

# RECLAMATION

*Managing Water in the West*

## Calendar Year 2014 Report to the Rio Grande Compact Commission

Colorado  
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New Mexico  
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Federal Chairman  
Hal Simpson

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U. S. Department of the Interior  
Bureau of Reclamation  
Albuquerque Area Office  
Albuquerque, New Mexico

March 2015

## MISSION STATEMENTS

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

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

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U. S. Department of the Interior  
Bureau of Reclamation

March 2014

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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 trans-basin 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 including 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 quit claim deed.

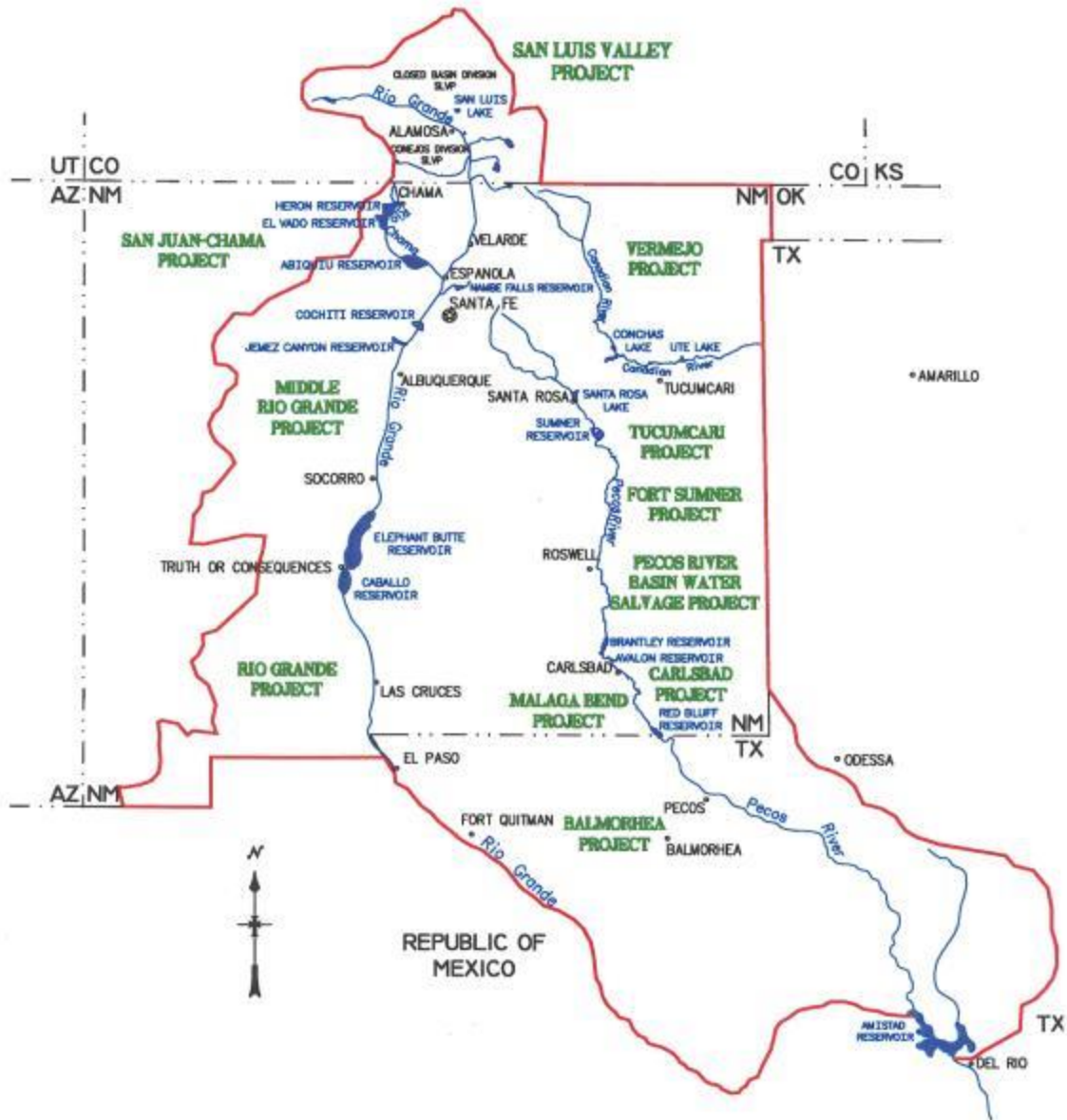


Figure 1: Project Map of Reclamation's Albuquerque Area Office

# 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 started the year on January 1, 2014 with a water surface elevation of 9,961.42 feet with a storage volume of 9,318 acre-feet (ac-ft). The December 31, 2014 reservoir elevation was 9,964.23 feet, with a storage volume of 10,534 ac-ft. The minimum storage during calendar year 2014 occurred on January 1, 2014. Maximum storage occurred on June 19, 2014 when the reservoir peaked at elevation 9,988.86 feet (23,477 ac-ft). There was 1,367 ac-ft of Rio Grande Compact water stored during water year 2014. All of this water was released by the end of the water year.

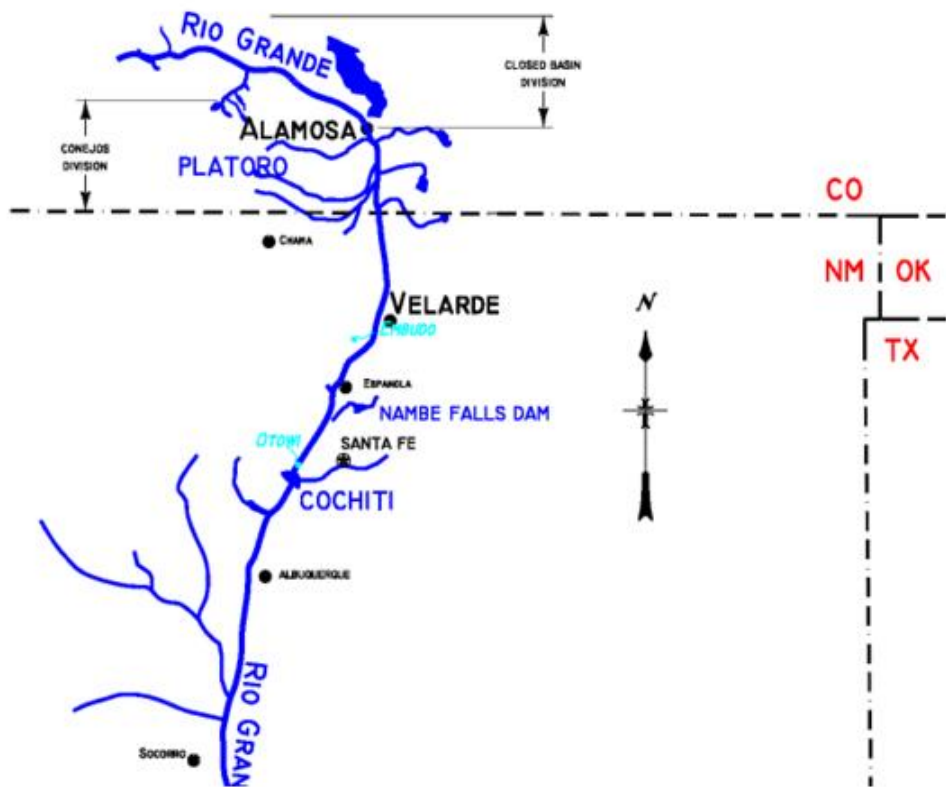


Figure 2: Area Map of San Luis Valley Project

## **Platoro Dam Facility Review and Safety of Dams Programs**

Outside of aging infrastructure, there are no significant dam safety related operations and maintenance issues associated with Platoro Dam and Dike. At the end of Fiscal Year (FY) 2014, there were five incomplete Category 2 O&M recommendations for Platoro Dam.

The scheduled embankment point survey of Platoro Dam and Dike was completed in August of 2014. There has been no measurable movement when compared to previous surveys. The next embankment survey is scheduled for 2020 based on the six year measurement schedule.

The Facility Review Rating was updated in September 2014. The rating for Platoro increased from a total score of 93 to a score of 96, which gives the facility an overall rating of “Good”.

## **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 helps stabilize water levels in 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 (RO&M) examination was conducted in October of 2011. The next RO&M examination is scheduled for 2016.

### **Operations**

Closed Basin water deliveries in Calendar Year (CY) 2014 included deliveries to the Rio Grande, Blanca Wildlife Habitat Area (BWHA) and Alamosa National Wildlife Refuge.

A total of 11,213 ac-ft of project water was delivered in CY2014. Total deliveries of Compact water to the Rio Grande for CY2014 were 7,598 ac-ft. Water deliveries to the Bureau of Land Management’s (BLM) Blanca Wildlife Habitat Area were 800 ac-ft for annual mitigation. An exchange of 228 ac-ft of Tabor Trans-Mountain water was also delivered, for a total of 1,028 ac-ft to Blanca Wildlife Habitat Area. 2,587 ac-ft of mitigation water was delivered to the Alamosa National Wildlife Refuge.

Natural inflows to San Luis Lake (SLL) are measured by the SLL inlet flume or estimated at the spillway and culverts. There was no natural inflow to SLL during CY2014. Closed Basin Division water accounting for the 2014 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			PARSHALL FLUME		ALAMOSA NATIONAL WILDLIFE REFUGE			DELIVERY TO THE RIO GRANDE				PROJECT TOTALS
	(BWWHA)			TOTAL	CREDITABLE	(ANWR)			TOTAL AT	CREDITABLE	NON-		
	CH03	CH04		PASSING	AMOUNT	CH01	CH02	PUMPING	MONTH	FLUME MINUS	AMOUNT TO RG	CREDITABLE	
	STA.	STA.	MONTH	FLUME	AT FLUME	CHICAGO	MUM	PLANT	TOTALS	DEL. TO ANWR	BY ANWR	@ LOBATOS	
	730+00	798+60	TOTALS			TURN-OUT	TURN-OUT						
JAN	0	0	0	1000	1000	0	0	0	0	1000	1000	0	1,000
FEB	0	0	0	855	855	0	0	0	0	855	855	0	855
MAR	0	0	0	936	936	329	370	0	699	237	237	0	936
APR	0	0	0	865	865	32	28	0	60	805	805	0	865
MAY	0	0	0	914	914	0	0	0	0	914	914	0	914
JUN	75	68	143	692	692	0	0	0	0	692	692	0	835
JUL	146	148	294	579	579	84	130	0	214	365	365	0	873
AUG	124	112	236	730	730	149	180	0	329	401	401	0	966
SEP	81	65	146	704	704	211	214	0	425	279	279	0	850
OCT	103	106	209	835	835	307	301	0	608	227	227	0	1,044
NOV	0	0	0	996	996	129	123	0	252	744	744	0	996
DEC	0	0	0	1079	1079	0	0	0	0	1079	1079	0	1,079
ANNUAL	529	499	1,028	10,185	10,185	1,241	1,346	0	2,587	7,598	7,598	0	11,213

Note: An additional 228 ac-ft of 2013- carryover, transmountain water was delivered to the BWWHA on behalf of the BLM during 2014.

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 [U.S. Fish and Wildlife Service (Service)], Colorado Division of Parks and 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 U.S. 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 2013 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 wells is an ongoing process. Six new pumps were installed in salvage wells in 2014. All of the salvage well preventive maintenance tasks were completed for the year. Four salvage wells were re-drilled and 6 were rehabilitated in 2014.

The following three items are carried over from last year. We are still evaluating the data and processes to determine the best methods for future use.

1. In August, 2012, the Closed Basin Division entered into an agreement with the USGS Water Science lab located in Oklahoma City, OK. The USGS was 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 controls the speed of the pump. As the water level in the well drops the pump speed slows down until the water level stabilizes.

2. Three wells were rehabilitated in cooperation with USGS and Halliburton in 2013. These three wells were rehabilitated using different methods to see which combination of treatments worked best. All wells pump-tested above 400 gallons per minute (GPM), so the USGS recommended installation of a VFD set to pump 300 GPM. It is not known if that pumping rate is sustainable. Also, the rehabilitated wells test pumped at a higher GPM as compared to re-drilled wells.

3. The Closed Basin Division is also experimenting with a timing program involving most of the operating wells on the project. The wells are on varying pumping schedules depending on well properties, location, and other factors. The objective is to let the well rest for a period of time to bring the water level up. In addition, when the pump is shut down it backwashes the well screen and helps prevent plugging. Preliminary data shows this method is working but more time is needed to draw conclusions. As treated wells are inspected, the extent or lack of, success attributed to the new rehab processes will be studied and documented.

### **Water Quality**

Water quality monitoring of Closed Basin Division salvage wells, the Rio Grande, Head Lake, and the conveyance channel continued throughout 2014.

The Water Quality Laboratory continues to support the Operations and Maintenance groups with their salvage well rehabilitation and bio-fouling mitigation efforts. Currently all salvage wells are monitored for the presence of iron-related 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

The *San Juan – Chama (SJ-C) Project* consists of a system of storage dams, diversion structures, tunnels and channels for trans-basin movement of water from the San Juan River Basin to the Rio Grande Basin as a component of the Colorado River Storage Project, authorized by Congress in 1962 through P.L. 87-483. The SJ-C Project provides water for municipal, domestic, industrial, recreation, fish and wildlife purposes, and supplemental water for irrigation.

Reclamation's web page for Middle Rio Grande Water Operations (<http://www.usbr.gov/uc/albuq/water/>) provides the current year's monthly data for the operation and water accounting of the SJ-C Project. An area map of the SJ-C Project is provided below in figure 3.

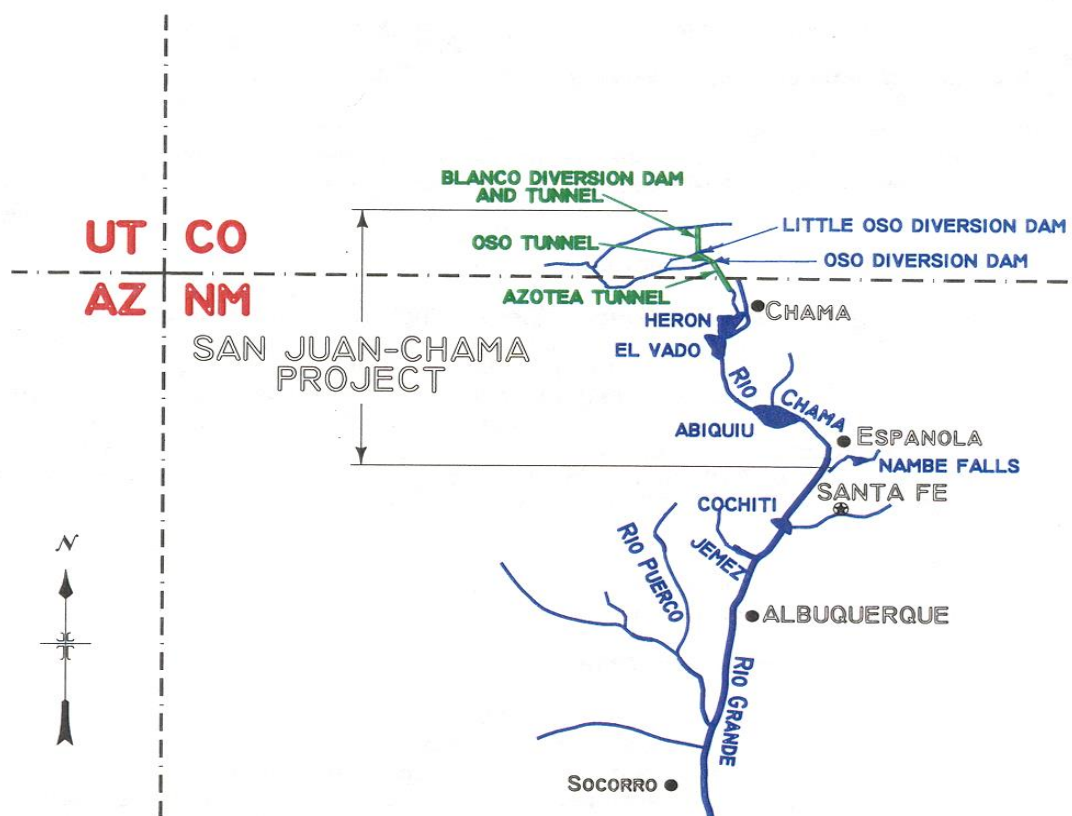


Figure 3: Area Map of the San Juan-Chama Project

## 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 SJ-C Project water must be accounted for separately from native Rio Grande flow, and must be fully consumed within New Mexico.

Reclamation is responsible for water contracts and accounting for the SJ-C Project. For several years, reports generated using an Excel<sup>®</sup> developed by Reclamation were compared to those generated with Crystal Reports<sup>®</sup>, which mines RiverWare<sup>®</sup> accounting data from Reclamation's hydrologic database (HDB). Results have been favorable, and in 2013 and 2014 the accounting report was generated using Crystal Reports<sup>®</sup>. SJ-C Project accounting for 2014 is provided in the separate *2014 Water Accounting Report*.

## Heron Dam and Reservoir Operations

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

Diversions into the Azotea Tunnel began on February 16 and ended on November 17, 2014. The total volume diverted through the tunnel was 60,030 ac-ft. The running 10-year average Azotea Tunnel diversions decreased slightly this year, from 94,999 ac-ft for the period 2004 through 2013, to 92,514 ac-ft for the period 2005 through 2014 (Table 2).

Heron Reservoir began the year at an elevation of 7,108.88 feet (88,807 ac-ft) and finished the year at an elevation of 7,096.80 feet (65,700 ac-ft) which also marked the lowest point of the year. The reservoir peaked at an elevation of 7,119.29' (112,918 ac-ft) on June 9.

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

AZOTEA	YEAR										10 YEAR TOTAL
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
MONTH	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
JANUARY	0	0	0	0	0	0	0	0	0	0	0
FEBRUARY	93	0	179	0	272	0	0	0	0	227	771
MARCH	1,931	706	12,976	4,745	5,938	546	2,008	7,014	1,036	1,984	38,884
APRIL	31,720	17,799	17,745	25,816	19,111	21,908	13,570	18,133	7,068	13,808	186,678
MAY	45,146	25,674	33,837	44,461	51,766	35,368	22,315	17,032	16,844	20,251	312,694
JUNE	50,209	7,600	26,679	47,463	23,544	27,249	42,779	4,037	8,387	18,851	256,798
JULY	13,347	3,785	4,302	13,428	4,392	1,815	8,404	670	511	1,550	52,204
AUGUST	3,779	4,868	7,375	2,606	232	1,501	1,594	260	3,115	788	26,118
SEPTEMBER	3,360	5,567	1,948	1,465	99	712	1,852	76	4,930	902	20,911
OCTOBER	4,873	12,795	33	0	0	251	4,452	0	2,761	1,334	26,499
NOVEMBER	735	0	0	0	0	53	1,295	0	1,049	335	3,467
DECEMBER	0	0	0	0	0	0	52	0	59	0	111
ANNUAL	155,193	78,794	105,074	139,984	105,354	89,404	98,321	47,222	45,760	60,030	925,135

Calendar year 2014 marked the first year where the full allocation of 96,200 ac-ft was not



delivered to the SJ-C Project contractors. Approximately 89% of the allocation was made throughout the year as water became available. The SJ-C contractors' 2014 and waived 2013 annual allocations were delivered as shown in Table 3, for a total delivery of 77,260 ac-ft. The remaining 2014 allocations are being held in Heron according to waivers which grant an extension for the delivery date for several contractors into 2015. Table 4 presents actual monthly Heron water operations for the 2014 calendar year.

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

SJ-C HERON RELEASE	MIRGCD	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	RECLAMATION	EL PRADO	TAOS PUEBLO	TOWN OF TAOS SETTLEMENT	TOTAL	
MONTH																						
ALLOCATION	19,900	5,230	375	5,000	48,190	1,030	400	1,190	1,000	15	400	400	500	60	6,500	1,900	2,990	40	2,215	366	96,190	
JANUARY	0	2,493	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,493
FEBRUARY	0	2,275	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,275
MARCH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
APRIL	5,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,100
MAY	0	0	0	0	4,259	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,259
JUNE	5,220	0	0	0	17,191	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22,411
JULY	6,316	0	0	0	17,645	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23,961
AUGUST	0	0	0	0	9,106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,106
SEPTEMBER	0	0	0	0	0	0	0	0	228	0	0	0	0	0	0	0	0	0	0	0	0	228
OCTOBER	0	0	0	195	0	249	0	0	637	0	72	0	0	0	0	0	0	0	0	0	0	1,153
NOVEMBER	0	0	0	879	0	0	0	0	0	0	0	0	0	0	0	0	1,140	0	0	0	0	2,019
DECEMBER	0	0	334	2,616	0	0	0	0	0	0	0	0	0	0	0	0	1,305	0	0	0	0	4,255
2014 CY TOTAL	16,636	4,768	334	3,690	48,201	249	0	0	865	0	72	0	0	0	0	0	2,445	0	0	0	0	77,260

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

HERON STORAGE	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	
MONTH	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DEC. 2013						345	87742	88087	7108.88
JANUARY	57	0	57	2493	82	0	85512	85512	7107.65
FEBRUARY	512	227	108	2275	355	404	83109	83513	7106.67
MARCH	295	1980	256	0	313	443	84780	85223	7107.51
APRIL	822	13780	511	5100	864	753	92597	93350	7111.29
MAY	1067	20210	1571	4259	598	250	107951	108201	7117.48
JUNE	1483	18813	1394	22411	1232	339	103122	103461	7115.59
JULY	698	1547	798	23961	113	240	80598	80838	7105.32
AUGUST	236	786	97	9106	462	379	71819	72198	7100.65
SEPTEMBER	46	900	46	228	691	379	71802	72181	7100.64
OCTOBER	371	1331	426	1159	384	325	71593	71918	7100.49
NOVEMBER	177	334	144	2019	304	357	69605	69962	7099.36
DECEMBER	181	0	189	4255	0	350	65350	65700	7096.80
SUB-TOTAL	5,945	59,908	5,597	77,266					
ADJUSTMENT						-350			
ANNUAL		65,853		82,863	5,398	0	65,700	65,700	

## Heron Dam Facility Review and Safety of Dams Programs

There are no significant dam safety related operations and maintenance issues associated with Heron Dam and Dike other than aging infrastructure. Currently, there are three incomplete Category 2 O&M recommendations for Heron Dam<sup>1</sup>.

The Bureau of Reclamation's Western Colorado Area Office was contracted to complete the normally inaccessible features examination of Heron Dam's toe drains in March of 2014. A Remotely Operated Vehicle (ROV) and Closed Circuit Television System (CCTV) were used to access and inspect as much of the drains as physically possible. The drains were found to be dry and clear of water, and only a few areas of accumulated debris were noted. Overall, the drains were determined to be in good condition. This work completes O&M recommendation 2013-2-A.

Category 2 O&M recommendation 2013-2-B from the 2013 Comprehensive Review (CR) calls for abandoning the hydraulic piezometer system at Heron, which is no longer functional. It was originally planned to back-fill the piezometer well with sand, but a thorough review of the O&M Guidelines discouraged this route. The Albuquerque Area Office (AAO) has solicited guidance from Denver Technical Services Center (TSC) on the appropriate method to complete this recommendation. The Chama Field Division is currently monitoring the piezometer well on a monthly basis to verify no seepage into the well is occurring.

The Facility Review Rating was updated in September 2014. The total score for Heron is 90, which is the same as the total score in 2013. Heron currently has an overall rating of "Good".

## Pojoaque Tributary Unit - Nambé Falls Dam and Reservoir

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

Nambé Falls began 2014 with a reservoir elevation of 6,825.25' feet (1,842 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 twice in 2014. The maximum elevation for the year was 6,827.08 feet (1,948 ac-ft) on May 4. The reservoir initially filled in February and remained full until June 27, when irrigation releases began and reservoir storage and elevation started falling. The reservoir fell about 4 feet before monsoon rains refilled it. Irrigation releases resumed in late August. The reservoir reached a low point of elevation at 6,806.05 feet (966 ac-ft) on October 17 and ended 2014 at elevation 6,807.76 feet (1,029 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

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<sup>1</sup> <http://www.usbr.gov/recman/fac/fac01-07.pdf>

season (May through October), water is stored and released on demand to meet downstream requirements.

A net depletion of 250 ac-ft was calculated for Nambé Falls operations for 2014. The depletion amount (plus transportation loss) was released from Heron and Abiquiu Reservoirs throughout 2014. Table 5 provides a summary of Nambé Falls use above Otowi and the Pojoaque Unit return flow credit used to calculate depletions during 2014. A summary of 2014 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	2,493	0	1,079	3,572	413	75	56	27	3,880
FEBRUARY	2,275	0	486	2,761	514	60	67	22	3,170
MARCH	0	0	2,795	2,795	411	60	4	19	3,161
APRIL	5,100	0	18	5,118	2,705	127	21	18	7,694
MAY	4,259	1,006	0	3,253	13,255	184	18	17	16,323
JUNE	22,411	11,953	0	10,458	7,431	276	5	12	17,620
JULY	23,961	3,953	0	20,008	-8,105	327	194	13	11,395
AUGUST	9,106	0	2,036	11,142	-4,767	180	145	40	6,090
SEPTEMBER	228	0	13,391	13,619	-1,593	258	0	35	11,802
OCTOBER	1,159	0	1,087	2,246	2,282	65	18	83	4,528
NOVEMBER	2,019	0	778	2,798	-459	52	31	46	2,302
DECEMBER	4,255	0	228	4,483	-1,582	75	52	30	2,803
ANNUAL	77,266	16,912	21,898	82,253	10,505	1,739	611	362	90,768

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
OPERATIONAL			IRRIGATION					
MONTH	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DEC. 2013							1,843	6,825.25
JANUARY	297	240	0	15	3	259	1,881	6,825.93
FEBRUARY	257	189	0	2	6	197	1,941	6,826.96
MARCH	412	408	0	0	13	421	1,932	6,826.81
APRIL	740	719	0	0	17	736	1,935	6,826.87
MAY	1,170	1,152	0	0	18	1,171	1,935	6,826.86
JUNE	1,130	1,121	0	57	29	1,207	1,857	6,825.51
JULY	725	525	0	276	6	808	1,775	6,824.02
AUGUST	936	786	0	209	10	1,005	1,706	6,822.73
SEPTEMBER	424	417	0	588	7	1,013	1,117	6,810.04
OCTOBER	341	320	0	152	5	477	981	6,806.48
NOVEMBER	340	308	0	21	4	333	989	6,806.69
DECEMBER	329	276	0	11	2	289	1,029	6,807.76
ANNUAL	7,101	6,461	0	1,331	120	7,916	1,029	6,807.76

## Nambé Falls Dam Facility Review and Safety of Dams Programs

There are no significant dam safety related operations and maintenance issues associated with Nambé Falls Dam other than aging infrastructure. Currently, there is one incomplete Safety of Dams (SOD) recommendation and four incomplete Category 2 O&M recommendations for Nambé Falls Dam<sup>2</sup>.

The Dam Safety Advisory Team (DSAT) review for the FY 2013 CR was completed in January of 2014, and the final CR Report was distributed on February 24, 2014. As a result of the CR, three new category two O&M recommendations were developed. One existing recommendation, 1995-2-D, was deleted and reissued as 2013-2-A. Three existing recommendations, 2007-2-C, 2007-2-G, and 2007-2-H were determined to be complete during the CR review process.

The Standing Operating Procedures (SOP) for Nambé Falls was updated in March of 2014, including a complete revision of Chapters I-IV. New photographs, plates, and drawings were included in the revised and distributed SOPs.

Denver TSC transmitted Technical Memorandum No. NAM-8668130-TM-2014-1 “Nambé Falls Dam Flat Jack Grouting Report” on August 30, 2014, which completes existing recommendation 2003-SOD-A. Recommendation 2003-SOD-A states “Permanently grout the flat jacks at Name Falls Dam during a time of low flat jack pressures (i.e. low temperatures).” The flat jacks at Nambé Falls Dam were grouted in 2009, but the recommendation was considered incomplete pending the completion of the report.

<sup>2</sup> <http://www.usbr.gov/recman/fac/fac01-07.pdf>

The Pueblo of Nambé was able to secure funds to contract with Denver TSC to complete another bathymetric survey of the delta area of Nambé Falls Reservoir. This survey was completed in May 2014. The results of this survey were compared to the March 2013 survey in order to determine the additional accumulation of sediment deposited in the delta area during September 2013 storm events. The Pueblo of Nambé is receiving grant funding through the Federal Emergency Management Agency (FEMA) to pay for excavation and removal of this volume of sediment from the reservoir pool. This work is expected to occur in early CY 2015.

Through a financial agreement with the U.S. Army Corps of Engineers (USACE) Albuquerque District, AAO's Technical Services Division completed "Technical Assistance Report for Nambé Pueblo, Pacheco and Molina Complex Fire Response, Rio Nambé Flood and Sedimentation Measures" in November 2013. The report provides hydrologic analysis, preliminary upstream earthen fill dam sedimentation basin design options, and a reservoir dredging alternative for management of the increased sediment inflow that is being experienced as a result of the burned upstream watershed.

The Facility Review Rating was updated in September 2014. The rating for Nambé Falls increased from a total score of 71 to a score of 90, which gives the facility an overall rating of "Good". The drastic increase in the total score was due to the completion of a number of long standing O&M recommendations.

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

Abiquiu Dam and Reservoir is a USACE facility. Public Law (P.L.) 97-140 authorizes storage of up to 200,000 ac-ft of SJ-C Project water in Abiquiu Reservoir. A new area/capacity table was implemented on May 1 which reflected the latest sediment survey conducted on the reservoir. The new table re-established the original volume allocated to SJ-C contractors based on the easement obtained by the City of Albuquerque [now the Albuquerque Bernalillo County Water Utility Authority (ABCWUA)] which is calculated as the total capacity at the top of the SJ-C storage pool (elevation 6,220.00 feet). The volume of sediment in the reservoir was re-calculated and the difference between hypothetical sediment volume accumulated since the last survey and the actual volume was credited to the Rio Grande account. This water was then released to Elephant Butte which coincided with the spring runoff peak on the main stem of the Rio Grande. The volume of SJ-C water in storage in Abiquiu Reservoir peaked on January 1, 2014, at 154,677 ac-ft. Abiquiu ended 2014 with 128,586 ac-ft of SJ-C water in storage. Table 7 provides a summary of monthly operations and water accounting for Abiquiu Reservoir.

Table 7: 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. 2013	4339	13476	4582	2130	0	180	4093	97	150413	154603
JANUARY	550	3432	647	3845	0	274	4093	0	149626	153719
FEBRUARY	937	2738	905	3253	-1	439	4093	33	148673	152799
MARCH	1411	2856	1440	3267	-2	701	4093	6	147561	151660
APRIL	16957	5062	17604	7767	-1	1402	4107	-640	143454	146920
MAY	36758	2621	35781	15876	61	1609	18	275	128589	128882
JUNE	12251	10307	12522	17738	4	2208	27	0	118950	118978
JULY	11390	19855	11401	11750	-4	1036	44	-6	126019	126057
AUGUST	17167	11451	17161	6684	-1	1269	58	0	129517	129575
SEPTEMBER	15058	13377	15063	11783	-6	1279	73	1	129831	129905
OCTOBER	5419	1438	5432	3720	-2	144	73	-10	127405	127468
NOVEMBER	3579	2829	3509	2370	0	268	74	60	127595	127729
DECEMBER	9276	4281	9938	2699	-1	65	75	-602	129112	128586
ANNUAL	130,753	80,247	131,403	90,752	47	10,694				

During 2014, Reclamation had a storage agreement with the 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, 16,126 ac-ft of leased SJ-C water was released from Abiquiu by Reclamation for endangered species purposes, namely the Rio Grande silver minnow (silvery minnow). This does not include water released from El Vado under the Emergency Drought Water Agreement.

## 2015 San Juan - Chama Outlook

On December 31, 2014, Heron Reservoir had 2,474 ac-ft of SJ-C Project storage. This amount is well below the calculated firm yield of 96,200 ac-ft, and is insufficient for a full annual allocation for all contractors prior to the 2015 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."

Heron Reservoir's dead pool, or water that cannot be drained by gravity through the outlet works, is 1,218 ac-ft. The available Project storage must also cover evaporation from the reservoir until runoff begins in the spring, which usually begins in March. Therefore, contractors were notified that there was no initial allocation on January 15, 2015. Subsequent allocations will be made monthly, beginning in April. They will continue until either a full allocation is received or the end of the calendar year.

## 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.

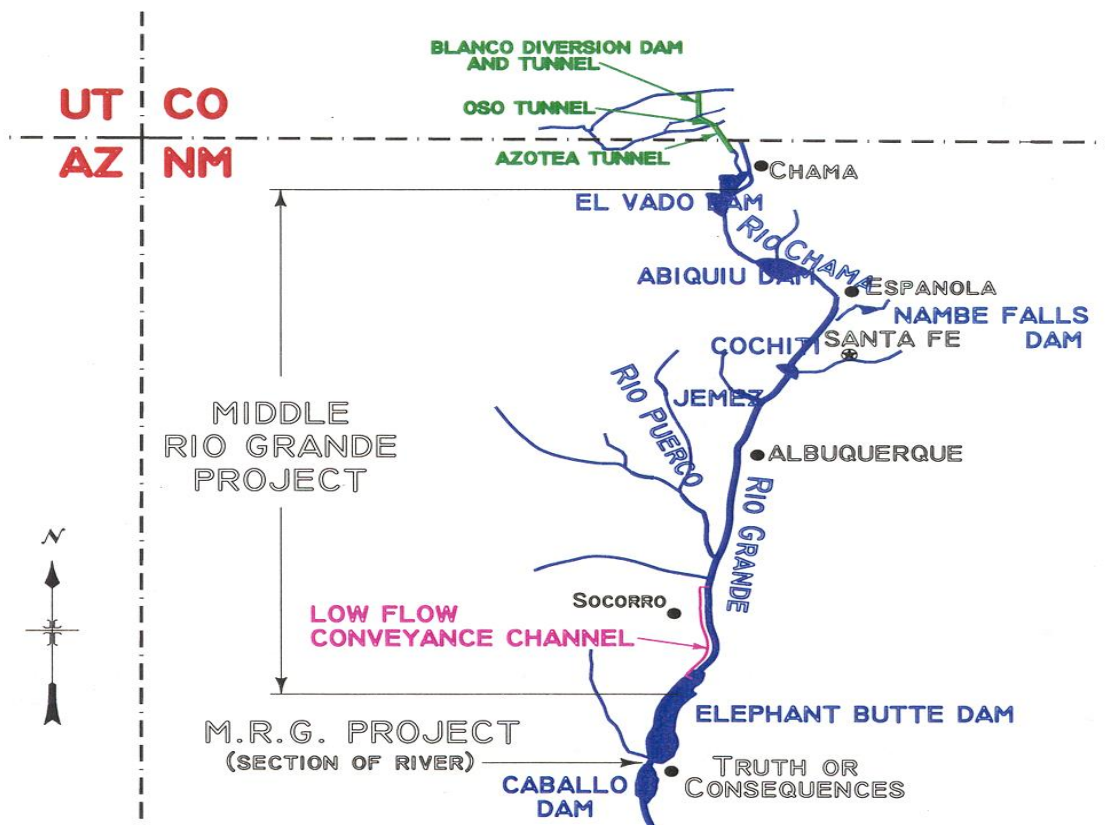


Figure 4: Area Map of the Middle Rio Grande Project

### 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 2014. 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.

### Emergency Drought Water

Emergency Drought Water (EDW) is water stored and made available by the State of New Mexico under the Emergency Drought Water Agreement (EDWA) as a conservation pool above Elephant Butte Reservoir. The water is stored for the benefit of the Middle Rio Grande Project

and the listed endangered species within the project reach.

During 2014, 21,316 ac-ft of EDW was captured in El Vado Reservoir for the benefit of the Middle Rio Grande Conservancy District (MRGCD) under the Emergency Drought Water Agreement (EDWA), and additional 11,035 ac-ft water was captured as part of Reclamation's remaining EDW balance. The balance of EDW available for capture and storage by Reclamation and MRGCD during 2015 or later years is 27,630 ac-ft. Reclamation's balance for use as supplemental water for endangered species is 8,374 ac-ft. MRGCD's balance is 19,258 ac-ft.

Neither Reclamation nor the MRGCD started 2014 with any EDW stored in El Vado Reservoir. At the end of the year, only Reclamation had any left, with 2,634 ac-ft of EDW remaining in storage to be used in 2015.

## **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 2014 at an elevation of 6,791.27 feet (5,345 ac-ft) which was also the low point for the year. The reservoir peaked on August 7 at an elevation of 6,849.72 feet (64,980 ac-ft). The reservoir ended the year at elevation 6,805.41 (13,928 ac-ft).

MRGCD began the year with 0 ac-ft of EDW, 36 ac-ft of general Rio Grande storage, and 0 ac-ft of SJ-C Project water available in El Vado for Middle Valley irrigation. This was in addition to MRGCD's curtailed preliminary 2014 allocation of 6,067 ac-ft in Heron Reservoir, and a beginning year balance of 402 ac-ft of SJ-C Project water stored in Abiquiu Reservoir. The 2014 allocation in Heron was brought up to 18,581 ac-ft by the end of the year which was just under 89% of their full allocation of 20,900 ac-ft. At the end of the year in El Vado, MRGCD had 0 ac-ft of EDW, 0 ac-ft of general Rio Grande storage, and 0 ac-ft of SJ-C Project storage. MRGCD also had 0 ac-ft of SJ-C Project water stored in Abiquiu as of December 31, 2014.

A total of 18,000 ac-ft of water was captured and stored for Prior and Paramount irrigation while under Article VII restrictions. No water was released to meet Prior and Paramount needs during the irrigation season. Finally, 11,388 ac-ft were transferred to the City of Santa Fe account on November 24 with a like amount transferred from Santa Fe's account to the Rio Grande account in Elephant Butte. The remaining 5,615 ac-ft in storage were released to Elephant Butte between November 24 and December 25.

The total SJ-C Project water in El Vado storage at the end of the year was 13,928 ac-ft which belonged to the City of Santa Fe and Reclamation, in both leased SJ-C Project water and EDWA storage. Table 8 provides a summary of monthly operations and water accounting for El Vado Reservoir.



Table 8: 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. 2013	-5,310	3,681	4,136	13,319	23	-9,502	36	5309	5345
JANUARY	3,372	2,493	36	3,572	6	0	3,366	4230	7596
FEBRUARY	4,122	2,275	0	2,761	37	3	7,451	3741	11192
MARCH	6,280	0	190	2,795	49	8	13,492	938	14430
APRIL	37,781	5,100	15,964	5,118	143	7	35,165	913	36078
MAY	37,821	4,259	24,819	3,253	236	7	47,931	1912	49843
JUNE	10,475	22,411	9,944	10,458	372	97	48,090	13768	61858
JULY	2,966	23,961	5,317	20,008	256	76	45,484	17644	63128
AUGUST	3,119	9,106	14,800	11,142	149	98	33,654	15510	49164
SEPTEMBER	1,411	228	13,378	13,619	130	144	21,556	1976	23532
OCTOBER	3,441	1,159	5,061	2,246	128	5	19,808	884	20692
NOVEMBER	-7,585	2,019	4,722	2,798	97	-11,414	7,404	11520	18924
DECEMBER	3,778	4,255	8,434	4,483	114	-2	2,634	11294	13928
ANNUAL	106,981	77,266	102,665	82,253	1,717	-10,971			

## El Vado Dam Facility Review and Safety of Dams Programs

The Corrective Action Study (CAS) recommended in 2011-SOD-A to investigate hydrologic failure modes at El Vado Dam continued during FY 2014. A new CAS was also started during FY 2014 to begin the investigations called for by recommendation 2013-SOD-A.

Recommendation 2013-SOD-A calls for an investigation to determine where uncertainties exist and where risk reduction can be achieved based on the current understanding of the static risks at El Vado Dam.

The intake grates for the Los Alamos County power plant were captured and lifted off of the intake structure when the reservoir iced over at the same elevation as the grates. The grates, which are only held in place by gravity and have no other mechanism to positively secure them in place, were lifted off of the structure as the reservoir inflows increased causing the water surface to raise. Los Alamos County personnel cut holes through the ice to secure the ice-encased intake grates with cables to prevent them from falling inside their intake structure when the ice melted. Once the ice melted off in spring, Los Alamos County contracted with a dive team to place the grates back in place on top of the power plant intake structure.

A Field Exploration Request (FER) was completed on the faceplates of the dam in April of 2014. This FER consisted of cutting three 3 ft by 3 ft holes through the upstream faceplates to inspect and sample the embankment material and determine the existence and size of voids behind the faceplates. The steel samples of the removed faceplate panels are being analyzed by Denver TSC. Final results of the faceplate analysis are pending. New steel plates were welded over the holes.

An inspection of the exposed intake structure was completed in January of 2014. The reservoir water surface elevation was at 6,794 ft, which exposed 16 ft of the intake structure for a detailed inspection. The outside of the side grates and inside of the structure were visually inspected, and found to be in extraordinarily good condition. There is only minimal rust and corrosion visible on the grates. The concrete has some cracks but is in good condition overall.

In March of 2014, a visual inspection of the upstream faceplates was completed. The only new observation was one area with a broken off section of metal.

There are currently two incomplete SOD recommendations and eleven incomplete Category 2 O&M recommendations for El Vado Dam.

The Facility Review Rating was updated in September 2014. The rating for El Vado increased from a total score of 61 to a score of 63, which gives the facility an overall rating of “Fair”.

## **Cooperative Programs with the State of New Mexico**

In September 2012, a new 5-year Cooperative Agreement (R13CF40001) 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 Delta Channel maintenance and other river maintenance projects, and riverside irrigation drain improvements with water salvage potential.

### **Delta Channel History (formerly known as the Temporary Channel)**

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 very rapid. 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 Delta Channel began in 2000. The current alignment of the Delta Channel begins at River Mile 58 (RM 58) and ends approximately at RM 39.

### **Delta Channel Maintenance**

The lack or presence of high flow conditions in the Delta Channel in 2013 affected the scope of maintenance in 2014. Given the drought conditions in 2013 and the corresponding low peak runoff, the Delta Channel did not experience any breaches during calendar year 2013. There were, however, sections along the channel where the banks narrowed considerably from vegetation encroachment and bank sloughing.

The maintenance work performed along the Delta Channel in 2014 extended from RM 46 upstream to RM 54. Maintenance of the Delta Channel was conducted by NMISC’s contractor, Wilco March Buggies Inc., beginning in January 2014 through March 2014. Channel maintenance efforts involved repair to channel spoil levees, removal of excessive accumulated

sediment and sediment plugs through the delta, improvement of channel alignment within the current footprint, and disturbance of in-channel islands and bar formations in a manner that enhances the potential for downstream migration of sediment within the channel.

In December 2014, Reclamation finalized consultation with the Service and was issued a Biological Opinion (Delta Channel BO) for Delta Channel maintenance activities. The Delta Channel BO expires in April 2017.

### **Irrigation Drain Improvements**

The following work was accomplished in 2014, by the Reclamation Socorro Field Division, under the Cooperative Agreement.

- **Low Flow Conveyance Channel (LFCC) Vegetation Removal:** The purpose of the work on the LFCC is to improve wasteway flow conveyance and water salvage capabilities, improve maintenance access, and reduce potential safety risks to the general public and maintenance crews. Maintenance consisted of removing large vegetation and normal mowing operations. Figure 5 depicts a typical section of LFCC moving and/or vegetation removal. The main section of focus was in between Escondida Park and Brown Arroyo. This work was done by the Socorro Field Division and was in preparation for the USACE levee project in that area.



Figure 5: LFCC mowed areas at Otero Bridge (Jan 2015)

- **LFCC Maintenance below Ft Craig Bridge:** The goal of maintenance work on this portion of the LFCC was to clean sediment and vegetation out of the channel to allow flow in areas that are overgrown. This work is a continuance of a State Cooperative Agreement task order that was issued in 2012. This portion of the maintenance work was funded by Reclamation.

## River Maintenance

Reclamation has authorization for maintenance of the Rio Grande from Velarde, New Mexico, south to the headwaters of Caballo Reservoir under the Middle Rio Grande Project. Responsibilities include maintenance of the river channel, floodplain, project drains, and the 55-mile Rio Grande Conveyance Channel. Project purposes include ensuring effective water delivery, transporting sediment, protecting riverside facilities and property, and preventing flooding. River maintenance includes any work done in the channel and floodplain and includes habitat restoration. Reclamation conducts annual river reviews of conditions of sites and reaches after the spring snowmelt runoff and summer monsoon events. Maintenance needs are prioritized based on these reviews and assessment of geomorphic trends and conditions, public and infrastructure risk, and water delivery effects for the 260-mile reach of the Middle Rio Grande. These needs and services remain important and are joined by newer considerations for habitat improvement to enhance ecological function of the system within the Project's authorization. Maintenance work is achieved through projects involving planning, construction, and adaptive management. All maintenance projects require adaptive and recurring maintenance over the life cycles of each of the project's intended design life.

### River Maintenance Sites

Reclamation is currently pursuing work at 19 sites along the Middle Rio Grande Project reach. Of the active sites, six require an annual review of channel capacity and possible maintenance due to sediment accumulation. In 2014, Reclamation completed work at five sites (San Ildefonso pond, Peralta Canyon Arroyo, Santo Domingo RM 224.6, Santo Domingo RM 223.9, and Santa Ana Pueblo 205.8). At present, work is in progress at three sites and involves the installation of instream bendway weirs located on San Felipe Pueblo immediately upstream of Angostura Diversion Dam. An additional project is also underway at the Truchas Arroyo confluence. In collaboration with the NMISC, work continues through the Delta Channel to maintain a 20-mile temporary channel into the reservoir pool for effective water delivery.

Reclamation's efforts at all maintenance 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.

In the following narrative, the terms "new", "existing", and "adaptive" are used to describe the maintenance sites. New sites are sites that developed following the 2013 Monsoonal high flow events on the Rio Grande. Existing is used to describe sites that are in the process of being completed. Adaptive is used to describe sites that are substantially completed and being monitored for function and performance. High flow events, or the lack thereof, in previous years affected the scope of Reclamation's river maintenance in 2014.

### Truchas Arroyo (New Maintenance Site)

A summer monsoon rainfall runoff flood event occurred on the Truchas Arroyo at approximately RM 283 on August 4, 2013. A large amount of sediment was deposited at the river confluence, constricting the river to as narrow as 10 feet wide in one location and creating a backwater effect upstream of the confluence. This backwater area was reportedly causing a rise in the adjacent

farm land groundwater levels.

The flood event also caused the breach of a non-Reclamation arroyo berm, and deposited a large amount of sediment in the adjacent agricultural orchard, south of the Truchas Arroyo. The flood flows traveled through the orchard and breached the southern La Rinconada Dike approximately 800 feet downstream. The dike did not fail on the river side, the portion meant to withstand high flows, but instead was breached by arroyo flows on the land side.

A Reclamation crew has monitored the site and collected elevation data in January and July, 2014. Surveys have shown the reduction of the sediment deposit. Figure 6 shows the difference in the original sediment deposit (left) and the remaining amount (right) after the river has mobilized the sediment for just under a year. The river has moved much of the small material leaving the larger material to armor the bed. Reclamation began removal of the sediment deposit in January 2015. The breach in the La Rinconada Dike will not be fixed during the time of the sediment deposit removal due to new trees being planted in the orchard. The new trees do not allow space for Reclamation construction equipment. Reclamation will pursue a small contract with a private contractor to repair the dike in Fiscal Year 2016.



Figure 6: Looking upstream at the Rio Grande River and Truchas Arroyo Confluence (Sept 2013 & July 2014, respectively, Benoit)

### **San Ildefonso Pond (Adaptive Maintenance Site)**

This priority site is located at 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. 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 longer term solution was divided into two phases. The first phase involved construction of seven bendway weirs; the second phase involves installing a floodplain side channel on the west side to complement bendway weir

work from the first phase. The first phase was completed in March 2013 with vegetation being planted on the created floodplain terrace in January 2014. The second phase was constructed from January 2014 to March 2014. This site has undergone natural adjustments (bed lowering and widening) since the project completion, as can be seen in the time sequence of pictures in figure 7.



Figure 7: Floodplain side channel at San Ildefonso Priority Site, 0 and 6 months after construction (March 2014 and September 2014, respectively, AuBuchon)

### **Peralta Arroyo (New Maintenance Site)**

The confluence of the Peralta Arroyo and the Rio Grande is located about 2.7 miles downstream of Cochiti Dam within the Pueblo de Cochiti. The watershed of the Peralta Arroyo was burned by the 2011 Las Conchas fire, which has affected the stability of the slopes on the upper watershed. With less stable slopes from lack of vegetation and a modified soil structure, soil erosion has increased. On September 13, 2013, a rainfall event produced an estimated peak discharge of about 9,000 cfs in the Peralta Arroyo. The USGS' "Rio Grande at San Felipe-08319000" gage (approximately 16 miles downstream of the confluence on the Rio Grande) recorded a provisional peak discharge of 9,490 cfs at 1:30 pm on that day. Much of the sediment transported by the Peralta Arroyo during this event was deposited in the Rio Grande at the arroyo confluence. Sediment deposits completely blocked the river channel and caused overbanking to occur on a terrace to the east of the Rio Grande. There was water ponding from that event observed along an unconsolidated spoil levee system and seepage through the spoil levee was also noticed.

Reclamation, the USACE, and the Pueblo de Cochiti worked to develop a mutually acceptable alternative to deal with the limited channel capacity in the Rio Grande caused by the sediment block. The alternative involved excavation of a pilot channel through the sediment block and augmentation of natural flow paths on the eastern terrace. The goal of the pilot channel and the flow augmentation work was to reduce the time needed for the river to naturally adjust and provide a minimum channel capacity of 5,000 cfs. On October 8, 2013, work began on the first phase, excavation of a pilot channel through the sediment at the Peralta Arroyo confluence. The pilot channel was opened on October 9, 2013.

The second phase is augmentation of natural flow paths to take advantage of overbanking on the existing eastern terrace, in an effort to develop side channels through the terrace. Three side channels were excavated on the eastern floodplain. The construction of the first side channel closest to the main channel only required lowering of the inlet so that overflowing flows slightly below 3,000 cfs would follow an existing flow path on the eastern terrace. The second side channel has the inlet approximately 0.5 foot higher than that of the first side channel and was anticipated to flow at discharges slightly above 3,000 cfs. The third side channel is the most eastern side channel (figure 8). This side channel has a berm on the east side to provide short term floodplain capacity in advance of the anticipated geomorphic changes that will provide a long term floodplain capacity. The third side channel, with a bottom elevation 0.5 foot higher than the second channel, is anticipated to flow before significant overbanking flows for any of the side channels occur. Besides the three side channels, there is also a redirection berm and ditch. This feature is meant to strategically intercept and redirect overbanking flows from an upstream oxbow area so that it does not affect the unconsolidated spoil levee system. The construction of the flow augmentation work was completed in April 2014 and an as-built survey was performed in May 2014. The design at this project site had a dual purpose of providing adequate channel capacity and creating an opportunity to increase vegetation diversity. Reclamation has been working with the Pueblo de Cochiti on a P.L. 93-638 contract to facilitate planting, monitoring, and maintenance of vegetation on the eastern terrace for at least three years, as well as monitoring geomorphic changes and biological response of the project.



Figure 8: Three Side Channels (Dec 2014)

### **Santo Domingo (Existing Site)**

There are currently three river maintenance sites (RM 225.1, RM 224.6, and RM 223.9) where maintenance work was required on the reach of the Rio Grande passing through the Pueblo of Santo Domingo. Bankline erosion on the west side of the river is the 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 as Phase 1, and RM 224.6 and RM 223.9 as Phase 2. Detailed designs, construction drawings, a project description, and environmental compliance for RM 225.1 were completed in September 2012. Construction began for this site in October 2012 and was completed in January 2013. 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 were completed in 2013. Construction for RM 224.6 started in October 2013 and was complete in February 2014. Construction for RM 223.9 began in February 2014 and was completed September 2014. The construction work at RM 223.9 realigned the middle channel and altered the main flow path of the river. Figure 9 below shows the realignment of the center channel along with the installed longitudinal stone toe and bioengineered bank.



Figure 9: Looking upstream after completion of RM 223.9 Site

### **San Felipe (Adaptive Maintenance and Existing Sites)**

There are 10 river maintenance priority sites on the Pueblo of San Felipe; four have been completed and six are active sites. Construction at the four completed sites ended in March 2013. Monitoring and re-planting of vegetation at these sites is ongoing. For the remaining six sites, Reclamation worked with the Pueblo of San Felipe and selected preferred alternatives in October 2012. Among the six remaining sites, the three downstream-most sites are grouped together and being built as one project. The remaining three upstream sites are still planned to each be independent constructed projects.

Design work for the upstream site group was finalized in September 2014. The priority site at RM 214.4 will involve a stepped riprap revetment and blocking a side channel. Bendway weirs will be installed at RM 212.8 in conjunction with bar lowering. A longitudinal stone toe



protection feature is planned for RM 211.3. Environmental compliance for the upstream sites is expected to be completed in 2015 prior to the anticipated start of construction in winter 2015 - 2016.

The three sites for the downstream project are on two consecutive meander bends on the Rio Grande between RM 210 and 210.3. In the design process, it was decided that combining the three sites into one comprehensive project would be helpful in evaluating impacts between sites. The selected preferred alternative was a combination of the longitudinal fill stone toe protection (LFSTP) and bendway weir alternatives coupled with the removal and/or destabilization of bars. The construction of the downstream sites started in September 2014. As of January 2015, 13 bendway weirs were constructed along the east bankline (figure 10) and construction of the LFSTP along the west bankline was initiated. Bar removal on the western floodplain is on-going (figure 11). It is expected that construction at this downstream group of sites will continue through most of this year. Coyote willow planting is also planned with certain design features. Planting is expected to occur in the dormant season following completion rock feature construction.



Figure 10: Placement of riprap for bendway weir (October 2014, Bui)



Figure 11: Bar excavation on west floodplain (December 2014, Bui)

### **Santa Ana Restoration (Adaptive Maintenance Site)**

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. Adaptive management projects at this site have been implemented four times since the original project construction (2005, 2008, 2009, and 2012). The adaptive management projects included lowering the elevation of backwater areas in 2005, adding flanking protection in 2008, placing bendway weirs in 2009, and constructing a longitudinal fill stone toe with tie backs in 2012. Re-vegetation with native vegetation was accomplished at all of these sites through a P.L. 93-638 contract with the Pueblo of Santa Ana. In 2014, the terms of this contract were completed, which concludes the planned work under this large scale project.

### **Santa Ana River Mile 205.8 (Existing Maintenance Site)**

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. An island and bar lowering project, undertaken by USACE 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 P.L. 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 in May 2012. Final designs, construction drawings, and environmental compliance were completed in 2013.

The design of the project involved the placement of nine bendway weirs and the creation of a low elevation floodplain in the vicinity of the eroded bankline. The construction of the project started in August 2014 and was completed in October 2014. Reclamation and the Pueblo of

Santa Ana have been working on a new Public Law 93-638 contract for planting vegetation, monitoring of vegetation, and collecting of hydraulic data to help assess geomorphic changes at the project site for the next three years.

### **Drain Unit 7 Extension Spoil Levee (New Maintenance Site)**

High flows from monsoonal rains in 2013 caused overbanking which overtopped and saturated the spoil levee in between the Rio Grande and Drain Unit 7 Extension. This led to failure of the spoil levee at one location and near failure at another. Emergency repairs to both areas took place in September 2013. A more permanent repair was made early in 2014 by utilizing locally available fill material.

### **Drain Unit 7 Priority Site (Adaptive Maintenance Site)**

The Drain Unit 7 River Maintenance Priority Site is located 500 feet upstream of San Acacia Diversion Dam, on the right bankline of the Rio Grande at RM 116.3. The river was actively eroding a spoil levee embankment that protects the Drain Unit 7 Extension irrigation structure. The design at this site involved protection of the Drain Unit 7 Extension spoil levee with riprap along the river side of the eastern spoil levee for a length of approximately 1,030 feet. Construction of the first two phases of this work was completed in 2009 and provided protection for 650 feet of the spoil levee. The final phase 3 work to extend the riprap protection for the remaining 380 feet to achieve the full design length is being done currently and as originally designed is being placed on an as necessary basis (i.e. adaptive maintenance). A site visit in 2013, detected a meander bend that threatened to flank the riprap protection placed in the first two phases. Plans for implementing the third phase were then put into motion. Construction work for the third phase began in December 2014 (figure 12) and is expected to be completed in early 2015. The third phase of work will tie into an existing rock groin field, providing future flanking protection.



Figure 12: Construction on Phase 3 at the Drain Unit 7 Priority Site (December 2014, AuBuchon)

### **Bosque del Apache Sediment Plug and Habitat Restoration Project (Existing Maintenance Site)**

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 New Mexico Interstate Stream Commission (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.

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 from 2008 to 2012. In 2012, Reclamation completed the monitoring requirements as stipulated by the 2008 Biological Opinion.

The 2008 Biological Opinion also required the development of alternatives to pilot channel construction to address recurring plug formation within the Middle Rio Grande between Highway 380 and the San Marcial Railroad Bridge. There were 14 alternatives developed in 2013 as plausible long-term solutions.

In 2014 the multi-agency project team consisting of Reclamation, BDANWR, the Service, and the USACE selected an east realignment strategy as the preferred alternative for addressing the ecological and engineering concerns affecting the Rio Grande from RM 79 north to RM 86. Preliminary analysis of suitable alignment alternatives, channel widths and depths was also done in 2014. It is anticipated the project team will continue to develop channel hydraulic models, analyze groundwater levels, and assess habitat conditions to establish the alignment that maximizes ecological benefits.

### **Fort Craig Bend and River Mile 60 (Existing Maintenance Sites)**

Historically, the Rio Grande has been a wide, braided, and relatively straight river channel. During recent years, the degree of meandering has increased in several areas as a more sinuous planform has developed. This has caused the formation of multiple bends including Fort Craig Bend near RM 64 (figure 13) and the S-curve bend at RM 60. The outside of these bends are near the western edge of the confined floodplain and adjacent to the spoil levee and the LFCC. Continued bank erosion and lateral migration at these locations threatens to breach the spoil levee and cause damage to the LFCC, access road, and Fort Craig pump site. Downstream water delivery and habitat for endangered species are also likely to be negatively impacted by a breach. A multi-disciplinary project team is currently being established to develop and evaluate alternatives to reduce maintenance frequency, increase water salvage, and enhance wildlife habitat. The multi-disciplinary project team decided to combine Fort Craig Bend and RM 60 into one comprehensive project because the two sites are close to each other.



Figure 13: Fort Craig Bend, pump site, and LFCC (December 2014, Aubuchon)

### **Truth or Consequences (Existing Maintenance Site)**

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. A new regional permit was obtained to extend Reclamation’s Clean Water Act compliance through 2022, facilitating annual maintenance responsibilities in this reach of the Rio Grande.

### **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. A final report is posted on the following internet site:

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

This maintenance plan is 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 guides involve 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 regards to reach based planning and developing ecological criteria

for endangered species suitable habitat to compliment current water delivery and public health and safety factors. Planning is underway to evaluate the geomorphic reaches from Isleta downstream to Elephant Butte in support of reach based planning. This lower reach has been identified as a high priority reach for habitat restoration and meeting ecological goals.

### **Determination of River Maintenance Need at Individual Sites and Reaches**

Reclamation has completed the annual 2014 Determination of River Maintenance Need which involved a joint workshop between Reclamation's Denver Technical Service Center and the AAO River Analysis Group. The Determination of Need ratings follows a newly developed technical rating system for sites and reaches along the river channel that integrates information involving channel instability, bank erosion, and loss of channel capacity with potential for impacts to riverside infrastructure, public health and safety, and water delivery for the 260-mile reach of the Middle Rio Grande. During the joint workshop, all monitored, existing, and completed sites were rated utilizing the new methodology and criteria developed. A total of 86 sites and 11 reaches were evaluated. A final report was completed on July 2014.

Five distinct maintenance classes are identified by the assessment. The maintenance classes designation helps define the apparent urgency related to addressing any need. Below is a description of the new maintenance class designations:

- Maintenance Class 1 – Maintenance is required in the short term (typically before the next high flow event or could be required immediately) because there is a high likelihood of substantial consequences if no action is taken.
- Maintenance Class 2 – Maintenance can be planned in advance but the consequences of no action could be substantial in the near term (the next normal spring runoff or within the next few years). This class includes the majority of ongoing or normal river work at existing and new sites.
- Maintenance Class 3a – Maintenance can be planned in advance and the consequences of no action are less likely to be substantial in the near term (the next normal spring runoff or within the next few years). Work can be described as preventative maintenance and also includes habitat enhancement.
- Maintenance Class 3b – Maintenance can be planned in advance and the consequences of no action are less likely to be substantial in the near term (the next normal spring runoff or within the next few years). Data collection and/or analysis are required to determine if preventative or normal maintenance (including habitat enhancement) is needed.
- Maintenance Class 4 – Maintenance is not anticipated to be needed in the near term (the next normal spring runoff or within the next few years) because change appeared to be occurring at a slow rate. Work can be described as monitoring for potential changes that could accelerate the need for maintenance to the near term.
- Maintenance Class 5 – Maintenance may be needed but is not within Reclamation's

authority. Responsible parties will be notified if it appears that the consequences of no action could be substantial in the near term.

This approach for the ratings and maintenance class designation compliments the approaches in the long term Plan and Guide and the current river maintenance component of the Draft 2015 Middle Rio Grande Biological Assessment. Recommended next steps for this rating involves the development of technical rating factors for ecological and cultural resources needs.

## Endangered Species

### **Programmatic Water Operations and River Maintenance ESA, Biological Opinion, Compliance**

On March 17, 2003, the Service issued the 2003 Biological Opinion (BiOp) on the effects of actions associated with the Programmatic Biological Assessment (BA) of Bureau of Reclamation's Water and River Maintenance Operations, USACE 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 Southwestern willow flycatcher (flycatcher) based on the biological needs of the species. The RPA elements address some of the long-term 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.

For the 2014 irrigation season, the Service made a determination that dry year flow requirements would be in effect, with anticipated incidental take calculated to be observed mortality of 259 silvery minnows. As the Rio Grande was experiencing a fourth consecutive year of exceptional drought with the prospect of limited minnow recruitment in the spring, Reclamation worked with the Collaborative Program's Minnow Action Team (MAT), similar to 2013, to develop a water operations plan to best utilize the available water for endangered species purposes and water users' needs. At the April 17, 2014, meeting of the Collaborative Program's Executive Committee, the MAT presented its recommendation that the water management agencies seek to augment a seven-day spawning pulse through the MRG using 18,000 ac-ft of stored water. The water used for this operation included the release of 12,000 ac-ft of ABCWUA's stored San Juan-Chama water, which was specifically set aside for that purpose, as well as 6,000 ac-ft of water that the USACE inadvertently stored and subsequently credited to the Rio Grande account in Abiquiu Reservoir. The operation began on May 7, 2014, with a 150 percent increase in flows for eight days, resulting in modest spawning (25,000 eggs were collected for propagation facilities). Also, water managers were able to achieve two additional pulses that resulted in more eggs collected.

After June 15, in compliance with the 2003 BiOp, the Rio Grande was allowed to dry in isolated locations within the Isleta Reach, and the San Acacia Reach downstream to the south boundary of the BDANWR. However, above normal precipitation in July and August reduced river drying

such that the river was continuous for periods of time and limited rescue and salvage efforts were needed in July and August. The Isleta Reach remained continuous until September. Water pumped from the LFCC helped slow river drying in the river channel, starting on March 31. The southernmost pumps at the south boundary of the BDANWR generally remained on all season. Native flow reconnected the river by October 11, and all LFCC pumping for the year ceased on October 31. Refer to the LFCC pumping section for cumulative volumes for 2014 at each of the sites. Reclamation remained in compliance with the 2003 BiOp throughout 2014.

The Service provided provisional data on its silvery minnow rescue and salvage activities. Between June and September 2014, the Service's New Mexico Fish and Wildlife Conservation Office (with assistance from Reclamation) conducted rescue and salvage activities on 26.4 unique miles of the Rio Grande, as compared to 36.5 miles in 2013. Of this, 23.1 unique miles were salvaged in the San Acacia Reach on 20 days between the south boundary of BDANWR (RM 74.1) and near Socorro (RM 100.9). Rescue and salvage within 3.3 unique miles of the Rio Grande in the Isleta Reach (RM 152.3 – 155.5) occurred on 5 days.

Six hundred and thirty silvery minnow were found in isolated pools, with 559 found alive. Five hundred and forty three (523 San Acacia, 36 Isleta) RGSM were salvaged, transported, and released alive to a continuously flowing site in the reach where collected – either the San Acacia or Isleta Reach. Of the 559 minnows found alive, 29 were young of year (YOY) (11 San Acacia, 18 Isleta). Of the 630 silvery minnow observed in 2014, 568 (90.2%) were marked (VIE), with 552 (87.6%) in the San Acacia Reach, and 16 (2.5%) in the Isleta Reach, indicating that they were hatchery-released individuals from 2013.

Formal ESA Section 7 consultation was reinitiated by the Service on February 22, 2013, prior to the end of the term of the 2003 BiOp, providing continued Federal and non-Federal coverage in accordance with the terms of the 2003 BiOp.

### **Rio Grande Silvery Minnow**

The Rio Grande silvery minnow (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.

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.

Studies of long-term trends of silvery minnow abundance have generally used October catch per unit effort (CPUE) data from the population monitoring project, which has used similar survey methods at established sites since 1993 (Figure 14). Catch rates were highest in 2005, and were lower, but similar, in 2004, 2006, 2010, and 2011. No silvery minnows were found in the October 2012 monitoring, but they were present in very low numbers in October 2013 monitoring. No silvery minnows were present in any of the 273 seine hauls that yielded fish during October 2014, indicating sustained low levels of abundance from 2012-2014.



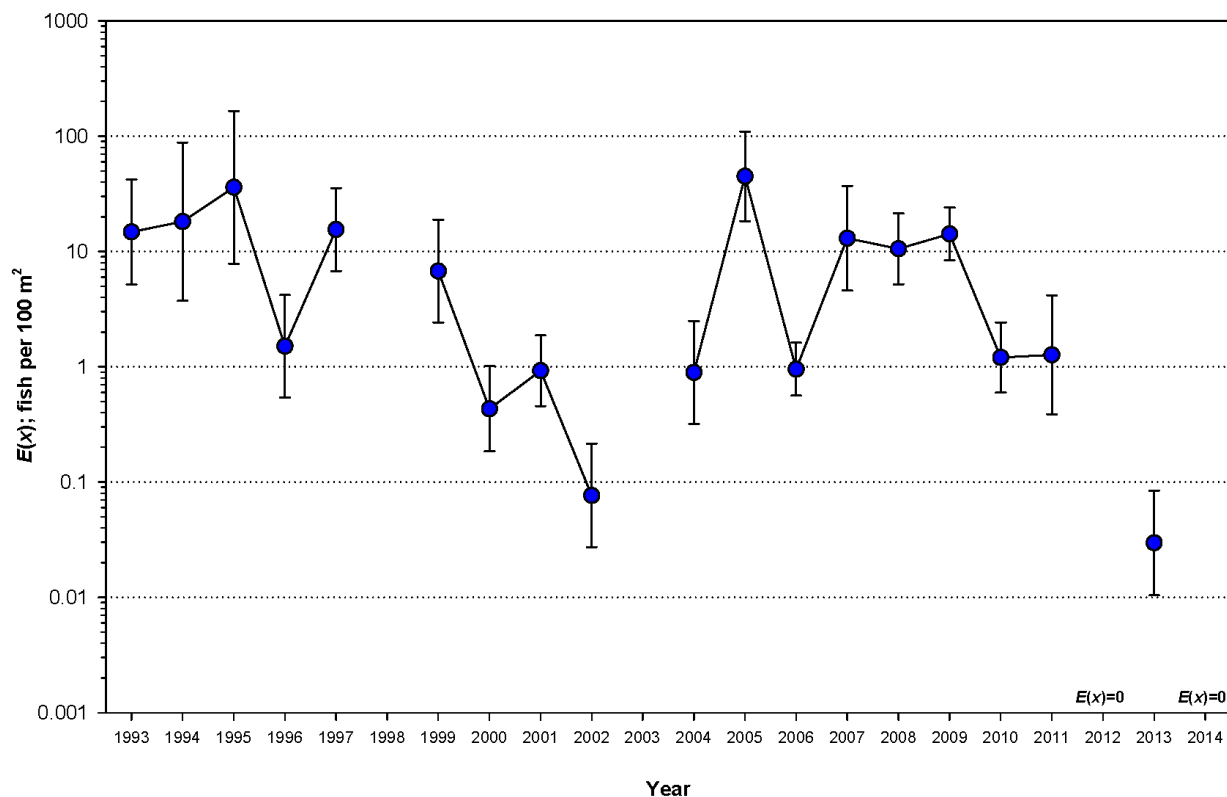


Figure 14: October silvery minnow catch rates (1993-2014) from American Southwest Ichthyological Researchers

During December 2014, silvery minnows were present in 64 of the 253 seine hauls that yielded fish (Dudley and Platania, 2014). As was the case in 2013, there was a notable density increase during December, mainly due to the release of about 268,000 hatchery-reared individuals during October and November. The majority of silvery minnow detected in December 2014 were from this stocking effort (91%); only 15 individuals were not marked and considered to be wild (Dudley and Platania, 2014).

Impacts of the exceptional drought in New Mexico over the last few years are reflected in the 2014 silvery minnow population monitoring results. It should be noted that population monitoring results are an indicator of relative and not absolute abundance. The 2014 monitoring shows a continuation of the low densities of silvery minnow observed in 2012 and 2013, indicating that the species is near its lowest numbers since monitoring began in 1993.

Reclamation conducted two periods of Rio Grande fish monitoring during 2014 associated with Reclamation projects. The winter electrofishing survey was carried out in February 2014. Surveys were conducted at sites between Bernalillo and the Delta Channel, below the confluence of the LFCC. A total of 778 fish were collected; comprised of 11 native and five introduced species. A total of 66 silvery minnows were found, 16 of which were unmarked. Numerically, silvery minnow was the most common species collected at only one site (San Acacia). Species composition was the most diverse at the Montano and LFCC sites with 10 species each, and the least diverse within the BDANWR and Delta Channel sites with seven species each.

Reclamation's fall surveys (October 2014) were conducted using seine nets within the Delta Channel in the Elephant Butte Reservoir pool, from the confluence of the Low Flow Conveyance Channel downstream to just above the reservoir pool near the Monticello Boat Ramp. Thirteen unmarked silvery minnows were captured in the Delta Channel in 2014; no tagged minnows were found. Catch per unit effort and catch metrics for silvery minnow and other species captured in 2014 will be developed during 2015.

Captive silvery minnows are maintained at the following permitted facilities: City of Albuquerque BioPark, Southwestern Native Aquatic Resources & Recovery Center (formerly the Dexter National Fish Hatchery), and the Interstate Stream Commission's Los Lunas Silvery Minnow Refugium. In 2014, the following Middle Rio Grande releases of silvery minnow occurred: 1) 113,407 VIE marked released in the Angostura Reach; 2) 78,114 VIE marked released in the Isleta Reach; and 3) 76,797 VIE marked released in the San Acacia Reach.

The Service also annually stocks captively propagated silvery minnows from these facilities into Big Bend National Park, Texas. In 2014, a total of 70,500 silvery minnow were stocked at Dryden boat launch.

#### Literature Cited

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### **Southwestern Willow Flycatcher**

The Southwestern Willow 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. On October 13, 2004, under court order, the Service reissued a proposed designation for critical habitat for the flycatcher that included portions of the Rio Grande in New Mexico. As a result of a lawsuit by the Center of Biological Diversity over the 2005 critical habitat designation, a final designation was published on January 3, 2013.

The 2013 final designation of critical habitat defines two units located along the Rio Grande in the state of New Mexico: the Upper Rio Grande Management Unit and the Middle Rio Grande Management Unit.

The Upper Rio Grande Management Unit includes four distinct segments between the Taos Junction Bridge and two miles upstream from the Rio Lucero confluence.

The Middle Rio Grande Management Unit includes the area from the southern boundary of the Isleta Pueblo to approximately two miles north of the Sierra County line.

In summer 2014, Reclamation conducted surveys and nest monitoring of the flycatcher in ten distinct reaches along approximately 250 miles of the Rio Grande in New Mexico, mainly between the southern boundary of the Isleta Pueblo and Elephant Butte Reservoir (Table 9). Other areas surveyed include a 6 mile stretch just north of Cochiti Reservoir as well as select locations from Caballo Reservoir to El Paso, TX. In 2013, there were 627 resident flycatchers documented in 371 territories and forming 256 breeding pairs. In 2014, the number of total territories increased slightly resulting in 664 documented resident flycatchers occupying 405 territories and forming 259 breeding pairs. As in previous years, the San Marcial reach of the river was by far the most productive, containing 307 territories (of which 205 were pairs).

Table 9: Southwestern Willow Flycatcher Territories – Middle Rio Grande Project, 2008 - 2014 Breeding Seasons (N/S = Not Surveyed)

Location/ Year	2014	2013	2012	2011	2010	2009	2008
<b>Frijoles</b>	0	1	0	2	N/S	1	1
<b>Belen</b>	18	23	14	9	6	3	4
<b>Sevilleta</b>	4	4	6	9	13	18	31
<b>San Acacia</b>	0	0	0	0	0	1	2
<b>Escondida</b>	4	8	23	8	4	0	1
<b>BDANWR</b>	23	27	51	49	34	20	5
<b>Tiffany</b>	8	4	1	4	5	5	8
<b>San Marcial</b>	307	266	252	318	298	319	235
<b>Caballo Reservoir</b>	15	4	1	N/S	N/S	N/S	N/S
<b>Lower Rio Grande</b>	26	34	27	3	N/S	5	N/S
<b>Total</b>	405	371	375	402	360	372	287

(This table does not include detections outside of the active floodplain at the BDANWR)

In 2014, 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 and in select sites from Caballo to El Paso, TX. Nests were monitored for success rates, productivity, and Brown-headed cowbird (*Molothrus ater*) parasitism. The San Marcial Reach proved most productive, producing 255 nests.

Other studies continued in 2014 include: 1) flycatcher nesting hydrology and habitat variable study, 2) river maintenance impact monitoring, 3) photo monitoring of habitat development in the Elephant Butte delta, and 4) depredation monitoring via trail cameras. These studies are designed to provide further insight into potential threats to and habitat requirements of flycatcher populations.

#### Elephant Butte Reservoir

When compared to the results from 2013, the 2014 flycatcher population grew the most in the San Marcial and Caballo reaches, increased a little in the Tiffany Reach, and declined or remained consistent with previous years in the remaining seven reaches that were surveyed. At Elephant Butte Reservoir, flycatchers have expanded their occupied habitat farther south near

River Mile 38. Flycatcher occupied 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, with the drought the last few years, this area rarely receives any overbank flooding from the LFCC and invasive salt cedar is encroaching and taking dominance.

Although salt cedar provides refuge habitat for flycatchers, the likely arrival of the salt cedar leaf beetle in the upcoming years is particularly concerning because they would likely defoliate salt cedar during flycatcher nesting times – providing less foliage cover and making nests more vulnerable to predation, parasitism, and the natural elements. In 2014, beetles moving from the north to south were located as far south as Socorro, and the beetles moving from the south to the north were located as far north as Rincon.

Habitat modeling from 2012 throughout the Middle Rio Grande has shown that there is still 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 likely a cause of their site fidelity.

Nest success in the Middle Rio Grande was the lowest it has ever been at only 28.1%. This decline in nest success over the past few years displays the decline in habitat suitability in heavily populated areas. However, in newly occupied areas (i.e. Belen sites and the areas south of the Narrows), nest success was very high at 71.4%. With such low nest success in the vast majority of the population, it is anticipated that population numbers will decrease in 2015.

### **Yellow-billed Cuckoo**

The western distinct vertebrate population segment of the Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*) (cuckoo) was listed as a threatened species by the Service in October of 2014. The proposed critical habitat posted on the Federal Register in August of 2014 includes 8 units in New Mexico. Along the Rio Grande, this proposed area includes:

Unit 50: NM-6 Upper Rio Grande: This proposed critical habitat is 1,830 acres in extent and is a 10 mile long continuous segment of the upper Rio Grande from Ohkay Owingeh to near Alcade in Rio Arriba County.

Unit 51: NM-7 Middle Rio Grande 2: This proposed critical habitat is 1,173 acres in extent and is a 6 mile long continuous segment of the Middle Rio Grande starting from the Highway 502 Bridge at the south end of the San Ildefonso Pueblo upstream to a point on the river in Rio Arriba County south of La Mesilla.

Unit 52: NM-8 Middle Rio Grande 1: This proposed critical habitat segment is 61,959 acres in extent and is a continuous 170 long from rivermile 54 at Elephant Butte Reservoir upstream to just below Cochiti Dam. Within this reach is the largest breeding population of western yellow-billed cuckoos north of Mexico.



Figure 15: Proposed critical habitat locations along the Rio Grande in New Mexico

During the summer of 2014, Reclamation conducted surveys in nine distinct reaches within sites also surveyed for flycatchers from the south boundary of Isleta Pueblo to Radium Springs, New Mexico (Table 10). In 2014, there were an estimated 99 territories (resident individuals, pairs, or pairs with ‘helper males’) derived from a total of 329 detections. The estimated territories and documented detections were most concentrated in the southern portion of the San Marcial Reach.

Table 10: Yellow-billed Cuckoo Detections/Estimated Territories – Middle Rio Grande Project, 2008 - 2014 Breeding Seasons (N/S = Not Surveyed)

Location/Year	2014	2013	2012	2011	2010	2009	2008
<b>Belen</b>	24/5	20/6	44/15	16/4	3/0	1/0	N/S
<b>Sevilleta</b>	9/2	19/6	36/12	6/2	1/0	4/2	N/S
<b>San Acacia</b>	15/4	20/5	19/4	6/1	3/0	8/1	N/S
<b>Escondida</b>	27/7	80/23	68/21	15/3	6/2	29/9	19/10
<b>BDANWR</b>	34/12	29/8	36/10	17/4	14/3	47/11	35/14
<b>Tiffany</b>	2/0	4/1	10/2	4/1	2/0	10/3	7/3
<b>San Marcial</b>	190/61	219/70	202/57	202/58	249/58	257/69	299/60
<b>Caballo Reservoir</b>	28/8	N/S	N/S	N/S	N/S	N/S	N/S
<b>Lower Rio Grande</b>	0/0	N/S	N/S	N/S	N/S	N/S	N/S
<b>Total</b>	329/99	391/119	415/121	266/73	278/63	356/95	360/87

(This table does not include detections outside of the active floodplain at BDNWR)

Cuckoos are loosely territorial with an average home range of 24 acres. Nests can be difficult to detect and project specific impact assessments are fairly subjective.

### **Southwestern Willow Flycatcher and Yellow-billed Cuckoo Habitat**

The number of flycatcher territories along the Rio Grande has decreased since 2011, from a high of 385 down to 342. There are, however, a few new territories in the Isleta Reach as well as in the Caballo Reservoir pool and below. The area within the pool of Elephant Butte continues to have the most territories. As the vegetation is maturing from north to south, and as the side channels fill in with sediment, the flycatcher territories follow the expanding areas of new vegetation to the east and south within the reservoir pool. Data collected in 2014 indicate that the flycatcher territories extend from River Mile 40 down to River Mile 38.

The cuckoo is also found within the Elephant Butte Reservoir pool. There is some overlap with the vegetation preferred by the flycatcher, but there are also some very distinct areas being utilized by the cuckoo. Cuckoos seem to be spread out over more area within the reservoir pool along the east side, and are concentrated in some areas like the Narrows. The cuckoo critical habitat designation should be finalized in 2015. Figure 16 shows 2014 detections of both flycatchers and cuckoos.

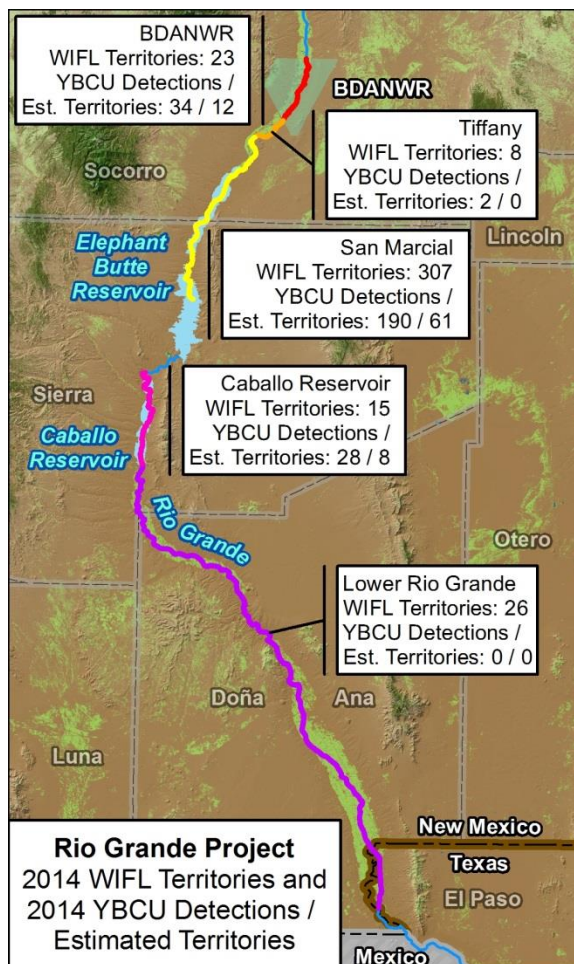


Figure 16: 2014 Detections of Flycatchers and Cuckoos along the Rio Grande

### New Mexico Meadow Jumping Mouse

The historical distribution of the New Mexico meadow jumping mouse (jumping mouse; *Zapus hudsonius luteus*) likely included riparian areas and wetlands along streams in the Sangre de Cristo and San Juan Mountains from southern Colorado to central New Mexico, including the Jemez and Sacramento Mountains and the Rio Grande Valley from Española to BDNWR, and into parts of the White Mountains in eastern Arizona. A final rule was published in the June 10, 2014 Federal Register (effective July 10, 2014) to list the jumping mouse as an endangered species under the Endangered Species Act (ESA) with proposed critical habitat. The final designation for critical habitat for the species is still being determined but proposed critical habitat units have been identified for Bernalillo, Colfax, Mora, Otero, Rio Arriba, Sandoval, and Socorro Counties, in New Mexico; Las Animas, Archuleta, and La Plata Counties, Colorado; and Greenlee and Apache Counties, Arizona.

In the Middle Rio Grande (MRG) valley, jumping mice are known to use both natural wetlands and riparian habitats associated with irrigation channels (Frey and Wright 2012). In either case, tall, dense herbaceous riparian vegetation is a key habitat component. Current distribution of jumping mice within the MRG is uncertain, but, the species was confirmed to be present at Ohkay Owingeh Pueblo and the adjacent Rio Chama, Isleta Pueblo, near Casa Colorada Wildlife

Area, and the BDANWR as of the late 1980s (Frey 2006). Survey efforts have regularly occurred at BDANWR and in 2014 resulted in the capture of 19 mice. With the exception of BDANWR, systematic survey efforts for jumping mice and their habitat have not been conducted throughout the entire riparian corridor of the MRG. Since its listing, surveys for suitable jumping mouse habitat have occurred in selected areas as part of environmental compliance activities for various projects, such as the Delta Channel river maintenance project (Reclamation 2014).

The Delta Channel is located on the southern fringe of the geographic area within the Rio Grande watershed where jumping mice could potentially occur, however; during the habitat assessment it was determined that this area does not represent suitable habitat based on the herbaceous vegetation composition and structure, a lack of soil moisture, a high frequency and long history of disturbance, and a lack of regular inundation necessary to support jumping mouse habitat. Based on the habitat assessments within the Delta Channel and at other locations, it is unlikely that occupied or suitable jumping mouse habitat exists south of BDANWR.

In January 2014, a preliminary assessment report was submitted to Reclamation for jumping mouse habitat associated with the Middle Rio Grande Project. Potential jumping mouse habitat was identified for the riparian zone of the MRG from levee to levee based on existing vegetation classification data. This vegetation mapping data did not include the State Drains and Low Flow Conveyance Channel. While this information is useful in preliminary evaluations, on site evaluations are necessary to determine if these areas are actually suitable jumping mouse habitat.

Literature cited:

- Frey, J.K., 2006. Status of the New Mexico meadow jumping mouse (*Zapus hudsonius luteus*) in the Sangre de Christo Mountains, New Mexico. Final Report submitted to New Mexico Department of Game and Fish, Santa Fe, 14 December 2006, 78 pp.
- Frey, J.K., and D.A. Kopp. 2014. Final Report: Preliminary Assessment of jumping mouse habitat associated with Middle Rio Grande Project U.S. Department of the Interior, Bureau of Reclamation, Albuquerque Area Office, 18 p.
- Frey, J.K., and G.D. Wright. 2012. Multiple scale habitat selection by a small mammal habitat specialist (*Zapus hudsonius luteus*) in a managed floodplain landscape. Final Report submitted to U.S. Fish and Wildlife Service, Cooperative Agreement 201819J806, 16 March 2012, 109 pp.
- Reclamation. 2014. River Maintenance Program: San Marcial Delta Water Conveyance Channel Maintenance Project Biological Assessment. Bureau of Reclamation, Albuquerque Area Office, September 2014, 80 pp.
- U.S. Fish and Wildlife Service. 2014. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the New Mexico Jumping Mouse Through It's Range; Final Rule. Federal Register 79: 33119-33137.
- U.S. Fish and Wildlife Service. 2013. Endangered and Threatened Wildlife and Plants; Proposed Designation of Critical Habitat for the New Mexico Meadow Jumping Mouse: Listing



Determination for the New Mexico Meadow Jumping Mouse; Proposed Rules. Federal Register 78: 37328-37363.

U.S. Fish and Wildlife Service. 2014. New Mexico meadow jumping mouse (*Zapus hudsonius luteus*) Survey Results at Bosque del Apache National Wildlife Refuge, United States Government Memorandum. 12 pp.

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

Formal ESA Section 7 consultation between the Service and Reclamation was reinitiated on February 22, 2013, prior to expiration of the 2003 BiOp, providing continued federal and non-federal coverage in accordance with the terms of the 2003 BiOp. 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 initially submitted a BA for Middle Rio Grande water operations and river maintenance to the Service in July 2012, addressing Reclamation, MRGCD, and State of New Mexico 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 ABCWUA, and undertaken by participants of the Collaborative Program. A revised BA was submitted on August 8, 2013 which included the Collaborative Program's Recovery Implementation Program (RIP) as a conservation measure, as endorsed by the Executive Committee of the Collaborative Program in July 2013. The BA will be further updated and resubmitted to the Service by the end of May 2015; updates will include effects to newly listed species, clarified sections for the proposed actions and effects analysis, and an analysis of the effectiveness of proposed conservation measures.

Concurrent with Reclamation's consultation, the Service also reinitiated consultation with the USACE and initiated consultation with the BDANWR on those agencies' programmatic actions. However, in November 2013, the USACE withdrew from consultation with the Service and in February 2014, notified the Service the USACE would not reinitiate consultation based on their evaluation that their on-going actions were non-discretionary.

### **Middle Rio Grande Endangered Species Collaborative Program**

The Middle Rio Grande Endangered Species Collaborative Program (Collaborative Program) brings diverse groups together to support ESA compliance and address environmental issues along the Middle Rio Grande (MRG). The Collaborative Program began transitioning to a Recovery Implementation Program (RIP) through endorsement of a new Program document, action plan, Long-Term Plan, and draft cooperative agreement in July 2013. 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 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. Currently, Reclamation manages and serves as the fiscal agency for the Collaborative Program as authorized by the Omnibus Appropriations Act of 2009 (P.L. 111-8). In federal fiscal year (FY) 2014, total appropriations were \$4,313,000, of which \$1,500,000 was utilized for Collaborative Program activities and \$2,813,000 was utilized for water leasing, pumping, and Program administration activities. Related FY2014 accomplishments include:

- Supported four USGS streamflow gages;
- Supported captive propagation of silvery minnow at the Southwestern Native Aquatic Resources & Recovery Center (the City of Albuquerque's BioPark Aquatic Conservation Facility and the New Mexico Interstate Stream Commission's Los Lunas Silvery Minnow Refugium did not provide captive propagation in 2014)
- Silvery minnow rescue efforts during river drying and reproductive monitoring;
- Annual monitoring of silvery minnow populations and flycatcher nests;
- Leasing supplemental water acquired from San Juan - Chama Project contractors in FY2014;
- Pumping from the Low Flow Conveyance Channel into the Rio Grande;
- Program management, assessment, reporting, and outreach activities.

## **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.

### **Water Acquisition and Management**

In 2014, a BiOp “dry” year, 24,172 ac-ft of supplemental water was released for endangered species purposes. Reclamation ended the year with 3,781 ac-ft of water leased from ABCWUA in storage in Abiquiu, 2,634 ac-ft of Emergency Drought Water stored in 2014 remaining in El Vado, and 12,320 ac-ft of 2014 leased San Juan – Chama project (SJ-C) water either in Heron or Abiquiu. In addition, in 2015, Reclamation may store up to 8,374 ac-ft of Emergency Drought Water and has potential leases of up to approximately 13,000 ac-ft from 2014 SJ-C allocations. Because of the SJ-C Project water shortage, however, the leased water available could be much less.

### **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 Alternative Elements 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 Alternative Elements 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.

<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 the BDANWR, pumps located at the North Boundary pump site were started on March 31. To maintain connectivity from the south boundary of the BDANWR to Elephant Butte Reservoir, pumps at the South Boundary site were turned on March 29. Pumps at North Boundary were turned on and off to augment monsoon runoff. The pumps at the North Boundary site were shut off for the season on July 30, while the pumps at South Boundary were shut off on October 31.

Table 11 below summarizes the volume, in acre-feet, pumped at each site for the year. Pumps at the North Boundary and South Boundary sites were used, while pumps at the Ft. Craig and Neil Cupp sites were not used for pumping supplemental water during the 2014 season. The total volume of supplemental flow provided by the pumping effort in the 2014 season was 11,935 ac-ft.

Table 11: 2014 Pumping Volume by Site

Total Per Pumping Site For The Year	Neil Cupp	North Boundary	South Boundary	Ft. Craig
	0 ac-ft	3,476 ac-ft	8,459 ac-ft	0 ac-ft

## Other Ongoing Water Management and Water Quality Related Projects

### 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. No additional funding was provided to the USGS in FY2014, but a small amount of funding was set aside so that Reclamation could continue to collect data and maintain the wells and transducers. Data were collected from one transect in November by Reclamation personnel. Numerous sites have been destroyed or the data loggers have stopped working. It will be determined in 2015 whether future data will be collected by Reclamation or a contractor.

A report, titled Groundwater Hydrology and Variability of Groundwater Gradients and Fluxes from the Rio Grande at Selected Locations in Albuquerque, New Mexico, 2009-10, is available online in .pdf format at <http://pubs.usgs.gov/sir/2012/5007/SIR2012-5007.pdf>

## **USGS MRG River Gage Operation and Maintenance**

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. 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 2014 irrigation season, RiverEyes monitored river conditions along the Rio Grande from Isleta Diversion Dam to the full pool elevation of Elephant Butte Reservoir from June 15, 2014, through October 31, 2014. The total maximum river miles dried during the 2014 RiverEyes monitoring period was 23.5 miles which included 2.5 miles in the Isleta Reach and 21 miles in the San Acacia Reach. The first occurrence of channel drying was recorded on June 19, 2014 and the last occurrence of channel drying was observed on October 11, 2014. River drying was restricted to two river segments: from 1.5 miles below the Los Chavez Wasteway to 0.5 miles below the Peralta Wasteway in the Isleta Reach, and from 1.5 miles above Brown Arroyo 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.

## 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 5). 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, under contract, Reclamation's diversion dams on the Rio Grande, including Percha Diversion Dam, Leasburg Diversion Dam, and Mesilla Diversion Dam in New Mexico. 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.

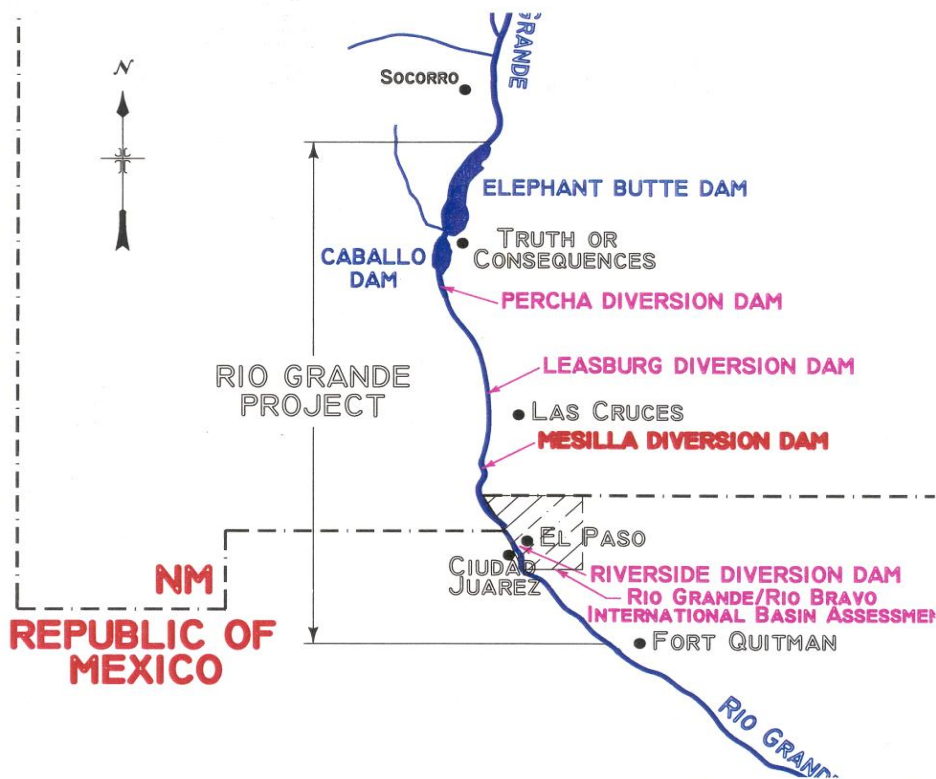


Figure 17: Area Map of the Rio Grande Project

## Water Supply Conditions

Preliminary inflow data into Elephant Butte Reservoir during 2014 as measured at the Rio Grande Floodway (FW) plus the Low Flow Conveyance Channel (LFCC) at San Marcial (FW+LFCC) was 319,370 ac-ft. The provisional flow record for the 2014 spring runoff (March to July), measured at San Marcial, was 91,570 ac-ft, or approximately 18% of the 30-year average. These stations are maintained and operated by the USGS.

During the period from 1998 to 2014, the spring runoff at the San Marcial gauging stations continues to be below the 30 year average. From 1998 to 2014, average inflow was 265,035 ac-ft and only two years, 2005 and 2008, exceeded the 30 year average of 510,000 ac-ft.

Releases from Elephant Butte Reservoir began on May 27, 2014, and continued through August 9, 2014. During this period a total release of 292,114 ac-ft was recorded by the USGS. July through December daily flow data remains provisional; all other data has been approved by the USGS.

During the 2014 irrigation season (May 25 to August 22), 305,090 ac-ft of water was released from Caballo Reservoir for delivery to Rio Grande Project water users which is combined with drain and arroyo inflows downstream of Caballo Dam. Combined total storage for Elephant Butte and Caballo Reservoirs was 326,499 ac-ft on December 31, 2014, or 14.5% of their total capacity.

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, for 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 2014.

Since 2011, the average March through July runoff was 86,700 ac-ft. In 2014, the spring runoff was estimated at 7,800 ac-ft. With the combined storage and minimal runoff, Reclamation allotted 30.36% of a full supply to Rio Grande Project water users. The available storage was not sufficient to begin a normal release in late February. Reclamation coordinated with the International Boundary Water Commission, Mexico, the Elephant Butte Irrigation District, and the El Paso Water Improvement District #1 to schedule a timely and organized irrigation release. Release from Caballo Reservoir began on May 25, 2014 and the irrigation season continued through August 22, 2014. This marks the fifth consecutive year with irrigation releases lower than 400,000 ac-ft.

The initial allocation for 2015 is scheduled to be finalized in late April 2015. On January 1, 2015, combined storage in Elephant Butte and Caballo Reservoirs was 288,888 ac-ft. This value includes all non-Project water pools therefore does not reflect total storage available for use by

the Rio Grande Project users. Water available to the Project water users was 210,260 ac-ft on January 1, 2015. Based on the January 1, 2015, Natural Resources Conservation Service and National Weather Service (NRCS/NWS) spring runoff forecast at the San Marcial gauging station, declining snowpack, and present hydrologic conditions, Reclamation anticipates a less than full supply for irrigation during 2015 for the Rio Grande Project.

## **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 New Mexico and by El Paso County Water Improvement District No. 1 in Texas. 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 2014. 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 2014.

The International Boundary and Water Commission (IBWC) owns, operates, and maintains the American Diversion Dam and the American Canal in accordance with the International Treaties with Mexico (1906 and 1933). In addition, the IBWC operates the International Diversion Dam, which diverts irrigation waters into the Acequia Madre head gates 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. In 2014, HCCRD was charged with 15,999 ac-ft.

## **Elephant Butte Reservoir and Power Plant**

In 2014, Elephant Butte Reservoir reached a daily minimum storage of 130,889 ac-ft (elevation 4301.01 feet) on August 2, 2014 and a daily maximum storage of 378,177 ac-ft (elevation 4,330.56 feet) on May 26, 2014.

The total gross power generation for 2014 was 13,413,270 kilowatt-hours (kWh). Net power generation for 2014 was 13,223,312 kWh, which was 28 percent of the 9-year average (2005

through 2014) of 47,573,546 kWh. The power plant releases were utilized to meet downstream irrigation demand and manage Caballo Reservoir storage levels. The balance valves were used to meet releases at the end of the 2014 irrigation season. The balance valves will be available for any required release beyond the Elephant Butte power plant capabilities for 2014.

### **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. There are currently two incomplete SOD recommendations and one incomplete Category 2 O&M recommendation for Elephant Butte Dam<sup>3</sup>.

In March 2014, surface repairs were completed on the upstream face of the embankment dam and an expansion joint was installed. This work completed O&M recommendation 2009-2-A.

The Facility Review Rating was updated in September 2014. The rating for Elephant Butte increased from a total score of 87 to a score of 89, which gives the facility an overall rating of “Good”.

### **Caballo Dam and Reservoir**

During the 2014 water year, October 2013 to October 2014, Caballo Reservoir reached a minimum storage of 21,960 ac-ft (elevation 4137.20 feet ) on August 23, 2014 and a maximum storage of 40,620 ac-ft (elevation 4143.88 feet ) on March 4, 2014.

According to Court Order No. CIV-90-95 HB/WWD of October 17, 1996, which resulted from a negotiated settlement with the 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. Storage in Caballo Reservoir at the end of the 2014 irrigation season did not exceed 50,000 ac-ft.

Reclamation operated Caballo Reservoir during the irrigation release period, May 25 through August 22, 2014, by maintaining storage levels such that they would not exceed 35,000 ac-ft. Operating Caballo Reservoir at these storage levels during the 2014 irrigation season allowed Reclamation to:

- Reduce evaporative losses between Elephant Butte and Caballo Reservoirs,
- Provide sufficient operational hydraulic head at Caballo Reservoir during the short irrigation demand releases,
- Use Caballo Reservoir as a reserve pool should releases from Elephant Butte Dam be

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<sup>3</sup> <http://www.usbr.gov/recman/fac/fac01-07.pdf>



- interrupted, and minimize changes to release rates from Elephant Butte Dam,
- Allow for data collection and maintenance of the One-Propeller Eddy Covariance and 3D-sec (ET) systems at Caballo Reservoir through cooperative research with New Mexico State University.

Caballo Reservoir's operating plan for the 2015 water year has not yet been finalized. Currently, releases are scheduled to begin around June 1, 2015, which has been the practice during very low available water irrigation seasons. Due to the ongoing drought, all parties are coordinating release schedules to avoid block releases. Reclamation will finalize its reservoir operating plan in the spring of 2015. The operations plan will reflect accommodations to minimize evaporation at Elephant Butte and Caballo Reservoirs and meet water user needs.

### **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 four incomplete Category 2 O&M recommendations for Caballo Dam.

Coating of the outlet energy dissipation device angle iron protection continued through FY 2014. The last remaining section requiring coating will be completed during FY 2015.

A leak was repaired on the Bonita Lateral irrigation pipe. During the course of the visual inspection of the area around the repaired pipe, it was observed that the joint welds of the interior of the pipe are in unsatisfactory condition. Significant corrosion and loss of the protective coating was noted.

The Facility Review Rating was updated in September 2014. The total score for Caballo is 94, which is the same as the total score in 2013, an overall rating of "Good".

## **Rio Grande Project Adjudications**

The 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 "stream adjudication" case 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 Lower Rio Grande in New Mexico. 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. In January 2013, Texas filed a motion in the United States Supreme Court to: receive a declaration of the rights of the State of Texas to the waters of the Rio Grande pursuant to and consistent with the Rio Grande Compact and the Rio Grande Project Act; issue its decree commanding the State of New Mexico to deliver the waters of the Rio Grande in accordance with the provisions of the Rio Grande Compact and the Rio Grande Project Act; plus award damages and other relief for the injury suffered by the State of Texas. On December 10, 2013, the United States filed a brief stating that Texas’ motion for leave to file a complaint should be granted, and New Mexico should be invited to file a motion to dismiss the complaint. On January 27, 2014, the U.S. Supreme Court ruled that Texas can proceed to the next step in its lawsuit against New Mexico and invited New Mexico to file a motion to dismiss the action. On February 27, 2014, the United States filed a motion to intervene as a plaintiff. Texas has filed a motion in support. New Mexico filed a response to not oppose the United States’ motion to intervene, but objects to the United States’ attempt to inject a new issue on the sources of water for the Project. On November 3, 2014, the Supreme Court of the United State appointed Gregory Grimsal of New Orleans as Special Master. The first session was held with the Special Master the week of January 5, 2015.

## **Rio Grande Project Operating Agreement**

On February 14, 2008, Reclamation, Elephant Butte Irrigation District (EBID), and El Paso County Water Improvement District No. 1 (EPCWID) agreed to, finalized, and signed the Operating Agreement for the Rio Grande Project. The Operating Agreement was executed on March 10, 2008 by the United States, and is available at: <http://www.usbr.gov/uc/albuq/rm/RGP/pdfs/Operating-Agreement2008.pdf>. Section 1.12 of the operating agreement requires an accompanying operations manual, completed in August 2008, which provide detailed information regarding the methods, equations, and procedures used by EBID, EPCWID, and the United States to account for all water charges and operating procedures for the Rio Grande Project, 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 Operating Agreement requires annual reviews for improvement of operations, and these reviews are documented in updates to the Operating Manual completed in 2008.

On January 15, 2014, Reclamation began National Environmental Policy Act (NEPA) activities by undertaking an Environmental Impact Statement (EIS) for continued implementation of the 2008 Rio Grande Project Operating Agreement (Operating Agreement) through 2050. Reclamation issued an environmental assessment (EA) in 2007 covering the Operating Agreement to 2012 followed by a supplemental EA extending coverage to 2016. The Scoping Report for the EIS is available at: <http://www.usbr.gov/uc/albuq/rm/RGP/EIS/RGOA-EIS-ScopingSummary.pdf>. Reclamation anticipates completing a Record of Decision before the 2016 irrigation season.

The most important provisions of the operating agreement are: (1) procedures for allocation and release of Rio Grande Project water supply to be delivered to users within the Elephant Butte

Irrigation District (EBID) in New Mexico, the El Paso County Water Improvement District No. 1 (EPCWID) in Texas, and users covered by the 1906 treaty with Mexico, (2) recognition of effects from groundwater pumping in the Rincon and Mesilla Valleys to the water supply available to EPCWID and adjusting the allocation procedures to mitigate the allotment for EPCWID, with a provision for EBID and EPCWID to carry over their respective unused allotments each year. The maximum carryover provision for each district is 60% of their respective historical full allocation. This carryover provision encourages each district to conserve and utilize irrigation water effectively, particularly during drought periods affecting the Rio Grande Project. The Rio Grande Project has completed seven irrigation seasons under the 2008 Operating Agreement and will begin the eighth irrigation season in June 2015 with low available water supplies with the measured diversion ratio higher than the predicted diversion ratio, as calculated under Section 4.10 of the Operating Manual.

EPCWID ended the 2014 irrigation season with 2,685 ac-ft in their allocation carryover account and EBID ended the season with 8,652 ac-ft in their allocation carryover account. During the 2014 irrigation season, the Project released 305,091 ac-ft from Rio Grande Project storage. The Project water users (EBID, EPCWID, and Mexico) were charged for 214,686 ac-ft of delivered water. The release to delivery ratio of 0.71 shall be used in the calculation of the allocation at the start of the 2015 irrigation season.

The release to delivery ratios since 2012 show that the Project continues operating under drought conditions covered by Section 4.10 of the Operating Manual. 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 as of February 1, 2015, were 49% of average at San Marcial; therefore, reservoir storage is expected to decline during the 2015 irrigation season.

The technical team for the Rio Grande Project, which consists of representatives from EBID, EPCWID, and Reclamation, meets in January of every year to discuss proposals for updates to the operations manual. As of January 1, 2015, none were submitted.

## **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 salt cedar. Herbicide treatments to salt cedar and tornillo (screwbean mesquite) are also made to limit the amount of mowing necessary to complete the task. Approximately 7,041 acres have been sprayed at both reservoirs over the past ten 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. A report with recommendations for optimization of storage for water conservation is currently being compiled.

During FY2014, Reclamation managed 2,985 acres of phreatophytic vegetation at Caballo reservoir utilizing mowers, mulchers, grubbers and herbicide treatments (110 acres).

# 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 adapt to projected future conditions, and provide for resilient social and ecological systems. These programs include:

- Basin Study Program
  - West-Wide Climate Risk Assessments
  - Basin Studies
  - SECURE Feasibility Studies
  - Landscape Conservation Cooperatives
- Reclamation's Water Conservation Field Services Program (AAO)
- Cooperative Watershed Management Program
- Title XVI Water Reclamation and Re-use 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. The Basin Study Program is also closely affiliated with the Landscape Conservation Cooperatives (LCCs). The Southern Rockies and Desert LCCs encompass the Middle Rio Grande and are jointly managed by Reclamation and the U. S. Fish & Wildlife Service. Further information about each of these sub-programs is provided below.

### West-Wide Climate Risk Assessments

WWCRA implementation activities focus on development of consistent climate projections for Western river basins, and evaluation of impacts of the projected changes to water supply, water demand, water/reservoir operations, water quality, hydropower generation, endangered species, fish and wildlife, flow-and water-dependent ecological resiliency, and recreation. 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. A WWCRA Impact Assessment for the Upper Rio Grande was completed in 2013 (Llewellyn, et. al., 2013). WWCRA activities include development and

refinement of climate projections, water supply analyses, water demand analyses, WWCRA impact assessments, and development of guidance for analysis of potential impacts of climate change on Reclamation projects. The WWCRA team also submits reports to Congress on the achievements of the Basin Study Program every five years, and is currently working on preliminary development of the 2016 SECURE Report to Congress.

### **Basin Studies**

Reclamation has been engaging in partnerships with local water management agencies to perform Basin Studies. Basin Studies in the Upper Rio Grande Basin build on the hydrologic projections developed by Reclamation as part of the Upper Rio Grande Impact Assessment (Llewellyn, et. al., 2013), which was performed as a component of the West-Wide Climate Risk Assessment. The projects are managed out of the Upper Colorado Region, Albuquerque Area Office, 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 partners, and involve considerable cooperation with other members of the water community in a basin. Reclamation and its partners have recently completed the Santa Fe Basin Study, and are scheduled to complete the Pecos Basin Study in 2015. Letters of interest for 2015 Basin Studies are due from potential project partners to Reclamation by March 3, 2015. Reclamation will select qualified partners who have submitted letters of interest to submit a full Basin Study proposal. Reclamation expects to select the final 2015 Basin Studies by May 2015.

#### Santa Fe Basin Study

Reclamation's Albuquerque Area Office has recently completed the Santa Fe Basin Study, in partnership with the City of Santa Fe and Santa Fe County. This study evaluates projected impacts of climate change, population growth, and other stressors on the Santa Fe watershed, and on water supplies for the combined municipal water system of the City and County.

Under this study, a Preliminary Assessment was performed to evaluate the range of potential impacts of climate change on the Santa Fe watershed, including its human and ecological systems, and to develop a list of potential adaptation actions that the community could take to mitigate the impacts, along with a summary of adaptation actions that are already underway in the watershed. Extensive modeling work was then performed to evaluate projected imbalances between water supply and demand for the City and County. The City and County's combined municipal system obtains water from the Santa Fe River watershed, the headwaters of the Rio Grande as far downstream as Otowi gage, the San Juan Basin tributaries that contribute to Reclamation's San Juan-Chama Project, and local groundwater supplies. Therefore, all of these water sources were considered in the study.

The study concludes that if no adaptation actions are taken to offset the growing gap between water supply and demand, for the City and County, annual deficits to the combined municipal supply could range from 3,500 acre feet per year (AFY) to 14,000 AFY, with recurring water shortages likely by the 2050s. To mitigate for the projected gap between supply and demand, the project team recommended a portfolio of measures, which together could provide approximately 8,350 AFY in additional water through direct reclaimed water reuse, conservation, direct injection aquifer storage and recovery, indirect aquifer storage and recovery through infiltration through the bed of the Santa Fe River, and acquisition of some additional Middle Rio Grande

water rights. These recommendations will be incorporated into the Long-Range Water Supply Plan for the City and County's combined municipal supply, and will be implemented over time by the City and County.

### Pecos Basin Study

In 2012, Reclamation's Albuquerque Area Office initiated a partnership with the New Mexico Interstate Stream Commission (ISC) for a Basin Study focusing on the Pecos River watershed in eastern New Mexico. This project emphasizes groundwater resources in the New Mexico portion of the Pecos River Basin, with a particular focus on the Fort Sumner area. Projections of the hydrologic impacts of climate change have been developed by Reclamation for this Basin, and used in simulations of the river system using the Pecos River Decision Support System model, a RiverWare model. In addition, Reclamation and the ISC are working together on the development of a groundwater representation in the basin's operations model. Additional information on this study is provided in the Pecos River Compact Report.

### **SECURE Feasibility Studies and Special Studies**

SECURE Feasibility Studies and Special 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. SECURE Special Studies provide Reclamation support to the evaluation of adaptation actions that may be taken by local partners. A framework for the inclusion of climate projections in Reclamation Feasibility Studies and Special Studies, as well as in environmental compliance efforts, is currently being finalized. No SECURE Feasibility or Special Studies have been funded in the Middle Rio Grande Basin.

### **Landscape Conservation Cooperatives**

Reclamation is partnering with the U. S. Fish & Wildlife Service to manage the Desert and Southern Rockies 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 Upper 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.

### Southern Rockies Landscape Conservation Cooperative

The following are the active projects of the Desert LCC in the Upper Rio Grande Basin:

- *Ecological Changes in Aquatic Communities in the Big Bend Reach of the Rio Grande: Synthesis and Future Monitoring Needs* (this project was funded by USFWS in 2014 –
  - Awarded to Utah Cooperative Fish and Wildlife Research Unit and Utah State University
  - Funding: US Fish & Wildlife Service, \$49,860
  - Timeline: July 2014 to June 2015
  - Status: In progress

- More information about the project can be found at: [http://fws.sciencebase.gov/sb\\_frame/index.php?sb\\_id=548b63d7e4b0279dd8f12c83](http://fws.sciencebase.gov/sb_frame/index.php?sb_id=548b63d7e4b0279dd8f12c83))
- *Developing a Geodatabase and Geocollaborative Tools to Support Springs and Spring-Dependent Species Management in the Desert LCC*
  - Awarded to: Museum of Northern Arizona
  - Funding: Bureau of Reclamation, \$149,839, cost-share \$173,771
  - Timeline: October 2013 to September 2015
  - Status: In progress
- More information about the project can be found at: [http://fws.sciencebase.gov/sb\\_frame/index.php?sb\\_id=53235da8e4b07f555751f5ac](http://fws.sciencebase.gov/sb_frame/index.php?sb_id=53235da8e4b07f555751f5ac))
- *Fire-Smart Southwestern Riparian Landscape Management and Restoration of Native Biodiversity in View of Species of Conservation Concern and the Impacts of Tamarisk Beetles*
  - Awarded to Texas A&M University
  - Funding: , \$114,946, cost-share \$115,691
  - Timeline: October 2014 to September 2016
  - Status: In progress
- More information about the project can be found at: [http://fws.sciencebase.gov/sb\\_frame/index.php?sb\\_id=548a27d6e4b0becfd8cebc35](http://fws.sciencebase.gov/sb_frame/index.php?sb_id=548a27d6e4b0becfd8cebc35))
- *Modeling Woody Plant Regeneration and Debris Accumulation under Future Streamflow and Wildfire Scenarios in the Desert LCC*
  - Awarded to Grassland, Shrubland, and Desert Ecosystem Science Program, USDA Forest Service Rocky Mountain Research Station
  - Funding: Bureau of Reclamation, \$51,840, cost-share \$52,000
  - Timeline: January 2013 to December 2014
  - Status: Bureau of Reclamation is awaiting receipt of final report
- More information about the project can be found at: [http://fws.sciencebase.gov/sb\\_frame/index.php?sb\\_id=5323552ee4b07f555751f572](http://fws.sciencebase.gov/sb_frame/index.php?sb_id=5323552ee4b07f555751f572))
- *The Impact of Ecosystem Water Balance on Desert Vegetation: Quantification of Historical Patterns and Projection under Climate Change*
  - Awarded to US Geological Survey Southwest Biological Science Center
  - Funding: Bureau of Reclamation, \$98,244 cost-share, \$161,788
  - Timeline: September 2012 to September 2014
  - Status: Completed, final report available
- More information about the project can be found at: [http://fws.sciencebase.gov/sb\\_frame/index.php?sb\\_id=532355c0e4b07f555751f57a](http://fws.sciencebase.gov/sb_frame/index.php?sb_id=532355c0e4b07f555751f57a))
- *Vulnerability of Riparian Obligate Species in the Rio Grande to the Interactive Effects of Fire, Hydrological Variation and Climate Change*
  - Awarded to Grassland, Shrubland, and Desert Ecosystem Science Program, USDA Forest Service Rocky Mountain Research Station
  - Funding: Bureau of Reclamation \$89,940, cost-share \$89,933
  - Timeline: January 2013 to December 2014
  - Status: Bureau of Reclamation is awaiting receipt of final report
- More information about the project can be found [http://fws.sciencebase.gov/sb\\_frame/index.php?sb\\_id=53235630e4b07f555751f57d](http://fws.sciencebase.gov/sb_frame/index.php?sb_id=53235630e4b07f555751f57d))

## Desert Landscape Conservation Cooperative

The following are the active projects of the Desert LCC in the Upper Rio Grande Basin:

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- *Modeling Woody Plant Regeneration and Debris Accumulation under Future Streamflow and Wildfire Scenarios in the Desert LCC*
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  - Timeline: January 2013 to December 2014
  - Status: Bureau of Reclamation is awaiting receipt of final report
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- *The Impact of Ecosystem Water Balance on Desert Vegetation: Quantification of Historical Patterns and Projection under Climate Change*
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- *Vulnerability of Riparian Obligate Species in the Rio Grande to the Interactive Effects of Fire, Hydrological Variation and Climate Change*
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  - Funding: Bureau of Reclamation \$89,940, cost-share \$89,933
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  - Status: Bureau of Reclamation is awaiting receipt of final report
- More information about the project can be found ([http://fws.sciencebase.gov/sb\\_frame/index.php?sb\\_id=53235630e4b07f555751f57d](http://fws.sciencebase.gov/sb_frame/index.php?sb_id=53235630e4b07f555751f57d))

#### Literature Cited

Llewellyn, Dagmar, Seshu Vaddey, Jesse Roach, and Ariane Pinson, 2013. Upper Rio Grande Impacts Assessment: An Activity of the West Wide Climate Risk Assessment. Bureau of Reclamation, Albuquerque, New Mexico.

### **Reclamation's Water Conservation Field Services Program (AAO)**

Through the Water Conservation Field Services Program (WCFSP), a WaterSMART program, Reclamation provides cost-share funding and technical assistance to a number of water management entities in New Mexico and Texas. The WCFSP 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 2014. Through collaboration with the New Mexico Water Conservation Alliance (NMWCA), the AAO WCFSP has greatly extended its outreach capabilities due to their presence with constituents throughout the state of New Mexico. NMWCA meets bi-monthly to discuss pertinent water conservation issues and they also help notify constituents of Funding Opportunity Announcements. Additionally, AAO provided an informational booth at the New Mexico Rural Water Association's annual conference in which we disseminated information regarding our programs and funding opportunity announcements. WCFSP staff supported outreach programs to hundreds of children in Rio Rancho, Gallup and Santa Fe, NM by demonstrating water conservation principles through the game of Water Jeopardy at their respective Children's Water Festivals. Additionally staff performed Water Jeopardy and demonstrated the Rolling River Trailer to local elementary school children at both Longfellow and Cochiti Elementary Schools in Albuquerque.

WCFSP again provided funding to constituents in order to increase water conservation. The City of Rio Rancho used funding to complete its Water Conservation Plan. The City of Santa Fe used its funding to complete the installation of 1600 automatic meter readers and related equipment which helps with water better managed. With improved meter technology, the City of Santa Fe has already realized an increase of revenue by 2% and has improved overall 99.9% accuracy of meter consumption. Bernalillo County Public Works completed their agreement providing the community with 537 rain barrels, 288 High Efficiency Toilets, and performed 286 home water audits which will conserve an estimated 20 acre-ft of water annually.

In 2014 the AAO WCFSP's personnel provided technical support for water conservation activities to the Pueblos of San Felipe, Santo Domingo and Cochiti in the form of laser levelling design, drafting and inspection related to irrigation efficiency improvements. The work includes

the conversion of traditional earthen ditches into pressurized underground pipes including the construction of check valves and measuring devices. This work enables the tribes to irrigate more effectively and efficiently as well as maintain historical water rights while assisting in the preservation of their traditional farming culture.

### **Cooperative Watershed Management Program**

The Cooperative Watershed Management Program (CWMP) contributes to the WaterSMART strategy by providing funding to watershed groups to encourage diverse stakeholders to form local solutions to address their water management needs. The purpose of the CWMP is to improve water quality and ecological resilience, conserve water, and to reduce conflicts over water through collaborative conservation efforts in the management of local watersheds.

In 2014 Reclamation worked to establish an agreement with Rio Grande Restoration Inc. (RGR) to provide funding to establish the Rio Chama Watershed Partnership. RGR proposes to broaden the membership of this watershed group, expand its geographic scope to the entire lower Rio Chama Basin and rename it the Rio Chama Watershed Partnership. The agreement was executed in FY2015.

### **Title XVI Water Reclamation and Re-use Projects**

Under the authority of Public Laws 102-575 and 104-266, Reclamation participates with the cities of Albuquerque and Santa Fe, New Mexico, and El Paso, Texas, in the construction of water reclamation and re-use projects.

#### 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 dollar, non-potable, water reclamation and re-use project. Up to 25 percent federal cost share was authorized for construction of the project, not to exceed \$20 million. Currently, ABCWUA re-uses about 1 million gallons of reclaimed water each day.

- **Southside Municipal Effluent Re-use Project (Southside Project):** The Southside Project consisted of an expanded treatment system at the Southside Wastewater Reclamation plant to include a clear well/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 to irrigate approximately 700 acres of turf at 24 schools, parks, and other recreational areas in the southern part of Albuquerque, thereby avoiding the use of San Juan - Chama Project water on public landscapes. The project total cost was \$8,159,968 with Reclamation contributing \$1,860,000.
- **Bosque and Tijeras Re-use Projects:** The Bosque and Tijeras Re-use 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 Re-use Project would be used for conveying effluent on the east side of the Rio Grande. Proposed construction for the Bosque and Tijeras Re-use 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 reclaimed water since 1961. El Paso's philosophy is that "every gallon of reclaimed water used to irrigate crops and landscapes or for construction or manufacturing is one gallon of potable water that is saved and does not have to be pumped from our aquifers or treated from the Rio Grande." 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, with Reclamation contributing \$14.4 million.

El Paso has prepared a feasibility study to augment the reclaimed water program by rerouting collection system flows that are currently delivered to the Haskell R. Street Wastewater Treatment Plant. The new collection system reconfiguration will then deliver flows to the Fred Hervey Water Reclamation Plant for treatment and re-use in northeast El Paso. When implemented, this project will recycle an additional 365 million gallons (~ 1,100 ac-ft) of water per year. When the feasibility study is approved, Reclamation will contribute \$1.4 million to the construction of this project. Construction is expected to begin in September 2015.

El Paso was also awarded Title XVI funding for another feasibility study in August 2014 in the amount of \$132,000. El Paso will be contributing an additional \$395,000 towards the cost of the feasibility study to evaluate options to make supplementary water available from wastewater, impaired agricultural drain waters and precipitation runoff; it will also evaluate additional uses for reclaimed water. The study options include advanced treatment of wastewater to direct potable use, creation of wildlife habitat utilizing reclaimed water, using captured precipitation runoff, using impaired agricultural drain waters, and available excess surface water orders. The goal will be to increase the available potable water supply by approximately 15,000 ac-ft per year. If constructed and successful, a project using these options could provide approximately 10 percent of annual public water demand. The project could potentially provide approximately 450 to 500 acres of wetland habitat in the dry Chihuahuan Desert for the benefit of several listed and endangered species, and reduce the need for an equivalent amount of raw water supply from the Reclamation Rio Grande Project and the Hueco and Mesilla Groundwater Bolsons combined. The feasibility study will be completed by December 15, 2015.

### City and County of Santa Fe

The City and County of Santa Fe are faced with the realization that the water supply now and in the future may be inadequate to meet regional demand. The City and County of Santa Fe intend to use reclaimed water as a component of potable supply. The City of Santa Fe was awarded Title XVI funding for a feasibility study in August 2014 for \$132,000. The City and County of Santa Fe will contribute another \$169,000 towards the cost of the feasibility study. The feasibility study will evaluate several reclaimed water supply augmentation alternatives and will

assess each option for the benefit of using reclaimed water in terms of environmental and economic sustainability, regional water needs, administrative and legal limitations, and compatibility with existing infrastructure and infrastructure planning efforts. The feasibility study will be completed by May 16, 2016.

## 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 track 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. The model can also be used to complete forecasting of operations for an upcoming year for an Annual Operations Plan (AOP) and 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 (<http://www.spa.usace.army.mil/Missions/CivilWorks/URGWOM.aspx>) is updated with details on recent activities, postings of the latest documentation, and meeting notes.

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, the *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.

In 2013, a single model was implemented that is used for daily accounting. The single model can be altered and made into a forecast or planning model. The tech team would also like to see the geographic scope of the model increased, and work is ongoing on separate RiverWare models to represent the Lower Rio Grande to Hudspeth County, Texas, and the Colorado portion from the headwaters to the Lobatos Gage just north of the New Mexico state line. These models are nearly complete, and work is underway to determine the feasibility of creating one model that extends from the headwaters in Colorado to Hudspeth County.

Sandia National Laboratories developed a monthly time step model, URGSim, using PowerSim software. This model was used for climate change scenarios for Reclamation's West Wide Climate Risk Assessment. Work is ongoing to develop a monthly time step model in RiverWare.

## **Water Accounting Reports Projects**

### **2013 San Juan – Chama Project Water Accounting**

The 2014 San Juan – Chama Project water accounting was accomplished using version 6.4.10 of the RiverWare modeling system software and version 6.0 of the URGWOM accounting module. All accounting data and information is stored directly in the final version of the 2014 accounting model. Reclamation consulted 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. The 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.

Development of water accounting and reporting functionalities for the AAO's HDB instance continued during 2014. Water accounting data is directly transferred from the RiverWare URGWOM Accounting Model to HDB, and from HDB to URGWOM, via an HDB/RiverWare Direction Data Connection interface.

Planned work for 2015 includes continued work to back-populate historical data to HDB and implementing a new version of HDB. Additional Crystal Reports (Version 2011) 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®**

Numerous improvements to RiverWare® were accomplished during 2014 through multiple contracts (Reclamation and USACE) with the CADSWES at the University of 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**

ET Toolbox was intended to make accurate, real-time ET predictions available to URGWOM for daily water operations model runs. This connection was never developed, but ET Toolbox has nonetheless proven to be a useful tool for water managers within and outside of Reclamation, supplying accurate, real-time ET predictions via a dedicated website, and providing a real-time ET dataset (daily riparian and crop water use estimates, open water evaporation estimates, and rainfall estimates). 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. ET Toolbox coverage extends from Cochiti Dam 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 at <http://www.usbr.gov/pmts/rivers/awards/Nm2/riogrande.html>.

Due to difficulties in the acquisitions process, a 2014 contract for ET Toolbox support was not awarded until September. In 2014, a number of sites that report water quality with the Middle Rio Grande Basin were added. In addition, the water quality schematic was improved. In 2015, Reclamation hopes to implement the 2014 MRGCD agricultural cropping pattern information, update documentation to represent all ET Toolbox features, remove unused components, and search for and attempt to implement riparian vegetation classifications. Some effort will also be spent encouraging MRGCD to update and maintain their weather station network as required for the Standardized reference ET method. The site is currently using forecast weather data and the Hargreaves method.

## **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, planning program,

water conservation 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 projects and purchase 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, on additional irrigation improvements at several Pueblos. Reclamation is also working with the Bureau of Indian Affairs on irrigation system improvements for Middle Rio Grande Conservancy District facilities on lands of the six Middle Rio Grande Pueblos.

The Omnibus Public Land Management Act of 2009, P.L. 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. Upon approval of the study by Congress, construction is authorized up to \$6 million per year through FY 2019, not to exceed \$60 million. In FY 2014, Congress continued appropriations for a total of \$858,000 to begin the study. An additional \$1,000,000 was made available through a fund transfer. 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. In order for the Settlement Agreement to become final and effective, seven conditions precedent need to be fulfilled by March 31, 2017. Three of the conditions precedent have been satisfied. These are (i) the President signed into law the settlement legislation (Title V of Pub. L. 111-291), (ii) the Settlement Agreement has been conformed to the settlement legislation, and (iii) the Secretary of the Interior, Pueblo, and local parties have executed the Settlement Agreement. Reclamation has entered into San Juan - Chama Project water contracts with Taos Pueblo, the Town of Taos, and El Prado Water and Sanitation District. The contracts were signed by the Secretary in July 2012 at a ceremony at Taos Pueblo. The Taos Federal Team has been working with the local parties and the United States District Court for the filing and hearing of objections to a proposed partial final judgment and decree that would adjudicate the water rights of Taos Pueblo. 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. Reclamation has also been working with the local parties to assist in the planning and design some of the Mutual Benefits Projects. The Taos Federal Team will be working to develop a plan for environmental compliance for all federal actions and to determine what additional delegations of authority will be needed.

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 Act establishes several deadlines, including completion of all “conditions precedent” by September 15, 2017, and completion of the RWS by June 30, 2024. The Secretary of the Interior delegated authority to the Commissioner of Reclamation to carry out many sections of the Act. The Secretary and all other governmental parties signed the Settlement Agreement and Cost Sharing and System Integration Agreement on March 14, 2013. 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. Of the 1,079 acre-feet of San Juan – Chama Project water, 369 acre-feet will come from unallocated supplies and 710 acre-feet will be exchanged for Cochiti Recreation Pool water. 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. Reclamation completed the public scoping process for the Pojoaque Basin Regional Water System Environmental Impact Statement in 2012. Reclamation’s Technical Service Center continues development of feasibility-level designs and cost estimates for the RWS. Reclamation is working with Santa Fe County to find suitable locations for storage tanks and pump stations in the Bishop’s Lodge area. Class III cultural resource surveys began in March 2014. Pueblo de San Ildefonso and Reclamation have executed a Contributed Funds Agreement to include waste water system improvements and an expanded service area in the environmental impact statement for the RWS. The County has decided to not extend the RWS to Chupadero. The Pueblos are interpreting the Act to mean that the RWS should be substantially complete by June 30, 2021. Reclamation and the Bureau of Indian Affairs are working closely with all parties to meet the timeframes specified in the Act.

## **Emergency Drought Program**

Congress has not reauthorized the Drought Relief Act to date. There have been inquiries, however, regarding the program’s operations in anticipation of its reauthorization. Reclamation continues to receive requests from entities interested in being included on the drought well priority list.



## 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.

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 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.
- 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.

Similar to 2013, 2014 confirmed no positive mussel detections. Reclamation continued to sample seven of its New Mexico reservoir bodies under the direction of Ms. Denise Hosler, the Mussel Detection Program Manager. Represented below is the respective reservoir, total number of tests sites, the total number of months over which the tests were conducted, associated PCR test results (Polymerase Chain Reaction, a technique to amplify a single or few copies of a piece of DNA to determine the species of origin) and Microscopy test results:

- Navajo – 49 test sites; 8 months; all results negative
- Heron – 10 test sites; 6 months; 8 PCR not tested (2 negative); Microscopy negative
- El Vado – 13 test sites; 5 months; all results negative
- Elephant Butte – 19 test sites; 6 months; 3 PCR not tested (16 negative); Microscopy negative
- Caballo – 6 test sites; 6 months; PCR not tested; Microscopy negative
- Sumner – 18 test sites; 6 months; all results negative
- Brantley – 17 test sites; 6 months; 16 PCR not tested (1 negative); Microscopy negative

It is believed that the ongoing drought, along with fluctuating reservoir levels, may be constraining mussel establishment. Continued vigilance is important as conditions may change in the future. As recently as 2012, Reclamation detected three reservoirs in the State of New Mexico as “suspect” for having quagga mussels: Sumner, El Vado, and Navajo. As noted in 2012, 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 deemed infested if it meets one of the following conditions:

- 1) Aquatic Invasive Species (AIS) is confirmed by positive PCR 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 water body has an established reproducing mussel population to call it infested.

## **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 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 and at the Drop Structures along the San Juan - Chama Project. 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.

### **Hydroelectric Power Development at Caballo Dam**

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. HydroPower Capital L.L.C. of Phoenix, Arizona has failed to provide information and has failed to respond to request for

information. The proposed agreement with HydroPower Capital L.L.C. will be canceled during 2015.

### **Hydroelectric Power Development on Azotea Tunnel Outlet**

On August 7, 2013, Reclamation published a Notice of Intent to Accept Proposals, Select Lessee, and Contract for Hydroelectric Power Development on Azotea Tunnel Outlet Drop Structures along the San Juan - Chama Project.

Reclamation received one proposal on January 6, 2014, from the Albuquerque Bernalillo County Water Utility Authority (ABCWUA). Reclamation reviewed and accepted the proposal. ABCWUA is working to develop the Hydroelectric Power project. The proposal was predicated on transmitting the renewable energy using the local electrical utility Northern Rio Arriba Electric Cooperative, Inc. (NORA). However, NORA is in the process of selling off this portion of its system to the Jicarilla Apache Nation Utility Authority and thus cannot develop an agreement to transmit the renewable energy. ABCWUA anticipates developing an agreement to transmit the renewable energy with the Jicarilla Apache Nation Utility Authority after the New Mexico Public Regulation Commission approves the sale of the local electrical utility. When the agreement to transmit power is completed, ABCWUA will provide the AAO a project plan.