation of the Project Hydrologist in 2007 remain off.

The Alamosa Field Division has been meeting with other interested parties (US Fish and Wildlife Service, Colorado Division of Parks and Outdoor Recreation, Colorado Division of Wildlife, and Rio Grande Water Conservation District) on the operation of San Luis Lake in an effort to make the Lake a viable recreation area and to provide storage of water for later use to deliver to the Rio Grande to meet Compact requirements.

The United States Geological Survey's (USGS) Pueblo, Colorado, Office continues to provide quality assurance/quality control (QA/QC) of the observation wells' network data for Reclamation. Reclamation received an excellent rating through the 2012 QA/QC program.

Maintenance

Routine preventive maintenance and repair activities continue at salvage and observation well sites, canal structures, pumping plants, and shelterbelts.

Repair and replacement of pumps in the salvage well vaults is an ongoing process. All of the salvage well preventive maintenance tasks were completed for the year. Five salvage wells were re-drilled and 13 were rehabilitated in 2012.

In August, 2012, the Closed Basin Division entered into an agreement with the USGS Water Science lab located in Oklahoma City, OK. The USGS is tasked with a new design for the replacement wells and test pumping the wells to establish the sustainable pumping capacity. The use of a variable frequency drive (VFD) is being tested on the five USGS-designed wells. The VFD will control the speed of the pump. As the water level in the well drops the pump will slow down until the water level stabilizes.

The new well design has proven to be a huge success, and includes gravel pack, stainless steel casing, and a study of the aquifer at each of the five wells. Under the current Joint Funding Agreement, well efficiency has increased approximately 20% from the older designs. In addition, aquifer information showed approximately three to four feet of static loss in re-drill areas from 1985 to present and some aquifer plugging. This plugging can be prevented by a program where pumps cycle on and off. Data gathered under the agreement has quantified this as a viable operation. Based on the data that was collected, a Preventive Maintenance program will be established to begin rehabilitating wells at 10% loss in specific capacity, rather than the previously used 50% loss in specific capacity.

Water Quality

Water quality monitoring of Closed Basin Division salvage wells, the Rio Grande, San Luis Lake, Head Lake, and the conveyance channel continued throughout 2012.

The Water Quality Laboratory continues to support the Operations and Maintenance groups with their salvage well rehabilitation and bio-fouling mitigation efforts. The laboratory has the capability to culture and identify “iron related bacteria,” and all salvage wells are currently monitored for the presence of these bacteria.

The Water Quality Laboratory participated in the spring and fall USGS’ Evaluation Program for Standard Reference Water Samples. The Laboratory continues to perform commendably on these audits.

Rio Grande Water Conservation District

The Rio Grande Water Conservation District (RGWCD) continues to perform civil maintenance on the Project based on a cooperative agreement with Reclamation. Canal berms, lateral access roads, and right-of-ways were maintained by blading and mowing. Other work included removal of aquatic weeds and sediment from structures and the canal, repair of fences, repair of erosion to the berms from large precipitation events, and assisting Reclamation personnel in maintaining equipment. RGWCD continued its involvement in the groundwater monitoring program and continues maintenance of the irrigation systems for shelterbelt areas.

The RGWCD continues to assist Reclamation in the re-drill and rehabilitation efforts due to the bio-fouling in numerous wells.

San Juan – Chama Project, Colorado – New Mexico

Reclamation's web page for Middle Rio Grande Water Operations provides the current year's monthly data for the operation and water accounting of the San Juan – Chama Project. To reach the internet web page, type <http://www.usbr.gov/uc/albuq/water/> into a web browser. An area map of the San Juan – Chama Project is provided below in Figure 3.

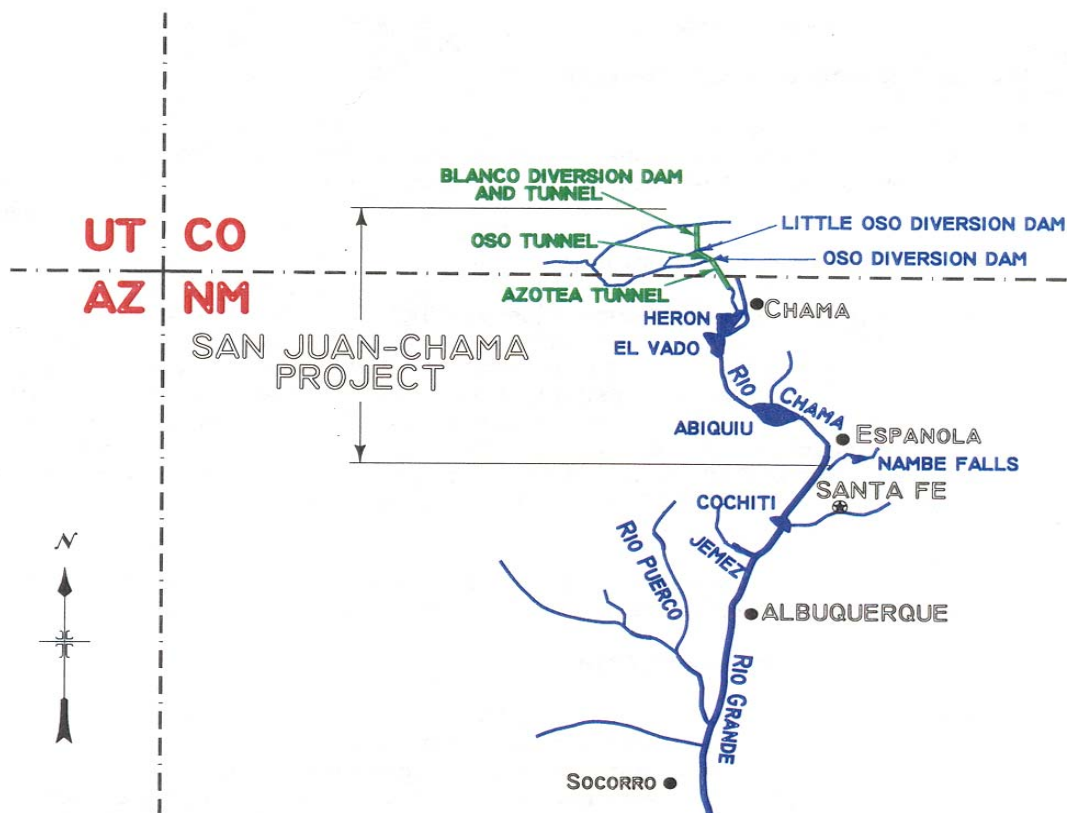


Figure 3: Area Map of the San Juan-Chama Project

San Juan - Chama Project Accounting

Water diverted from the San Juan Basin in Colorado through the San Juan – Chama Project authorized by Congress in 1962 through P.L. 87-483, introduced special circumstances for water use and management in the Middle Rio Grande Valley. Imported San Juan – Chama Project water must be accounted for separately from native Rio Grande flow, and fully consumed within New Mexico.

Reclamation is responsible for water contracts and accounting for the San Juan – Chama Project. An Excel[®] spreadsheet was developed in 2008 and used to produce the final accounting

document. Improvements to the RiverWare[®] accounting model using the hydrologic database (HDB) for data storage and Crystal Reports[®] for report generation allowed side-by-side comparison of accounting tables produced independently by Excel[®] and the RiverWare[®] accounting model/HDB/ Crystal Reports[®] method with favorable results. This practice continued in 2012. Reclamation continues to compare the Excel[®] spreadsheets to those generated using Crystal Reports[®], but plans to discontinue any use of Excel[®] for this purpose in 2013. San Juan – Chama Project accounting for 2012 is provided in the separate report *2012 Water Accounting Report*.

San Juan - Chama Diversion Dams and Tunnels

Diversions for the San Juan – Chama Project begin in Colorado at the Blanco, Oso, and Little Oso diversion dams, depicted in Figure 3. Operation begins with the spring runoff, and maintenance occurs in the fall, when the intake forebay areas and associated structures are dredged and cleaned to allow unobstructed access to the associated tunnels. The Azotea Tunnel collects diversion flows for transport to the outfall at Willow Creek above Heron Reservoir.

To maintain compliance with Section 404 of the Clean Water Act, permits for maintenance at the Blanco and Oso Diversion Dams were acquired from the U.S. Army Corps of Engineers (USACE). The permits, initially scheduled to expire December 1, 2011, have been extended through December 1, 2016. They require annual reporting of any maintenance that was accomplished for that year, including sediment removal, bank stabilization, and maintenance of the diversion dams and associated infrastructure.

In 2009, a sluice gate malfunctioned at the Oso Diversion and allowed about 700 cubic yards of sediment to discharge downstream. Reclamation received a Notice of Violation of the Clean Water Act from the USACE. Reclamation has corrected the sluice gate programming error that caused the accidental discharge of sediment. Reclamation also worked with downstream property owners to remove sediment deposited on their property. As a result of this violation, Reclamation agreed to conduct a three year survey of fish and macro-invertebrates to ascertain the health of the Navajo River. Reclamation has submitted interim reports of findings to the USACE annually from 2009 to 2011. Reclamation submitted the final report to the USACE in January 2013. Several tort claims concerning the 2009 release of sediment were filed in 2011 by landowners adjacent to the river. In January, 2012, administrative determination letters, dated January 26, 2012, were sent from the Department of the Interior, Office of the Solicitor, to the ten tort claimants. Reclamation is working with local landowners, many of whom are claimants, to proactively evaluate the condition of the river below Oso Diversion and to contribute to improving the fishery conditions going forward. As a result all tort claims were dropped.

Heron Dam and Reservoir Operations

(All elevations are 1929 NGVD, storage reference is 2010 ACAP survey)

Diversions into the Azotea Tunnel began on March 12, and ended on September 16, 2012. The total volume diverted through the tunnel was 47,222 ac-ft. The running 10-year average Azotea

Tunnel diversion increased slightly this year, from 92,603 ac-ft for the period 2002 through 2011, to 96,694 ac-ft for the period 2003 through 2012 (Table 2). Heron Reservoir began the year at an elevation of 7,152.39 feet (223,328 ac-ft) and finished the year at an elevation of 7,136.84 feet (167,274 ac-ft), which also marked Heron’s lowest pool elevation and storage. Storage peaked on June 8 at an elevation of 7160.86 feet (266,483 ac-ft).

Table 2: SJ-C Project - Diversions through Azotea Tunnel (units are acre-feet)

AZOTEA MONTH	YEAR										10 YEAR TOTAL
	2003 (1)	2004 (2)	2005 (3)	2006 (4)	2007 (5)	2008 (6)	2009 (7)	2010 (8)	2011 (9)	2012 (10)	
JANUARY	0	0	0	0	0	0	0	0	0	0	0
FEBRUARY	0	0	93	0	179	0	272	0	0	0	544
MARCH	1,170	11,505	1,931	706	12,976	4,745	5,938	546	2,008	7,014	48,539
APRIL	11,366	15,427	31,721	17,799	17,745	25,816	19,111	21,908	13,570	18,133	192,596
MAY	26,613	30,164	45,146	25,674	33,837	44,461	51,766	35,368	22,315	17,032	332,376
JUNE	18,816	20,390	50,210	7,600	26,679	47,463	23,544	27,249	42,779	4,037	268,767
JULY	669	2,139	13,347	3,785	4,302	13,428	4,392	1,815	8,404	670	52,951
AUGUST	487	237	3,779	4,868	7,375	2,606	232	1,501	1,594	260	22,939
SEPTEMBER	3,340	1,973	3,360	5,567	1,948	1,465	99	712	1,852	76	20,392
OCTOBER	246	1,821	4,873	12,795	33	0	0	251	4,452	0	24,471
NOVEMBER	0	1,218	735	0	0	0	0	53	1,295	0	3,301
DECEMBER	0	12	0	0	0	0	0	0	52	0	64
ANNUAL	62,707	84,886	155,195	78,794	105,074	139,984	105,354	89,403	98,321	47,222	966,940

The SJ-C contractors’ 2012 and waived 2011 annual allocations were delivered as shown in Table 3, for a total delivery in 2012 of 94,227 ac-ft. The remaining 2012 allocations are being held in Heron according to waivers which grant an extension for the delivery date for several contractors into 2013. Table 4 presents actual monthly Heron water operations for the 2012 calendar year.

Table 3: SJ-C Project – Water Releases from Heron Reservoir (units are acre-feet)

SJ-C HERON RELEASE MONTH	MRGCD	SANTA FE	SANTA FE COUNTY	COCHITI	CITY OF ALBUQUERQUE	POJOAQUE UNIT	TAOS	COUNTY OF LOS ALAMOS	CITY OF ESPAÑOLA	TWINING SANITATION	VILLAGE OF LOS LUNAS	TOWN OF BERNALILLO	BELEN	RED RIVER	JICARILLA APACHE	SAN JUAN PUEBLO	UNCON- TRACTED	RECLAMATION	TOTAL
ALLOCATION	20,900	5,230	375	5,000	48,200	1,030	400	1,200	1,000	15	400	400	500	60	6,500	2,000	2,990		96,200
JANUARY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FEBRUARY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MARCH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APRIL	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	0	0	36
MAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JUNE	421	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	448
JULY	7,166	0	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,187
AUGUST	4,413	0	0	0	19,513	0	0	0	0	0	0	0	0	0	0	0	0	11,133	35,059
SEPTEMBER	0	2,756	0	0	28,687	0	148	0	26	1	71	0	9	0	0	0	0	3,552	35,250
OCTOBER	0	0	0	0	2,108	0	0	0	0	0	0	0	0	0	0	0	0	7,335	9,443
NOVEMBER	0	0	0	0	2,449	0	0	0	76	3	240	0	29	0	0	0	0	0	2,797
DECEMBER	0	0	0	2,298	1,709	0	0	0	0	0	0	0	0	0	0	0	0	0	4,007
2009 CY TOTAL	12,000	2,756	49	2,298	54,466	36	148	0	102	4	311	0	38	0	0	0	0	0	94,227

Table 4: SJ-C Project – Monthly Water Storage in Heron Reservoir (units are acre-feet)

HERON STORAGE MONTH	INFLOW		OUTFLOW		SAN JUAN CHAMA LOSS	END-OF-MONTH CONTENT			ELEVATION (FEET)
	RIO GRANDE	SAN JUAN CHAMA	RIO GRANDE	SAN JUAN CHAMA		RIO GRANDE	SAN JUAN CHAMA	TOTAL	
	(1)	(2)	(3)	(4)		(5)	(6)	(7)	
DEC. 2011						350	229,411	229,761	7,152.39
JANUARY	115	0	115	0	258	0	228,075	228,075	7,152.33
FEBRUARY	108	0	108	0	43	0	228,032	228,032	7,152.32
MARCH	1,653	7,000	671	0	0	982	235,032	236,014	7,154.16
APRIL	2,283	18,097	2,315	36	2,934	950	250,158	251,108	7,157.54
MAY	2,492	16,998	2,750	0	3,479	692	263,677	264,369	7,160.41
JUNE	1,148	4,029	1,513	448	2,841	328	264,416	264,744	7,160.49
JULY	603	670	553	7,187	520	378	257,379	257,757	7,158.99
AUGUST	327	260	255	35,059	581	450	221,999	222,449	7,151.01
SEPTEMBER	104	76	204	35,250	1,545	350	185,281	185,631	7,141.84
OCTOBER	99	0	99	9,443	1,213	350	174,625	174,975	7,138.98
NOVEMBER	94	0	94	2,797	615	350	171,213	171,563	7,138.04
DECEMBER	96	0	96	4,007	282	350	166,924	167,274	7,136.84
SUB-TOTAL	9,123	47,130	8,773	94,227					
ADJUSTMENT						-350 (M)			
ANNUAL		56,253		103,001	14,311	0	167,274	167,274	

Heron Dam Facility Review and Safety of Dams Programs

There were no major issues with the operation and maintenance at Heron Dam, other than aging infrastructure. Accomplishments in 2012 include:

- The dive exam for the 2013 Comprehensive Facility Review (CFR) was completed in September with no significant issues.
- The mechanical exam for the 2013 CFR was completed in October with no significant issues.
- The civil portion of the CFR is scheduled for the spring of 2013.
- New flow meters were installed on the outlet works, adjustments are ongoing.
- SOP updates for the above mentioned flow meters will be completed when the final adjustments are completed.
- The Annual Site Inspection was completed in October.
- The Facility Review Rating was updated and Heron fell in the Good category.
- Work continued on Quagga/Zebra mussel prevention.
- There are currently three incomplete O&M recommendations.

Pojoaque Tributary Unit - Nambé Falls Dam and Reservoir

(All elevations are 1929 NGVD, storage reference is 2004 ACAP survey)

Nambé Falls began 2012 with the reservoir at elevation 6,812.57 feet, providing a storage volume of 1,221 ac-ft. During the winter, releases averaged about 1 cfs to maximize conservation storage as agreed to by the Pojoaque Valley Irrigation District and Indian water users. The reservoir filled and spilled in 2012. The maximum elevation for the year was

6,826.85 feet (1,934 ac-ft) on March 31. The reservoir filled on that date and remained full until May 31, when irrigation releases began and reservoir storage and elevation started falling. Nambé Falls Reservoir ended 2012 at elevation of 6,815.09 feet (1,332 ac-ft).

Cyclical operations of Nambé Falls Reservoir consist of non-irrigation season operations and irrigation season operations. During non-irrigation season (November through April), all inflow in excess of the bypass requirement of 0.5 cfs is stored until an elevation of 6,825.60 feet is reached. Once that elevation is attained, the outlet gates are regulated weekly to stabilize the reservoir at 6,825.60 feet, or an elevation determined by 100 percent ice cover. An uncontrolled spill begins at elevation 6826.6 feet, which is the top of the spillway crest. During irrigation season (May through October), water is stored and released on demand to meet downstream requirements.

A net depletion of 1,140 ac-ft was calculated for Nambé Falls operations for 2012. The depletion amount (plus transportation loss) was released from Heron and Abiquiu Reservoirs throughout 2012. Table 5 provides a summary of Nambé Falls use above Otowi and the Pojoaque Unit return flow credit used to calculate depletions during 2012. A summary of 2012 Nambé Falls Reservoir operations is provided in Table 6.

Table 5: SJ-C Project – San Juan-Chama Water at Otowi (units are acre-feet)

SJ-C AT OTOWI	RELEASE FROM HERON	HERON RELEASE STORED IN EL VADO	RELEASE FROM EL VADO	TOTAL BELOW EL VADO	RELEASE FROM OR STORAGE IN ABIQUIU	TRANS. LOSSES	NAMBE FALLS USE ABOVE OTOWI	RETURN FLOW CREDIT - POJOAQUE UNIT	SAN JUAN WATER AT OTOWI
MONTH	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
JANUARY	0	0	0	0	2,818	25	188	27	2,632
FEBRUARY	0	0	0	0	2,051	18	205	25	1,852
MARCH	0	0	2,479	2,479	342	53	339	22	2,451
APRIL	36	0	4,599	4,635	-2,642	69	17	20	1,927
MAY	0	0	0	0	2,799	25	23	19	2,771
JUNE	448	0	18,818	19,266	9,907	474	-4	18	28,721
JULY	7,187	0	31,296	38,483	8,698	848	243	108	46,199
AUGUST	35,059	0	2,237	37,296	-1,785	730	124	79	34,737
SEPTEMBER	35,250	567	0	34,683	-17,738	534	104	53	16,359
OCTOBER	9,443	1,108	0	8,336	1,730	182	26	31	9,888
NOVEMBER	2,797	1,612	0	1,185	1,143	34	164	32	2,161
DECEMBER	4,007	1,015	0	2,992	2,730	84	170	25	5,493
ANNUAL	94,227	4,301	59,429	149,355	10,054	3,078	1,599	459	155,192

Table 6: SJ-C Project – Monthly Water Storage in Nambé Falls Reservoir (units are acre-feet)

NAMBÉ FALLS MONTHLY	INFLOW	OUTFLOW			RESERVOIR LOSSES	TOTAL OUTFLOW + LOSSES	END OF MONTH	
		BYPASSED	STORAGE RELEASE				CONTENT	ELEVATION
MONTH			OPERATIONAL	IRRIGATION				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DEC. 2011							1,221	6,812.57
JANUARY	224	36	0	0	1	38	1,408	6,816.75
FEBRUARY	239	34	0	0	4	38	1,609	6,820.87
MARCH	682	343	0	0	14	357	1,934	6,826.85
APRIL	1,354	1,337	0	0	20	1,357	1,931	6,826.80
MAY	1,378	1,355	0	0	25	1,379	1,930	6,826.77
JUNE	526	508	0	781	26	1,315	1,140	6,810.62
JULY	593	346	0	418	7	771	962	6,805.95
AUGUST	465	340	0	156	3	498	929	6,805.02
SEPTEMBER	310	205	0	11	5	220	1,019	6,807.50
OCTOBER	256	225	0	38	9	272	1,004	6,807.09
NOVEMBER	204	40	0	0	6	46	1,162	6,811.16
DECEMBER	202	31	0	0	1	32	1,332	6,815.09
ANNUAL	6,433	4,798	0	1,404	120	6,322	1,332	6,815.09

Nambé Falls Dam Facility Review and Safety of Dams Programs

There were no major issues with the operation and maintenance at Nambé Falls Dam, other than a flash flood that occurred in July that washed out the sediment trap that was built in 2011. No action was taken as flow continues to enter the Reservoir without problems.

Accomplishments in 2012 include:

- The dive exam for the 2013 Comprehensive Facility Review was not completed due to the heavy accumulation of black ash and woody material from the 2011 fire. It is currently scheduled for January or February of 2013.
- The Annual Site Inspection was completed in October.
- The mechanical exam was completed in November with minimal recommendations.
- The Facility Review Rating was updated, and Nambé fell in the Fair category.
- There are currently five incomplete O&M recommendations.

2013 San Juan - Chama Outlook

On January 1, 2013, Heron Reservoir had 86,634 ac-ft in storage in the Federal Pool. This amount is below the calculated firm yield of 96,200 ac-ft, and is insufficient for a full annual allocation for all contractors prior to the 2013 runoff season. Water scarcity was contemplated in the SJCP authorization, which directs that “when the actual available water supply may be less than the estimated firm yield, [Contractors] shall share in the available water supply in the ratio that the above allocation bears to the firm yield.”

After coordination with Contractors, the initial allocation reduces each Contractor's normal allocation by approximately 20%. At this time, Reclamation plans a second 2013 allocation, but the timing of a full allocation depends on the snowmelt runoff and will be evaluated as additional runoff forecast information becomes available.

Middle Rio Grande Project, New Mexico

The *Middle Rio Grande Project* (Figure 4) is operated out of the Albuquerque Area Office, with support provided by the Chama Field Division for operations and maintenance of northern facilities. The Socorro Field Division performs construction throughout the project area.

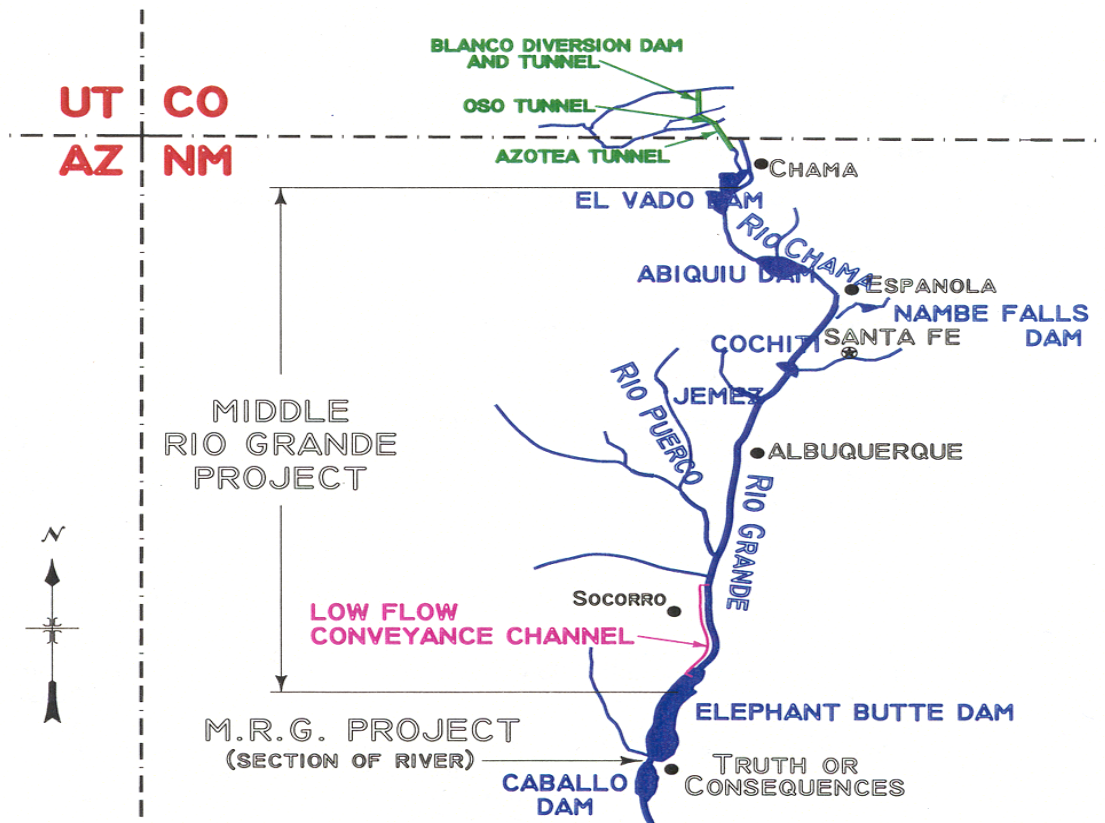


Figure 4: Area Map of the Middle Rio Grande Project

New Mexico Relinquishment of Rio Grande Compact Credit

Per the Rio Grande Compact Article I definition, the usable water in Project storage (Elephant Butte and Caballo Reservoirs together) was below 400,000 ac-ft for all of 2012. Article VII of the Rio Grande Compact stipulates that when usable water in Project storage is below 400,000 ac-ft, no “native Rio Grande flows” will be stored in post-1929 reservoirs upstream of Elephant Butte Reservoir in New Mexico and Colorado unless relinquishment of credit waters in Elephant Butte Reservoir occurs.

During 2012, 30,513 ac-ft of Emergency Drought Water was captured by Reclamation for the benefit of the Middle Rio Grande Conservancy District under the Emergency Drought Water Agreement (EDWA) and no additional water was captured as part of Reclamation’s remaining Emergency Drought Water balance. The balance of Emergency Drought Water available for

capture and storage by Reclamation and MRGCD during 2013 or later years is 40,536 ac-ft. Reclamation's balance for use as supplemental water for endangered species is 19,451 ac-ft, and 21,085 ac-ft remains to be captured for the benefit of MRGCD.

Reclamation started 2012 with 19,197 ac-ft, while MRGCD began the year with 0 ac-ft of Emergency Drought Water stored in El Vado Reservoir. By the end of the irrigation season, all Emergency Drought Water in El Vado had been released.

El Vado Dam and Reservoir Operations

(All elevations are Middle Rio Grande Project Datum – add 7.8 feet for 1929 NGVD, storage reference is 2007 ACAP survey)

El Vado reservoir began 2012 at an elevation of 6,862.03 feet (86,655 ac-ft). The reservoir peaked on May 17 at an elevation of 6885.54 feet (141,307 ac-ft), and hit a low point of 6800.30 feet (10,463 ac-ft) on December 31.

MRGCD began the year with 0 ac-ft of Emergency Drought Water, 281 ac-ft of general Rio Grande storage, and 67,176 ac-ft of SJ-C water in El Vado for Middle Valley irrigation. This was in addition to MRGCD's 20,900 ac-ft of 2012 SJ-C allocation in Heron Reservoir, and a beginning year balance of 2,193 ac-ft of SJ-C stored in Abiquiu Reservoir. At the end of the year in El Vado, MRGCD had 0 ac-ft of Emergency Drought Water, 0 ac-ft of general Rio Grande storage, and 122 ac-ft of SJ-C storage. MRGCD also had 2,087 ac-ft of SJ-C stored in Abiquiu as of December 31, 2012. The amount in Abiquiu exceeded the MRGCD storage allocation of 2,000 ac-ft due to a request from the NM State Engineers Office to transfer 1,319 ac-ft to MRGCD to make up for depletions caused by the Albuquerque Bernalillo County Water Utility Authority.

A total of 33,110 ac-ft of water captured and stored for Prior and Paramount irrigation while under Article VII restrictions. A total of 4,253 ac-ft was released to meet Prior and Paramount needs during the irrigation season, and 26,371 ac-ft were released to Elephant Butte between November 13 and December 22.

The total SJ-C water in El Vado storage at the end of the year was 10,463 ac-ft which belonged to the MRGCD, Reclamation, and the Albuquerque Bernalillo County Water Utility Authority. Table 7 provides a summary of monthly operations and water accounting for El Vado Reservoir.

After a crack was discovered in the metal faceplate during the previous year, it was determined that it would be beneficial to take advantage of the low reservoir levels to examine as much of the faceplate as possible. A waiver was granted the MRGCD to store its 2012 SJ-C allocation in Heron until September for this purpose. No further damage was noted, and the existing crack was repaired.

Table 7: Reservoir Operation for El Vado Dam (units are acre-feet)

EL VADO RESERVOIR OPERATION	INFLOW		OUTFLOW		LOSSES		EOM CONTENT		
	RIO GRANDE	SAN JUAN - CHAMA	RIO GRANDE	SAN JUAN - CHAMA	RIO GRANDE	SAN JUAN - CHAMA	RIO GRANDE	SAN JUAN - CHAMA	TOTAL
MONTH	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DEC. 2011	4,331	2,760	13,712	2,871	93	-2	19,479	67,176	86,655
JANUARY	3,394	0	3,221	0	61	16	19,591	67,160	86,751
FEBRUARY	3,383	0	3,481	0	76	-2	19,417	67,162	86,579
MARCH	19,223	0	7,952	2,479	88	150	30,599	64,533	95,132
APRIL	66,622	36	21,174	4,635	365	243	75,682	59,691	135,373
MAY	28,779	0	37,845	0	539	430	66,076	59,262	125,338
JUNE	3,677	448	37,475	19,266	290	532	31,988	39,912	71,900
JULY	1,778	7,187	4,443	38,483	72	107	29,251	8,509	37,760
AUGUST	3,248	35,059	3,994	37,296	19	44	28,486	6,228	34,714
SEPTEMBER	3,537	35,250	5,086	34,683	143	37	26,795	6,757	33,552
OCTOBER	1,719	9,443	1,939	8,336	93	46	26,482	7,819	34,301
NOVEMBER	2,032	2,797	12,590	1,185	70	19	15,854	9,412	25,266
DECEMBER	2,952	4,007	18,614	2,992	193	-37	0	10,463	10,463
ANNUAL	140,344	94,227	157,813	149,355	2,008	1,585			

El Vado Dam Facility Review and Safety of Dams Programs

The designs and specifications for repair of the cathodic protection system are moving forward. The anticipated schedule is:

- May 2012: Investigations, drill anode beds (Completed, collected data is being analyzed)
- November 2013: Finish investigations and specs
- February 2013: Award contract
- September 2013: Notice to proceed
- One to two months for installation

Concerns continued regarding cracking of the steel face plate, and were further addressed in 2012 as discussed in the Operations section above. Below is a timeline, beginning in 2011:

- In early spring 2011, the dam tender noticed that seepage was increasing. Reclamation's Technical Service Center was notified and recommended daily inspections of seepage areas through the summer. The seepage pond and the white milky substance were not noticed in 2011 as they were in 2010.
- In March 2011, a closer visual inspection of the upstream faceplate was completed. The inspection team noticed more activity on the left abutment, including more cracks on the seams. The Chama Field Division repaired these cracks soon after.
- In October 2011, the dam tender noticed a crack at the same distance from the left abutment, but lower in elevation, than the crack discovered in the spring of 2010. The new crack was also much longer than the 2010 crack (estimated at 25 feet) and was located on a panel seam. At the time of identification it was at the water surface elevation, 6866 feet, and minimal work could be accomplished. The reservoir elevation was lowered, and the crack was repaired to the extent possible.

- In December 2011, an underwater camera was used to inspect that crack. This revealed that the crack continued 18 to 20 feet below the current water level (6862 feet).
- In February 2012, dye was poured into the crack. The exit time was 2 ½ hours at the pump house. Dye was observed in the river about three hours later.
- In April 2012, a temporary repair was completed. Magnetized material with heavy duty magnets was placed over the crack by divers.
- In June 2012, permanent repairs were completed by the Chama Field Office. The entire crack was welded.

El Vado Dam accomplishments in 2012 include:

- The Annual Site Inspection was completed.
- The Facility Review Rating was updated and El Vado fell in the Poor category.
- The dive exam for the 2013 Comprehensive Facility Review (CFR) was completed in September with no major issues although the divers noted “more exposed rebar on the stilling basin flip bucket.”
- The Mechanical exam for the 2013 CFR was completed in October, with minimal recommendations.
- The last of the three required surveys before the 2013 CFR was completed in June.
- The control house was painted.
- The Civil portion of the CFR is scheduled for the spring of 2013.
- Work continued on Quagga/Zebra mussel prevention.
- There are currently eight incomplete O&M recommendations. Work for recommendation 2007-2-E, install log booms, is scheduled for FY2013. Recommendation 2007-2-C is also moving forward with design and specifications for the cathodic protection system scheduled for completion in FY2013. Installation of the new cathodic system is scheduled for FY2014/15.

Efforts continue for completion of a Corrective Action Study (CAS) that will evaluate alternatives for addressing the risk of failure for the service and emergency spillways. The risk of hydrologic failure for these structures, in their current condition, has been determined to fall above Reclamation guidelines. Geotechnical data collection for the CAS was completed in 2012, consisting of drill holes and test pits for the dam, service spillway, and emergency spillway. Hand-augered holes were also drilled in the floodway for the emergency spillway (Cooper Arroyo). The CAS Report is currently scheduled for completion in January of 2015.

U.S. Army Corps of Engineers' Related Reservoir Operations

Abiquiu Dam and Reservoir is a U. S. Army Corps of Engineers' facility. Public Law 97-140 authorizes storage of up to 200,000 ac-ft of SJ-C water in Abiquiu Reservoir. Adjustments for sediment reduced the sum of the available storage allocations to 180,124 ac-ft at the start of 2012, which is calculated as the total capacity at the top of the SJ-C storage pool (elevation 6,220.00 feet), less the total accumulated sediment in the reservoir at the end of 2011. The volume of SJ-C water in storage in Abiquiu Reservoir peaked on January 1, 2012, at 181,597 ac-

ft. Abiquiu ended 2012 with 155,897 ac-ft of SJ-C water in storage. Table 8 provides a summary of monthly operations and water accounting for Abiquiu Reservoir.

During 2012, Reclamation had a storage agreement with the Albuquerque Bernalillo County Water Utility Authority (ABCWUA) to store up to 10,000 ac-ft of supplemental water in the ABCWUA's storage space in Abiquiu Reservoir. Over the course of the year, 37,542 ac-ft of leased SJ-C water was released from Abiquiu by Reclamation for silvery minnow purposes.

Table 8: Reservoir Operations for Abiquiu Dam (units are acre-feet)

ABIQUIU RESERVOIR OPERATION	INFLOW		OUTFLOW		LOSSES		EOM CONTENT			
	RIO GRANDE	SAN JUAN - CHAMA	RIO GRANDE	SAN JUAN - CHAMA	RIO GRANDE	SAN JUAN - CHAMA	SEDIMENT	RIO GRANDE	SAN JUAN - CHAMA	TOTAL
MONTH	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DEC. 2011	15,370	3,070	15,069	3,382	2	156	3,757	815	177,025	181,597
JANUARY	4,313	0	4,304	2,818	6	409	3,757	824	173,797	178,378
FEBRUARY	4,929	0	5,633	2,051	1	354	3,757	120	171,392	175,269
MARCH	11,425	1,962	10,575	2,304	7	981	3,760	970	170,069	174,799
APRIL	26,731	5,074	27,204	2,433	2	1,362	3,776	497	171,349	175,622
MAY	39,802	0	39,706	2,799	1	2,428	3,805	593	166,121	170,519
JUNE	42,662	17,162	43,258	27,070	1	2,626	3,868	-3	153,587	157,452
JULY	7,166	38,659	7,163	47,357	-4	1,546	3,904	0	143,343	147,247
AUGUST	5,455	37,303	5,403	35,518	-4	1,541	3,934	53	143,586	147,573
SEPTEMBER	3,647	34,147	4,239	16,409	-3	1,282	3,958	-539	160,042	163,462
OCTOBER	1,469	9,268	887	10,998	-1	1,441	3,962	43	156,871	160,876
NOVEMBER	11,924	1,245	11,952	2,388	0	771	3,966	15	154,957	158,938
DECEMBER	19,548	2,746	19,563	5,476	0	304	3,974	0	151,923	155,897
ANNUAL	179,077	147,567	179,888	157,621	5	15,047				

Cooperative Programs with the State of New Mexico

In September 2012, a new 5-year Cooperative (State Coop) Agreement was executed between the New Mexico Interstate Stream Commission (NMISC) and Reclamation. The Agreement provides funding for joint benefit water salvage work on the Middle Rio Grande Project. This work currently includes Elephant Butte Temporary Channel maintenance and other river maintenance projects, and riverside irrigation drain improvements with water salvage potential.

The 2012 State Coop Agreement provided approximately \$2,099,000 for water salvage projects. Funds for the 2012 Agreement consisted of carry over funding from the expired 2007 agreement. The majority of the work completed in 2012 was done under the old 2007 agreement prior to the execution of the new agreement in September. Total State Coop work expenditures for calendar year 2012 involving joint benefit water salvage projects as of December 31, 2012, are approximately \$387,000.

Elephant Butte Temporary Channel History

River disconnection has been an issue at the headwaters of Elephant Butte Reservoir since the early 1950s. The contributing factors for the disconnection are many: the valley slope is slight, the incoming sediment load is high, the clay deposits are highly cohesive, and vegetation growth is extremely aggressive. During drought periods when the reservoir pool decreases rapidly, all of these factors make it difficult for the river channel to maintain a connection with the reservoir pool. The latest incidence of disconnection began in the late 1990s, and construction of the Temporary Channel began in 2000. The channel was constructed in three phases:

- **Temporary Channel 2000:** This reach was constructed from 2000 to 2004 and is seven miles in length, beginning at River Mile (RM) 58 and ending at Nogal Canyon (RM 51.5). This reach has a high flow channel with an average width of 250 feet and a smaller channel within the larger channel to carry low flows. The low flow channel width is approximately 75 feet.
- **Temporary Channel 2002:** Constructed from 2003 to 2004, it is 11 miles long, beginning at Nogal Canyon (RM 51.5) and ending just downstream of the Elephant Butte Narrows (RM 41). The average width for this reach is 150 feet.
- **Temporary Channel 2004:** Construction began in 2004, and approximately three miles has been constructed to date. This channel begins at RM 41 and will be extended downstream as needed in response to future retreat of the reservoir. The average width for this reach is 75 feet.

Elephant Butte Temporary Channel — 2011 Maintenance

The maintenance work performed along the Temporary Channel in 2012 extended from RM 46 north to RM 54. Given the drought conditions in 2012 and a low peak runoff, the Temp Channel did not experience any breaches during the year. There were, however, significant sections along the channel where the banks had narrowed considerably from vegetation encroachment and bank sloughing. General maintenance of banks along the length of channel was done to increase the width of the banks. The bank widths were increased on the channel side, so the overall footprint of the Temporary Channel did not increase. Maintenance work consisted of the removing sediment deposits within channel and placing the removed material on the channel banks to increase width.

Reclamation will be re-consulting with the U.S. Fish and Wild Life Service (Service) on the Temporary Channel maintenance activities during 2013. The Biological Assessment is expected to be submitted to the Service in April of 2013.



Photo 1: Amphibious excavator working on west berm of the Temporary Channel (January 2012, Casuga)

Irrigation Drain Improvements

The following work was accomplished in 2012 under the Cooperative Agreement.

- Drain Assessment Update Report 2012: Recommended maintenance items were identified for Drain Unit 7, Drain Unit 7 Extension, San Francisco Riverside Drain, San Francisco Riverside Drain Wasteway, San Juan Riverside Drain North, San Juan Riverside Drain South, La Joya, Escondida, and Elmendorf Drain. Most maintenance involves mowing vegetation, removing accumulated channel sediment and aquatic vegetation, and grading service roads. The report include sections on each drain, completed maintenance work since last assessment, summary of cost estimates, and drain priorities.
- Elmendorf Drain, south branch. Maintenance work was completed in August and September 2012. Work items included mowing overgrown vegetation along the drain channel banks, removing aquatic vegetation from the wetted drain channel, removing sediment in the drain in areas where it has accumulated to form shallow or island areas, grading the service road on both sides of the drain, and diverting flow from the east branch to the south branch to wash away tumbleweed blockages.



Photo 2: Elmendorf Drain, south branch before maintenance (April 2012, Grogan)



Photo 3: Elmendorf Drain, south branch after maintenance completed (April 2012, Grogan)

- Task orders are being completed for mowing and grading of all of the drains, mowing, dredging, and service road grading on the San Francisco Riverside Drain Wasteway and San Juan Riverside Drain South. The mowing and grading maintenance work will be completed by Reclamation's Socorro Field Division throughout 2013. Work on the San Francisco Riverside Drain Wasteway is anticipated to begin in mid January or early February 2013, and be completed by March 2013. Work on the San Juan Riverside Drain South is anticipated to begin in fall 2013 and continue through December 2013.

River Maintenance

Reclamation has authorization for river channel maintenance of the Rio Grande from Velarde, New Mexico, south to the headwaters of Caballo Reservoir, as specified by the Flood Control Acts of 1948 and 1950. Project purposes include ensuring effective water delivery, transporting sediment, protecting riverside facilities and property, and preventing flooding. Reclamation prioritizes river maintenance based on public safety, property damage risk, and potential for reduction of water delivery.

River Maintenance Priority Sites

Reclamation is actively pursuing work at 17 priority sites along the Middle Rio Grande Project reach where bank erosion or reduced channel capacity could cause levee failure resulting in shallow overland flooding, reduction of water delivery, or destruction of canals and drains. Reclamation's efforts at these sites include data collection, geomorphic and sediment investigations, design studies, alternative evaluation, design and development of construction drawings, material supply and development, lands access, environmental compliance, project and construction management, and construction maintenance.

Work has involved completion of 17 sites since 2004. All of these completed sites require adaptive and recurring maintenance over the life cycles of each of the project's design life. One of the 17 completed sites was finished in 2012. Of the current 18 active priority sites, five require an annual review of channel capacity and possible maintenance due to sediment accumulation. These five are the Bosque del Apache sediment plug, the Bosque del Apache levee, the Tiffany and San Marcial levees, the Truth or Consequences reach, and the Temporary Channel. Although the Temporary Channel is discussed in the State of New Mexico Cooperative Programs section, it is also a priority site.

San Ildefonso Pond

This priority site is located at River Mile (RM) 259. In spring 2007, a river maintenance project was constructed by Reclamation's Socorro Field Division to provide protection for the San Ildefonso fishing pond. During the spring runoff of 2009, the channel eroded through a line of dense vegetation planted as part of the project. This erosion resulted in the loss of up to 75 feet of bankline upstream of the previous project area. This bank erosion exposed and threatened to flank three of the buried rock vanes (Photo 4). Reclamation worked with the Pueblo de San Ildefonso to construct a temporary solution prior to the 2010 spring runoff. The project consisted of a buried trench riprap revetment and a riprap windrow. This 2010 temporary protection work allowed for the development and permitting of a longer term solution.

The selection of a preferred alternative for the longer term solution was made in April 2012. The project was divided into two phases. Detailed designs, construction drawings, a project description, and environmental compliance for the first phase were completed in 2012, with construction beginning in January 2013. The second phase is expected to have detailed designs, construction drawings, a project description, and environmental compliance in 2013.



Photo 4: San Ildefonso bankline erosion, showing exposed rock vanes (December 2012, AuBuchon)

Santo Domingo

There are currently three priority sites (RM 225.1, RM 224.6, and RM 223.9) on the reach of the Rio Grande passing through the Pueblo of Santo Domingo. Bankline erosion on the west side of the river is cause for concern at these sites because of the close proximity to the levee and riverside drain. A Data Collection and Confidentiality Agreement was executed between the Pueblo of Santo Domingo and Reclamation in August 2007 to allow collection of design data for the three priority sites. Reclamation reached an agreement in cooperation with the Pueblo of Santo Domingo on the preferred alternative for the design at each of these three priority sites in March 2012.

The three project sites were divided into two phases, RM 225.1 will be completed in Phase 1, and RM 224.6 and RM 223.9 will be completed together at a later time as part of Phase 2. Detailed designs, construction drawings, a project description, and environmental compliance for RM 225.1 were completed in September 2012. Construction began on this site in October 2012 and is expected to be completed in January 2013. A picture of the construction at this site is shown in Photo 5. The project description for RM 224.6 and RM 223.9 was completed in the

spring of 2012 and detailed designs, construction drawings, and environmental compliance are expected in the spring/summer of 2013. Construction for these two projects is planned for fall 2013.



Photo 5: Santo Domingo Pueblo RM 225.1, placing self launching riprap (December 2012, AuBuchon)

San Felipe

There were 10 active river maintenance priority sites on the Pueblo of San Felipe, three of which projects have been completed to provide protection (currently seven are active sites).

Construction was completed at two sites, RM 213.4 and RM 213.7, in 2011. A third site, RM 212, was completed in early 2012 (see Photo 6). Current conditions at the unprotected sites could lead to damage of levees, irrigation infrastructure, roads, and a residential area of the Pueblo. Construction on RM 215.5 began in July 2012 and should be completed in March 2013. For the remaining six sites, Reclamation worked with the Pueblo of San Felipe and selected preferred alternatives in October 2012 for the designs at each of these sites. Design work at these sites is currently being pursued. Construction drawings and project descriptions are expected in the first half of 2013. Environmental compliance is anticipated at the end of 2013, with an anticipated start of construction in early 2014.



Photo 6: Coyote willow whips, rock toe, and Bio-D blocks at Priority Site RM 212.0 (May 2012, Walton)

Santa Ana Restoration

Reclamation's river maintenance work associated with a large scale project at the Pueblo of Santa Ana is complete. The work at this site extended from RM 208.4 to 207.2, with major features including river realignment and construction of a gradient restoration facility (GRF) completed in 2002 by Reclamation's Socorro Field Division. Reclamation anticipated at that time that given the dynamic nature of the river there would be some level of uncertainty associated with the river's geomorphic response to the design and the underlying design assumptions. To deal with this uncertainty, Reclamation decided that the most economical approach would be to monitor the site conditions and employ adaptive management practices to develop solutions as the need developed. Adaptive management projects at this site have been implemented four times since the original project construction (2005, 2008, 2009, and 2012).

In 2005, Reclamation lowered the elevation of backwater areas to facilitate inundation at higher discharges. In 2008 additional flanking protection was added on the west side of the installed GRF and along bioengineering bankline protection along the Jemez River. Another backwater area on the west side was also added at this time. In 2009, bendway weirs were placed in the eroding bend upstream of the GRF and the remaining sediment spoil piles were removed, allowing increased inundation of the floodplain. In 2012, construction of a longitudinal fill stone toe (LFSTP) with tiebacks was initiated to provide flanking protection on the east side of the installed GRF (see Photo 8). Construction of the LFSTP began in February 2012 and was completed in April 2012. Re-vegetation with native vegetation was accomplished at all of these sites through a P.L. 93-638 contract in place with the Pueblo of Santa Ana.



Photo 7: 2012 construction on the LFSTP with tiebacks (March 2012, Mims)

Santa Ana River Mile 205.8

This site is within the Pueblo of Santa Ana, on the east bank of the Rio Grande across from the Tamaya Resort special events tent (see Photo 8). An island and bar lowering project, undertaken by the Corps of Engineers through their Section 1135 project authority, has helped reduce the active bank erosion at this site by reducing outer bank velocities and shear stresses at high flows. Reclamation has worked with the Pueblo of Santa Ana to develop a preferred alternative to provide protection at this site. A Public Law 93-638 contract was initiated with the Pueblo of Santa Ana in 2010 to facilitate the collection of design data, pursue the geomorphic and hydraulic analyses at this site, develop suitable alternatives, and produce final designs. A preferred alternative was selected at this site in May 2012. Final designs are expected in January 2013, along with a project description. Environmental compliance and maintenance construction are anticipated in the fall of 2013.



Photo 8: Santa Ana RM 205.8 priority site (September 2012, Nemeth)

Bosque del Apache Sediment Plug

During the 2008 spring runoff, a sediment plug formed in the main channel of the Rio Grande at RM 81 located within the Bosque del Apache National Wildlife Refuge (BDANWR). Reclamation and NMISC partnered to construct a 25 foot wide pilot channel, and that work was completed in October 2008. Reclamation monitored this site closely after completion of the 2008 pilot channel. While the pilot channel area stayed open, the river channel remained partially plugged upstream of the pilot channel area for several miles.

As part of this Project's 2008 Biological Opinion, Reclamation continued to monitor the river in the vicinity of the sediment plug by gathering cross-section data and performing field observations during the spring runoff for 2008, 2009, 2010, and 2011/2012. In 2012, Reclamation completed the monitoring requirements as stipulated by the 2008 Biological Opinion. Figure 5 shows the results of the mean bed profile monitoring for data collected in 2008, 2009, 2010, 2011/2012.

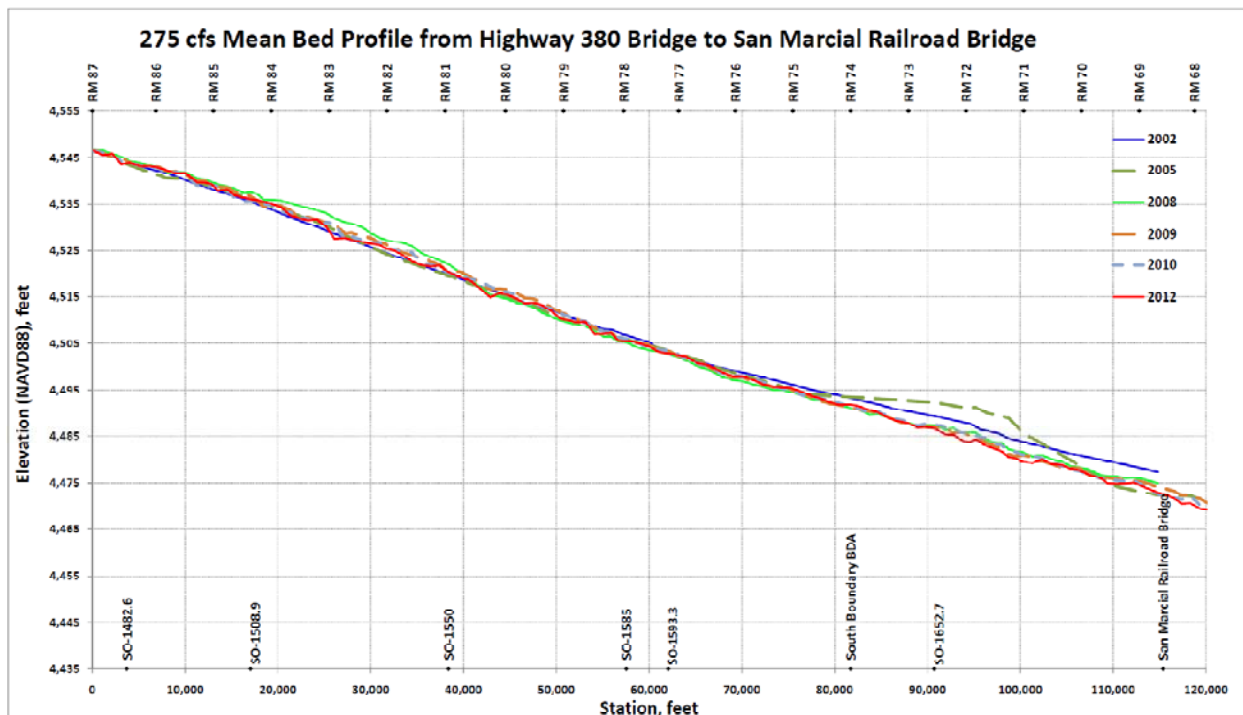


Figure 5: Mean Bed Profile from Highway 380 to San Marcial Railroad Bridge

Bosque del Apache Levee

The Bosque del Apache Levee is located on the west side of the Rio Grande from approximately RM 87 to 74, and is a spoil levee that was formed during excavation of Reclamation's Low Flow Conveyance Channel (LFCC) in the 1950's. The portion of the levee from approximately RM 85 to 80 has become an area of concern in recent years due to the amount of sediment deposition in the river and floodplain areas. Future plug formation in the river channel in the vicinity of RM 81 also causes concern for the levee stability. The 2008 sediment plug caused a rise in water surface against the levee and prompted emergency work on a portion of the levee during the runoff.

In 2009, Reclamation requested American Recovery and Reinvestment Act (ARRA) funds for improvements to the levee, and received \$2 million. The improvements included raising low areas and widening narrow areas within a three mile stretch of levee where conditions were of greatest concern. Reclamation is currently evaluating the hydraulic capacity of the levee and river system from San Antonio downstream through the Temporary Channel for 2013 spring runoff planning. Work will resume in spring 2013 to widen the base of the BDA levee.

Fort Craig Bend

This site is located on the west bank of the Rio Grande, approximately 4.5 miles downstream from the San Marcial railroad bridge. It is also about 0.25 miles upstream of the Fort Craig Pump Site, where water can be pumped from the LFCC to the river during the dry summer months. The active bankline is currently 30 feet from the toe of the San Marcial Levee, which protects the LFCC from the river. The levee road also provides the only access to 9.5 miles of the river downstream of this site, including the upper 3.5 miles of the Elephant Butte Temporary Channel.

Reclamation continues to monitor the bank erosion at this site. Due to the current drought conditions, the 2012 runoff was not sufficient to cause the temporary riprap windrow constructed in March of 2011 to launch. It is anticipated that given a normal spring runoff or large thunderstorm monsoonal event that the material protecting the levee will be launched. The riprap window is an interim measure at this location and should withstand the design event of 7700 cfs or approximately two to three seasons of normal spring runoff. Reclamation is starting a long term evaluation of potential reach-based strategies for the river and LFCC for the reach between Ft. Craig and RM 60.



Photo 9: Fort Craig Bend, looking upstream with riprap window in left corner (September 2012, Holste)

Truth or Consequences

Reclamation annually excavates sediment from the river channel to maintain the authorized 5,000 cfs capacity in the reach of the Rio Grande between Elephant Butte Dam and Caballo Reservoir. Maintenance activities are conducted after releases are shut off from Elephant Butte Dam each fall. The primary activity consists of sediment removal at arroyo mouths. Secondary activities include sediment removal in other areas throughout the reach and bank stabilization with riprap at selected sites. During periods of non-release, Reclamation installs a dike in the river to raise the stage for the benefit of hot spring bathhouse owners in Truth or Consequences. Since the last Clean Water Act (CWA) compliance expired at the end of 2012, a new regional permit was obtained to extend for CWA compliance for the next ten years (to 2022) to continue the annual maintenance responsibilities in this reach of the Rio Grande.

Due to the lack of heavy monsoonal rains in 2012, sediment excavation was very minimal.

Photo 10 shows the temporary dike installed for 2012.



Photo 10: Temporary dike installation on the Rio Grande (October 2012, AuBuchon)

Other River Maintenance Activities

Through 2012 Reclamation has coordinated and completed other river maintenance activities not related to its listed priority sites. This section outlines river maintenance activities not related to completed or ongoing priority site work.

Elephant Butte Narrows USGS Surface Water Gauging Station

In 2012 Reclamation funded the development of a new USGS gauging station located at the Elephant Butte Temporary Channel just north of rangeline EB-53 in the Reservoir Narrows. The next upstream gauging station along the Rio Grande is located at San Marcial, approximately 30 river miles upstream of the active reservoir pool. The surface water gauge is approximately 6.5 river miles upstream of the current reservoir pool stage. Reclamation is currently doing a hydrologic analysis for the water delivery benefits derived from Temporary Channel maintenance between the San Marcial and Narrows gauges.

Installation of the new gauging facility was done by the USGS. Reclamation provided support through funding, vegetation clearing, and environmental compliance. Construction was completed May of 2012.



Photo 11: New USGS Gage located within the Narrows of Elephant Butte Reservoir (Ryan 2012)

2012 Aggradation/Degradation Rangeline and Aerial Photography Data Collection

Reclamation has pursued an extensive aerial photography and cross sectional data collection effort every decade since 1962 along the Rio Grande, typically between Embudo, New Mexico, and Caballo Dam. Historically, the data collection effort consists of aerial photography of the river corridor and photogrammetrically derived ground elevations along established range lines. These historic range lines, spaced approximately 500 feet apart, begin just downstream of Cochiti Dam and extend to Elephant Butte Dam, and are known as the aggradation-degradation (agg-deg) lines. These lines are used to evaluate the long term aggradation or degradation of a reach and thus their name has been applied to this decadal study. The data collected from these studies is also used to assess geomorphic changes, develop hydraulic and sediment routing models for reach and project specific areas, develop feasible alternatives at problem sites, assess accuracy of other aerial photography datasets, and augment the Elephant Butte Reservoir surveys.

In 2012, Reclamation undertook the collection of agg/deg data along the Rio Grande between Cochiti Dam and the headwaters of the Elephant Butte Reservoir. The agg/deg data were collected using LiDAR, completed in February of 2012. The LiDAR data horizontal and vertical accuracy is currently being validated against an independent field survey. Validation and understanding of the data's geospatial accuracy relative to "true" ground position is important for its long term uses. Reclamation's Technical Service Center's (TSC) River Hydraulics and Sedimentation group is estimating the underwater portion of the river channel not acquired by LiDAR. Both thalweg field surveys and the mean hydraulic depth will be added to the cross sectional data in the spring of 2013 by the TSC.

Middle Rio Grande River Maintenance Plan

The Middle Rio Grande River Maintenance program has developed a long term River Maintenance Plan that will assist in accomplishing project purposes in an environmentally and economically sound manner that is consistent with Project authorization. The Plan's main objective is to provide a technical guide for Reclamation's future river maintenance activities, to meet the original project authorization (core mission) purposes and environmental compliance needs.

Part 1 of the Plan provides documentation of the authority and necessary maintenance actions, including legal requirements, water delivery needs, endangered species needs, current river and LFCC conditions, historical changes in these conditions, and potential river and LFCC realignment strategies downstream of the San Marcial railroad bridge. The Part 1 report was completed in May 2007. Part 2 of the report addresses future maintenance strategies, conditions, and needs. Part 2 was completed in April 2012. A final report is posted on the following internet site:

<http://www.usbr.gov/uc/albuq/envdocs/reports/mrgRivMaint/index.html>

This maintenance plan is envisioned to be an engineering and geomorphic review that can be used to readily implement the most cost effective and environmentally sound strategies that reduce Reclamation's long term commitment of resources.

Ongoing work on the "living" long term comprehensive plan and guide involves evaluating reach-based strategies for feasibility, prioritizing reaches, and evaluating effects of strategy implementation between reaches, upstream and downstream. Work is also being pursued in updating River Maintenance work prioritization and classification considering risk-based, conditional, and ecological assessments and criteria.

Preparation for 2012 Spring Runoff

As of January 2013, it appears that the spring runoff will be below normal on the Rio Grande, with some potential for erosion damage to riverside facilities. In preparation, Reclamation is assessing riprap availability for potential emergency placement and analyzing levee capacity and the need for levee work prior to the runoff. Specific attention will be given to reach near San Antonio, the Bosque del Apache Levee, and the Ft. Craig Bend. Attention is given to the Bosque del Apache Levee due to the potential for sediment plug formation and the Ft. Craig Bend will be watched because of the high risk of additional bank erosion. Additionally, periodic monitoring by aerial flights and levee patrols will occur during high flow periods, and rates of bankline erosion will be monitored at selected sites as necessary. Discharge reported by gages on the Rio Grande and its tributaries will be monitored daily. If flow predictions increase to above normal as the spring runoff period approaches, Reclamation will coordinate with other flood control agencies to facilitate efficient reporting of river maintenance needs and issues.

Middle Rio Grande Endangered Species Collaborative Program

The Middle Rio Grande Endangered Species Collaborative Program (Collaborative Program) brings diverse groups together to support Endangered Species Act (ESA) compliance and address environmental issues along the Middle Rio Grande (MRG). The Collaborative Program consists of stakeholders representing diverse interests including federal, state, and local government entities; Indian tribes and pueblos; and non-governmental organizations working to support compliance with the ESA. The Collaborative Program is transitioning to a Recovery Implementation Program (RIP) through development of a new Program document, action plan, new Long-Term Plan, and cooperative agreement to formalize the RIP as the federal action agencies' conservation measure in new biological opinions (BiOps). The purpose of the RIP is to protect and improve the status of listed species within the MRG by implementing certain recovery activities to benefit those species and their associated habitats and, simultaneously, to protect existing and future water uses while complying with applicable state and federal laws, including Rio Grande Compact delivery obligations.

In 1994, the U.S. Fish and Wildlife Service listed the silvery minnow as endangered, issued a recovery plan in 1999, and released a revised critical habitat designation in 2003. The silvery minnow recovery plan was updated in 2010. The flycatcher was added to the endangered species list in 1995 and a final recovery plan was issued in 2002. The designation for flycatcher critical habitat was revised in January 2013. The 2003 BiOp, which expires on March 1, 2013, requires delivery of supplemental (leased) water and other measures to reduce impacts to the listed species and alleviate jeopardy on the MRG Project for water, river maintenance, and flood control operations. Currently, Reclamation manages and serves as the fiscal agency for the Program as authorized by the Omnibus Appropriations Act of 2009 (P.L. 111-8). In federal fiscal year (FY) 2012, total appropriations were \$11,360,000, of which \$1,600,000 was utilized for Collaborative Program activities and \$9,760,000 was utilized for water leasing, pumping, and Program administration activities. Related FY2012 accomplishments include:

- Support of four USGS river gages;
- Captive propagation of silvery minnow at Dexter National Fish Hatchery and Technology Center, City of Albuquerque BioPark Rearing and Breeding Facility, and the New Mexico Interstate Stream Commission Los Lunas Silvery Minnow Refugium (NMISC LLSMR);
- Silvery minnow spawning and recruitment study at NMISC LLSMR;
- Survey of biological habitat on the Rio Grande/Rio Jemez by Santa Ana Pueblo;
- Silvery minnow rescue efforts during river drying and reproductive monitoring;
- Annual monitoring of silvery minnow and flycatcher populations;
- Acquisition of 23,918 acre-feet of supplemental water;
- Low Flow Conveyance Channel pumping;
- Program management, assessment, and outreach activities.

These and other beneficial activities serve to meet 2003 BO requirements and support species recovery.

Supplemental Water Program

The Supplemental Water Program is utilized to comply with elements of the Reasonable and Prudent Alternative of the 2003 BiOp. The Program consists of water acquisition and storage, concurrence with waiver requests, the continued conveyance of water from the Low Flow Conveyance Channel (LFCC) to the Rio Grande, and the implementation of water conservation practices by water contractors. The Program supports Endangered Species Act coverage under Section 7(a)(2).

Water Acquisition and Management

In 2012, a BiOp “dry” year, 56,144 ac-ft of supplemental water was released for endangered species purposes. Reclamation ended the year with 12,965 ac-ft in storage—6,532 ac-ft in El Vado, 3,802 ac-ft of leased ABCWUA water in Abiquiu, and 2,631 leased and waived in Heron. In addition, Reclamation can store up to 17,000 ac-ft of Emergency Drought Water and has potential leases approximately of 13,400 ac-ft from 2013 SJC allocations.

Low Flow Conveyance Channel (LFCC) Pumping Program – San Acacia to Fort Craig Reach

During the irrigation season, flows in the Rio Grande between San Acacia Diversion Dam and the full pool elevation of Elephant Butte Reservoir can drop to a level that may result in adverse impacts to the silvery minnow and flycatcher. Reasonable and Prudent Alternatives D, G, K, and O of the 2003 BiOp require the use of pumps to manage river recession, maintain river connectivity, and supply water for nesting flycatchers. The LFCC Pumping Program also helps Reclamation comply with the continuous river requirements stipulated by Reasonable and Prudent Alternatives E, H, and L, and has been effective in allowing Reclamation to maximize the effectiveness of supplemental water releases made for ESA purposes.

Reclamation installed and maintains portable pumps with flow measurement devices at strategic locations to move water from the LFCC into the Rio Grande. Discharge data for the pumping sites is now posted in orange boxes on the MRGCD Gage Schematic page within the Reclamation ET Toolbox web site. The URL of the referenced site is <http://www.usbr.gov/pmts/rivers/awards/Nm2/rg/riog/schematic/SCHEMATICsocorrodiv.html>.

The total available pumping capacity for all pump locations is approximately 200 cfs, although the maximum total combined rate is limited to 150 cfs by the 2003 permit granted by the New Mexico Office of the State Engineer.

Due to the low flows in the Rio Grande and the need to manage recession through Bosque del Apache, pumps located at the North Boundary and Neil Cupp sites were started on May 19, 2012. The pumps at Neil Cupp were shut off on May 29, while the pumps at North Boundary were shut off on June 16. To maintain connectivity from the south boundary of Bosque del Apache to Elephant Butte Reservoir, pumps at the South Boundary site were turned on May 23 and turned off upon conclusion of the irrigation season, November 5, 2012.

Table 9 below summarizes the volume, in acre-feet, pumped at each site for the year.

Table 9: 2012 Pumping Volume by Site

Total Per Pumping Site For The Year	Neil Cupp	North Boundary	South Boundary	Ft. Craig
	439 ac-ft	1,384 ac-ft	10,454 ac-ft	0 ac-ft

As Table 9 illustrates, pumps at Neil Cupp, North Boundary, and South Boundary were used, while pumps at the Ft. Craig site were not used during the 2012 season. The total volume of supplemental flow provided by the pumping effort in the 2012 season was 12,277 ac-ft.

Other Ongoing Water Management and Water Quality Related Projects

Upper Rio Grande Water Operations Model (URGWOM)

Funding has been provided to support collaborative URGWOM modeling efforts since FY 2006. In 2011, enhancements to the URGWOM planning model continued to be made to support the new ESA Section 7 consultation for MRG water operations, river maintenance activities, and USACE flood operations. The planning model has been further updated to reflect current water operations practices and calibrated to be consistent with observed conditions during low flow periods. Using the five synthetic 10-year hydrologic sequences representing a range of conditions from very wet to very dry, developed for use as URGWOM inputs, draft and final water management scenarios were developed and run through the planning model for all five hydrologic sequences. In 2012, the results of the model runs were utilized to evaluate water management operations impacts for the draft Middle Rio Grande Biological Assessment and for subsequent ESA Section 7 consultation with the U.S. FWS.

U.S. Geological Survey (USGS) Groundwater/Surface Water Interaction in the MRG Valley

The monitoring network presently consists of 252 groundwater piezometers on both sides of the Rio Grande, from I-25 to the Alameda bridge crossing, and 27 surface water staff gages. The majority of these components are equipped with data loggers, which monitor water level and temperature at regular intervals. FY2011 was the eighth year of funding by the Collaborative Program. No additional funding was provided to the USGS in FY2012, but a small amount of funding was set aside so that Reclamation could continue to collect data and maintain the wells and transducers. This project has been successful in the collection of continuous data sets and the posting of data on the USGS website, <http://nm.water.usgs.gov/projects/riograndesections/>.

A draft report, titled *Groundwater Hydrology and Variability of Groundwater Gradients and Fluxes from the Rio Grande at Selected Locations in Albuquerque, New Mexico, 2009-10*, was issued during 2011. A final report should have been issued during 2012, but the release has been delayed due to the ongoing review process. Data were collected from three transects between August and December by Reclamation personnel. It will be determined in 2013 whether future data will be collected by Reclamation or a contractor.

USGS MRG River Gage Operation and Maintenance

This project has been funded by the Collaborative Program since FY2002. The USGS operates and maintains a network of 24 streamflow gages in the MRG, including 12 in the mainstem and 12 in tributaries or distribution features. Four streamflow gages and one sediment data collection

gage are funded by the Collaborative Program. Data from the river gages help MRG water management agencies meet the needs of water users, fulfill the requirements of the Rio Grande Compact, maintain sufficient water in storage for future needs, maintain adequate water in the river to support the silvery minnow, and provide the information needed to improve the daily management of the river system from Cochiti Dam to Elephant Butte Reservoir. The data from these gages are available to the public at <http://waterdata.usgs.gov/nm/nwis/current/?type=flow>.

RiverEyes

Reasonable and Prudent Alternative Element C of the 2003 BiOp states that monitoring must be performed when flows are less than 300 cfs at San Acacia. RiverEyes is a program that provides current information on river flows and river drying and allows action agencies to react quickly to changing conditions on the river. RiverEyes also facilitates coordination among agencies to prevent unexpected drying and prepare for silvery minnow salvage and rescue actions.

For the 2012 irrigation season, RiverEyes monitored river conditions along the Rio Grande from Isleta Diversion Dam to the full pool elevation of Elephant Butte Reservoir from May 7, 2012, through October 31, 2012. The total maximum river miles dried during the 2012 RiverEyes monitoring period was 54 miles which included 22 miles in the Isleta Reach (in two segments) and 32 miles in the San Acacia Reach. The first occurrence of channel drying was recorded on June 16, 2012; the last occurrence of channel drying was observed on November 3, 2012. River drying was restricted to three river segments: from 1.5 miles above the Bosque Farms gage to 1.5 miles below the Peralta Wasteway in the upper Isleta Reach, from two miles below the Highway 346 Bridge to one mile above the Highway 60 Bridge in the lower Isleta Reach, and from one mile above the Escondida Bridge to the South Boundary pumping station in the San Acacia Reach. There were four main periods of drying, punctuated by re-wetting events that were caused by flooding during the summer monsoons.

Endangered Species

Programmatic Water Operations and River Maintenance ESA, Section 7, Compliance

On March 17, 2003, the Service issued the 2003 BiOp on the effects of actions associated with the Programmatic Biological Assessment (BA) of Bureau of Reclamation's Water and River Maintenance Operations, Army Corps of Engineers' Flood Control Operation, and Related Non-Federal Actions on the Middle Rio Grande, New Mexico for March 10, 2003, through February 28, 2013. The 2003 BiOp contained a Reasonable and Prudent Alternative (RPA) designed to alleviate jeopardy to the silvery minnow, adverse modification to silvery minnow critical habitat, and jeopardy to the flycatcher based on the biological needs of the species. The RPA elements address some of the long-term recovery needs of the silvery minnow by incorporating four essential factors during the 10-year scope of the project: 1) water operations; 2) habitat improvement; 3) population management; and 4) water quality. The water operations elements establish flow requirements under different hydrologic scenarios that are needed to alleviate jeopardy to both species.

The Service made a determination that dry year flow requirements would be in effect for the

2012 irrigation season. Reclamation remained in compliance with the 2003 BiOp throughout 2012. In compliance with the 2003 BiOp, the Rio Grande was allowed to dry in isolated locations within the Isleta Reach, and within the San Acacia Reach downstream to the south boundary of Bosque del Apache National Wildlife Refuge (BDANWR). Water pumped from the LFCC helped slow river drying in the river channel starting on May 19. The southernmost pumps at the south boundary of the BDANWR generally remained on all season. Native flow reconnected the river at the end of the irrigation season, and all LFCC pumping for the year ceased on November 5, 2012.

The Service provide provisional data on its silvery minnow rescue and salvage activities, and a final 2012 Salvage Report will be produced later with greater detail and provided to the Middle Rio Grande Endangered Species Collaborative Program. As of November 2, 2012, Service – New Mexico Fish and Wildlife Conservation Office (with assistance from USACE, City Of Albuquerque, and volunteers) conducted rescue and salvage activities on 51.0 unique miles of the Rio Grande. Of this, 31.8 miles were salvaged in the San Acacia Reach on 40 days between the south boundary of BDANWR (RM 74.0) and near Escondida (RM 105.8) between June 16 and October 22, 2012. Rescue and salvage within 19.2 unique miles of the Rio Grande in the Isleta Reach occurred on 30 days between July 4 and October 22, 2012.

A total of 4,167 (2,509 San Acacia, 1,658 Isleta) Rio Grande silvery minnow > 30 mm standard length (SL) were salvaged, transported, and released alive to a continuously flowing site in the San Acacia Reach (either below San Acacia Diversion Dam or the San Marcial railroad crossing), or in the Isleta Reach (either below the Isleta diversion dam, at the Highway 346 bridge, or at the Highway 60 bridge). There were 303 (275 San Acacia, 28 Isleta) silvery minnow > 30 mm SL identified as incidental take. In addition, a total of 463 (286 San Acacia, 177 Isleta) either died during transport, were too small or sick to salvage, or were found dead during secondary drying events. These mortalities do not count towards incidental take of silvery minnow > 30 mm SL. Of the 5,014 silvery minnow observed so far in 2012, 1,841 (36.7%) have been marked (VIE), with 1,786 (56.7%) in the San Acacia reach, and 55 (2.9%) in the Isleta reach, indicating that they are hatchery-released individuals from last fall (2011). All but 84 fish observed to date have been estimated to be adult silvery minnow.

The current BiOp expires on March 1, 2013. Reclamation submitted a BA for Middle Rio Grande water operations and river maintenance to the Service on July 31, 2012, supplemented on August 15, 2012, and again on September 17, 2012, addressing Reclamation, Middle Rio Grande Conservancy District (MRGCD), and State of New Mexico (State) water management-related actions taken in the Middle Rio Grande, and State actions in the Upper Rio Grande. A final amended BA was submitted on January 15, 2013.

Rio Grande Silvery Minnow

The silvery minnow was formerly one of the most widespread and abundant species in the Rio Grande basin of New Mexico, Texas, and Mexico, but is now listed as endangered (Fish and Wildlife Service, 1994). Currently, the silvery minnow occupies less than 10 percent of its historic range, and is restricted to the reach of the Rio Grande in central New Mexico from Cochiti Dam to the headwaters of Elephant Butte Reservoir.

Studies to indicate trends of silvery minnow abundance have generally used October catch per unit effort (CPUE) from the population monitoring project that have used similar survey methods since 1993. Catch rates were highest in 2005, and were similar in 2004, 2006, 2010, and 2011. In 2012, no silvery minnow were found in the October monitoring (figure 6).

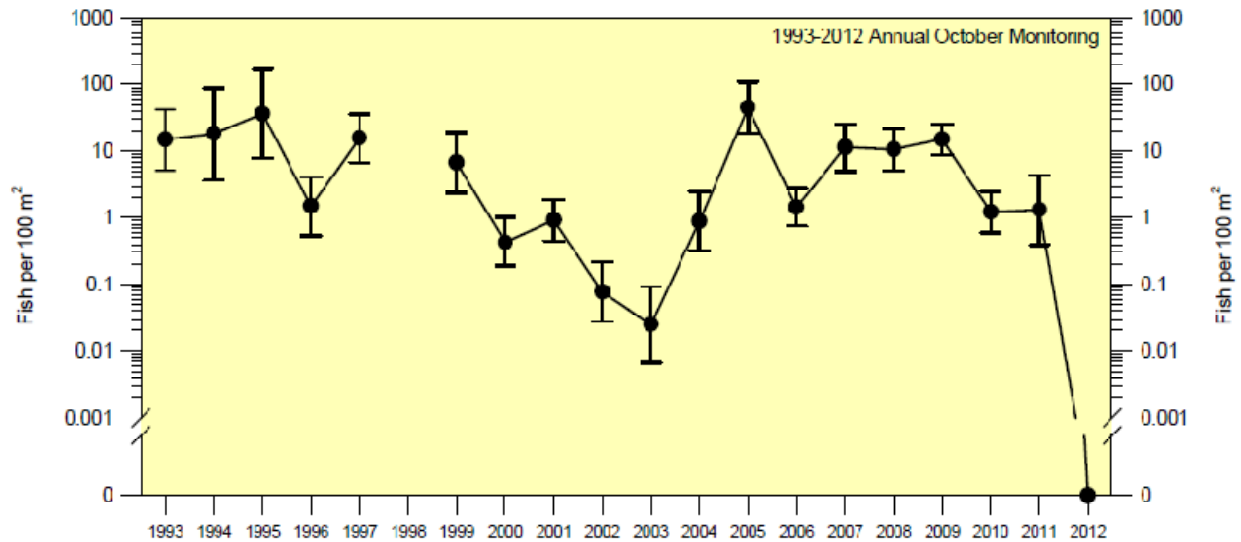


Figure 6: October silvery minnow catch rates (1993-2012) from American Southwest Ichthyological Researchers

Rio Grande silvery minnow was not present in any of the 260 seine hauls that yielded fish during October 2012, as compared with four of the 289 seine hauls that yielded fish during September 2012 (figure 7).

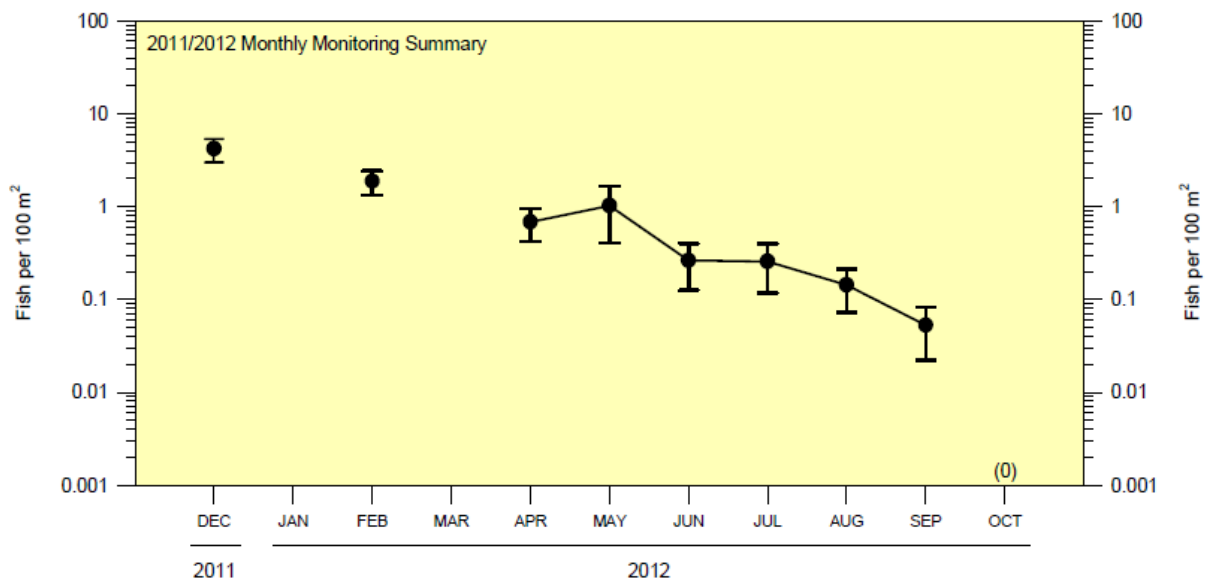


Figure 7: Silvery minnow monthly summary through October 2012 from American Southwest Ichthyological Researchers

During December 2012, fifteen fish species were collected and silvery minnow was most common in the San Acacia Reach. Rio Grande silvery minnow were present in 79 of the 275 seine hauls that yielded fish during December 2012, as compared with 0 of the 260 seine hauls that yielded fish during October 2012 (Dudley and Platania, 2012).

There was a notable density increase of silvery minnow during December 2012, mainly due to the release of nearly 300,000 hatchery-reared minnow to the river. While the majority of Rio Grande silvery minnow were from this stocking, there were some individuals (mostly age 1 and age 2) that appeared to be wild, or were not marked (Dudley and Platania, 2012).

Impacts of the severe drought in New Mexico are reflected in the 2012 Rio Grande silvery minnow population monitoring results. It should be noted that population monitoring results are an indicator of relative and not absolute abundance. The lack of silvery minnow in the October 2012 density data does not mean there are no silvery minnow in the river but, instead, indicates that the species is near its lowest numbers since monitoring began in 1993. If necessary, further sampling will take place this spring to gain a better understanding of the distribution of silvery minnow at locations outside of those used for the standardized population monitoring.

Reclamation conducted two periods of Rio Grande fish monitoring during 2012 associated with Reclamation projects. The winter electrofishing survey was carried out from February 22 through February 29, 2012. Surveys were conducted at five sites between Bernalillo and Bosque del Apache. Species frequently caught included common carp, channel catfish, flathead chub, river carpsucker, longnose dace, white sucker, and silvery minnow. Silvery minnow were found at all survey sites.

For the third year, fall surveys (October 2012) were conducted within the temporary channel in the Elephant Butte reservoir pool. No silvery minnow were found this year.

Captive silvery minnow populations include Albuquerque BioPark, Dexter National Fish Hatchery, and the Interstate Stream Commission's Los Lunas Silvery Minnow Refugium. In 2012 a total of 144,000 (Yellow Left Dorsal) VIE Marked silvery minnow were released in the San Acacia Reach. A total of 130,552 (Pink Left Dorsal) were released in the Isleta Reach.

The Service also annually stocked captively propagated silvery minnow from these facilities into Big Bend National Park, Texas, from 2008 to 2012. In 2012, a total of 120,000 silvery minnow were stocked at four locations. Monitoring for survival is conducted quarterly.

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Dudley, R.K. and S.P. Platania. 2012. Summary of the Rio Grande Silvery Minnow Population Monitoring Program Results from December 2012. Report to the Middle Rio Grande Endangered Species Act Collaborative Program and the U.S. Bureau of Reclamation, Albuquerque, N.M. 29 pp.

Dudley, R.K. and S.P. Platania. 2012. Summary of the Rio Grande Silvery Minnow Population Monitoring Program Results from October 2012. Report to the Middle Rio Grande

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Southwestern Willow Flycatcher

The flycatcher was listed as endangered by the Service effective March 29, 1995. Critical habitat was designated, effective August 21, 1997, in some areas of New Mexico and other states throughout the species' range. The Rio Grande was not designated as critical habitat for the flycatcher at that time. The 1997 critical habitat proposal was later retracted. On October 13, 2004, under court order, the Service reissued a proposed designation for critical habitat for the flycatcher that now includes portions of the Rio Grande in New Mexico. The final rule designating critical habitat was issued October 19, 2005, and includes four sections of riparian forest in the Middle Rio Grande Valley: from the Taos Junction bridge to the north boundary of Ohkay Owingeh Pueblo, from the south boundary of the Pueblo of Isleta to the north boundary of Sevilleta National Wildlife Refuge (NWR), from the south boundary of Sevilleta NWR to the north boundary of Bosque del Apache NWR, and from the south boundary of Bosque del Apache NWR to the powerline crossing of the Rio Grande near Milligan Gulch.

The Service revised the designation of critical habitat in January 2013. The southern boundary of critical habitat along the Rio Grande in New Mexico was extended to about RM 54, or about eight miles into the upper end of the Elephant Butte Reservoir pool. No critical habitat was designated south of this point, including proposed areas south of Elephant Butte and Caballo Reservoirs. Critical habitat was also designated within the Bosque del Apache and Sevilleta National Wildlife Refuges. Reclamation provided its management plan for the flycatcher to the Service during the comment period for the critical habitat designation. Reclamation also committed to consult with the Service within the next two years under ESA, section 7, on the ongoing operations of the reservoir and the management plan to address and allow for future filling of the reservoir and inundation of habitat. The results of this consultation and ongoing management efforts could affect what is considered critical habitat in this area in the future.

During the summer 2012, Reclamation conducted surveys and nest monitoring of the flycatcher in ten distinct reaches along approximately 400 kilometers (250 miles) of the Rio Grande in New Mexico, mainly between the southern boundary of the Isleta Pueblo and Elephant Butte Reservoir. Other areas surveyed include a six mile stretch just north of Cochiti Reservoir as well as select locations from Caballo Reservoir to El Paso, TX. Surveys were performed to contribute to current baseline population data of the flycatcher along the Rio Grande, and also to meet Reclamation's ESA compliance commitments. In 2011, there were 686 resident flycatchers documented in 402 territories and forming 284 breeding pairs. In 2012, the survey area increased, however the number of total territories decreased, resulting in 629 documented resident flycatchers occupying 375 territories and forming 254 breeding pairs. As in previous years, in 2012 the San Marcial reach of the river was by far the most productive, containing 252 territories (of which 181 were pairs), as compared to 318 territories (of which 237 were pairs) in 2011.

In 2012, nest monitoring was conducted at all sites where nesting pairs were detected in the areas from the southern boundary of Isleta Pueblo to Elephant Butte Reservoir. Nests were monitored for success rates, productivity, and Brown-headed cowbird (*Molothrus ater*) parasitism. The San

Marcial reach proved most productive, producing 223 nests. Other studies continued in 2012 include: (1) vegetation and avian monitoring, (2) Elephant Butte Reservoir photo station documentation and summary report, and (3) a flycatcher nesting vegetation and hydrology study. These studies are designed to provide further insight into potential threats to and habitat requirements of flycatcher populations. In addition, a study to determine the flycatcher habitat suitability from the southern boundary of Isleta Pueblo to Elephant Butte via a vegetation mapping project was updated from previous years (the last similar project was completed in 2008). The shapefiles and report are anticipated to be received prior to April 2013.

Table 10: Southwestern Willow Flycatcher Territories – Middle Rio Grande Project, 2000 - 2012 Breeding Seasons (N/S = Not Surveyed)

	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Velarde	N/S	N/S	N/S	0	0	0	1	0	1	0	0	1	2
Frijoles	0	2	N/S	1	1	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
Belen	14	9	6	3	4	10	1	4	0	N/S	1	N/S	N/S
Sevilleta	6	9	13	18	31	14	21	17	19	17	13	11	8
San Acacia	0	0	0	1	2	0	0	0	0	0	0	0	0
Escondida	23	8	4	0	1	0	1	0	0	0	4	0	0
BDANWR	51	49	34	20	5	7	4	0	1	3	3	0	0
Tiffany	1	4	5	5	8	4	9	3	6	4	3	0	0
San Marcial	252	318	298	319	235	197	142	107	113	86	63	25	23
Caballo Reservoir	1	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
Lower Rio Grande	27	3	N/S	5	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
Total	375	402	360	372	287	232	179	131	150	113	87	37	33

Elephant Butte Reservoir

In 2012, the flycatcher population grew the most in the Belen and Escondida reaches, remained steady in the Bosque del Apache NWR, and declined to the south. At Elephant Butte Reservoir, flycatchers have expanded their occupied habitat farther south past the Narrows. Areas in the delta portion of Elephant Butte Reservoir (i.e., River Miles 60 to 54) used to consist of mainly dense Goodding's and coyote willow of various age classes, with water provided by the LFCC

outfall. However, due to the drought, this area rarely receives overbank flooding from the LFCC and invasive saltcedar is encroaching and becoming dominant. Although this provides refuge habitat for flycatchers, the likely arrival of the saltcedar leaf beetle in the next few years is particularly concerning as they may defoliate saltcedar during flycatcher nesting times, providing less foliage cover and making nests more vulnerable to predation, parasitism, and the natural elements.

Habitat modeling from 2008 throughout the Middle Rio Grande has shown that there is suitable habitat that is not occupied, thus indicating that habitat is not a limiting factor to this population. The reason that flycatchers do not expand into all areas of suitable habitat is more likely due to site fidelity. However, with the updated habitat modeling from 2012, future analysis in 2013 will take place to quantify whether or not suitable habitat is a limiting factor.

Predation rates (50%) during summer 2012 were higher than average and nest success (32%) was the lowest it has been since the initiation of this study in 1999 (figure 8). This decline in nest success over the past few years could indicate that vegetation in the northern end of the reservoir pool where the majority of the territories are is declining in habitat suitability, and may eventually cause the population to shift to other areas of suitable habitat. This shifting in territories may be what is currently occurring, particularly with the large population increase in the Belen and Escondida reaches, and historically the population increase in the Bosque del Apache NWR.

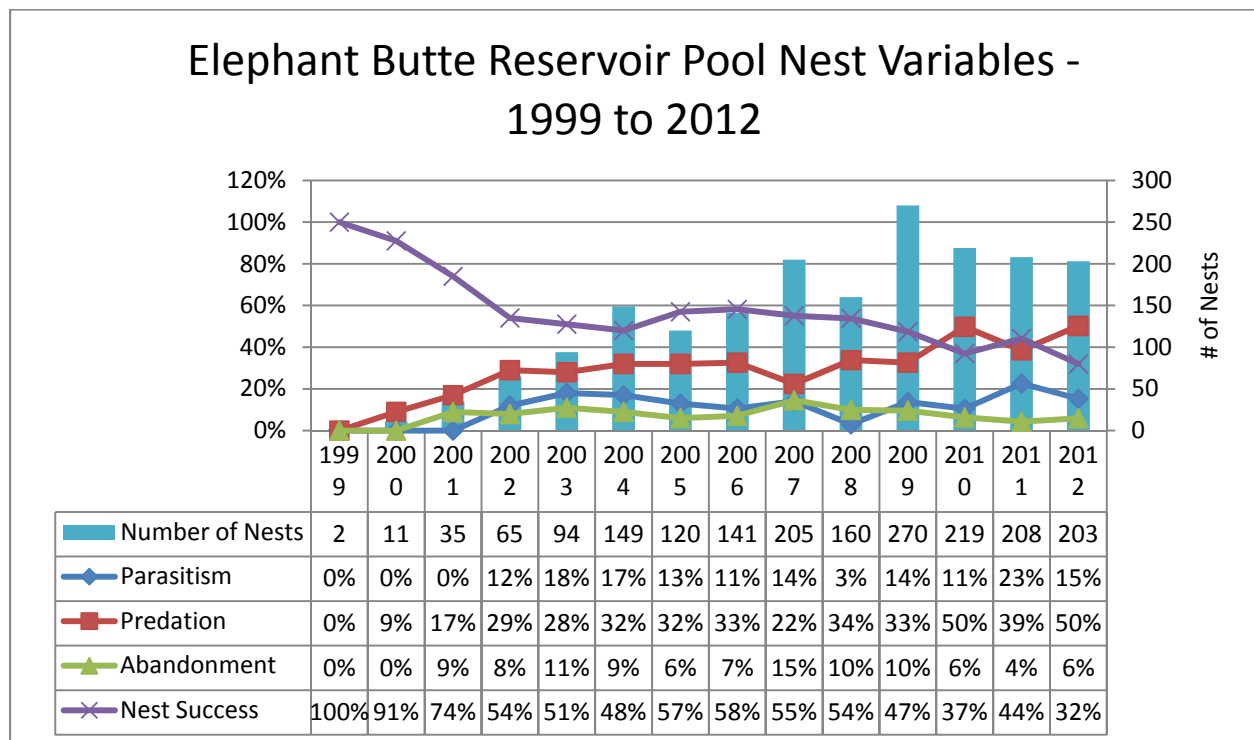


Figure 8: Summary of Flycatcher Nesting in Elephant Butte Reservoir Pool, 1999 - 2012

As previously mentioned, the LFCC historically provided water to much of the high quality flycatcher habitat on the western side of the delta within Elephant Butte Reservoir. The initial

drying of some of this habitat was partially beneficial, stimulating new growth in areas that were becoming overmature or stressed due to the prolonged flooding. However, in some areas of the delta, particularly closer to the main channel and farther south, the drought combined with the freezing event in February 2011, as well as grazing activity, caused tremendous stress to currently existing and historically occupied vegetation. Root systems that are close to the surface due to the prolonged flooding are likely unable to penetrate deep enough to reach the current ground water levels.

Flycatcher habitat has historically been a dynamic system that is created and destroyed in relatively short periods of time. Flycatchers depend on this type of dynamic successional system for breeding habitat.

Flycatcher ESA Compliance Issues at Elephant Butte Reservoir

Due to the ongoing drought, Elephant Butte Reservoir has receded and remained low. Reclamation has allowed temporary habitat to develop as the reservoir recedes as part of its ESA Section 7(a)1 authority to help in the conservation of threatened and endangered species. Under ESA Section 9, Reclamation would still need to address incidental take of flycatchers if the reservoir were to fill up and impact flycatchers or their habitat. Reclamation developed a voluntary ESA Section 7(a)1 “Flycatcher Management Plan” to develop flycatcher habitat as part of the Rio Grande Project, and submitted the document to the Federal Register along with flycatcher proposed critical habitat comments in an effort to have Elephant Butte Reservoir excluded from critical habitat designation.

New Middle Rio Grande Water Management and River Maintenance ESA, Section 7 Consultation

Reclamation has been successful in meeting the requirements of the 2003 BiOp, in part, through supplemental water acquisition and management with willing lessors, including San Juan-Chama Project (SJCP) contractors. In the future, both imported and native water supplies will be limited, making the 2003 BiOp hydrologically unsustainable. In addition, the term of the 2003 BiOp expires at the start of the 2013 irrigation season, and new ESA Section 7 consultation is needed to provide future federal and non-federal coverage. Consultation goals include achieving and maintaining comprehensive ESA compliance through a hydrologically viable BiOp that maintains and improves the status of listed species.

For these reasons, Reclamation submitted a biological assessment (BA) for Middle Rio Grande water operations and river maintenance to the Service on July 31, 2012, supplemented on August 15, 2012, and again on September 17, 2012, addressing Reclamation, Middle Rio Grande Conservancy District (MRGCD), and State of New Mexico (State) water management-related actions taken in the Middle Rio Grande, and State actions in the Upper Rio Grande. The BA includes conservation measures proposed by Reclamation, MRGCD, the State, the Albuquerque-Bernalillo County Water Utility Authority (ABCWUA), and taken by participants of the Middle Rio Grande Endangered Species Collaborative Program (Collaborative Program). A final amended BA was submitted on January 15, 2013. Reclamation conducted government-to-government consultation with the pueblos and tribes during 2012. The 2003 BiOp states that if formal consultation is reinitiated before February 28, 2013, the current BiOp carries all of its

coverage into the future until consultation is complete. It is expected the Service will initiate formal consultation by the end of February 2013.

Reclamation intended that the BA would include the Middle Rio Grande Recovery Implementation Program (RIP) and the Middle Rio Grande Water Management Plan; however, inclusion was dependent on actions which have not yet occurred. Thus, Reclamation will include the current Collaborative Program in the BA as a conservation measure and as the federal nexus until transition to a RIP is complete. Development of the Water Management Plan will continue and will be a key component of the RIP. Reclamation, MRGCD, the State, and ABCWUA will continue working with the Service and other members of the Executive Committee of the Collaborative Program to develop a RIP that can be included during formal consultation as the foundation for a new BiOp.

Rio Grande Project (New Mexico - Texas)

Reclamation's El Paso and Elephant Butte Field Divisions are jointly responsible for the operations of the Rio Grande Project (figure 9). Elephant Butte Field Division operates and maintains Elephant Butte and Caballo Dams. El Paso Field Division is responsible for scheduling releases from Elephant Butte and Caballo Reservoirs to meet irrigation demand and the delivery of Rio Grande Project water to the canal headings of Elephant Butte Irrigation District (EBID), El Paso County Water Improvement District No. 1 (EPCWID), and Mexico (under the 1906 International Treaty). EBID operates and maintains Reclamation's diversion dams on the Rio Grande, including Percha Diversion Dam, Leasburg Diversion Dam, and Mesilla Diversion Dam in New Mexico. EBID operates and maintains the three diversion dams under a contract with Reclamation. In September 2003, Reclamation completed work to remove Riverside Diversion Dam and the adjacent Coffey Dam, both in Texas. Riverside Diversion Dam had been inoperable since 1987, when flooding on the Rio Grande caused the structure to fail.

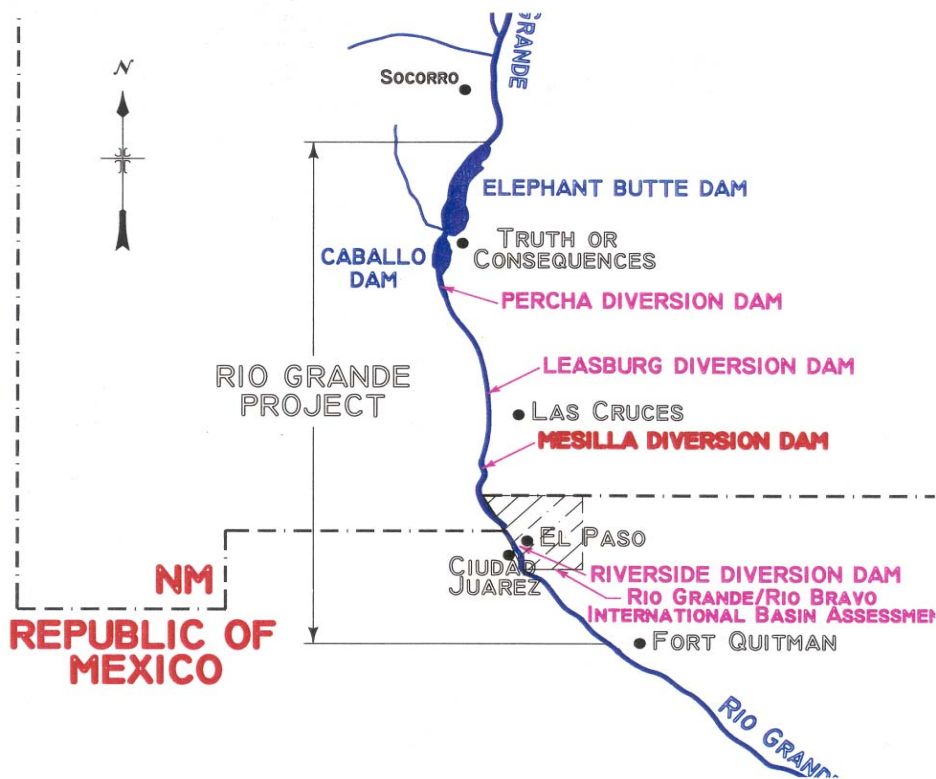


Figure 9: Area Map of the Rio Grande Project

Water Supply Conditions

Inflow into Elephant Butte Reservoir during 2012 as measured at the Rio Grande Floodway (FW) plus the Low Flow Conveyance Channel (LFCC) at San Marcial (FW+LFCC) was 283,598 ac-ft, or an estimated 24,000 ac-ft less than 2011. The provisional flow record for the 2012 Spring Runoff (March - July), measured at San Marcial, was 123,479 ac-ft, or 22% of the 30-year average. During the period from 1998 to 2012, the spring runoff at the San Marcial gauging stations have been consistently below average. From 1998 to 2012, average inflow was 294,000 ac-ft and only two years, 2005 and 2008, exceeded the 30 year average of 573,000 ac-ft. The 2013 updated 30 year average for the inflow at SM gauging stations is now 510,000 ac-ft. As of January 7, 2013, the 2012 daily streamflow record for the FW and LFCC remain provisional. These stations are maintained and operated by the United States Geological Survey (USGS).

Releases from Elephant Butte Reservoir began on March 26, 2012, and continued through September 4, 2012. During this period a total release of 361,919 ac-ft was recorded by the USGS. The total calendar year release, including non-irrigation releases, amounted to 365,464 ac-ft. Daily flow data beginning January 1, 2012, through October 3, 2012, has been approved by USGS, but October 4 to December 31, 2012, remain provisional.

During the 2012 irrigation season (April 1 to September 13), 372,032 ac-ft of water was released from Caballo Reservoir. This flow met the irrigation requirements to the Project water users. The total 2012 release from Caballo Reservoir was 371,522 ac-ft.

The most probable January through June Natural Resources Conservation Service and National Weather Service (NRCS and NWS) coordinated forecasts received for the 2012 March through July runoff season are presented in Table 11.

Table 11: Summary of 2012 Rio Grande Coordinated Spring Runoff Forecasts

Month	Forecasted Otowi Runoff (ac-ft)	Percent of 30-Year Average	Forecasted San Marcial Runoff (ac-ft)	Percent of 30-Year Average
Jan 1	665,000	88	490,000	86
Feb 1	600,000	79	400,000	70
Mar 1	590,000	78	400,000	70
Apr 1	335,000	44	172,000	30
May 1	315,000	42	141,000	25
June 1	305,000	40	121,000	21
Actual Runoff	375,524	50	123,479	22

Combined total storage for Elephant Butte and Caballo Reservoirs was 168,599 ac-ft on December 31, 2012. This combined storage was 7.6% of their total capacity. In 2012, the available storage for both reservoirs during the winter months (October 1 to March 31) is equal to the capacity of Elephant Butte Reservoir, 2,024,586 ac-ft, minus 25,000 ac-ft that Reclamation reserves for winter operational flood control space (50,000 ac-ft during the summer), plus the capacity of Caballo Reservoir, 324,934 ac-ft, minus 100,000 ac-ft for flood control space, or a

total of 2,224,520 ac-ft during the winter and 2,199,520 ac-ft during the summer.

Per the Rio Grande Compact Article I definition, the usable water in Project storage (Elephant Butte and Caballo Reservoirs together) was below 400,000 ac-ft throughout 2012. In March 2012, Compact Credit and San Juan – Chama (SJ-C) water totaled 126,400 ac-ft or 32.89% of project storage.

Based on preliminary figures, Reclamation declared a final allocation of 40% of a full supply to the Rio Grande Project water users for the irrigation season. The initial allocation to the Rio Grande Project water users, issued in December 2011 (declared in February 2012), began at 20.46% of a full supply. The January 2012 forecast seemed promising because of the projected spring runoff, but fell short of an average year.

The initial allocation for 2013 is scheduled to be issued in late January 2013. On January 1, 2013, combined storage was 169,657 ac-ft, therefore a less than full allocation is anticipated. Based on the January 1, 2013, NRCS/NWS spring runoff forecast at the San Marcial gauging stations and present hydrologic conditions, Reclamation anticipates a less than full supply for irrigation during 2013 for the Rio Grande Project.

The most probable coordinated January and February 2013 forecasts from the NRCS and NWS are presented in Table 12.

Table 12: 2013 Rio Grande Coordinated Spring Runoff Forecasts

Month	Otowi Runoff (ac-ft) (Mar-Jul)	Percent of 30-Year Average	San Marcial Runoff (ac-ft) (Mar-Jul)	Percent of 30-Year Average
Jan 1	340,000	47	191,000	38
Feb 1	380,000	53	197,000	39

Project Irrigation and Drainage Systems

Following title transfer, which was completed in 1996, the irrigation and drainage system is owned, operated, and maintained by Elephant Butte Irrigation District in the New Mexico portion of the Rio Grande Project and by El Paso County Water Improvement District No. 1 in the Texas portion of the Project. Reclamation owns and administers the lands and rights-of-way activities of the reservoirs and diversion dam areas, and also retains title and operation and maintenance responsibilities for Elephant Butte and Caballo Dams and Reservoirs.

The Districts performed flow measurements at canal headings, river stations, and lateral headings during 2012. Reclamation also performed flow measurements at canal headings and river stations, and coordinated and maintained central control of releases, river operations, and water accounting. To accomplish the water allotment accounting, the Districts collect field flow measurements and coordinate data from all water user entities. Utilizing the summarized flow data submitted by the Districts for their areas of responsibility, Reclamation calculated and

summarized the monthly and end-of-year Project water supply use and accounting for 2012. The International Boundary and Water Commission (IBWC) continued to own, operate, and maintain the American Diversion Dam and the American Canal during 2012 in accordance with the International Treaties with Mexico (1906 and 1933). In addition, the IBWC operated the International Diversion Dam, which diverts irrigation waters into the Acequia Madre headgates operated by Mexico.

Drainage waters from the Rio Grande Project lands provide supplemental irrigation water for approximately 18,342 acres of the Hudspeth County Conservation and Reclamation District No. 1 (HCCRD). Total flows out of the Project to HCCRD are measured at three gauging stations near the Hudspeth County line: the Hudspeth Feeder Canal, the Tornillo Canal at Alamo Alto, and the Tornillo Drain. Under the Warren Act contracts, HCCRD is charged for drainage water from the Project between March 1 and September 30. As of February 6, 2013, no data had been reported to Reclamation.

Water flow is measured by the International Boundary and Water Commission (IBWC) at the station located on the Rio Grande at Fort Quitman, downstream of the Project and HCCRD boundaries. The total water flowing past the gage in 2012 was 7,739 ac-ft. All flow occurred between January 1 and May 13, 2012.

Elephant Butte Reservoir and Powerplant

Elephant Butte Reservoir reached a daily minimum storage of 109,445 ac-ft (elevation 4,297.21 feet) on September 4, 2012. A daily maximum storage of 390,017 ac-ft (elevation 4,331.63 feet) was reached on March 25, 2012.

The total gross generation for 2012 was 29,397,533 kilowatt-hours (kWh). Net power generation for 2012 was 28,756,675 kilowatt-hours, which was 39 percent of the 69-year average (1940 through 2008) of 73,397,441 kilowatt-hours. The power plant releases were utilized to meet downstream irrigation demand and manage Caballo Reservoir storage levels. The balance valves were not needed to meet releases during 2012 but were operated per the annual maintenance, which requires the valves to be operated discharging an estimated 200 cubic feet. The balance valves will be available for any required release beyond the Elephant Butte Powerplant capabilities for 2013. Reclamation anticipates that all three turbines will be available for generation and discharge by the spring of 2013. Currently the excitation system commissioning is scheduled to begin in February 2013. Then the switch gear will be replaced, and should be completed within a few weeks. All work should be finished before the start of the 2013 irrigation season.

The 2012 summer monsoon season was relatively mild, and did not produce any flood events or sediment discharges into the Rio Grande downstream of Elephant Butte Dam. However, a strong storm event in May produced hail and required Reclamation to close the gates at Caballo Reservoir. The gates remained closed for approximately eight days.

Elephant Butte Dam Facility Review and Safety of Dams Program

There are no significant dam safety related operations and maintenance issues associated with Elephant Butte Dam other than aging infrastructure. Elephant Butte Field Office is located at the dam site, so operation and maintenance issues are resolved as soon as they occur. There are currently four incomplete O&M Recommendations for Elephant Butte Dam.

Five O&M recommendations were completed during 2012:

- EB-2009-2-B, completed January 2012: There is some deteriorated concrete on the dike crest of the curb wall with exposed rebar that should be repaired.
- EB-2009-2-C, completed in 2012: Clean out sediment so that seepage measurement #5 can be read and doesn't get buried.
- EB-2011-2-A, completed May 2012: Perform core sampling with concrete testing on the hollow-sounding areas discovered on the spillway floor.
- EB-2011-2-D, completed October 2011: Adjust limit switch on spillway cylinder gate motor operator, gate No. 2, to allow full opening of the gate.
- EB-2011-3-C, completed 2012: Cover the shutter gate seals either with hard covers or with white latex house paint.

The spillway at Elephant Butte dam was inspected in accordance with CFR recommendation 2005-2-A in December 2008 and the concrete showed signs of delaminating. With the 2011 CFR, recommendation 2011-2-A was created which called for core sampling and concrete testing of the areas on the spillway floor that sounded hollow. Samples were taken from nine of 18 locations identified as areas of concern. There was no indication of delaminating from the foundation, which was a major concern. Results from a visual inspection of the core samples by Reclamation's Technical Service Center determined that no further action was required, considering the age and the frequency of use of the spillway.

The sluice gates were operated in November of 2011 when the reservoir elevation dropped to 4214 feet, allowing safe operation of the gates without cavitation. The gates were run through a full operational cycle, proving that the sluice gates can be successfully operated under normal conditions. During operation of the gates, it was found that the non-removable portion of the catwalk access to the sluice gates was being damaged so the test was limited to 10 minutes. This portion of the catwalk has now been rebuilt so as to be removable as well. Another functional test is planned for the spring of 2013 so that the sluice gates can be tested over a longer period of release.

An inspection of the upstream face of the dam was completed in March 2012. The Elephant Butte Rope Access Team was utilized to complete this task. The inspections determined that the upstream and downstream faces are in good overall condition. The top veneer on the upstream side of the dam was seen to be falling off in places. Rust stains and exposed rebar were observed in three locations on the upstream face. There is some spalling on the downstream face, but no major cracks or leaks were observed. The trashrack top cover was put back in place during the upstream face inspection, correcting a condition that had existed for several years.

A Comprehensive Security Review was completed in March 2012. The Annual Site Inspection

was completed in December 2012. No significant issues were identified during these inspections.

Caballo Dam and Reservoir

Caballo Reservoir reached a minimum storage of 4,186 ac-ft (4,126.86 feet) on September 14, 2012. A maximum storage of 40,589 ac-ft (4,143.87 feet) was reached on July 17, 2012.

According to Court Order No. CIV-90-95 HB/WWD of October 17, 1996, which resulted from a negotiated settlement with the Irrigation Districts, the Caballo Reservoir storage level is targeted not to exceed 50,000 ac-ft (4,146.44 feet) from October 1 to January 31 of each year, unless flood control operations, storage of water for conservation purposes, re-regulation of releases from Elephant Butte Dam, safety of dams purposes, emergency operations, or any other purpose authorized by Federal law, except non-emergency power generation, dictate otherwise. Significant variation above 50,000 ac-ft during the winter months of October through January requires collaboration and consultation between the Districts and Reclamation.

Reclamation's plan for operation of Caballo Reservoir during April 1 through September 30, 2012, was to maintain storage levels such that they would not exceed 25,000 ac-ft in February, not exceed 45,000 ac-ft in June, and not be less than 5,000 ac-ft by the end of September. Operating Caballo Reservoir at these storage levels during the 2012 irrigation season allowed Reclamation to:

- Reduce evaporative losses between Elephant Butte and Caballo Reservoirs,
- Provide sufficient operational hydraulic head at Caballo Reservoir for irrigation demand releases,
- Have Caballo serve as a reserve pool should releases from Elephant Butte Dam be interrupted, and minimize changes to release rates from Elephant Butte Dam,
- Allow for data collection and maintenance of OPEC and 3D-sec (ET) systems at Caballo through cooperative research with New Mexico State University.

Caballo Reservoir's operating plan for the 2013 water year has not yet been finalized. Due to drought, all possible release scenarios are being considered including block releases. Storage in Caballo Reservoir at the end of the 2012 irrigation season did not exceed 50,000 ac-ft. Reclamation will finalize its reservoir operating plan in the spring of 2013. The 2012 operations plan will reflect accommodations to minimize evaporation differences between Elephant Butte and Caballo Reservoirs.

Caballo Dam Facility Review and Safety of Dams Program

There are no significant dam safety related operations and maintenance issues associated with Caballo Dam other than aging infrastructure. There are currently seven incomplete O&M Recommendations for Caballo Dam.

Three O&M Recommendations for Caballo Dam were completed during FY2012:

- 2011-2-B, completed June 2012: Label the toe drain monitoring wells and outfall drains with their respective numbers or letters.
- 2011-2-F, completed March 2012: Remove the grease lines from west radial gate No. 2 and plug the ports, or clean or replace the lines using a grease resistant to separation under time and heat.
- 2011-2-A, completed August 2012: Assess the drummy noise coming from behind the spillway radial gates guides.

During an annual function test of the radial gates, it was found that the drain valve in the float well was not closing, indicating an issue with the gate or the stem. An inspection revealed that the stem coupler to the gate was rusted out. The middle joint of the stem was rusting and in danger of failure as well. The entire stem will be replaced utilizing the rope access team.

Work associated with recoating the angle iron on the energy dissipation devices continued in FY2012. Three coatings are being tested in their normal operating positions through a standard operating season. Whichever product performs the best will be used to coat all of the angle iron on the energy dissipation devices.

A Comprehensive Security Review was completed in March 2012. The Annual Site Inspection was completed in December 2012. No significant issues were identified during these inspections.

Rio Grande Project Adjudications

The United States filed the case *United States of America v. Elephant Butte Irrigation District, et al* Civ. No. 97-0803 JP/RLP/WWD (Quiet Title to the Waters for the Rio Grande Project) on June 12, 1997, requesting the Court to quiet legal title to the waters of the Rio Grande Project in its name. The United States District Court (USDC) for the District of New Mexico dismissed the case in August 2000. On May 7, 2002, the United States Court of Appeals (10th Circuit) vacated the USDC's August 2000 decision and remanded the case back to District Court for further proceedings. Chief Judge James A. Parker issued an order to stay the case and close for administrative purposes on August 15, 2002, but further ordered that should it become necessary or desirable during the pendency of the water adjudications in New Mexico and Texas, any party may initiate proceedings as though the case had not been closed for administrative purposes.

Lower Rio Grande Basin Adjudication (New Mexico), *State of New Mexico, ex rel, Office of the State Engineer v. EBID, et al*, CV-96-888: This "stream adjudication" was originally filed by Elephant Butte Irrigation District (EBID) against the State Engineer in 1986. Negotiation meetings on the Offers of Judgment on Lower Rio Grande Basin Adjudication (New Mexico) have been held between the Office of the State Engineer and the United States. In 2011, as part of Stream System Issue No. 101, the Court issued a final judgment approving a settlement agreement whereby the State of New Mexico and the farmers in the Rio Grande Project agreed to

a total consumptive use amount of 4.5 ac-ft per acre per year, consisting of up to 3.024 ac-ft of surface water and the remainder from groundwater. The total may be increased to a maximum of 5.5 ac-ft if a farmer can prove beneficial use in excess of 4.5 ac-ft per acre per year. Since 2010, interested parties have been proceeding with Stream System Issue No. 104, which involves the United States' water interests in the Rio Grande Compact. In 2012, the Court determined that the United States did not have a groundwater right associated with the Rio Grande Project. However, the Court did not rule on whether the various groundwater inflows into the Rio Grande are considered "project water", which would mean the United States still has a right to such inflows once they become surface water again.

The Texas Commission on Environmental Quality (TCEQ) posted public notice of adjudication of all claims of water rights in the Upper Rio Grande (above Ft. Quitman) segment of the Rio Grande Basin and the requirement to file sworn claims pursuant to section 11.307 of the Texas Water Code on or before April 22, 1996. The Investigation Report was completed under Phase 1. Phase 2 calls for evidentiary hearings in which claimants present evidence to support the validity of their claims. Threshold issues were briefed, and on July 31, 2003, the Administrative Law Judge ruled as follows: (1) the TCEQ has jurisdiction over the proceeding, (2) the river segment subject to the adjudication does not need to be revised or expanded, and (3) the proceeding qualifies as an adjudication of water rights under the McCarran Amendment. An evidentiary hearing was held on December 11, 2003, and Reclamation presented expert testimony about the Rio Grande Project. Notice was given under Texas Administrative Code §86.18 (c) that on April 13, 2006, the Texas Commission on Environmental Quality issued a Final Determination of all claims of water rights under adjudication in the Upper Rio Grande Segment of the Rio Grande Basin (above Fort Quitman) located within the State of Texas and which includes all portions of Hudspeth and El Paso Counties, Texas. The effective date of the Final Determination is May 15, 2006.

Rio Grande Project Operating Agreement

On February 14, 2008, Reclamation, Elephant Butte Irrigation District (EBID), and El Paso County Water Improvement District No. 1 (EP#1) agreed to, finalized, and signed a new operating agreement for the Rio Grande Project. This is very significant in that the first negotiations of a draft operating agreement started almost 30 years ago. This historic document, and its accompanying operations manual finalized in August 2008, provides detailed procedures for operating the Rio Grande Project between Reclamation, EBID, and EP#1 while recognizing and fulfilling the terms of the 1906 Convention Treaty with Mexico to supply up to 60,000 ac-ft of irrigation water from the Rio Grande Project.

The most important items in the operating agreement are: (1) procedures for allocation of Rio Grande Project water supply to the three Project water users, (2) recognition of groundwater pumping in the Rincon and Mesilla valleys affecting the water supply available to EP#1 and adjusting the allocation procedures to mitigate the allotment for EP#1, and (3) an incentive for EBID and EP#1 to carry over their respective unused allotments each year with a maximum carry over provision for each District of 60% of their respective historical full allocation. This carry over incentive encourages each District to conserve and effectively utilize irrigation water,

particularly during drought periods on the Rio Grande Project. The Rio Grande Project has completed five irrigation seasons under the 2008 Operating Agreement and will begin the sixth irrigation season in June 2013 due to extremely low available water supplies.

EP#1 ended the 2012 irrigation season with 4,777 ac-ft on their allocation account and EBID ended the season with -4,513 ac-ft on their allocation account.

The technical team for the Rio Grande Project, which consists of representatives from EBID, EP#1, and Reclamation, will meet in early 2013 to discuss amendments to the operations manual. At this time, none have been proposed.

During the 2012 irrigation season, the Project released 371,277 ac-ft of from Rio Grande Project storage. The project water users (EBID, EP#1, and Mexico) were charged for 292,627 ac-ft of delivered water. The release to delivery ratio of 0.78 shall be used in the calculation of the allocation at the start of the 2013 irrigation season.

The release to delivery ratios for the years that the operating agreement has been in effect show that the Project continues operating in an extreme drought scenario. Reclamation continues to work with each district to account accurately for water released from Caballo and water delivered at each diversion point. Snow pack conditions presently are below normal, therefore reservoir levels are expected to fall during the 2013 irrigation season.

Elephant Butte and Caballo Reservoir Vegetation Management Cooperative Agreement

Under this Agreement, Reclamation performs maintenance of previously managed vegetation, primarily by mowing to limit the non-beneficial consumption of water by woody phreatophytes such as saltcedar (*Tamarix*). Herbicide treatments to saltcedar and tornillo (screwbean mesquite) are also made to limit the amount of mowing necessary to complete the task. Approximately 6,931 acres have been sprayed at both reservoirs over the past eight years with varying amounts of success. With assistance from New Mexico State University, scientific investigations are being done concurrently to estimate reductions in evapotranspiration after various treatments.

During FY2012, Reclamation managed 8,395 acres of phreatophytic vegetation at Caballo reservoir utilizing mowers, mulchers, grubbers and extraction equipment.

Other Reclamation Programs

The Secure Water Act

The SECURE Water Act became law on March 30, 2009, as a component of the Omnibus Land Management Act of 2009. It provides authority for Federal water and science agencies to work both independently and in partnership with States and with local water managers to plan for climate change and other threats to our water supplies, and to take action to secure water resources for the communities, economies, and ecosystems they support. The SECURE Water Act authorizes and funds a number of programs under the Department of the Interior's WaterSMART Program to evaluate the risk that climate change and other threats pose to water supply, and to initiate local actions to mitigate these threats. These programs include:

- Basin Study Program
 - West-Wide Climate Risk Assessments
 - Basin Studies
 - SECURE Feasibility Studies
 - Landscape Conservation Cooperatives
- WaterSMART Grants
 - Water and Energy Efficiency Grants
 - System Optimization reviews
 - Advanced Water Treatment Pilot and Demonstration Projects
 - Grants to Develop Climate Analysis Tools
- Adaptations to Climate Change through the Water Conservation Initiative
 - Water Conservation Challenge Grant Program (previously Water for America Challenge Grant Program)
 - Title XVI Water Reclamation and Reuse Program

Basin Study Program

Reclamation's Basin Study Program, a component of the WaterSMART Program, represents a comprehensive approach to identifying and incorporating the best available science into climate-change adaptation planning. Within the Basin Study Program, Reclamation and its partners seek to identify strategies for addressing imbalances in water supply and demand, as authorized in the SECURE Act. The Program includes three complementary activities: the West-Wide Climate Risk Assessment (WWCRA) and basin-specific WWCRA Impacts Assessments, Basin Studies, and SECURE Feasibility Studies.

West-Wide Climate Risk Assessments

WWCRA implementation activities focus on development of consistent west-wide climate projections within each of eight major Reclamation river basins, and impacts to water supply, water demand, and water/reservoir operations, as well as impacts to ecological resources. WWCRA Impacts Assessments are Reclamation-only projects, which focus on the development of baseline projections of the impacts of climate change alone, isolated from other human-induced changes to our water supply and ecological resources, so that the magnitude of the

impacts of climate change can be understood. WWCRA activities include climate projections, water supply analyses, water demand analyses, reports to Congress, and WWCRA impacts assessments.

Upper Rio Grande WWCRA Impacts Assessment

In 2011, Reclamation was authorized to initiate the Upper Rio Grande WWCRA Impacts Assessment, in which Reclamation is assessing climate change impacts to the headwaters of the Rio Grande and the Rio Chama in Colorado and New Mexico, and the Rio Grande and its tributaries as far downstream as Elephant Butte Reservoir. This Impacts Assessment is being managed by the Upper Colorado Region, Albuquerque Area Office. Under this project, Reclamation has used a suite of 112 General Circulation Model simulations (GCM, which are global climate models) to develop projections of future climatic conditions in the basin. These forecasts have been downscaled and corrected for bias, and used as input to hydrologic models, which use forecasted temperature and precipitation to provide projections of future snowpack, evapotranspiration rates, and river flow rates. These parameters, after additional calibration and correction for bias, are then being used in local routing models that incorporate river and reservoir operations within the basin to provide projections of future river flow and water availability. This project also includes a general assessment of ecological resilience or vulnerability to the predicted climatic and hydrologic changes. This project is scheduled to be completed in the summer of 2013.

Basin Studies

Reclamation has been seeking partnerships with local water management agencies to perform Basin Studies. These studies build on the hydrologic projections developed by Reclamation as part of the Rio Grande Climate Risk Assessment, and seek to develop adaptation and mitigation strategies for watersheds affected by climate change. Basin studies require a 50% cost share from Reclamation's local water-management partner, and involve considerable cooperation with other members of the water community in a basin.

In 2011, Reclamation initiated a partnership with the City and County of Santa Fe for a Basin Study covering the Santa Fe River watershed, the headwaters of the Rio Grande as far downstream as Otowi gage, and the San Juan Basin tributaries that contribute to Reclamation's San Juan-Chama Project. Reclamation's involvement in this project is being managed out of the Upper Colorado Region, Albuquerque Area Office. In March 2012, the Santa Fe Basin Study sponsored a Preliminary Assessment Workshop in Santa Fe, which was attended by over 100 participants. This conference focused on assessment of the myriad of potential impacts of climate change in the basin, including impacts on human systems, wildlife, and forest health, and evaluation of human and ecosystem resiliency to the projected changes. The results of the Preliminary Assessment were presented to the Santa Fe city council in September 2012. The Preliminary Assessment Report is available on the city of Santa Fe's website (<http://www.santafenm.gov/index.aspx?NID=2577>). Work is currently underway on a detailed assessment of the implications of the predicted hydrologic changes on the City and County's ability to provide water supply to its constituents, as well as on the development of adaptation and mitigation measures for predicted shortages.

In 2012, Reclamation initiated a partnership with the New Mexico Interstate Stream Commission

(ISC) for a Basin Study focusing on the Pecos River watershed in New Mexico. Reclamation and the ISC have developed a Memorandum of Agreement for this project and agreed on a scope of work. This project will emphasize groundwater resources in the Pecos River Basin.

SECURE Feasibility Studies

SECURE Feasibility Studies, the third step in the three-step Basin Studies Program, evaluate the implementation of adaptation and mitigation strategies identified in Basin Studies to address climate change impacts on water resources, including their impact on ecological resources. These studies can be used to evaluate the feasibility of changes to reservoir operations or new or modified infrastructure such as water management infrastructure or infrastructure to benefit environmental needs. A framework for the inclusion of climate projections in Reclamation Feasibility Studies is currently underway, and a request for proposals for a pilot SECURE Feasibility Study will be announced in 2013.

Landscape Conservation Cooperatives

Reclamation is partnering with the U. S. Fish & Wildlife Service to establish Landscape Conservation Cooperatives (LCCs). LCCs are designed to be links between science and conservation actions, which address climate change and other stressors within and across landscapes. The Middle Rio Grande straddles the Southern Rockies LCC and the Desert LCC. Reclamation invites all federal, state, tribal, local government, and non-governmental management organizations to become partners in the development of these cooperatives.

Under the Southern Rockies Landscape Conservation Cooperative, the Albuquerque Area Office funded enhancements to the Upper Rio Grande Water Operations Model (URGWOM) to allow it to perform runs of 50 to 100 years, sufficient length to allow evaluation of water operations under conditions predicted in climate change projections. The refined URGWOM model is currently being employed to perform simulations of local water operations under climate-change scenarios, as part of the Upper Rio Grande WWCRA Impacts Assessment described above.

WaterSMART Grants

The Department of the Interior's WaterSMART Initiative is a plan for working with communities, irrigation districts, and states to help resolve and avert water supply crises in the West. The Rio Grande has been identified as among the most likely areas in the West to experience the kinds of water-related conflicts that the WaterSMART Initiative is addressing. The WaterSMART Initiative's goals are being accomplished primarily through competitive award of challenge grants to irrigation districts, communities, and states. Through the Challenge Grant Program, Reclamation provides 50/50 cost-share funding for projects focused on water conservation, efficiency, and water marketing. The focus is on projects that can be completed within 24 months.

The following projects are currently being funded under the WaterSMART Initiative. In FY 2010 and FY 2011, the Arch Hurley Conservancy District was awarded grants to apply sodium bentonite to areas along the main canal to reduce water loss due to poor soil conditions. Construction continued in 2012 and the project will be closed out once irrigation flows resume in 2013.

The Carlsbad Irrigation District was awarded a Water and Energy Efficiency Grant in order to replace Parshall flumes in irrigation channels that were inoperable due to settlement or problems in original construction. Telemetry systems will be installed to transmit real-time data to the Irrigation District for managing system losses and measuring water flows. The project also includes GIS mapping and creation of a database for cataloging system information.

Title XVI Water Reclamation and Reuse Projects

Under the authority of Public Laws 102-575 and 104-266, Reclamation is/was participating with the cities of Albuquerque, New Mexico, and El Paso, Texas, in the construction of water reclamation and reuse projects. Reclamation has also participated in a Title XVI feasibility study with the City of Espanola.

Albuquerque Bernalillo County Water Utility Authority (ABCWUA)

In 1999 Reclamation entered into agreements with ABCWUA that provide the framework for participation and cost sharing in their \$67 million non-potable water reclamation and reuse project. Up to 25 percent federal cost share was authorized for construction of the project, not to exceed \$20 million.

- **Southside Municipal Effluent Reuse Project (Southside Project):** The Southside Project consisted of an expanded treatment system at the Southside Wastewater Reclamation plant to include a clearwell/chlorine contact tank, two pump stations, a 1.9 million gallon storage reservoir, and associated transmission and distribution pipelines. Construction began in December 2009, and the project was operational as of March of 2012. The project will provide about 2,500 acre-feet per year of polished municipal effluent, which will be used primarily for turf irrigation by various municipal, industrial, and commercial customers along the pipeline route.
- **Bosque and Tijeras Reuse Projects:** The Bosque and Tijeras Reuse Projects feasibility report was approved by Reclamation in August of 2012. The project consists of two treatment facilities that would intercept wastewater collection system flows on both the west (Bosque) and east (Tijeras) sides of the Rio Grande within Albuquerque, separate solids, then treat the remaining effluent for delivery and irrigation of public turf areas. Sludge removed from the flows would be sent to the Southside treatment facility for processing. The transmission and distribution system constructed as part of the above Southside Municipal Effluent Reuse Project would be used for conveying effluent on the east side of the Rio Grande. Proposed construction for the Bosque and Tijeras Reuse Projects would also include transmission, distribution, and storage infrastructure on the west side of the Rio Grande. Effluent proposed to be delivered from the Bosque plant is 2,811 ac-ft, with 6,104 ac-ft proposed to be delivered from the Tijeras plant.

City of El Paso

The City of El Paso has been using recycled water since 1961. Reclamation has contributed to El Paso's efforts since 1996 through Title XVI. El Paso currently recycles nearly 2 billion gallons of water per year (~ 6,000 ac-ft per year) through 50 miles of purple pipe. This recycle program has cost the City \$56 million dollars, with Reclamation's contribution of \$14.4 million

The recycled water has been applied to some sites not suited for this water, resulting in damage to vegetation. The City of El Paso, in conjunction with Texas A&M, has proactively implemented a best management program to help water users better prepare their sites and select vegetation better suited for recycled water. Reclamation has contributed more than \$50,000 to aid El Paso's best management practices program.

Reclamation was working with the El Paso Water Utilities-Public Service Board (EPWU-PSB) to conduct a pilot plant study for utilizing the Montoya Drain flows during the non-irrigation season (October – March). This work has been on hold while the EPWU-PSB has concentrated on repair and upgrades to their infrastructure since the flooding in 2006.

The City of El Paso is moving forward with an upgrade to the Kay Bailey Hutchison Desalination Plant. At their own expense, the City will install solar photovoltaic panels to generate power for their operations. The pumping and processing of water and sewage is the City's largest use of electricity.

The Central Waste Water Treatment Plant purple pipe expansion project is moving forward after a delay enforced by the Utilities take-over and response to the flood control measures required following the flooding disaster of 2006.

Reclamation's Water Conservation Field Services Program

Through the Water Conservation Field Services Program, Reclamation provides cost-share funding and technical assistance to a number of water management entities in New Mexico and Texas. The Water Conservation Field Services Program seeks to promote water use efficiency through support of outreach efforts, research projects, and technical assistance to water users.

Reclamation continued to support conservation outreach aimed at increasing public and industrial awareness of water issues during 2012. Funding was used to promote the nation's largest xeriscape conference, as well as for irrigation water management workshops that were co-sponsored by Reclamation, the New Mexico Office of the State Engineer, and the New Mexico Water Conservation Alliance. The New Mexico Association of Conservation Districts provided funding to support the Rolling Rivers Educational Trailers throughout New Mexico. Outreach demonstrations are generally held at State and County Fairs, public and private schools, teacher workshops, water conferences, and other outreach activities. Funding was provided for children's water festivals in Rio Rancho, Santa Fe, Artesia, Carlsbad, Lovington, and Las Cruces.

In 2012, Reclamation provided funding to the City of Rio Rancho to update their water conservation plan. Funds were allocated to the Carlsbad Irrigation District to improve their ability to measure and account for irrigation water through the renovation of Parshall flumes and installation of telemetry. The City of Santa Fe received funds to install automatic meter readers. Funds were also provided to the Bernalillo County Public Works Division to implement various efficiency measures.

The application of sodium bentonite on irrigation canals for the Arch Hurley Irrigation District, funded in 2011, was completed in 2012. Under an agreement with the UNUM-NFP, a 501(c)(3) not for profit corporation, nine water conservation plans have been completed. In addition, the Eastern New Mexico Water Utility Authority and Rio Rancho Public Schools both completed water conservation plans in 2012. Construction began for efficiency implementation through the construction of a diversion structure for four irrigation associations in Tierra Amarilla, NM.

Upper Rio Grande Water Operations Model

The Upper Rio Grande Water Operations Model (URGWOM) is a computational model developed through an interagency effort and is used to simulate processes and operations in the Rio Grande Basin in New Mexico as well tracking the delivery of water allocated to specific users. RiverWare is the software used by URGWOM and was developed at the Center for Advanced Decision Support for Water and Environmental Systems (CADSWES). The primary purpose of URGWOM is to facilitate more efficient and effective flood risk management operations, forecasting, accounting, and management of water in the Upper Rio Grande Basin. URGWOM performs accounting of multiple San Juan-Chama Project water contracts and forecasting to simulate daily storage and delivery operations in the Rio Grande Basin. A water operations application is used to complete forecasting of operations for an upcoming year for preparing an Annual Operations Plan (AOP) and a planning application is used to complete long-term planning studies.

Water management decisions are becoming even more complex and difficult because of the broad range of interests and issues that must be addressed. URGWOM is used to provide the community of water managers and water users with a clear, consistent, and common set of data to formulate, evaluate, and support decisions.

Work continues on stakeholder outreach for all activities involving URGWOM. Meetings of the Technical Team, Executive Committee, and Advisory Committee are held periodically, and the URGWOM website is updated with details on recent activities, postings of the latest documentation, and meeting notes.

In 2012, the Technical Team worked on an updated calibration for the Middle Rio Grande portion of the model. While the previous calibration was good, the Technical Team worked to utilize new data and refined model methods to further improve the model calibration and to simplify model administration and also improve the model run-time and efficiency for completing simulations. Enhancements include refinements to the methodology for computing crop evapotranspiration (ET) rates and changes to the model approach for including crop consumption to simplify model maintenance and allow for longer-term model runs, on the order of 50 years, to be completed more efficiently. Work is also being completed to develop estimates of actual crop ET as needed for the URGWOM database. Currently, actual ET is estimated as 80 percent of the computed potential ET. During early 2013, the updated calibration will be finalized by reviewing and adjusting numerous hydraulic conductivities for the modeled groundwater fluxes throughout the Middle Valley.

Enhancements to the model configuration for the updated URGWOM calibration also included setting up an updated representation for modeling returns to the river at outfalls and wasteways from the MRGCD distribution system and a new method for representing evaporation losses from wetted sands on the river bed.

An updated vegetated area survey was completed in 2011 by the New Mexico Interstate Stream Commission (ISC) for updating the URGWOM database to include the latest actual irrigated areas. Efforts were initiated in 2012 and will be completed in 2013 to process the survey data to be utilized by URGWOM. The work includes completing the data processing of the crop survey data to estimate irrigated areas using aerial photos and Quality Assurance/Quality Control (QA/QC) procedures in the process. Crop areas for each groundwater reach in URGWOM will then be developed.

In 2012, a full update to the URGWOM database was initiated with work nearly complete. Data needed for URGWOM were set up in a new single database file, and work also began to utilize a new RiverWare data management interface (DMI) dialog to set up new DMIs in URGWOM for importing needed data for simulations from the single database file. Also, numerous enhancements were implemented to the RiverWare rule policy language (RPL) used in the URGWOM ruleset to represent the latest policy for setting diversions, deliveries, and reservoir releases and to simplify the rules and consolidate the amount of code used to represent policy.

Two parallel tracks continue to develop watershed models. Work was completed in 2011 to develop watershed models for the basin to be used by the National Weather Service (NWS) West Gulf River Forecasting Center (WGRFC) for providing forecasted flows. In 2012, NWS worked to implement the new models into their new system with the first forecasted flows are to be provided in 2013. Work was also initiated with Riverside Technologies, Inc. to develop and calibrate rainfall-runoff methods in a Hydrologic Modeling System (HMS) model for use during the summer/monsoon season. The HMS model will use the same basin configuration as the completed NWS model.

URGWOM has been used in recent years for daily accounting to update the actual status of accounts with the latest data for preparing AOPs and for long-term planning studies. Separate URGWOM versions were used for the different applications including the *Accounting Model* used for simulations with actual data to track the status of accounts; *Water Operations Model* used with the *Forecast Model* to complete runs through a calendar year to prepare AOPs; and the *Planning Model* used to evaluate long-term impacts of proposed actions (e.g. for NEPA processes or Biological Assessments) on various indicators in the basin such as deliveries to water users, river flows, interstate Compact deliveries, and the overall water budget.

Work was completed in 2012 to consolidate the models into two separate URGWOM models utilized for all modeling exercises and decision support: a *Rulebased Simulation Model* and an *Accounting Model*. Configuring the new *Rulebased Simulation Model* involved modification of the accounting, rules, database, DMIs, and documentation. The new models can now better meet the growing modeling needs including longer term simulations (e.g., 50 to 100 years) for climate change studies and to provide inputs to biology models for endangered species analyses and for real-time water operations modeling. Changes were also made to enhance the representation of

specific aspects of policy and to utilize new capabilities added by CADSWES for improved simulation efficiency. The changes were also completed to significantly simplify model administration and the setup for all applications of URGWOM. A new URGWOM account setup was created to allow for all modeling to be completed with the same model file and to particularly reduce the model file size as needed for longer-term simulations.

Significant work was also completed on a new single master model for 2013 designed by the Technical Team that will be used as the 2013 Accounting Model. It is also being configured to simplify model maintenance further and allow for more efficient use of URGWOM for all applications including AOP model runs and planning runs with multiple hydrologic sequences. The new model is also being configured to be used efficiently for real-time water operations modeling using 7-day ET forecasts from Reclamation's ET Toolbox and runoff forecasts from the watershed models.

Work also continued in 2012 on other tasks included in the URGWOM Five Year Plan as referenced as part of the interagency URGWOM Memorandum of Understanding (MOU). Significant progress was made during 2012 on model development for the separate Lower Valley portion of URGWOM, below Elephant Butte Dam, to represent all the key physical processes and include greater detail of the physical system. Also, significant work was completed to develop a separate test model for the Colorado portion of the basin. The test model is being set up to simulate the delivery of available water to adjudicated water rights holders, as actually done in Colorado, with consideration for curtailments to the allocatable flow to assure Compact deliveries are made. Currently, URGWOM uses gaged flows of the Rio Grande near Lobatos as an upstream input rather than modeling Colorado water management operations, so the new model for the Colorado portion of the basin is being developed to refine the input flows at Lobatos for AOP model runs and planning studies.

A water quality component will be included in the development of URGWOM that will be useful for making management decisions to maintain optimal river ecosystem health while meeting downstream water delivery requirements. The design and incorporation of needed capabilities for simulating water quality into RiverWare was completed in 2012. Currently, the Technical Team is testing the development of the water quality methods and implementing them into URGWOM.

In 2012 the Technical Team continued to coordinate with Sandia National Laboratories on activities that involve the monthly-timestep Upper Rio Grande Simulation Model (URGSiM) developed with the PowerSim Studio software package. Work in 2012 included enhancements for representing flows from the Colorado portion of the Rio Grande basin, addition of a water rights component, and rules documentation. Significant progress was also made on a new user interface for URGSiM. URGSiM was also used in 2012 to make 112 climate scenario model runs for the West-Wide Climate Risk Analysis (WWCRA).

Water Accounting Reports Projects

2012 San Juan – Chama Project Water Accounting

The 2012 San Juan – Chama Project water accounting was accomplished using version 6.2.7 of the RiverWare modeling system software and the URGWOM accounting module. All accounting data and information is stored directly in the final version of the 2012 accounting model. Reclamation held periodic meetings with representatives of the New Mexico Interstate Stream Commission and the U. S. Army Corp of Engineers, Albuquerque District, to verify accounting data entered for the previous months. This minimized year-end data quality and accounting concerns.

Oracle® Hydrologic Database (HDB)

The Hydrologic Database (HDB) is a specialized relational database for storing and recovering hydrologic data used by Reclamation in the management of river and reservoir systems. A generalized version of HDB was specifically developed for Reclamation use with RiverWare® models. HDB is an Oracle® relational database application, and includes connections to data sources such as Reclamation's Hydromet, DOMSAT, DSS, and models such as RiverWare. HDB was originally developed at the University of Colorado, Center for Advanced Decision Support for Water and Environmental Systems (CU-CADSWES). Reclamation's Albuquerque Area Office (AAO) HDB instance is now maintained by Reclamation's Upper Colorado Regional Office as well as through contract with Sutron Corporation. HDB has been customized by independent Reclamation consultants and Reclamation offices for specific office and model requirements. HDB is currently used by Reclamation's Upper and Lower Colorado Regional Offices for joint management of the Colorado River. The AAO and the El Paso Field Division (EPFD) depend on HDB installations for the purposes of data storage and retrieval. The AAO instance of HDB is located in the Salt Lake City Regional Office.

Development of water accounting and reporting functionalities for the AAO's HDB installation continued during 2012. Water accounting data is now directly transferred from the RiverWare URGWOM Accounting Model to HDB via an HDB/RiverWare Direction Data Connection interface. Further improvements to DECODES, the Computation Processor, the Calculation Application, Compedit, and the MetaData Application were accomplished to improve data storage and availability in 2012.

Planned work for 2012 includes continued work on DECODES, the Computation Processor, the Calculation Application, Compedit, and the MetaData Application. Historical data at most sites will also be back-populated to HDB as needed. Automated functionality to notify the AAO of EPFD entry or editing of MRG Accounting model-dependent data will also be examined and potentially developed. Additional Crystal Reports (Version 2008) accounting table reports for internal use and external reporting may be developed, as well as work to automatically update certain accounting tables posted to the internet.

RiverWare®

The use of the new RiverWare® URGWOM Accounting Module Data Objects allow for all accounting and accounting report table data to be derived within and acquired directly from the RiverWare® based URGWOM Accounting Module. The URGWOM Accounting Module Data

Objects easily allow Reclamation, the USACE, and the NMISC to check the current status of individual or multiple accounts, transfers, and storage.

Numerous improvements to RiverWare® were accomplished during 2012 through multiple contracts (Reclamation and USACE) with the Center for Advanced Decision Support for Water and Environmental Systems (CADSWES) at Colorado University-Boulder, Colorado. The improvements are documented in the annual report produced by CADSWES and distributed to the user community at the annual meeting.

Evapotranspiration (ET) Toolbox Decision Support System

Reclamation and others have determined a need for rapid improvement in measuring and predicting both daily open water evaporation, and daily riparian and crop water use in the Rio Grande Basin. Reclamation developed the ET Toolbox for estimating these daily water use requirements at a resolution useful for implementation in URGWOM.

The primary purpose of the ET Toolbox project is to supply water managers within and outside of Reclamation with accurate, real-time ET predictions via a dedicated website, while making the real-time ET dataset (daily riparian and crop water use estimates, open water evaporation estimates, and rainfall estimates) available to URGWOM for daily water operations model runs. The ET Toolbox is an extension of Reclamation's Agricultural Water Resources Decision Support (AWARDS) system that provides internet access to high-resolution rainfall and daily crop water use estimates for improving the efficiency of water management and irrigation scheduling. The initial development work focused on the Middle Rio Grande area from Cochiti Dam to San Marcial, which is just south of the Bosque del Apache National Wildlife Refuge in New Mexico. ET Toolbox coverage has now been extended to Elephant Butte Reservoir. ET currently accounts for an estimated 67 percent of the water depletions over this reach of the Rio Grande, including riparian vegetation, irrigated crops, and open water/wet sand evaporation.

The ET Toolbox model processes and predictions are highly dependent on local farm weather station data feeds. Other remote forms of data acquisition are under study, but for the near term significant resources are necessary to update and maintain the data collection and telemetry platforms that feed critical hourly weather data to the Toolbox.

The ET Toolbox daily rainfall and water depletion predictions for the Rio Grande are available to users and water managers via the Internet at the URL <http://www.usbr.gov/pmts/rivers/awards/Nm2/riogrande.html>.

During 2012, the ET Toolbox changed the vegetation classifications for the agriculture using MRGCD crop reports from 2011 and riparian from a combination of 2000 IKONOS at 4 meter resolution and 2001 Utah State University at 0.5 meter resolution. This change reduces the extent of the classifications to the river corridor, resulting in a significant reduction in riparian consumptive use. The growing degree day based crop coefficients have been replaced with coefficients developed by researchers in the Middle Rio Grande. A combination of temperature, stage-of-growth, and monthly processes is implemented. These processes can be altered as more

research and discussion evolves. This has resulted in lower agricultural ET estimates and higher riparian and open water estimates. Upon advice from Middle Rio Grande research personnel, the Toolbox has started using the 1985 Hargreaves method for calculating Reference ET, which is a temperature based equation. Lack of quality wind, solar, and humidity data, which are required by other methods, has forced this decision. Once quality data becomes available the Toolbox may revert back to the ASCE Standardized method.

During 2013, Reclamation will continue to maintain and update the ET Toolbox to meet needs and improve ET estimates. In particular, Reclamation is exploring ways to improve the user interface.

Native American Affairs Programs

Reclamation has numerous projects underway with Pueblos and tribes. These projects fall under several categories, including the Native American Affairs Program, water rights settlements, WaterSMART Program, cooperative ventures with other federal agencies, and special projects funded through Congressional legislation.

As part of Reclamation's Native American and other programs, assistance was given to various Pueblos to improve irrigation system efficiency. Some of the items funded or purchased included concrete lining of farm ditches, terracing, laser leveling, check structures, pipes, culverts, and turnouts. Reclamation is working with the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) on additional irrigation improvements at several Pueblos. Reclamation is also working with the Bureau of Indian Affairs (BIA) on irrigation system improvements for the Middle Rio Grande Conservancy District facilities on lands of the six Middle Rio Grande Pueblos. The BIA is providing funding which is being passed through to these six pueblos via Reclamation contracts.

The Omnibus Public Land Management Act of 2009, Public Law 111-11, authorized up to \$4 million in federal appropriations to conduct a study of the eighteen Rio Grande Pueblos' irrigation infrastructure. The focus will be to obtain increased water efficiency through infrastructure improvements. Construction is authorized up to \$6 million per year through Fiscal Year 2019, not to exceed \$60 million. In Fiscal Year 2012, Congress began appropriations with \$250,000 to begin the study. These funds were spent on land surveying at various pueblos to collect data to be used in the study. The study report cannot be completed until an amount closer to the \$4 million authorized is obtained.

Indian Water Rights Settlements

The Claims Resolution Act of 2010 was signed into law on December 8, 2010, authorizing the settlement of two long-running New Mexico Indian water rights cases. Title V, the Taos Pueblo Indian Water Rights Settlement Act, authorizes implementation of the Abeyta (Taos Pueblo) settlement. Title VI, the Aamodt Litigation Settlement Act, authorizes the implementation of the Aamodt (Pojoaque, Nambe, Tesuque, and San Ildefonso Pueblos) settlement. Reclamation is

working with the Bureau of Indian Affairs (BIA), the Pueblos, the State of New Mexico, and other involved parties to implement the provisions of these settlements.

Pursuant to Title V of the Claims Resolution Act of 2010 (P.L. 111-291), Reclamation's Albuquerque Area Office is working on implementing Reclamation's responsibilities under the Taos Pueblo Indian Water Rights Settlement. The Federal Team is working with the local settlement parties to complete the execution of the Taos Pueblo Indian Water Rights Settlement Agreement. Reclamation has entered into San Juan-Chama Project (SJCP) water contracts with Taos Pueblo, the Town of Taos, and El Prado Water and Sanitation District. The contracts were signed by the Secretary of the Interior in July 2012 at a ceremony at Taos Pueblo. Reclamation has also been working with the local parties to assist in the planning and design some of the Mutual Benefits Projects. Upon the Enforcement Date, Reclamation will provide financial assistance in the form of grants on a non-reimbursable basis to Eligible Non-Pueblo Entities to plan, permit, design, engineer, and construct the Mutual-Benefit Projects in accordance with the Settlement Agreement.

The Aamodt Settlement Agreement provides for settlement of water rights claims in the Pojoaque Basin including claims of the Pueblos of Nambe, Pojoaque, San Ildefonso, and Tesuque; the County of Santa Fe; and the City of Santa Fe. The Aamodt Litigation Settlement Act authorizes Reclamation to plan, design, and construct a Regional Water System (RWS). The RWS will consist of a surface water diversion and water treatment facilities at San Ildefonso Pueblo on the Rio Grande and storage tanks, transmission and distribution pipelines, and aquifer storage and recovery well fields that will supply up to 4,000 acre-feet of water annually to Pueblo and non-Pueblo customers within the Pojoaque Basin. The Pueblo water supply includes 1,079 acre-feet of San Juan Chama Project water, 1,141 acre-feet of "Top of the World" water rights the BIA will acquire from the County of Santa Fe, and 302 acre-feet of Nambé reserved water rights. A Pojoaque Basin Regional Water Authority will be formed to operate and maintain the RWS. Permits from the New Mexico Office of the State Engineer will be obtained to divert and consume the water supply for the RWS. In 2012, Reclamation began the public scoping process for the Pojoaque Basin Regional Water System EIS.

Emergency Drought Program

Congress provided appropriations for emergency drought relief in the Reclamation states. In the Rio Grande basin, Reclamation, through an interagency agreement with the U.S. Indian Health Service, is providing drought relief by providing drinking water wells for the Pueblos of Acoma, Nambé, Isleta, and San Felipe. Acoma well #8 was completed in May 2009. Wells for Nambé and Isleta have been completed. The interagency agreement will terminate on December 31, 2012. Any remaining funds from Isleta will be returned to Reclamation.

Wells for Eunice, Hagerman, and Brazos in New Mexico were completed in 2009. Wells for Carlsbad, Wildlife West, Colonias, and Cannon were completed in 2010. The Cannon well was abandoned due to insufficient water bearing strata.

The Blue Water well was completed on February 2012. The well for the Village of Capitan is a

“re-drill” due to the poor quality of water and other issues at the previous well. Construction of the new Capitan Well was completed on March 28, 2012.

The Regina well has encountered many unknowns and obstacles, but is progressing to design depth. The expected completion date is February 2013. Congress did not renew the Drought Relief Program, so at the completion of the Regina well the Program will come to an end.

Quagga and Zebra Mussel Update

In January 2007, an employee with the National Park Service at Lake Mead, NV, discovered the first quagga mussel in the western United States. The mussels were likely transported to the west via a contaminated boat from an eastern state. Since that time, mussels have expanded their range throughout many western states. Since 2009, Reclamation has been sampling seven of its New Mexico reservoir bodies (Navajo, Heron, El Vado, Elephant Butte, Caballo, Sumner, and Brantley) for mussels and processing these water samples through Reclamation’s research lab in Denver.

At this time, New Mexico has three reservoirs considered “suspect” for having quagga mussels: Sumner, El Vado, and Navajo. Further testing and confirmation is necessary before these waterways meet the State of New Mexico’s criteria for being deemed “infested.” Within the State of New Mexico, a body of water is determined infested if it meets the following conditions:

- 1) Aquatic Invasive Species (AIS) is confirmed by positive PCR (Polymerase Chain Reaction, a technique to amplify a single or few copies of a piece of DNA across several orders of magnitude, generating thousands to millions of copies of a particular DNA sequence which can then be used to determine the species of origin) testing from two independent labs and at least one sample is confirmed positive by microscopy analysis; or
- 2) Confirmation of live adult AIS by two experts in the field of taxonomic identification of the taxa in question.

Without the presence of an organism (body), the positive DNA testing indicates an introduction or “inoculation”, but not enough evidence to state that the waterbody has an established reproducing mussel population to call it infested.

In October 2012, a mechanic doing work on a boat at Elephant Butte Reservoir discovered living mussels; these mussels were later identified as zebra mussels. The contaminated boat had been utilized multiple times at Elephant Butte Reservoir over a number of years. According to the owner, who had moved the boat from Michigan to New Mexico, the boat had not been utilized in any waters other than Elephant Butte since about 2007. Once this discovery was made, additional water testing for mussels at Elephant Butte was completed in November 2012. Results so far are negative.

Current Reclamation funding, to pay for the monthly water testing and other mussel related work, is coming from Reclamation’s Upper Colorado Regional Office. Because Reclamation strongly believes that preventing the spread of mussels is the least costly option for protecting

the state's water bodies, it is pursuing the following ongoing activities:

- Reclamation's Albuquerque Area Office has made a serious public outreach effort since 2009, printing some 41,000 'Zap the Zebra' brochures and 1,000 mussel posters. These brochures and posters that have been dispersed throughout New Mexico at the state parks, convenience and sporting good shops, libraries, etc.
- Permanent signs with the "Stop Aquatic Hitchhikers!" message have been installed at boating docks and other key park locations that are under Reclamation's jurisdiction.
- Reclamation purchased three mobile decontamination units; one is permanently assigned to Elephant Butte Reservoir, one is available for the Chama River area, and the third unit is in the Pecos River basin area. However, these units can be moved where needed.
- State and Federal employees continue to be trained to perform watercraft inspections (Level 1) and decontamination procedures (Level 2).

Seven mussel decontamination station locations have been designated at the following reservoir locations: Heron, El Vado, Elephant Butte Main Entry, Elephant Butte Hot Springs, Sumner, and two sites at Brantley. Funding and future direction shall determine if any of these facilities are built.

Non-Federal Hydroelectric Power Development

The Administration would like to increase America's renewable energy resources. The Town Sites and Power Development Act of 1906 and the Reclamation Project Act of 1939 (1939 Act) authorize the Bureau of Reclamation (Reclamation) to enter into Lease of Power Privilege (LOPP) contracts with non-Federal entities to use Reclamation facilities for electric power generation consistent with Reclamation project purposes. Reclamation recently made available to the public the *Hydropower Resource Assessment at Existing Reclamation Facilities Draft Report*. The draft report indicates that it may be economically feasible to develop the hydropower potential at Caballo Dam. Title to Reclamation Project facilities, and any modifications to those facilities, remains with the United States. Title to any installed power plant facilities is with the lessee, unless legislated or contracted otherwise.

On September 22, 2011, Reclamation published a Notice of Intent to Accept Proposals, Select Lessee, and Contract for Hydroelectric Power Development at Caballo Dam in the Federal Register. The Notice stated that Reclamation, in consultation with the Department of Energy, Western Area Power Administration (WAPA), would consider proposals for non-Federal development of hydroelectric power at Caballo Dam, a feature of the Rio Grande Project.

Reclamation received one proposal from HydroPower Capital L.L.C. of Phoenix Arizona. HydroPower Capital was selected as lessee on December 4, 2012. The lessee has two years from that date to complete the NEPA process and enter into an LOPP for the development. The lessee then has two years from the date of execution of the LOPP to complete the designs and specifications, then an additional year to begin construction.