2001

2001 Calendar Year Report to the Rio Grande Compact Commission

Hal D. Simpson
Colorado

Thomas C. Turney
New Mexico

Joe G. Hansen
Texas

Bob Armstrong
Federal Chairman

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Rio Grande Compact Commission

COLORADO	NEW MEXICO	TEXAS
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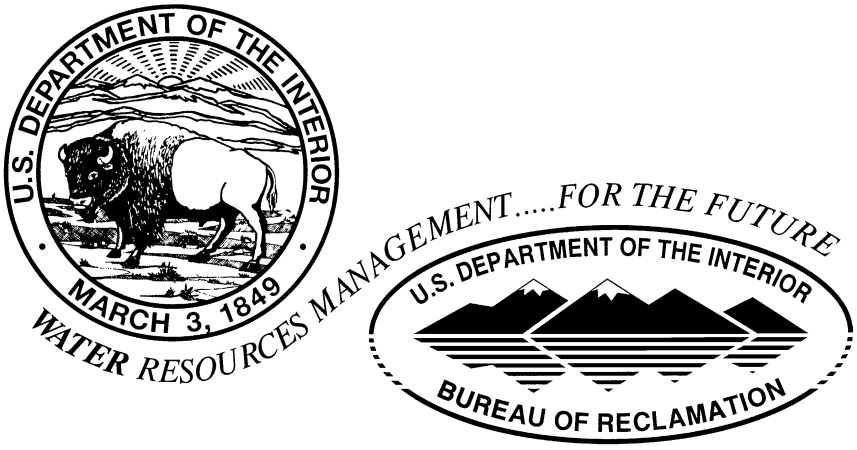

UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF RECLAMATION

Upper Colorado Region

Albuquerque Area Office

March 8, 2002

2001 Calendar Year Report to the
Rio Grande Compact Commission

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UNITED STATES DEPARTMENT O
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U.S. Bureau of Reclamation
Upper Colorado Region - Albuquerque Area Office
2001 Calendar Year Report to the Rio Grande Compact Commission

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, with Platoro Dam and Reservoir, provides water for about 86,000 acres within Conejos Water Conservancy District. The Closed Basin Division is a ground water salvage project located near Alamosa, Colorado which pumps water from a shallow, unconfined aquifer that would otherwise be lost through evapotranspiration.

The *San Juan-Chama (SJ-C) Project* consists of a system of storage dams, diversion structures, tunnels and channels for transbasin movement of water from the San Juan River Basin to the Rio Grande Basin, as a component of the Colorado River Storage Project. The SJ-C Project provides water for municipal, domestic, industrial, recreation, fish and wildlife purposes, and supplemental water for irrigation. Another component of the project is the Pojoaque Irrigation Unit and Nambe Falls Dam. The Pojoaque Irrigation Unit provides water for about 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 south of San Acacia, New Mexico. Irrigation water is provided to the Middle Rio Grande Conservancy District (MRGCD) which supplies water to between approximately 50,000 to 90,000 acres of land in any given year.

The *Rio Grande Project* includes Elephant Butte and Caballo Reservoirs and Percha, Leasburg, Mesilla, and Riverside Diversion Dams in the lower Rio Grande valley of southern New Mexico to just south of El Paso, Texas. The 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. Drainage waters from the Rio Grande Project lands provide a supplemental supply for about 18,000 acres of land within the Hudspeth County Conservation and Reclamation District No. 1 in Texas. Elephant Butte Dam also provides generation of electrical power for communities and industries in southern New Mexico. Reclamation transferred title to the canal and drainage facilities to the districts in 1996.

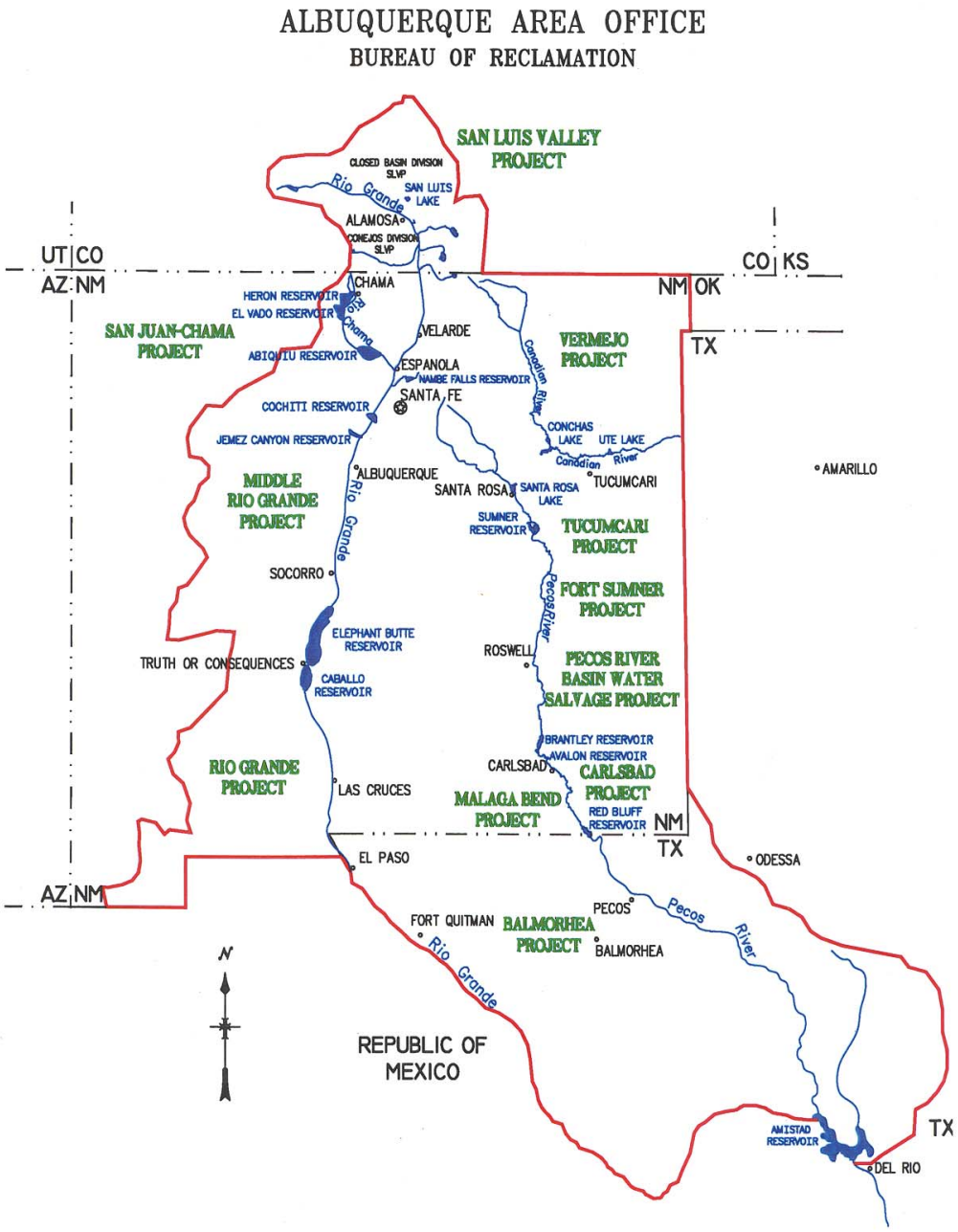

Figure 1. Project map of Reclamation's Albuquerque Area Office.

SAN LUIS VALLEY PROJECT, COLORADO

Conejos Division, Platoro Reservoir

The Conejos Water Conservancy District operates the Conejos Division portion (Platoro Dam and Reservoir) (Figure 2) of the San Luis Valley Project, with its office in Manassa, Colorado. Platoro Reservoir started the year with a storage content of 16,779 acre-feet (af). Supplemental releases to meet the demands were made throughout the summer and fall. There were no flood control operations in 2001. The October 2001 content was 17,079 af.

Platoro Dam Facility Review and Safety of Dams Programs

A Comprehensive Facility Review (CFR) is performed every 6 years on all high and significant hazard dams. The CFR is initiated and overseen by the Denver Safety of Dams (SOD) Office in coordination with the Area and Regional Offices. A CFR consists of a state-of-the-art review of the facility, a site examination, and a report of findings. A CFR was started in October 2000 and will be finalized in 2002. As a part of this CFR, a dive examination of the trash rack and the river outlet works was performed in October 2000 and a mechanical review was completed in May 2001. The CFR examination for the remaining features of Platoro Dam was conducted in September of 2001. The facility was deemed to be in good shape. Several category II recommendations were listed, such as cleaning vegetation from the bottom end of the spillway and at the seepage monitoring station.

Closed Basin Division

The Alamosa Field Division of the Albuquerque Area Office operates and oversees the maintenance of the water salvage project constructed in the Closed Basin area of the San Luis Valley, Colorado. It is a ground water salvage project which pumps water from a shallow unconfined aquifer that would otherwise be lost through evapotranspiration. The project consists of a field of 170 wells distributed throughout an area of approximately 130,000 acres, 115 miles of pipeline laterals, 42 miles of conveyance canal, 82 boundary observation well sites and a complex remote control and monitoring system. There are 169 miles of electrical distribution system lines including 96 miles of overhead primary electric lines, 31 miles of underground primary lines, and 42 miles of underground secondary lines.

Reclamation continues to work under the guidance of the Closed Basin Division Operating Committee in management of Closed Basin operations and water deliveries.

Closed Basin - Operations and Maintenance

Operations

A total of 20,255 af of project water was delivered to various points, including 16,561 af creditable to the Rio Grande pursuant to the Rio Grande Compact. Closed Basin water deliveries in 2001 included deliveries to; the Blanca Wildlife Habitat Area, Alamosa National Wildlife Refuge, San Luis Lake, and the Rio Grande.

The project continued flow-through operations at San Luis Lake during 2001 with 237 af delivered to the lake through San Luis Lake Feeder Canal. Natural inflows to San Luis Lake were measured at the San Luis Lake Parshall flume or estimated at the spillway and culverts. Natural inflow to San Luis Lake during 2001 total 2,038 af. During the 2001 water year, 1,470 af was pumped from the lake.

Deliveries to the Blanca Wildlife Habitat Area included the annual mitigation delivery of 800 af. Total deliveries to the Blanca Wildlife Habitat Area of 920 af included 120 af through an exchange with the Division of Wildlife. Deliveries to the Alamosa Wildlife Refuge included the annual mitigation delivery of 2,774 af. Cooperative efforts between the Division of Wildlife and the Bureau of Reclamation accomplished installation of flow meters at the culverts at San Luis Lake Flume. Final preparation and accuracy checks will begin during the initial runoff period of spring 2002. This effort will improve water accounting in the San Luis Lake area.

Salvage operations continued to be modified in 2001 to reduce the amount of flow of 34 project wells in Stages 3, 4 and 5 as recommended by the Operating Committee for hydrologic impact analysis. This change in operation began in 1999.

U.S. Geological Survey's (USGS) Pueblo Colorado Office continues to provide quality assurance/control of the observation well network data for Reclamation.

Design change has been implemented at the observation well vaults to improve the overall safety of personnel working at these sites. Approximately sixty sites were completed with the cooperative efforts of the Bureau and the Rio Grande Water Conservation District. This design change also provided the opportunity to verify and document measuring points at these sites.

UNITED STATES
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ALBUQUERQUE AREA OFFICE

SAN LUIS VALLEY - CONEJOS DIVISION

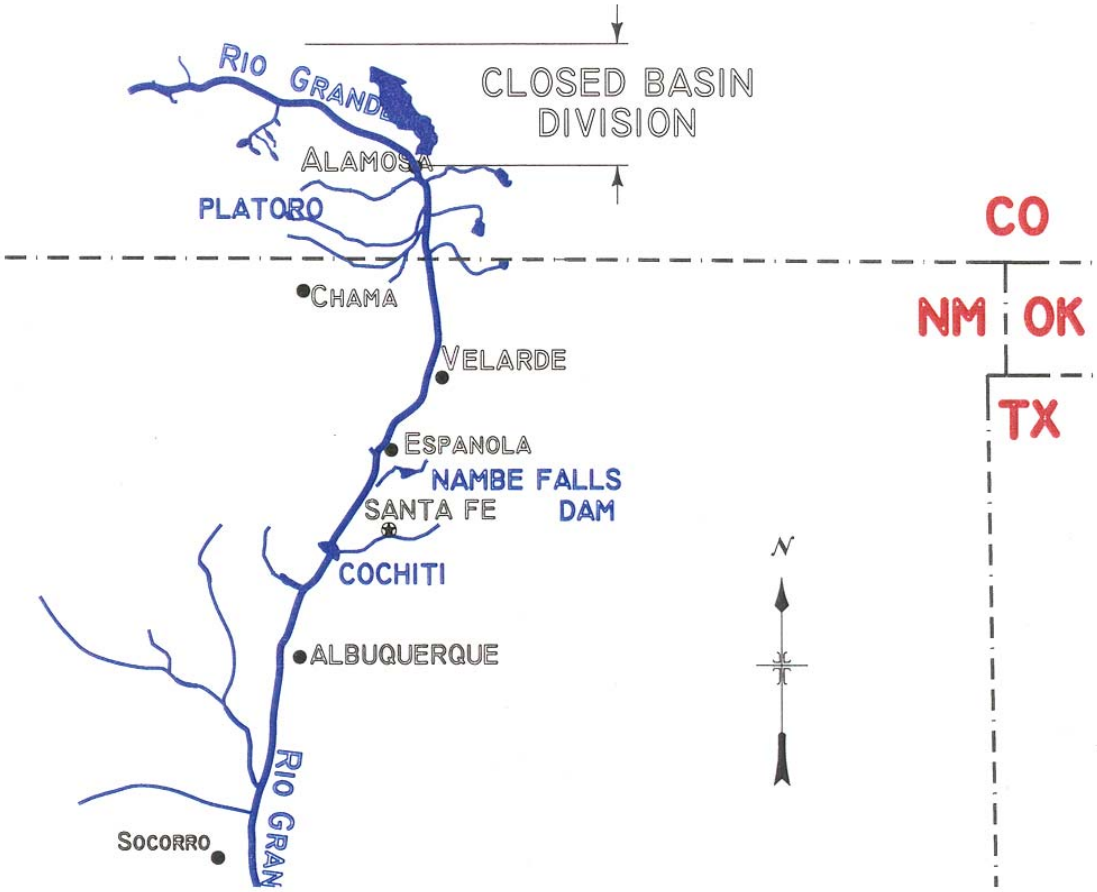

Figure 2. Area map of San Luis Valley and Conejos division.

2001

TABLE 1. SAN LUIS VALLEY PROJECT
CLOSED BASIN DIVISION - WATER ACCOUNTING

(UNIT = ACRE-FEET)

TABLE 1. SLV CBD	BLANCA WILDLIFE HABITAT AREA			PARSHALL FLUME		ALAMOSA NAT'L WILDLIFE REFUGE (ANWR)				DELIVERY TO THE RIO GRANDE			
MONTH	CH03 STA. 730+00	CH04 STA. 798+60	MONTH TOTALS	TOTAL PASSING FLUME	CREDIT-ABLE AMOUNT AT FLUME	CH01 CHICAGO TURN-OUT	CH02 MUM TURN-OUT	PUMPING PLANT	MONTH TOTALS	TOTAL AT FLUME MINUS DEL. @ ANWR	Credit. Amt. del. to RGrande & not used by ANWR	NON-CREDIT-ABLE @ LOBATOS	PROJECT TOTALS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
JAN	0	0	0	1906	1906	0	0	0	0	1906	1906	0	1906
FEB	0	0	0	1805	1805	0	0	0	0	1805	1805	0	1805
MAR	9	93	102	1726	1726	316	438	60	814	912	912	0	1828
APR	24	73	97	1446	1446	0	0	0	0	1446	1446	0	1543
MAY	0	0	0	1718	1718	0	0	0	0	1718	1718	0	1718
JUN	6	69	75	1791	1791	0	0	0	0	1791	1791	0	1866
JUL	65	126	191	1490	1490	298	312	0	610	880	880	0	1681
AUG	35	100	135	1164	1164	177	213	36	426	738	738	0	1299
SEP	118	105	223	1388	1388	346	355	48	749	639	639	0	1611
OCT	50	47	97	1515	1515	87	88	0	175	1340	1340	0	1612
NOV	0	0	0	1662	1662	0	0	0	0	1662	1662	0	1662
DEC	0	0	0	1724	1724	0	0	0	0	1724	1724	0	1724
ANNUAL	307	613	920	19335	19335	1224	1406	144	2774	16561	16561	0	20255

Maintenance

Routine preventive maintenance and repair activities continued at salvage and observation well sites, canal structures, pumping plants, shelterbelts, vehicles and heavy equipment. Other work included aquatic and noxious weed control, rodent control, and ice removal.

Excessive algae growth along the canal continues to be a problem. The algae have been identified as blue-green algae called *Oscillatoria* (non-branching filamentous algae). In the summer of 2000, a treatment utilizing barley straw, which creates hydrogen peroxide as it rots, was applied to a 6-mile stretch of the canal with limited success. Barley straw treatment was continued in 2001.

In 2001, chemical and mechanical treatments were used on the bio-fouling problem that exists in the project wells, all of which showed minimal improvement. In-house treatments along with new treatment processes continue to be a priority in dealing with the bio-fouling problems. Six wells are planned for replacement in 2002.

Problems continue with poor health conditions of the grass carp, which are used to control aquatic weed growth in the canal system. Super-saturation levels of dissolved nitrogen in the canal are a serious threat to the success of the grass carp program. Pumping water

into the air is reducing dissolved nitrogen to tolerable levels and appears to be a viable solution. To prevent the movement of the fish to the southern end of the canal, drum screen fish barrier were installed. These barriers, along with favorable water quality conditions improved the situation.

Water Quality

Water quality monitoring of Closed Basin Division salvage wells, the Rio Grande, San Luis Lake, Head Lake and the conveyance channel continued throughout 2001. In addition to the standard water quality parameters, dissolved oxygen, nitrogen and carbon dioxide continue to be monitored to assist canal grass carp survival studies and dissolved nitrogen reduction endeavors, in cooperation with Denver Technical Center personnel.

The Water Quality Laboratory participated in the Spring USGS Evaluation Program for Standard Reference Water Samples. The overall laboratory rating for these samples was good.

The laboratory has acquired the capability to culture and tentatively identify “iron related bacteria”, to support salvage well rehabilitation and biofouling mitigation efforts.

The laboratory continued a "student volunteer" program with Adams State College, Alamosa, Colorado. The current student assisted with sample analysis and data review.

Rio Grande Water Conservation District

The Rio Grande Water Conservation District (RGWCD) continues to perform civil maintenance on the project. Canal berms were maintained along with resurfacing some sections of the canal berms. Other work included maintenance of lateral access roads, mowing of canal berms and rights-of-way, removal of aquatic weeds from structures, repair of fences, and assisting Reclamation personnel with equipment maintenance.

The RGWCD continued its involvement in the ground water monitoring program and continues maintenance of the irrigation systems for shelterbelt areas.

In 2001, the RGWCD cooperated with the Reclamation in the removal of the old observation vaults and installation of the new vaults. The RGWCD also assisted Reclamation in the salvage well rehabilitation efforts.

The RGWCD in partnership with Reclamation applied for a $200,000 grant from the Colorado Water Conservation Board Construction Fund to assist Reclamation in well redrilling activities that are being planned as a multi-year effort aimed at regaining lost project production.

SAN JUAN-CHAMA PROJECT, COLORADO-NEW MEXICO

San Juan-Chama Diversion Dams

Work on the diversion dams included operating and maintaining Blanco, Oso, and Little Oso Diversion Dams (Figure 3); cleaning sediment and debris from the diversion dams; and water accounting and measurement. A Review of Operations and Maintenance (RO&M) examination was conducted in October 2001. A draft report is being finalized and is expected to be complete in the spring of 2002.

Heron Dam and Reservoir Operations

Computations of the Rio Grande basin inflow to Heron Reservoir for 2001 were made using the ratio method. The ratio method is the basis for determining the natural flow (Rio Grande) within the Willow Creek drainage area. The daily volume was measured directly using the Willow Creek gage above Heron Reservoir, and when SJ-C diversions were in progress, the gaged flow was adjusted for Azotea Tunnel outlet gaged flow less a small channel loss. The natural volume was then adjusted by the appropriate historical correlation factor to arrive at the amount to be bypassed at Heron Dam. The correlation factors were developed using the historical gage data for Willow Creek above Heron Reservoir and Willow Creek at Parkview (Heron Dam).

Frequency analyses of the stream flow data for Willow Creek at Parkview between 1943 and 1970 indicate that flows of 1 cubic foot per second (ft^3/s) were exceeded approximately 60 percent of the time. The mean annual stream flow values indicate only one year in the period that averaged less than 2 ft^3/s. Seepage from Heron Dam averages between 2 and 3 ft^3/s at current storage levels. Thus, the base flow of Willow Creek at Heron Dam (Rio Grande flow) approximates the seepage from the dam.

Diversions into the Azotea Tunnel began on March 21 and ended on September 21. Total amount diverted was 110,582 af (Table 2). This amount is slightly more than the running 10-year average of 92,406 af. Heron Reservoir began the year at an elevation of 7160.76 ft, (267,389 af) and finished the year at an elevation of 7165.76 ft (291,416 af). The February 2002 most probable streamflow forecasts for the Blanco and Navajo River Basins are 59 and 58 percent, respectively, of the 30-year average. Based on the current forecast for below-average runoff this Spring, it is unlikely that Heron Reservoir will fill for the seventh straight year. Reclamation will maximize diversions as water becomes available in 2002.

Table 3 lists the SJ-C water delivered for each contractor from Heron Reservoir in 2001. Table 4 illustrates actual operations of Heron Reservoir for 2001. Column 5 is a balance

between the end-of-month contents using the operational inflow and outflow data. Table 4 also shows Heron Reservoir end-of-month storage.

The SJ-C contractors 2001 and waived 2000 annual allocations were delivered for a total delivery in 2001 of 77,107 af. The remaining 2001 allocation of 32,015 af is being held in Heron according to a waiver that grants an extension for the delivery date for the City of Albuquerque from December 31, 2001 to April 30, 2002. This water will be released in a manner to insure a fisheries flow in the Rio Chama between El Vado and Abiquiu Reservoirs. An additional 2,222 af allocated for the Cochiti Recreation Pool for 2001 remains in Heron and is being released in a manner to provide fisheries flows in the Rio Chama below Abiquiu Reservoir.

Heron Dam Facility Review and Safety of Dams Programs

A CFR was started in November 2000. A dive examination of the stilling basin and a Remote Operated Vehicle (ROV) exam to the river outlet works intake structure were performed in October 2000 and a facility review was completed in May 2001. The CFR was finalized in September 2001, with a determination that no known significant risks are associated with Heron Dam. Regular facility reviews are ongoing.

As part of the CFR, a screening-level seismotectonic and ground motion evaluation for Heron Dam was completed in March 2001

The Chama Field Division and Reclamation's Technical Service Center installed a Remote Terminal Unit (RTU) and upgraded the hydraulic system to allow for remote monitoring and operation from the Chama Field Division Office.

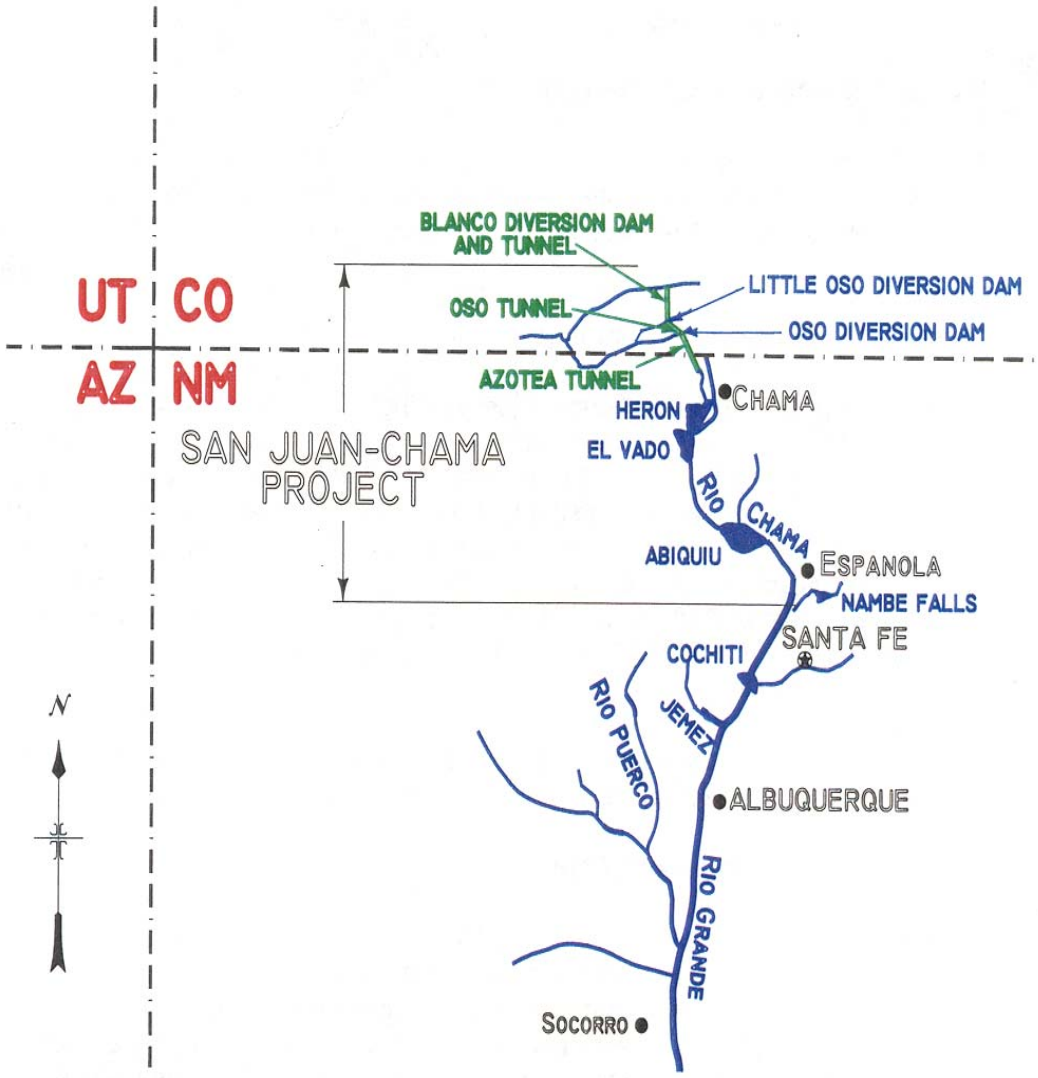

Figure 3. Area map of the San Juan-Chama Project

TABLE 2.

DIVERSIONS THROUGH AZOTEA TUNNEL

(UNIT = ACRE-FEET)

Azotea MONTH	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	10 YEAR TOTAL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
JANUARY	0	0	0	0	0	349	0	0	0	0	349
FEBRUARY	0	0	0	0	0	76	0	0	0	0	76
MARCH	820	0	0	0	1400	9299	2329	4152	536	1512	20048
APRIL	27880	7430	21060	10010	16370	13890	11516	12516	15864	19284	155820
MAY	44700	46170	48050	36090	30760	43720	41822	32806	20987	51092	396197
JUNE	9330	37050	12320	37200	5820	48442	28598	39659	5019	29283	252721
JULY	2870	3050	780	1900	2620	11634	8846	12734	106	4643	49183
AUGUST	1310	3430	0	1050	70	9108	1668	13019	229	4455	34339
SEPTEMBER	150	1670	0	0	210	3406	153	4015	0	313	9917
OCTOBER	0	10	0	0	270	2350	200	0	0	0	2830
NOVEMBER	0	0	0	0	980	0	1188	0	0	0	2168
DECEMBER	0	0	0	0	30	0	381	0	0	0	411
ANNUAL	87060	98810	82210	86250	58530	142274	96701	118901	42741	110582	924059

TEN YEAR AVERAGE = 92406

2001

TABLE 3. SAN JUAN-CHAMA WATER RELEASES FROM HERON RESERVOIR

(UNIT = ACRE-FEET)

TABLE 4 SJ-C Heron Rel MONTH	MRGCD	SANTA FE	COCHITI	CITY OF ALBUQ-UERQUE	POJO-AQUE UNIT	TAOS	COUNTY OF LOS ALAMOS	CITY OF ESPAN-OLA	TWINING SANI-TATION	VILLAGE OF LOS LUNAS	TOWN OF BERNA-LILLO	BELEN	RED RIVER	OTHER SJ-C	TOTAL
	20900	5605	5000	48200	1030	400	1200	1000	15	400	400	500	60	11490	96200
JANUARY	0	0	0	1312	0	0	0	0	0	0	0	0	0	0	1312
FEBRUARY	0	0	0	5554	0	0	0	0	0	0	0	0	0	0	5554
MARCH	0	0	0	6149	0	0	0	0	0	0	0	0	0	0	6149
APRIL	0	0	0	2380	0	400	1200	0	0	200	0	400	60	11490	16130
MAY	0	0	0	583	0	0	0	0	0	0	0	0	0	0	583
JUNE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JULY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AUGUST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEPTEMBER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OCTOBER	1236	0	0	732	0	0	0	0	0	0	0	0	0	0	1968
NOVEMBER	11544	0	342	11037	879	0	0	0	0	0	0	0	0	0	23802
DECEMBER	8120	5605	2436	3833	0	0	0	1000	15	200	400	0	0	0	21609
2001 CY Total	20900	5605	2778	31580	879	400	1200	1000	15	400	400	400	60	11490	77107

Other SJ-C includes Jicarilla Apache allocation and uncontracted water.

2001

TABLE 4. HERON RESERVOIR
MONTHLY WATER STORAGE--SAN JUAN - CHAMA PROJECT

(UNIT = ACRE-FEET)

TABLE 4 Heron Storage	INFLOW		OUTFLOW		SAN	END-OF-MONTH CONTENT			
MONTH	RIO GRANDE	SAN JUAN CHAMA	RIO GRANDE	SAN JUAN CHAMA	JUAN CHAMA LOSS	RIO GRANDE	SAN JUAN CHAMA	TOTAL	ELEVATION (FEET)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DEC. 2000						-208	267181	267389	7160.76
JANUARY	688	0	127	1312	0	769	265869	266638	7160.60
FEBRUARY	1935	0	114	5554	0	2590	260315	262905	7159.80
MARCH	9571	1512	4608	6149	0	7553	255678	263231	7159.87
APRIL	6987	19245	11821	16130	0	2719	258793	261512	7159.50
MAY	131	50990	2991	583	309	-141	308891	308750	7169.23
JUNE	138	29224	138	0	2188	-141	335927	335786	7174.43
JULY	145	4634	145	0	947	-141	339614	339473	7175.12
AUGUST	146	4446	146	0	1597	-141	342463	342322	7175.65
SEPTEMBER	141	313	141	0	2303	-141	340473	340332	7175.28
OCTOBER	145	0	145	1968	1565	-141	336940	336799	7174.62
NOVEMBER	137	0	137	23802	328	-141	312810	312669	7170.00
DECEMBER	491	0	135	21609	0	215	291201	291416	7165.76
SUB-TOTAL	20655	110364	20648	77107					
ADJUST.						-350	(A)		
ANNUAL		131019		97755	9237	-135	291551	291416	

(1) FROM 1(7)

(2) FROM 1(1) - 1(2)

(3) ACTUAL RIO GRANDE RELEASE INCLUDING SEEPAGE.

(4) ACTUAL SAN JUAN-CHAMA RELEASE.

(5) PREVIOUS EOM SJ-C CONTENT, 3(7) + 3(2) - 3(4) - CURRENT EOM SJ-C CONTENT, 3(7).

(6) PREVIOUS RG CONTENT, 3(6) + 3(1) - 3(3) = CURRENT EOM CONTENT.

(7) TOTAL CONTENT, 3(8) - RG CONTENT, 3(6) = SJ-C CONTENT.

(8) FROM CURRENT AREA/CAPACITY TABLES.

(9) ACTUAL EOM RESERVOIR ELEVATION.

(A) 350 ACRE-FEET WERE USED FOR THE YEAR AS PER WATER RIGHTS FILE NO. 1545 AND 1699. 3 ACRE-FEET WERE USED FOR HERON RECREATION AND 347 ACRE-FEET TO REPLACE EVAPORATION LOSSES.

Pojoaque Tributary Unit - Nambe Falls Dam and Reservoir

Nambe Falls began 2001 with the reservoir at elevation 6,812.43 ft providing a storage volume of 1,306 af. During the winter, releases averaged around 1 to 5 ft^3/s to maximize conservation storage as agreed to by the Pojoaque Valley Irrigation District (PVID) and Indian water users. The reservoir filled only once in 2001. The maximum elevation for the year was 6,826.86 ft. (2,038 af) on May 20. The reservoir stayed near that level until June 24. The reservoir reached the low point of the year on November 1 at an elevation of 6,801.09 ft (873 af).

A depletion of 830 af was computed at the USGS Rio Grande at Otowi Bridge near San Ildefonso (Otowi) gage. Cyclical operations of Nambe Falls Reservoir consist of non-irrigation season operations and irrigation season operations. During the non-irrigation season (November through April), all inflow in excess of the bypass requirement of 0.5 ft^3/s is stored until an elevation of 6,825.60 ft is reached. An uncontrolled spill begins at elevation 6826.6 ft, which is the top of the spillway crest.

During the irrigation season (May through October), water is stored and released on demand to meet downstream requirements. The depletion of 830 af was below the 1,030 af PVID Heron allocation set aside to offset Nambe Falls storage. Although the 1,030 af is a “soft number,” a depletion close to this amount is typically computed at Otowi during an average year (Table 5). A release of 847 af of San Juan-Chama replacement water to offset the depletions for Nambe Falls operations was needed at Heron which is the depletion of 830 af at Otowi plus a transportation loss of 17 af. An actual release of 879 af was made in November to cover the depletion plus loss.

Nambe Falls Reservoir ended 2001 at elevation 6,807.83 ft (1,112 af). A summary of the reservoir operation is shown on Table 6.

Nambe Falls Dam Facility Review and Safety of Dams Programs

A CFR was started in the fall of 2000 and will be finalized in 2002. A dive examination and a mechanical examination were conducted at the dam in the fall of 2000. The facility review will be conducted in 2001. The outlet works intake structure was found to be in good condition, with no concrete erosion or major metal work deterioration or damage to the trash racks.

Issues considered with the CFR:

A flood frequency analysis (FFA) is being prepared for the current CFR and suggests larger flood loading.

New ground motions prepared for the current CFR are about the same as previously assumed- no changes to analysis results are expected.

The Standard Operating Procedures (SOP) were updated on September 2001. A new inundation study and maps were completed by Reclamation's Upper Colorado Regional Office in January 2001.

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

Abiquiu Dam and Reservoir is a U.S. Army Corps of Engineers facility. Public Law 97-140 authorized storage of up to 200,000 af of SJ-C water in Abiquiu Reservoir. Adjustments for sediment reduced the sum of the available storage allocations to 183,381 af in 2001. The amount of SJ-C water in storage peaked on June 17 at 153,498 af and ended the year at 131,158 af (Table 7). MRGCD was granted storage by the City of Albuquerque to temporarily store 20,000 af of SJ-C water which the City has provided for the past several years as part of an agreement to maintain flows at the USGS Rio Grande at Albuquerque Gage. 2001 was the last year of the agreement, though water will be delivered in 2002.

An agreement was reached between the three Rio Grande Basin states to allow for the storage of native flows in Abiquiu and Jemez Reservoirs for the benefit of the Rio Grande silvery minnow. Up to 100,000 af could be stored over a 3-year period with releases of up to 30,000 af a year to be made to maintain flows in the Rio Grande below San Acacia Diversion Dam. Losses on this water would be calculated the same as native storage. A maximum storage of 50,115 af was reached on June 17. Releases were made beginning July 2 and continued through October 29. There were several days during this time period when no releases occurred. The average release was just under 100 ft^3/s. At the end of the year, 26,945 af remained in storage for 2002 operations.

Initial SJ-C contractor and native storages were adjusted to reflect the application of new sediment equations retroactively to the beginning of 1999. Daily computations were made using the new equations on end of year 1998 numbers and carried forward to 2001. The new storages would reflect changes in loss rates to the different pools based on new initial storages after the sediment surveys of 1998.

2001

TABLE 5. SAN JUAN-CHAMA WATER AT OTOWI--SAN JUAN-CHAMA PROJECT

(UNIT = ACRE-FEET)

TABLE 5. SJ-C @ Otowi MONTH	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
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
JANUARY	1312	0	4644	5956	-5909	66	126	34	-111
FEBRUARY	5554	202	0	5352	-5259	60	123	29	-61
MARCH	6149	0	285	6434	-6378	71	302	27	-290
APRIL	16130	13750	0	2380	-2550	25	194	26	-363
MAY	583	0	0	583	725	18	17	20	1293
JUNE	0	0	14	14	1763	16	7	12	1766
JULY	0	0	1146	1146	10473	117	24	24	11502
AUGUST	0	0	2401	2401	4638	90	177	62	6834
SEPTEMBER	0	0	1790	1790	172	37	11	63	1977
OCTOBER	1968	1236	319	1051	2440	43	27	42	3463
NOVEMBER	23802	10753	0	13049	-11691	156	112	52	1142
DECEMBER	21609	7818	0	13791	-11541	172	131	30	1977
ANNUAL	77107	33759	10599	53947	-23117	871	1251	421	29129

RELEASE OF SAN JUAN-CHAMA WATER FROM ANY RESERVOIR MADE ON THE LAST DAY OF PRIOR MONTH WILL BE ACCOUNTED FOR AT OTOWI ON THE FIRST DAY OF THE MONTH.

(9) = (4) + (5) - (6) - (7) + (8)

2001

TABLE 6. NAMBE FALLS RESERVOIR
MONTHLY WATER STORAGE--SAN JUAN-CHAMA PROJECT

(UNIT = ACRE-FEET)

TABLE 6 NF Monthly MONTH	INFLOW	OUTFLOW BY PASSED	OUTFLOW STORAGE RELEASE OPER.	OUTFLOW STORAGE RELEASE IRRIG.	RESER. LOSSES	TOTAL OUTFLOW + LOSSES	END OF MONTH CONTENT	END OF MONTH ELEVATION	RELEASE AF from Table "Daily Res. Comps" BLUE BOOK	Mass Bal. Check
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DEC. 2000							1306	6812.43		
JANUARY	203	77	0	0	0	77	1432	6815.24	77	77
FEBRUAR	190	67	0	0	0	67	1555	6817.86	67	67
MARCH	388	86	0	0	9	95	1848	6823.54	86	86
APRIL	894	698	0	5	12	715	2027	6826.66	703	703
MAY	2393	2376	0	0	12	2388	2032	6826.76	2376	2376
JUNE	1091	1079	0	133	26	1238	1885	6824.19	1212	1212
JULY	433	405	0	430	4	839	1479	6816.25	835	835
AUGUST	538	326	0	413	32	771	1246	6811.04	739	739
SEPTEMB	286	271	0	166	5	442	1090	6807.27	437	437
OCTOBER	266	208	0	234	33	475	881	6801.33	442	442
NOVEMBE	208	96	0	8	4	108	981	6804.29	104	104
DECEMBE	210	79	0	0	0	79	1112	6807.83	79	79
ANNUAL	7100	5768	0	1389	137	7294	1112	6807.83	7157	7157

2000 EOY CONTENT + TOT. INFLOW - TOT. OUTFLOW - LOSSES = 1112 ACRE-FEET

SJ-C REQUIRED AT OTOWI = (INFLOW - BYPASS - RETURN FLOW CREDIT - LOSSES ACCRUED DURING DRAWDOWN) = (7100 - 5768 - 421 - 81) = 830 ACRE-FEET

ACTUAL SJ-C RELEASED FOR NAMBE FALLS IN 2001 = 879 ACRE-FEET (A)
EQUIVALENT SJ-C RELEASED FROM HERON IN 2001 = 879 ACRE-FEET

COL. (5) LOSSES ACCRUED DURING RESERVOIR DRAWDOWN = 81 ACRE-FEET
ACCRUED DURING RESERVOIR RISE OR STEADY STATE= 56 ACRE-FEET

(A) SJ-C WATER REQUIRED AT OTOWI MAY NOT COME DIRECTLY FROM HERON. RELEASES MAY BE MADE FROM EL VADO OR ABIQUIU ON A GIVEN MONTH BUT WILL EVENTUALLY BE REPLACED FROM HERON WITH LOSSES ADJUSTED ACCORDINGLY.

NOTE:OPERATIONS ARE BASED ON DAILY ACCOUNTING

2001

Table 7.

RESERVOIR OPERATION FOR ABIQUIU DAM

(UNIT = ACRE-FEET)

Abiquiu Res. Op.	INFLOW		OUTFLOW		LOSSES		EOM CONTENT			
MONTH	RG	SJ-C	RG	SJ-C	RG	SJ-C	SEDIMENT	RG	SJ-C	TOTAL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DEC. 2000	0	5871	2110	1069	0	178	499	1925	88896	91320
JANUARY	1583	5909	3355	0	3	-12	499	156	94817	95472
FEBRUARY	3057	5509	3463	250	0	318	499	-251	99758	100006
MARCH	2629	6919	2580	541	0	1254	499	-203	104882	105178
APRIL	12218	2550	10180	0	14	1163	502	1849	106269	108620
MAY	47573	658	9352	1383	368	1574	561	40441	103970	144972
JUNE	18619	14	10421	1777	1133	1256	569	49773	100951	151293
JULY	12407	1134	20567	11607	567	681	572	42179	89797	132548
AUGUST	25167	2374	30898	7012	540	773	586	36987	84386	121959
SEPTEMBER	42751	1638	49176	1810	565	852	621	31129	83362	115112
OCTOBER	22684	809	25292	3249	384	605	631	28905	80317	109853
NOVEMBER	315	12829	1331	1139	96	165	633	27986	91842	120461
DECEMBER	-175	13635	612	2094	65	123	635	27263	103260	131158
ANNUAL	188828	53978	167227	30862	3735	8752				

RG REFERS TO RIO GRANDE WATER.
SJ-C REFERS TO TRANSMOUNTAIN WATER IN ABIQUIU.

(11) INCLUDES CONSERVATION POOL STORAGE AND RELEASES

M&I Water Use - National Environmental Policy Act Compliance

Reclamation is serving as the lead federal agency for the City of Albuquerque's Drinking Water Supply Project Environmental Impact Statement (EIS) which is addressing the City of Albuquerque's plan to divert, treat, and directly use its SJ-C water for municipal and industrial purposes. During 2001, the City of Albuquerque's environmental contractor continued with impact analysis and preparation of EIS documentation. The U.S. Fish and Wildlife Service has been consulted regarding project impacts and mitigation planning. Coordination with Native Americans is ongoing. Three different types of diversions have been analyzed: a new diversion dam, a subsurface diversion gallery, and use of the existing Angostura diversion. A Draft EIS will be released for public review in 2002.

Reclamation is involved in City and County of Santa Fe water supply projects. After completing National Environmental Policy Act (NEPA) compliance, a demonstration subsurface horizontal collector well was constructed on lands of San Ildefonso Pueblo and the well is currently being tested. Regarding another diversion project, the City, County and a private developer (Las Campanas) are working with the Forest Service and BLM on an EIS to address effects of the proposed Buckman Water Diversion Project. Reclamation is serving as a cooperating agency on the Buckman EIS. As the City and County pursue more comprehensive water supply and reuse plans in the near future, Reclamation will have a lead role.

In October 2001, Reclamation completed an environmental assessment of contracting the Pueblo of San Juan's 2,000 af allotment of SJ-C water to the Pueblo. After determining that the contract would not result in significant environmental impacts, a repayment contract was executed with the Pueblo.

In November 2001, Reclamation initiated an environmental assessment process for a proposal to amend six existing water service contracts that would convert them to repayment contracts. Repayment contracts have no expiration dates. The City/County of Santa Fe, City of Española, Village of Los Lunas, County of Los Alamos, Village of Taos Ski Valley, and Town of Taos requested the proposed change.

MIDDLE RIO GRANDE PROJECT, NEW MEXICO

El Vado Dam and Reservoir Operations

The State of New Mexico began 2001 with a credit, per the Rio Grande Compact, which allowed for a portion of the total Rio Grande inflow into El Vado (Figure 4)to be captured during spring runoff to benefit the MRGCD. The total SJ-C water in storage at the end of the year was 36,302 af (Table 8).

El Vado Reservoir filled in 2001. The maximum content was 180,549 af which occurred on June 10.

The MRGCD began the year with 2,490 af of SJ-C water in El Vado Reservoir. This amount had increased to 28,571 af by the end of the year. There was an additional 1,354 af of MRGCD SJ-C water stored in Abiquiu Reservoir.

Irrigation releases ceased at the usual date of October 31. The Six Southern Pueblos, however, continued to receive diversions of native Rio Grande flows through November 15, 2001.

Flows out of El Vado Reservoir were reduced to their winter operations level by the end of October. The majority of this water is City of Albuquerque's 2001 allocation which is being moved from Heron Reservoir to Abiquiu Reservoir. All native flows were captured at El Vado Reservoir during winter operations.

El Vado Dam Facility Review and Safety of Dams Programs

A CFR was started in November 2000. As part of the CFR, a dive examination of the trash rack and the river outlet works was performed in October 2000 and a facility review was completed in May 2001. The CFR was finalized in September 2001, with a determination that no known significant risks are associated with El Vado Dam. Regular facility reviews are ongoing.

A wet spot was noted on the downstream slope side of the dam by the Chama Field Division on December 13, 2000. An inspection was conducted on December 19, 2000 by Reclamation, Middle Rio Grande Conservancy District and Los Alamos County personnel. The inspection team was unable to determine the cause of this, but it was agreed not to be a threat to the facility. A monitoring program and surveys of the area were established. The increased monitoring program is on-going with no increased seepage or movement identified.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

ALBUQUERQUE AREA OFFICE

MIDDLE RIO GRANDE PROJECT

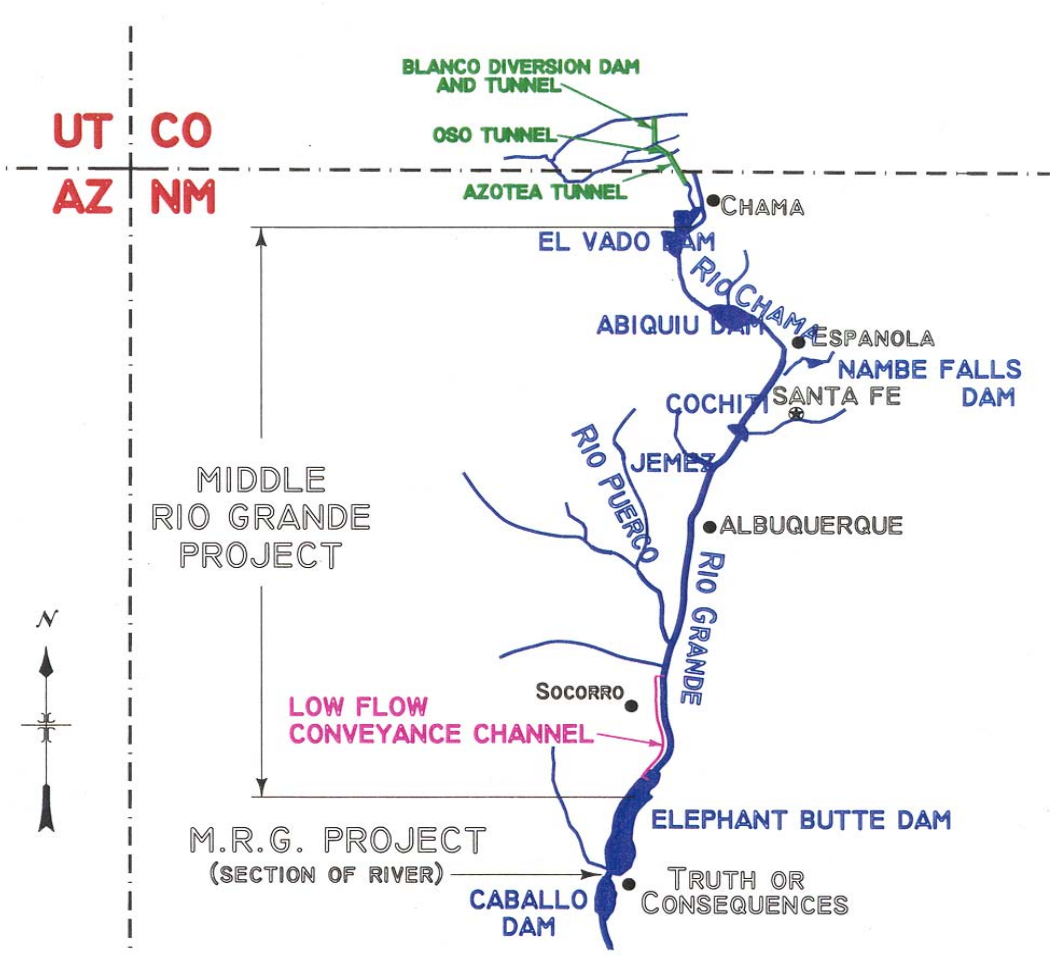

Figure 4. Area map of the Middle Rio Grande Project.

2001

TABLE 8.

RESERVOIR OPERATION FOR EL VADO DAM

(UNIT = ACRE-FEET)

El Vado Res. Op.	INFLOW		OUTFLOW		LOSSES		EOM CONTENT		
MONTH	RG	SJ-C	RG	SJ-C	RG	SJ-C	RG	SJ-C	TOTAL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DEC. 2000	1374	6208	0	5866	16	17	9020	14920	23940
JANUARY	1699	1312	0	5958	0	6	10719	10268	20987
FEBRUARY	1240	5554	0	5352	0	-15	11959	10485	22444
MARCH	12176	6149	167	6434	3	11	23965	10189	34154
APRIL	55665	16130	4100	2380	255	51	75275	23888	99163
MAY	121819	583	40092	583	865	112	156137	23776	179913
JUNE	17844	0	18796	14	1123	124	154062	23638	177700
JULY	3028	0	13496	1147	762	299	142832	22192	165024
AUGUST	1860	0	22223	2400	457	117	122012	19675	141687
SEPTEMBER	240	0	40571	1789	469	813	81212	17073	98285
OCTOBER	908	1968	21075	1049	351	230	60694	17762	78456
NOVEMBER	1369	23802	221	13049	176	15	61666	28500	90166
DECEMBER	1240	21609	0	13793	87	14	62819	36302	99121
ANNUAL	219088	77107	160741	53948	4548	1777			

RG REFERS TO RIO GRANDE WATER.
SJ-C REFERS TO TRANSMOUNTAIN WATER IN EL VADO.

As a result of the CFR, a thickness survey of the upstream face plates and the steel-lined spillway was completed in September 2001, The steel plate is generally in satisfactory condition on both the dam face and spillway.

Middle Rio Grande Diversion Dam Facility Review and Safety of Dams Programs

Reclamation conducted a field and aerial examination of the Rio Grande Project from the Velarde reach down to Socorro in September 2001. A draft report is out for review and the final report will be out in early Spring 2002.

Cooperative Program with the State of New Mexico

Reclamation cooperates with the New Mexico Interstate Stream Commission (NMISC) on water salvage, drain improvement, and river maintenance activities. State funds were used for equipment purchase, operation, and maintenance, as well as various construction efforts, during 2001.

In an effort to improve information sharing and coordination, regularly scheduled meetings were held with NMISC staff to look at on-going work for which the State of New Mexico (State) provides funds through the Cooperative Program.

Repairs were completed on the State-funded Elmendorf Drain outfall, including the installation of the concrete capped sheet piling. The modified outfall performed well when tested using available drain flows. Reclamation also performed vegetative mowing along the Elmendorf and La Joya Drains, and Drain Unit 7. A portion of State funds was used towards Reclamation's 10-year interval aggradation/degradation rangeline aerial photography surveys of the river channel and floodplain. The resulting data will be key to making future predications about river hydraulics and morphology and how best to plan future river maintenance projects. Such projects benefit the State of New Mexico in its continuing effort to meet compact deliveries.

The State provided significant cost share funds to aid in continuation of construction of the Temporary Channel into Elephant Butte Reservoir. The funds were vital to the operation and maintenance of the amphibious excavators. Funds were also used to purchase an ARGO machine for safe and efficient transport of personnel across the river to the work site. Details regarding the Temporary Channel project are provided in the following section.

Appraisal level discussions were held with NMISC staff regarding possible water salvage opportunities if drain improvements are made on the east side of the river above San Acacia Diversion Dam.

Temporary Channel into Elephant Butte 2000

The reach of the Rio Grande above Elephant Butte Reservoir continues to undergo long-term aggradation (rise of riverbed due to sediment accumulation) as a result of sediment loads that are higher than can be transported with the mild valley slope. Additionally, the river is restricted to the eastern edge of the valley from San Acacia to Elephant Butte Reservoir. Problems that arise from this situation include loss of water delivery, and flow reduction past the San Marcial Railroad Bridge.

A river channel tends to adjust its length entering a reservoir as the pool rises and falls, thus maintaining a continuous channel into the reservoir pool. In the case of the headwater area above Elephant Butte Reservoir, the clay deposits and mild valley slope prevent the river from maintaining a connection as evidenced in Figure 5.

It is therefore necessary to construct a channel to maintain a connection between the reservoir pool and Rio Grande. As the reservoir pool increases, the channel will be inundated. As the pool drops, additional work is necessary to maintain a connection.

Figure 5. 1998 photograph illustrating the Rio Grande's inability to cut a channel through the delta.

The Temporary Channel is a multi-phased project that began in the late summer of 2000. Phase I was originally designed for a length of about 3 miles, however, there was already a defined channel in existence at the start of the project and the reservoir pool was at a higher elevation than anticipated. An access road was constructed along the river for a length of about 2 miles and a berm was constructed upstream of the channel alignment to divert river flows away from the construction site as part of Phase I. One problem occurred

during spring runoff when the upper end of the temporary channel breached because of a sharp bend through some non-cohesive fine sandy soils.

Phase II consists of the remaining 5-mile length of channel, and repair of the breached area at the upper end of Phase I. Phase II began in late summer of 2001 after considerable maintenance on the tracks and excavator were made. The soil within Phase II is primarily clay and silts and is highly saturated by spillage from the Low Flow Conveyance Channel (LFCC). These impediments made for difficult working conditions and lead to a request for a variance to work in flowing water from the New Mexico Environmental Department. A variance was granted which led to improved production and reduced equipment maintenance. A 6,200 ft-long channel has now been constructed at half the design width. The alignment of Phase II has been changed to connect the river to the LFCC spillage flows. At the breach location, the channel is being realigned to reduce the curvature and raise the left bank to prevent further breaches.

Phase III will continue construction of the channel downstream to Nogal Canyon and include further widening of the work under Phase II to the design width. The environmental features, which fulfill mitigation requirements outlined in the Elephant Butte Temporary Channel 2000 Biological Assessment, will also be constructed under Phase III.

If Elephant Butte Reservoir continues to drop below Nogal Canyon, it will be necessary to seek either an extension or new 404 permit and 401 certification. Discussions will take place in earnest in early 2002 to assure the proper environmental clearances and permits are in place should the need arise to continue the project to the Narrows of Elephant Butte Reservoir.

Another benefit of the temporary channel is the increase in flow capacity at the San Marcial Railroad Bridge. The higher capacity will allow for higher releases from Cochiti Dam which should improve the overall morphological characteristics of the river and pass flood flows. The floods of the early 1940s obliterated the river channel above Elephant Butte Reservoir. Those flood events, coupled with the onset of a severe drought in the 1950's, led to reduced flows and saltcedar infestation causing the river channel to disappear as illustrated in Figure 6.

A rough estimate of open water evaporative losses was made for the existing conditions and for the temporary channel scenario during a three-year period (1999, 2000, and 2001). There is a savings in depletions of about 5,400 af per year with the construction of the temporary channel. As part of the dredged channel analysis in the early 1950's, net depletion savings were estimated to be 40,700 af per year. The expectation is that the *actual* net depletions savings will range between the 1950's value and the savings from evaporative losses with the temporary channel in place.

Figure 6. 1952 photograph illustrating loss of river channel near San Marcial, NM.

River Maintenance

Reclamation's responsibility for Rio Grande channel operation and maintenance involves that part of the river from Velarde, New Mexico, to the narrows of Elephant Butte Reservoir, and from Elephant Butte Dam to Caballo Reservoir.

At the Santa Ana Pueblo, a Gradient Restoration Facility (GRF) was installed to halt channel bed degradation in the reach. The GRF is a sheet pile and rock structure that acts as a grade control structure with an apron that allows for fish passage. In 2001, approximately half of the sheet pile wall (500 ft length) was driven. Approximately 15,550 cubic yards (cy) of rock material was placed for the apron. Also, a 25 ft-wide pilot channel was excavated upstream of the GRF for a length of 3200 ft. The purpose of the pilot channel is to create a new channel alignment away from the toe of the existing eastern levee system and relocate the existing channel over the GRF. For the channel re-alignment work, a new floodplain is being constructed. In 2001, this activity has involved approximately 110,000 cy of excavation. Previously, due to the channel bed degradation, the river was eroding into the levee system and threatened both a drain system and agricultural properties outside the levee system. When completed, this project will eliminate that threat. Additional project components involved placement of 1500 cy of rock riprap for a channel realignment dike and 120,000 cy of floodplain earthwork for removal of sediment by the river channel.

In the river channel between Elephant Butte Dam and Caballo Reservoir, approximately 8,500 cubic yards of material were removed from the mouths of Cuchillo Negro Arroyo and Mescal Arroyo. Heavy sediment loads from tributaries in this reach are deposited annually during the summer monsoon season. Reclamation is authorized to maintain a safe discharge of 5,000 cfs in this reach, and removal of sediment deposits at tributary

confluences is required to maintain the channel capacity. Sediment removal was performed during a period of non-release from Elephant Butte Dam. No bank stabilization was required in this reach in 2001. As in previous years, a temporary dike was constructed to raise the river stage during the non-release period for the benefit of commercially operated artesian hot springs. The temporary dike was removed in December 2001, and then redesigned and reconstructed to function during a period of low winter releases that were required because of a maintenance project at Caballo Reservoir.

Rio Grande River Restoration Projects

The river restoration projects are part of an initiative to partially restore the Middle Rio Grande bosque and determine the effectiveness of creating new habitat within the floodplain via a managed effort. The goals in general are to provide opportunities for re-growth of native tree species, channel widening, widening of the flood-prone area, and creation or enlargement of high-flow side channels to provide greater habitat diversity and more suitable habitat for the native aquatic and terrestrial communities.

Reclamation, in cooperation with the University of New Mexico and other State and Federal agencies, has teamed up at two sites, the Albuquerque Overbank Project and the La Joya River Restoration Project, to help restore the environmental integrity of the bosque along the Rio Grande.

In collaboration with the Santa Ana Pueblo and the Corps of Engineers, approximately four miles of the Rio Grande are being rehabilitated to provide for a more stable gradient, to reconnect the floodplain with the system's hydrology, and to develop aquatic/terrestrial habitats more favorable to native and endangered species. Additionally, approximately 300 acres of adjacent bosque are being cleared of non-native invasive vegetation and replanted with native trees, shrubs, and grasses.

Endangered Species

Rio Grande Silvery Minnow

The U.S. Fish and Wildlife Service (Service) listed the Rio Grande silvery minnow (silvery minnow) as endangered in 1994 under the Endangered Species Act (ESA). The silvery minnow was formerly one of the most widespread and abundant species in the Rio Grande basin of New Mexico, Texas, and Mexico. 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 2001, a near average snow pack and summer monsoons along with the cooperative management of conservation pool water in Abiquiu and Jemez Reservoirs (see **U.S. Army**

Corps of Engineers Related Reservoir Operations section) and flexible irrigation operations generally maintained continuous flow throughout the middle Rio Grande during the irrigation season. Limited river drying occurred, however, intensive monitoring and salvage efforts led to the successful rescue of silvery minnow from critical reaches. Ongoing population monitoring during 2001 showed an increase in the distribution of silvery minnow at some upstream sampling locations when compared to similar data from 2000. Fall 2001 sampling indicates that silvery minnow populations were relatively stable in 2001.

Silvery Minnow monitoring information is available on a Reclamation web page: http://www.uc.usbr.gov/progact/rg/rgm/index.html.

Reclamation continues to take a proactive approach to Rio Grande aquatic issues, especially those relating to the silvery minnow, through activities such as developing and funding aquatic research and monitoring programs, securing and overseeing the management of supplemental water (including the leasing of SJ-C water from willing contractors), conducting river restoration, and participating in collaborative efforts for the benefit of endangered species.

Southwestern Willow Flycatcher

The southwestern willow flycatcher (flycatcher) was listed as endangered by the Service effective March 29, 1995. Critical habitat was designated effective August 21, 1997 in some areas of New Mexico and other states throughout the species range. The Rio Grande was not designated as critical habitat for the flycatcher. However, Section 7 of the ESA requires all Federal agencies to consult with the Service on any action that "may affect" a listed species regardless of whether critical habitat has been designated or not. Reclamation has been in consultation with the Service pursuant to Section 7 over numerous actions, mainly operations and maintenance activities along the Rio Grande, since 1995.

Reclamation continues to conduct flycatcher surveys and nest monitoring along portions of the Rio Grande. Surveys for flycatcher breeding territories and nest monitoring have been conducted from 1994 to 2001. In 1994, no territories or nests were located in the San Marcial reach of the Rio Grande (north of Elephant Butte Reservoir). In 1995, 3 territories and no nests were located. Flycatcher numbers gradually increased from 13 territories and one nest in 1996 to 25 territories and 25 nests in 2001. This is the largest breeding population of flycatchers on the middle Rio Grande to date. Flycatcher surveys and nest monitoring will continue in 2002.

Middle Rio Grande Endangered Species Act Collaborative Program

In January 2000, Reclamation signed a Memorandum Of Understanding with other partners to develop a Middle Rio Grande Endangered Species Act Collaborative Program (Collaborative Program) for the purpose of protecting and improving the status of endangered species, while existing and future water uses are protected and proceed in compliance with all applicable laws. An ESA Work Group comprised of federal and non-federal participants was formed to carry out these activities. Involved parties currently include representatives from Reclamation, Service, Bureau of Indian Affairs, Corps of Engineers, State of New Mexico, MRGCD, Alliance for Rio Grande Heritage, Plaintiffs in the *Minnow v. Keys* lawsuit, City of Albuquerque, National Association of Industrial and Office Properties, New Mexico Farm and Livestock Bureau, University of New Mexico, and New Mexico State University.

On January 19, 2001, the ESA Work Group completed preparation of a draft Cooperative Agreement and draft Collaborative Program document describing a long-term strategy that provides a framework for coordinated actions to enhance habitat, increase populations, and contribute to the recovery of the Rio Grande silvery minnow and the southwestern willow flycatcher. The ESA Work Group is also participating in drafting authorizing legislation that will address the authorities and appropriations necessary to accomplish the Collaborative Program. Congress has identified $11.2 million in additional funding for Reclamation in FY02 to support the efforts of the Collaborative Program. The ESA Work Group recently completed a Detailed Spending Plan for Congress describing activities to be funded. Proposed activities include habitat restoration, silvery minnow population management, water quality management, and water acquisitions.

Reclamation believes the Collaborative Program is a process that will conserve and recover the endangered species, attain necessary ESA compliance for all parties, federal and non-federal, and provide for existing, ongoing, and future water development and management activities. Tasks that need to be addressed prior to federal agencies signing the Cooperative Agreement that establishes the Collaborative Program include: decisions regarding federal/non-federal cost-sharing, government-to-government consultations with Pueblos and Tribes, environmental compliance, and authorizing legislation. The federal agencies have proposed an interim strategy identifying desired outcomes, goals, actions, and milestones for addressing these tasks.

During 2000 and 2001, significant progress was made in developing the Collaborative Program, securing funding for planning and executing restoration projects, and conducting research and monitoring supportive of the Rio Grande Silvery Minnow Recovery Plan and the programmatic biological opinion (see the following section).

Reclamation is committed to continuing these efforts and actively collaborating with other federal and non-federal stakeholders on the middle Rio Grande to develop and implement

solutions that will provide for the continued delivery of water for agriculture, municipal and industrial uses, the river and the bosque, and the protection of threatened and endangered species.

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

In June 2001, Reclamation and the Corps of Engineers completed formal consultation with the Service over the agencies' discretionary actions related to water management in the Middle Rio Grande, including Reclamation's river maintenance program, and related non-federal actions. A final biological opinion was received from the Fish and Wildlife Service in June 2001 that contained a Reasonable and Prudent Alternative to avoid jeopardizing the continued existence of the listed species and Reasonable and Prudent Measures to minimize impacts of incidental take of the silvery minnow. Reclamation and the Corps of Engineers are proceeding to implement these elements of the biological opinion.

The programmatic biological opinion addresses the short-term needs of the endangered species over a three-year period through December 31, 2003 and allows additional time for the ESA Work Group to develop a long-term program that will ultimately be the implementation vehicle for ESA-related activities in the future. A supply of water for ESA purposes after 2003 still needs to be identified and will be a key issue in the long-term ESA, Section 7, consultation for the Collaborative Program.

Rio Grande Silvery Minnow v. Keys Litigation

In November 1999, environmental groups collectively filed suit against Reclamation and the Corps of Engineers for alleged ESA and National Environmental Policy Act (NEPA) violations (*Minnow v. Keys*). In August 2000, at the conclusion of the first phase of mediation, an Agreed Order was signed resolving the Plaintiff's Motion for Preliminary Injunction. A second phase of mediation ended unsuccessfully in February 2001, and subsequent negotiations resulted in a Conservation Water Agreement that made additional supplemental water available over a three-year period. The Plaintiffs rejected a Motion to Dismiss in July 2001 and filed a Second Amended complaint. A hearing on the merits of the case was held in federal court before Judge Parker in November 2001. The final ruling was still pending.

In the MRGCD cross claim against the United States in the *Minnow v. Keys* lawsuit, MRGCD seeks quiet title to all Middle Rio Grande Project properties (which MRGCD claims to have never conveyed to the United States), a reconveyance of state water permit 1690 (regarding storage in El Vado Reservoir), and a declaration that the 1951 repayment contract is no longer in effect. The United States' position in this cross claim is that MRGCD conveyed all Middle Rio Grande Project properties to the United States and that those properties remain in the name of the United States until, among other things,

Congress authorizes title transfer. The repayment contract also stays in effect until such time. The cross claim was still in the discovery phase of the process.

Rio Grande and Low Flow Conveyance Channel Modifications and EIS

In September 2000, Reclamation released a Draft Environmental Impact Statement (DEIS) on proposed realignment of the Rio Grande and the Low Flow Conveyance Channel below San Marcial. The proposed project would alleviate some of the more critical channel maintenance problems in the San Marcial area.

The DEIS evaluates alternatives for reconfiguring the channel system below San Marcial for continuing water conservation benefits, maintaining system elements for effective valley drainage, and minimizing costs while considering environmental needs and the protection of endangered species and their habitats.

On May 3, 2001, Reclamation submitted a Biological Assessment (BA) to the U.S. Fish and Wildlife Service requesting formal consultation on the proposed project pursuant to Section 7 of the Endangered Species Act. Consultation with the Service on potential effects of the proposed project on the southwestern willow flycatcher and the Rio Grande silvery minnow is continuing.

As reported in our June 8, 2001 letter to the Engineer Advisers, we have elected to consult on the "bottom up" realignment alternative described in the DEIS. This is the more flexible of the two proposed realignment alternatives and can better encompass the range of possible outcomes from the Upper Rio Grande Basin Water Operations Review, Section 7 consultations, ESA collaborative program decisions, and ongoing court proceedings.

The bottom up alternative allows construction of new segments of the Low Flow Conveyance Channel below San Marcial to be phased by first building channel segments to carry drainage flows of up to 500 ft^3/s. Provisions will be made to enable later enlargement of the channel, if necessary, to accommodate water diverted at San Acacia. We believe that, at present, satisfactory completion of Section 7 consultation would be far more difficult to complete on a 2,000 ft^3/s capacity channel than on a smaller channel because of the greater effects on endangered species and the uncertainties regarding future conveyance system operations. Fully completing the channel realignment will take a number of years. If a decision to resume diversions is reached within the next few years and all permitting and compliance requirements are completed, work on a larger channel could begin in the early stages of the realignment transition. On the other hand, if diversions do not resume in the reasonably near future, we could not view building a 2,000 ft^3/s capacity channel to carry 500 ft^3/s of water to be a prudent expenditure. Furthermore, we anticipate significant reductions in our future budgets. Phasing of Low Flow

Conveyance Channel construction will allow spreading of construction costs over a longer period of time.

One particular concern with the realignment project relates to the numerous southwestern willow flycatcher territories at the upper end of the reservoir. Some 30 percent of known currently active southwestern willow flycatcher nesting sites in the middle Rio Grande valley are in this area. These habitats are dependent on the outflow from the Low Flow Conveyance Channel that runs along the west side of the floodplain. We have proposed to avoid impacts to this area by ending the new Low Flow Conveyance Channel above the nesting area and continuing it further downstream, leaving the hydrology of the area undisturbed. The channel could be connected in the future as the vegetation ages and becomes less suitable flycatcher habitat.

A final EIS will be released following completion of the current consultation. Reclamation's near-term ability to fund construction under the Middle Rio Grande Project presently appears questionable.

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 7). Elephant Butte Field Division operated and maintained Elephant Butte and Caballo Dams. The Elephant Butte Irrigation District and the El Paso County Water Improvement District No. 1 (Districts) operated and maintained Reclamation's diversion dams on the Rio Grande, including Percha Diversion Dam, Leasburg Diversion Dam, and Mesilla Diversion Dam in New Mexico, and the Riverside Diversion Cofferdam in Texas. The Elephant Butte Irrigation District operated and maintained the three diversion dams in New Mexico under a contract with Reclamation. The El Paso County Water Improvement District No. 1 operated and maintained the diversion into the Riverside Canal in Texas under a contract with Reclamation.

Water Supply Conditions

Inflow into Elephant Butte Reservoir during 2001, measured at the Rio Grande Floodway (FW) plus the LFCC at San Marcial (FW+LFCC), was 403,510 af. The 86-year average annual inflow, measured at San Marcial (FW+LFCC) is 873,858 af. The actual 2001 March through July runoff, measured at San Marcial (FW+LFCC), was 158,900 af which was 31.7 percent of the 30-year average of 501,000 af. Of the period 1996-2001, the spring runoffs (March-July) at the San Marcial gauging station have consistently been below normal, with the exception of 1997, which was 120 percent of normal. Also, 1996 and 2000 spring runoffs have been near-record low volumes. During 2001, 782,510 af of water was released from Elephant Butte Reservoir. There was a release of 786,550 af to meet the irrigation requirements of Project water users from Caballo Reservoir.

The January through June National Weather Service and Natural Resources Conservation Service coordinated forecasts for the 2001 March through July runoff season are presented in Table 9.

Combined storage for Elephant Butte and Caballo Reservoirs was 923,130 af on December 31, 2001. This combined storage was 40.9 percent of the total capacity of both reservoirs, and 43.3 percent of the available storage. The available storage for both reservoirs during the winter months (October 1 to March 31) is equal to the capacity of Elephant Butte Reservoir, 2,023,358 af minus 25,000 af that Reclamation reserves for winter operational flood control space (50,000 af during the summer), plus the capacity of Caballo Reservoir, 233,428 af minus 100,000 af for flood control space, or 2,131,786 af during the winter (2,106,786 af during the summer).

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RIO GRANDE PROJECT

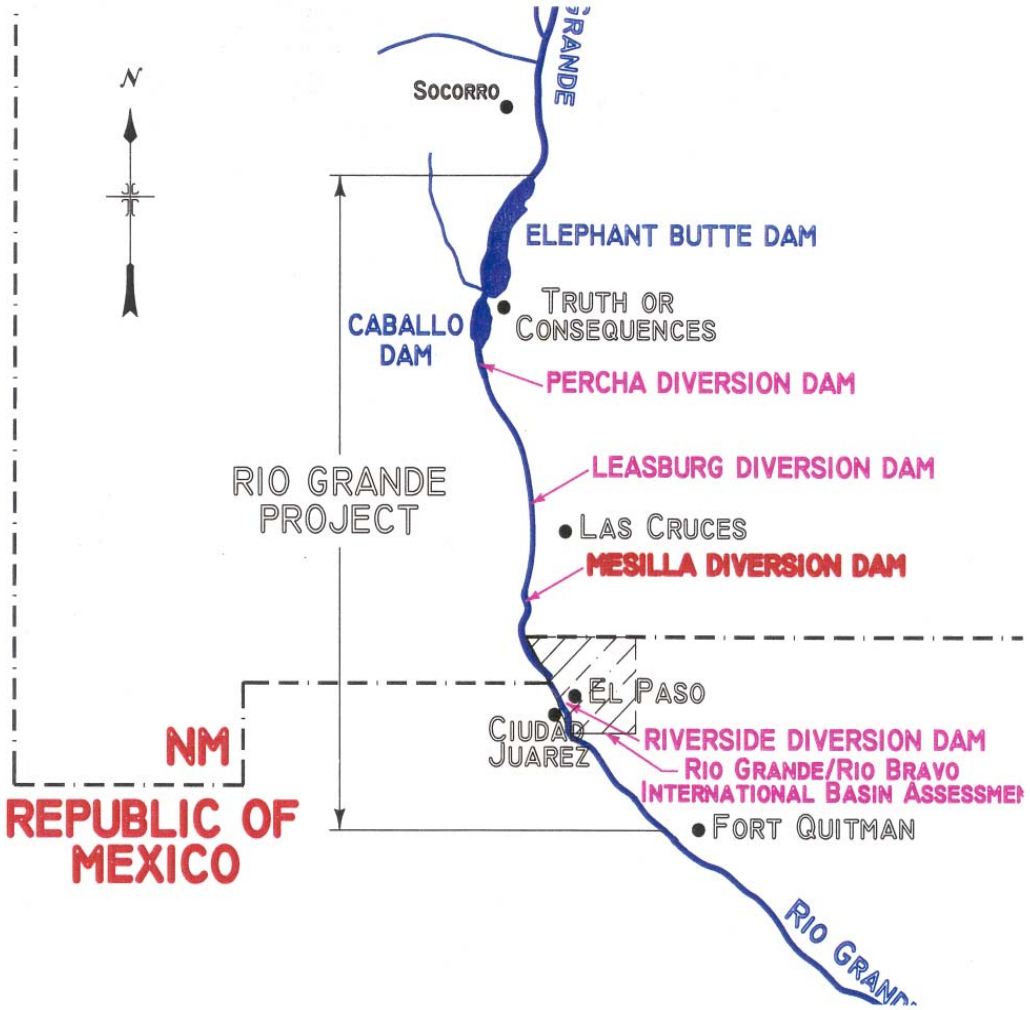

Figure 7. Area map of the Rio Grande Project.

Table 9. Summary of 2001 Rio Grande coordinated spring runoff forecasts.

Month	Forecasted Otowi Runoff (af)	% of 30-Year Average	Forecasted San Marcial Runoff (af)	% of 30-Year Average
Jan 1	690,000	101	460,000	92
Feb 1	715,000	104	500,000	100
Mar 1	715,000	104	500,000	100
Apr 1	715,000	104	500,000	100
May 1	785,000	114	575,000	115
Jun 1	770,000	112	560,000	112
Actual Runoff			158,900	32

A full allotment was declared by Reclamation in December 2000 for the 2001 irrigation season. This was the 21st consecutive year that a full allotment has been declared at the beginning of each irrigation season. The Rio Grande Project has enjoyed a full supply for the last 23 years. A less than full allotment (20.79 percent reduction) was declared in December 2001 for the 2002 irrigation season. This was an initial allotment, and the allotment was revised in January 2002 to a less than full allotment (12.75 percent reduction) based on inflow to the Rio Grande Project reservoirs during December 2001. Reclamation projects that the final allotment will be a full supply, which will be reached in early March 2002.

The coordinated forecast from the National Weather Service and the Natural Resource Conservation Service for the 2002 March through July runoff season is presented in Table 10.

Table 10. Coordinated spring runoff 2002 Rio Grande forecasts.

Month	Otowi Runoff (af) (Mar-Jul)	% of 30-Year Average	San Marcial Runoff (af) (Mar-Jul)	% of 30-Year Average
Jan 1	425,000	56	270,000	47
Feb 1	350,000	46	190,000	33
Mar 1	258,000	34	100,000	18

Project Irrigation and Drainage Systems and Title Transfer

In 1992, Congress authorized the transfer of title to certain irrigation facilities to the Districts. The official transfer of the irrigation and drainage rights-of-way and facilities to the Districts was completed on January 22, 1996. Therefore, in 2001, the irrigation and drainage system continued to be operated and maintained by Elephant Butte Irrigation District in the New Mexico portion of the Rio Grande Project and by El Paso County Water Improvement District No. 1 in the Texas portion of the Project. Reclamation continues to administer the lands and rights-of-way activities of the reservoirs and diversion dams areas.

Reclamation retains title and operation and maintenance responsibilities for Elephant Butte and Caballo Dams and Reservoirs. Operation and maintenance of the diversion dams are performed by the Districts under contracts with Reclamation. Reclamation retains the rights-of-way and title of the reserved works for the diversion dams. The Districts performed water accounting flow measurements at canal headings, river stations, and lateral headings during 2001. Reclamation coordinated and maintained central control of releases, river operations, and water accounting. To accomplish the water allotment accounting, the Districts collected field flow measurements and coordinated 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 2001. The International Boundary and Water Commission (IBWC) continued to operate and maintain the American Diversion Dam and the American Canal during 2001 in accordance with the International Treaties with Mexico (1906 and 1933). In addition, the IBWC operated the International Diversion Dam which diverts irrigation waters into the Acequia Madre head gates operated by Mexico.

Drainage waters from the Rio Grande Project lands provide a supplemental irrigation water supply for approximately 18,342 acres of the Hudspeth County Conservation and Reclamation District No. 1 (HCCRD). Total flows out of the Project to HCCRD, through the Hudspeth Feeder Canal, Tornillo Canal at Alamo Alto, and Tornillo Drain were 151,892 af during 2001. Under the Warren Act contracts, HCCRD was charged for drainage water from the Project between March 1 and September 30 which amounted to 114,226 af.

Water flows measured by IBWC at the Rio Grande at Fort Quitman Station, downstream of the Project and HCCRD boundaries, amounted to 137,920 af during 2001.

Elephant Butte Reservoir and Powerplant

Elephant Butte Reservoir reached a maximum storage of 1,306,100 af (elevation 4,383.24 ft) on January 30, 2001. A minimum storage of 840,400 af (elevation 4,361.88 ft) was reached on October 9, 2001. The last time Elephant Butte Reservoir was at this low storage level was November 1982. Storage levels in Elephant Butte Reservoir did not

enter into the 50,000 af prudent flood control space in 2001.

Net power generation for 2001 was 96,823,590 kilowatt-hours which was 127.1 percent of the 62-year average (1940 through 2001) of 76,175,475 kilowatt-hours.

The balance valves were utilized to meet downstream irrigation demand and manage Caballo Reservoir storage level from February 5 - February 15, and June 25 - July 26, 2001. In 1998, Reclamation determined that the hydraulic turbines of the power plant needed to be replaced because of severe stress fracturing. A new hydraulic turbine was installed in the power plant in the winter of 2001 to replace the No. 2 turbine. Presently, the No. 3 turbine has been disassembled for refabrication, and the power plant will have only two turbines available for operation in 2002. The remaining two turbines will be replaced over the next two years.

Elephant Butte Dam Facility Review and Safety of Dams Programs

The update for the SOP was completed in August of 2001.

In 1999, a sediment survey was performed and new tables were distributed in Dec, 2000, and effective in January, 2001.

The spillway bridge inspection was performed in May 2001. The primary structural components (deck, superstructure and substructure) were rated as fair. The traffic safety features (bridge railing, approach railing) are inadequate by present design standards. Annual inspections of this bridge are recommend.

Following a risk analysis meeting conducted in September 2000 discussing seismic stability issues at the dam and static loading and seismic stability concerns at the dike, a draft Risk Analysis was written. This draft analysis was in the review process in 2001 and continues. No additional work was done in 2001 relating to Reclamation's Safety of Dams Program on Elephant Butte Dam.

A Periodic Facility Review (PFR) is scheduled for both Elephant Butte and Caballo Dams in the spring of 2002 with UC Region, Albuquerque Area Office and the Elephant Butte Field Division.

Caballo Dam and Reservoir

Caballo Reservoir reached a maximum storage of 115,100 af (4,158.36 ft) on March 9, 2001. A minimum storage of 4,490 af (4,126.82 ft) was reached on October 6, 2001.

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 af (4,146.11 ft) 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 af during the winter months of October through January requires collaboration and consultation between the Districts and Reclamation.

Reclamation's plan for operation of Caballo Reservoir during February 1 through September 30, 2001 was to maintain storage levels such that they would not exceed 112,000 af in February and not be less than 6,600 af by the end of September. Having higher storage levels earlier in the irrigation season allowed Reclamation to: 1. reduce evaporative losses between Elephant Butte and Caballo Reservoirs; 2. provide sufficient operational hydraulic head at Caballo Reservoir for irrigation demand releases; 3. serve as a reserve pool in case releases were interrupted from Elephant Butte Dam and minimize changes to release rates from Elephant Butte Dam; and, 4. compensate for loss in discharge capacity from Elephant Butte Dam power plant due to the turbine runner replacement program.

Caballo Reservoir's operating plan for October 1, 2001 through September 30, 2002 was coordinated with the Districts by letter transmitted on December 17, 2001. It also reflects accommodations for the Elephant Butte turbine runner replacement program. Reclamation will raise Caballo Reservoir to a maximum storage level of 100,000 af (4,156.00 ft) by late February, 2002 and gradually allow the reservoir storage to decrease throughout the irrigation season to a low point of approximately 25,400 af (4,138.39 ft) by the middle of October 2002.

Reclamation lowered Caballo Reservoir down to the trashrack structure level (4,490 af, elevation 4,126.82 ft) by October 6, 2001 to conduct an inspection of the outlet works of Caballo Dam during October and November, 2001. The last time this inspection was conducted and the reservoir drawn this low was 1981. Only minor damage near the service gates was discovered. Reclamation also constructed and installed a metal stoplog guide extension to the trashrack structure. This extension is high enough in elevation to allow future inspections of the outlet works without having to draw Caballo Reservoir so low. The reservoir was raised up to its normal winter operating range of 25,500 af by the end of December 2001.

On March 23, 2000, at the Rio Grande Compact Commissioners' annual meeting in El Paso, TX, Reclamation officially announced the temporary restriction on the Caballo Reservoir pool level due to safety concerns of operating the spillway gates under static and dynamic loading (see **Caballo Dam Facility Review and Safety of Dams Programs**

section). Under this restriction, Reclamation will not be allowed to exceed the elevation of 4161.00 ft (the spillway crest) for normal conservation storage operation. Reclamation will allow a functional flood control pool (100,000 af) from elevation 4,161.00 ft to 4,173.17 ft.

At the February 28, 2001 Rio Grande Compact Commission Engineer Advisors annual meeting in Santa Fe, NM, the Engineer Advisors recommended the temporary loss of 93,244 af of Project storage in Caballo Reservoir for Rio Grande Compact accounting purposes due to the safety of dams restriction. At the March 22, 2001 Rio Grande Compact Commissioners annual meeting in Alamosa, CO, the Commissioners approved the temporary loss of Project storage due to the reservoir operating restriction.

Caballo Dam Facility Review and Safety of Dams Programs

As part of the SOD program, a Risk Analysis on the dam and an Arm and Truss Buckling Analysis for the Radial Gates for Caballo Dam was completed in August 2000. This analysis included a hydrologic, hydraulic, static and seismic analysis of the embankment and spillway, with a special review of the radial gates and center pier for the spillway. Analysis indicated that the radial gates were under strength for a load created by the reservoir with concerns beginning at approximate elevation 4,173.2 ft. One result is a **temporary** reservoir restriction being set at 4,173.17 ft until the gates are modified.

In July, 2001, Reclamation finalized its design plans and drawings for the Caballo Dam spillway gates rehabilitation and modification. On August 15, 2001, Reclamation officially transferred the status of Caballo Dam and Reservoir from operation and maintenance to safety of dams construction. Work on the spillway gates began on August 20, 2001, and all work on the west spillway gate was complete in December, 2001. All work on the east spillway gate was completed in February, 2002. Additional counterweights will be added in March, 2002 and the spillway gates will be lowered to their normal closed position by the end of March, 2002. A final inspection report will be issued in March, 2002, and Reclamation anticipates that the temporary restriction on Caballo Reservoir operations will be removed at that time. This action will allow 93,244 af of Caballo Reservoir storage to be available again for Rio Grande Compact accounting purposes.

Data Automation and Instrumentation and Flow Monitoring System

Reclamation's El Paso Field Division launched its new Internet Web Page for the Rio Grande Project on November 1, 2001. The current year's daily, weekly, and monthly data on the operations of Elephant Butte & Caballo Reservoirs, and the delivery of water to the two United States Rio Grande Project water users (Elephant Butte Irrigation District and El Paso County Water Improvement District No. 1), are now available via the Internet. To reach the Web page, type in http://elpaso.uc.usbr.gov.

Elephant Butte and Caballo Reservoirs Resource Management Plan

The Resource Management Plan (RMP) for Elephant Butte and Caballo Reservoirs was initiated in late 1995 and is presently in its final stage of development. The intent of the RMP is to produce a guide for Reclamation and other relevant agencies for use in the management of Elephant Butte and Caballo Reservoirs' land and associated resources. The Final Environmental Impact Statement (FEIS) is presently being developed and is expected to be distributed for public review in the spring of 2002. The Record of Decision (ROD) will be completed following the 30-day review period of the FEIS. The preparation of the RMP is anticipated to be completed by the end of the year 2002. Among the primary issues being discussed and evaluated are grazing management practices, lease lot ownership and management, threatened and endangered species, water quality, and recreation development. The public and related agencies are kept informed throughout the planning process by way of newsletters, planning workgroup meetings, periodic public workshops, and informational open houses.

Diversion Dam Facility Review and Safety of Dams Programs

Reclamation conducted a field examination of the Rio Grande Project reserved works structures - Percha, Leasburg, Mesilla, and Riverside Diversion Dams, on October 28-29, 1998. The final examination report was issued in November, 2000. The next scheduled RO&M field examination of the diversion dams is tentatively set for the fall of 2002, after the irrigation season ends.

Rio Grande Project Adjudications

The United States District Court for the District of New Mexico issued a Memorandum Opinion and Order dismissing United States of America v. Elephant Butte Irrigation District, et al Civ. No. 97-0803 JP/RLP/WWD (Quiet Title to the Waters for the Rio Grande Project) in August 2000. The United States filed this case on June 12, 1997, requesting the Court to quiet legal title to the waters of the Rio Grande Project in its name. The dismissal is currently in appeal.

Lower Rio Grande Basin Adjudication (New Mexico), State of New Mexico, ex rel, Office of the State Engineer v. EBID, et al, CV-96-888: This "stream adjudication" was originally filed by Elephant Butte Irrigation District (EBID) against the State Engineer in 1986. During 2000, the Court met with the parties four times; the hydrology committee was reestablished with the State of New Mexico acting as secretary of the committee in order to schedule meetings and distribute minutes, agendas, and other data for meetings of the hydrology committee. There are pending motions and state processes associated with this case currently in progress.

Concerning the issue of All Claims of Water Rights in the Upper Rio Grande (above Fort Quitman) Segment of the Rio Grande Basin; SOAH Docket No. 582-96-0144; Texas, the Texas Natural Resources Conservation Commission (TNRCC) posted public notice of adjudication of all claims of water rights in the Upper Rio Grande (above Ft. Quitman) segment of the Rio Grande Basin and the requirement to file sworn claims pursuant to section 11.307, Texas Water Code on or before April 22, 1996. The Investigation Report was completed under phase 1. Phase 2 calls for evidentiary hearings in which claimants present evidence to support the validity of claims. There continues to be a hold on these evidentiary hearings pending the outcome of other cases in both State of New Mexico courts and federal courts.

EL PASO FIELD DIVISION PLANNING STUDIES AND INTERACTION WITH THE NEW MEXICO - TEXAS WATER COMMISSION

The New Mexico-Texas Water Commission (Commission) was created as a result of the voluntary court settlement in the El Paso vs. Reynolds (563 F. Supp. 379 D.N.M. 1983) ground water appropriation case. The Commission seeks to effect the best management practices for the water resources of the west Texas and southern New Mexico area (Figure 8). The following sections summarize the studies that Reclamation and the Commission are cooperating on.

Aquifer Storage and Recovery

A pilot aquifer storage and recovery (ASR) project is investigating possible storage regimes and methods for excess surface water flows in the Hueco bolson (aquifer) via recharge zones for later extraction to augment water supplies during drought and shortages conditions. This study is a cooperative effort of the American Water Works Association, the El Paso Water Utilities Public Service Board, and Reclamation. The excess water for ASR will be a by-product of the El Paso-Las Cruces Regional Sustainable project utilizing surface waters of the Rio Grande/Rio Bravo as the primary source of Municipal and Industrial potable water. The latest pilot test investigates the feasibility of utilizing shallow infiltration basins (as opposed to direct injection wells) along the eastern front of the Franklin Mountains. A one-acre basin was excavated below the surface layer of caliche present, approximately 20' deep. 1000 gallons per minute (gpm) of treated sewage effluent is being pumped into the one-acre basin over a period of one year. The initial results look very promising as the rate of infiltration has been so high that the entire one-acre surface has yet to be inundated. A second basin is currently being considered for use as an actual recharge facility as opposed to a pilot project.

Delivery of Surface Water on a Year-Round Basis

This is tied to the El Paso-Las Cruces Regional Sustainability Project which is “on-hold” at this time. There are no indications that year-round release of project storage water is being pursued by the El Paso Water Utilities.

Elephant Butte and Caballo Reservoir Water Quality Assessments

Reclamation and the USGS are partners in these reservoir water quality assessments. In addition to measuring temperature, dissolved oxygen, and pH profiles throughout the year, the source and potential solution to the release of hydrogen sulfide (H_2S) gas at the Elephant Butte power production facility is being investigated. The release of H_2S poses

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RIO GRANDE / RIO BRAVO INTERNATIONAL BASIN ASSESSMENT

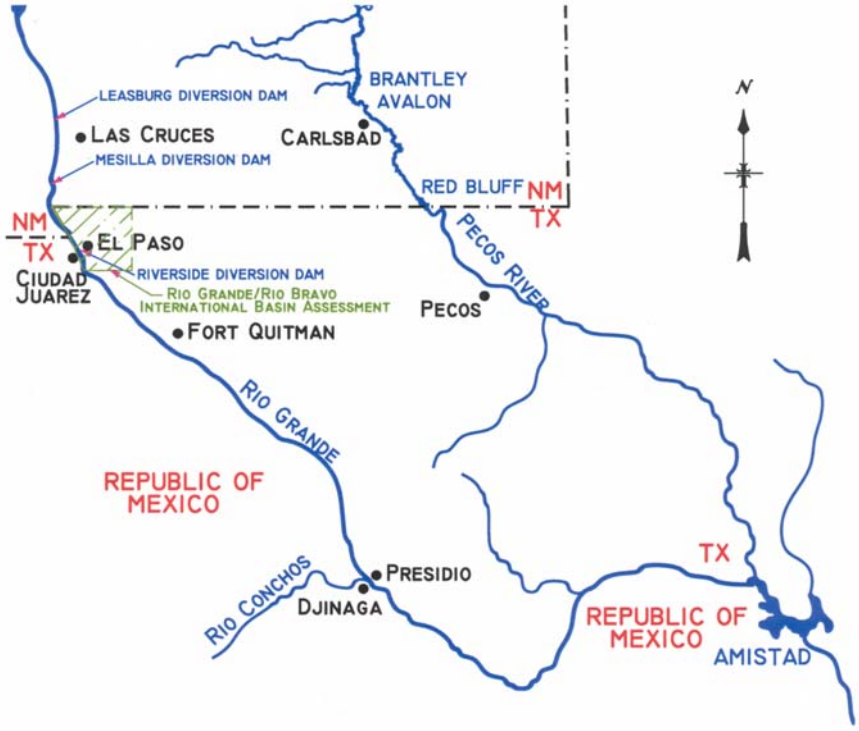

Figure 8. Area map of the Rio Grande/Rio Bravo International Basin Assessment
a potential health risk to the employees in the power plant and falls under the purview of

Occupational Safety and Health Act (OSHA) regulations. Dissolved H_2S below Elephant Butte is also detrimental to the cold water trout population present in the tailwaters. This effort is being managed by Reclamation's Upper Colorado Regional Office. The actual measurements are being conducted by personnel from New Mexico State University. This investigation will continue through 2001 and the data collected will be used to develop reservoir water quality models for the Elephant Butte and Caballo Reservoirs. For 2002, this effort will be continued, though funding has been a problem.

El Paso-Las Cruces Regional Sustainable Water Project

The New Mexico - Texas Water Commission is the appointed oversight group for the planning and technical investigations required to meet the objectives of this Sustainability Project. Specifics of this effort include the transfer of Rio Grande Project waters from the El Paso County Water Improvement District No. 1 (EP#1) to the El Paso Water Utilities (EPWU) through a third-party agreement with Reclamation. Contingent upon the transfer of the use of this water is the withdrawal of surface waters on a year-round basis by the EPWU to provide 100 percent of El Paso's drinking water during non-drought years. Excess waters available from the Rio Grande could potentially be stored in an Aquifer Storage and Recovery Project. The U.S. section of the IBWC is the lead federal agency for NEPA requirements with Reclamation providing assistance in the form of NEPA expertise. Reclamation has provided funding to EPWU through cost-sharing reimbursements and line-item Congressional write-ins. The Draft Environmental Impact Statement was developed in 1999 and the Final Draft EIS/Record of Decision was issued on January 18, 2001, by the IBWC. Various alternatives and strategies for withdrawal of waters from the Rio Grande and site selections for Water Treatment Plants were evaluated during this EIS process and public comments were provided on these alternatives through public scoping meetings.

To date, a third-party agreement has yet to be reached for implementing transfer of water from the El Paso County Water Improvement District No. 1 to the El Paso Water Utilities via the 1920 Sale of Water for Miscellaneous Purposes Act of Feb. 25,1920, 41 Stat. 451, which provides for the conversion of Reclamation Project water from irrigation to miscellaneous purposes . Currently, this project has been greatly scaled-back, and with the drought conditions present in the Rio Grande Basin, the likelihood of utilizing surface waters for M&I purposes is slim. The El Paso Water Utilities have concentrated on developing more wells in the Mesilla Valley, desalination of the Hueco Bolson, and the importation of groundwater east of El Paso to meet future demands.

Rio Grande/Rio Bravo International Basin Assessment / Border Regional

Environmental Workgroup

Under the authorization of the MOU between the Department of the Interior and Mexico's Secretariat of Environment and Natural Resources (SeMARNAT), a bi-national water and natural resources information network is being developed to provide a focal point for the collection, maintenance, and distribution of information and data for the Lower Rio Grande/Rio Bravo Basin (Figure 6).

Description of Basin:

Various groups have designated the subsections of the river differently; however, for the purposes of this assessment, the "Lower Rio Grande / Rio Bravo is the Reach between El Paso, Texas and the Gulf of Mexico. Major U.S. cities located along the Lower Rio Grande include El Paso, Laredo, Brownsville, and McAllen, Texas. Major Mexican cities along the Rio Grande are Juarez, Chihuahua, and Nuevo Laredo and Matamoros, Tamaulipas.

The Joint Resolution signed at the Binational Rio Grande / Rio Bravo Symposium on June 14, 2000, listed eight objectives to be accomplished to protect the ecological integrity of the Rio Grande / Rio Bravo in the reach between Fort Quitman and Amistad Dam. Subsequently, meetings have been held between federal and state agency representatives (the organizing committee) to develop a strategy to move forward initiatives to satisfy the intent of the Joint Declaration. Phase one will seek implementation of four of the eight objectives listed in the Joint Declaration, (#1. Form a binational task force; #6. Undertake research on biologic and hydrologic conditions of the region; #7. Develop and exchange of compatible information systems; #8. Facilitate public participation in developing strategies for environmental sustainability.)

Mission Statement:
Enhance communication and cooperation among the various organizations with interests and responsibilities for resource management in the Lower Rio Grande/Rio Bravo basin to develop a better understanding of the biological, cultural, hydrological, and land-use issues of the region.

Objective:
The BiNational Rio Grande / Rio Bravo Ecosystem Workgroup supports development of the recommendations of the proposals of the Rio Grande Binational Symposium to conserve, protect and improve the ecological environment of the river and implement recommendations within the institutional framework existing between Fort Quitman and Amistad Dam.

Current Activities:

1. USGS and Mexico's National Ecological Institute (INE) are conducting studies of contaminants in Biota, and Invertebrates in the Big Bend / Maderas del Carmen region.

2. A population study and observation of peregrine falcon nests in Big Bend National Park from 1993 to 1996 indicated that nest productivity rates were alarmingly low. This project evaluates the impacts of environmental contaminants on the Big Bend peregrine falcon during the 1997 breeding season by analyzing contaminants in potential avian and bat prey items. Preliminary research indicates that mercury, selenium and DDE may be contributing to low reproductive rates. The published report will be available in the fall of 2002.

3. Survey of In-Stream and Riparian Zone Natural Resources and Ambient Water-Quality Conditions of the Rio Grande/Rio Bravo from Big Bend Ranch State Park near Redford, Texas, to the End of the Wild and Scenic River Segment at Foster's Ranch, Texas.

Report Generated:
Creating a Standardized Watersheds Database for the Lower Rio Grande/Río Bravo, Texas USGS Open-File Report 00-065

This report describes the creation of a large-scale watershed database for the lower Rio Grande/Rio Bravo Basin in Texas. The watershed database includes watersheds delineated to all 1:24,000-scale mapped stream confluences and other hydrologically significant points, selected watershed characteristics, and hydrologic derivative data sets.

Computer technology allows generation of preliminary watershed boundaries in a fraction of the time needed for manual methods. This automated process reduces development time and results in quality improvements in watershed boundaries and characteristics. These data can then be compiled in a permanent database, eliminating the time-consuming step of data creation at the beginning of a project and providing a stable base data set that can give users greater confidence when further subdividing watersheds.

Database Generated:
During January/February 2002, Reclamation and USGS collaborated in providing a literature search/database of water quantity/ quality, habitat, flora & fauna studies for the reach between Fort Quitman and Amistad Dam. (Points of contact: Dr. Bruce Moring (USGS) and Lorenzo Arriaga (Reclamation))

Caballo Mercury Study

Reclamation, in conjunction with the New Mexico State University Department of Fishery and Wildlife Sciences and the USGS/Biological Resources Division, has established the only mercury deposition network (MDN) site in the southwestern United States. Unique to

this site is the measurement of both dry and wet deposition of atmospheric mercury.

Mercury is deposited on both a regional and global scale, and the inorganic mercury which lands in the watershed of the Rio Grande eventually washes into the river and reservoir areas. Under anaerobic conditions, bacteria may transform inorganic mercury into the toxic organic form, methylmercury (MMHg). Methylmercury has profound ecological effects because it is one of the few metals that is known to bioconcentrate, bioaccumulate, and biomagnify in aquatic food chains. The biomagnification is predominantly responsible for the elevated levels of mercury present in the fish populations at Elephant Butte and Caballo Reservoirs. The primary route of MMHg accumulation in wildlife and humans is through the ingestion of fish. Currently, the State of New Mexico has issued an advisory concerning the consumption of fish from these reservoirs. The long-term prognosis of mercury accumulation in our reservoirs is unknown, and is the primary reason for undertaking this project.

The goals of this study are to identify the transport, fate, and effects of mercury in an arid environment. Ultimately, the results of this investigation may lead to a better understanding of the potential for mercury contamination in lakes and reservoirs in both arid and wetter climates across the globe. The direct results of this research may expand this investigation to cover other Reclamation reservoirs throughout the Southwest, including Lake Powell, Lake Mead, Lake Havasu, and Roosevelt Lake. Funding will end at the end of Fiscal Year 2002, and this project may be terminated.

Snow-Melt Runoff Modeling

Monitoring snow runoff within the Rio Grande Basin is critical to the management and operation of the Rio Grande Project. The Rio Grande Project's system (dams and reservoirs) is designed for flood control and for the storage and delivery of irrigation and/or municipal waters. The crucial factors for determining Rio Grande Project storages, diversions, and releases are the flows within the river, and expected flows from runoff predictions. Currently, this runoff assessment is made from specific NRCS Snowpack Telemetry (SNOTEL) sites coupled with information from the National Weather Service. A Snow-Melt Runoff (SMR) model, utilizing satellite imagery and data from SNOTEL points, could greatly enhance predictive capabilities for runoff forecasts. Implementation of this SMR model is an important step towards more effectively predicting the amount of runoff expected to drain into the Rio Grande Basin. Reclamation is working with the Center for Applied Remote Sensing in Agriculture, Meteorology, and Environment, a cooperative effort of the New Mexico State University, College of Agriculture and Home Economics and the U. S. Army Research Laboratory at White Sands Missile Range.

OTHER RECLAMATION PROGRAMS

Reclamation's Water Conservation Field Service Program

Reclamation has provided funding and technical assistance for the following projects in the Rio Grande Basin under the Water Conservation Field Services Program.

1. MRGCD water measurement program to provide instruments and telemetry to obtain operational data to improve water transport and distribution efficiencies. The program has been continued into calendar year 2001.

2. Office of New Mexico State Engineer to support water conservation education and outreach initiatives. Some activities include; Project WET, teacher workshops, projects at New Mexico Museum of Natural History, Xeriscape Curriculum and Conference, and Rio Bravo/Rio Grande -WERC.

3. Drip irrigation research and demonstration project with the Socorro Soil and Water Conservation District and the NRCS. Monies are currently being used to alleviate the gopher problem. The project will carry over into calendar years 2002 and 2003.

4. Precision Irrigation Project with the NRCS and the La Union Soil and Water Conservation District to provide on-farm information to improve crop production and water use efficiencies.

5. Co-sponsored water education festivals in Albuquerque and Las Cruces, New Mexico and El Paso, Texas.

6. Provided funding for water education program with the Rio Grande County Museum in southern Colorado. The program was completed on July 10, 2001.

7. Provided funding and technical assistance for several water management planning activities including plans for Cities of Albuquerque, Santa Fe, Elephant Butte and Espanola, New Mexico, Elephant Butte Irrigation District and El Paso County Water Improvement District No.1., and Pojoaque Valley Irrigation District. Funding assistance was provided to Valley Improvement Association (City of Belen, New Mexico) to write a water conservation plan although not required by the Reclamation Reform Act.

8. Conducted an-one-and-a-half day Acequia Water Management Workshop with the New Mexico Acequia Commission in Socorro, New Mexico on November 9 and 10, 2001. Former Reclamation Commissioner Eluid Martinez and New Mexico State Engineer Tom Turney were the keynote speakers.

9. Provide funding to the New Mexico Association of Conservation Districts to provide, maintain, distribute/manage the 12 Rolling Rivers Educational Trailers throughout New Mexico. Demonstrations are generally held at the State/County Fairs, public/private schools, teacher workshops, water conferences, and other educational activities

10. Reclamation is working with staff at EBID and NMSU to develop and implement well and ground water monitoring system for the Mesilla Bolson.

11. Reclamation has executed agreement with the Texas Water Resource Institute and Texas A&M University to perform irrigation water loss studies in portions of the Rio Grande Project.

12. Developed a working agreement with El Paso County Water Improvement District #1 to expand irrigation system water measurement and telemetry to provide data for increased operation efficiencies.

Water Reclamation and Reuse Projects

Under the authority of Public Laws 102-575 and 104-266, Reclamation is participating in water reclamation and reuse projects with the cities of Santa Fe, Albuquerque, and Espanola in New Mexico, and El Paso, Texas.

The Santa Fe Program consists of three parts: The first part is Santa Fe's Treated Effluent Management Program which may reclaim a portion of Santa Fe's secondary effluent for irrigation and Santa Fe River surface flows. A "Treated Effluent Management Plan" was completed in 1998. The second part is the Santa Fe River Augmentation Project which will deliver water upstream on the Santa Fe River to augment the city's supply wells through indirect recharge of the aquifer and enhance the recreational use of the Santa Fe River corridor in the downtown area. A "Water Management and River Restoration Strategy" was also completed in 1998. The third part is the Rio Grande Diversion Demonstration Pilot Project which will divert a small amount (300 af/yr) of surface water from Rio Grande through a subterranean horizontal radial collector well for non-potable irrigation use in the vicinity of San Ildefonso Pueblo, and for pilot testing to determine future treatment needs for a full-scale surface water diversion on the Rio Grande. In 2001, an Environmental Assessment was completed for the Rio Grande Infiltration Collector Well Demonstration Project and a contract was signed to define water management alternatives for the NEPA process. The subsurface horizontal collector well was constructed in 2001 and year-round tests are underway to gather engineering and water quality data.

The City of Albuquerque program will develop wellhead arsenic removal technology, and apply it to a production well currently out of service due to high arsenic levels. Another aspect of the program will be the development of non-potable water distribution systems

for the irrigation of turf grass in public areas. The north Albuquerque area water source will be from impaired Rio Grande surface water infiltration galleries and industrial effluent. The south area source of water will be the City of Albuquerque's treated effluent. In 2001, an Environmental Assessment was completed for two of the reclamation and reuse projects. The industrial recycling project was completed in 2001 and construction of the subsurface collectors to divert a small portion of the City of Albuquerque's San Juan-Chama water is scheduled to begin this year.

The City of Espanola completed an appraisal study in 2000. In late 2001, the City initiated work on a feasibility study under Public Law 102-575, Section 1604. The feasibility study will cover NEPA requirements and investigate a subsurface horizontal radial collector well diversion and treatment for the City of Espanola's San Juan-Chama water rights. The treated water would be mixed with existing City of Espanola well water to dilute naturally high groundwater fluoride levels to drinking water standards.

Funding for the Northwest portion of the El Paso Water Reclamation and Reuse Title XVI project has been allocated. This project has been expanded to include the Haskell R. Street Waste Water Treatment Plant (WWTP) in central El Paso and is referred to as the Central Portion of the El Paso Reclamation and Reuse Project. The first two of four phases of the Northwest portion have been completed and treated effluent from the Northwest WWTP is being delivered to the Coronado Golf Course and various parks along the west side of El Paso. The Northwest construction portion will be completed in 2004. Eventually, over 4,500 af of treated sewage effluent will be utilized on the northwest side of El Paso. The facilities plan for the Central Portion has been completed and a Finding of No Significant Impact (FONSI) was issued to meet NEPA compliance regulations. The Central Portion will eventually deliver over 5,000 af of treated effluent from the Haskell St. WWTP to area parks and a cemetery. A Cooperative Agreement for the Central portion of this project has been finalized in Spring 2000. Construction of pipelines and pumping stations has begun in 2002. For 2002, $970,000 has been allocated for funding this construction. To date these two projects have received a total of just over $7 million to help extend the water resources available to this area.

Upper Rio Grande Water Operations Model

In 2001, Upper Rio Grande Water Operations Model (URGWOM) team worked with Reclamation staff to officially implement the Accounting Model as the SJ-C accounting tool. After proofing it using the years 1995, 1996, and 2000, it was accepted as accurately maintaining the accounting methods formerly performed in the Fortran-based "daily programs". The implementation has thus far proved successful, both doing the accounting, and through sharing of updated models, allowing representatives from the Rio Grande Compact to track operations and accounting. The model was updated late in the year to add accounting of Rio Grande Conservation pools in Abiquiu and Jemez Canyon

reservoirs, requiring some RiverWare software development. Among successes of the model were; checking and correcting of 2000 accounting in preparations for the Compact Commission meeting, and re-running Elephant Butte accounting for the years 1993 through 1998 to determine the effects of some erroneous evaporations reported to and used by Compact Accounting.

It was also a breakthrough year in development of the Water Operations Model, particularly in the coding of the "Rules" of operation. By the end of the year, a model was together and making reasonable operational decisions, SJ-C accounting included. Testing, debugging, and refinement began, along with implementing new accounting and physical modeling updates. The water operations model was tested by running the AOP using the April 1 forecast, reduceding time and effort from previous years. Among physical improvements were bi-seasonal (irrigation and non-irrigation) loss calibration and addition of riparian evapotranspiration (ET) consumption affecting river leakage. This takes further advantage of the ET-Toolbox monitoring of current conditions and two-to three-day climate forecasts on the Bosque, beyond the already-used crop ET data. These physical enhancements made significant improvements in Cochiti to Elephant Butte flow predictions. Additionally, development of the Planning Model, an accounting-simplified, long-term version of the Water Operations Model, began. The Planning Model is primarilty for use in studies to be conducted by the Upper Rio Grande BasinWater Operations Review EIS (see **Upper Rio Grande Basin Water Operations Review** section). A collaborative developmental undertaking in 2001 was Modular Modeling System (MMS), a USGS-developed model for predicting both snowpack and rainfall runoffs given ground and weather conditions applied to defined sub-basins. This system is to improve upon streamflow forecasting currently assembled by URGWOM's Forecast Model, which applies historic hydrograph shapes to current forecast volumes. All in all, it was a very productive year for modeling.

Evapotranspiration Tool Box Network

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

The goal of the ET Toolbox project is to supply water managers within and outside of Reclamation with accurate, real-time ET data via a dedicated website, while making the real-time ET dataset (daily riparian and crop water use estimates, open water evaporation estimates, and rainfall estimates) available to the URGWOM for daily water operations model runs. The ET Toolbox is an extension of Reclamation’s Agricultural Water Resources Decision Support (AWARDS) system that provides Internet access to high-resolution rainfall and daily crop water use estimates for improving the efficiency of water

management and irrigation scheduling. The initial development work has focused on the Middle Rio Grande area from Cochiti Dam to San Marcial, which is just south of the Bosque del Apache National Wildlife Refuge in New Mexico. ET currently accounts for an estimated 60 percent of the water depletions over this reach of the Rio Grande, including riparian vegetation, irrigated crops, and open water evaporation.

The primary purpose of the ET Toolbox is to accurately determine, and predict, daily rainfall and water depletions along the Rio Grande. These daily ET estimates and summary year-to-date cumulative ET estimates are already available to users and water managers via the Internet at the URL: http://www.usbr.gov/rsmg/nexrad. The daily cumulative river reach ET estimates are being automatically input into RiverWare, the modeling software basis of the URGWOM. RiverWare currently contains water accounting and ownership tools and peripheral water budget and flood routing tools that are being configured for the URGWOM. The ET Toobox data, now directly retrievable into URGWOM, allows the model to more accurately reflect the physical conditions in the basin, and will allow daily water operation managers to make better water release decisions from upstream control structures when the URGWOM model goes online.

Funding for ET research and development has been declining and currently threatens the future viability of the ET Toolbox. Without the Toolbox, the URGWOM will have difficulty achieving sufficient accuracy to be useful for planning studies and daily water operations.

Upper Rio Grande Basin Water Operations Review

Reclamation, the Corps, and the New Mexico Interstate Stream Commission entered in to a Memorandum of Agreement in January of 2000, to cooperate as joint lead agencies in a review of their water operations activities in the Rio Grande basin above Fort Quitman, TX. The scope of the Upper Rio Grande Basin Water Operations Review (URGWOPS) will be limited to existing facilities and authorities. Because of ongoing litigation, water supply operations at Elephant Butte and Caballo Reservoirs will not be included in the URGWOPS, at least for the present time. However, flood control operations and their impacts down to Fort Quitman will be considered.

The purpose of the URGWOPS is to develop a better understanding of how U.S. Army Corps of Engineers and Reclamation facilities could be operated more efficiently and effectively as an integrated system and to formulate a plan for conducting future water operations. The review will support continued compliance with state, federal, and other applicable laws and regulations, including the ESA. The Review may also result in improved processes for making decisions about water operations through better interagency communications and public input.

The review will take place through the preparation of an EIS that describes and evaluates a range of alternative water operations plans. Each of the lead agencies will publish a separate Record of Decision on its future water operations following the completion of a Final Environmental Impact Statement. The process was officially started in March of 2000 with the notice of intent to prepare an EIS.

Extensive involvement of stakeholders and interested parties, including the Rio Grande Compact Commission, IBWC, Indian tribes, Congressional staff, and the general public, will be part of the Review. The URGWOM will be used extensively to evaluate alternative water operations and the interrelated effects of the various facilities. A range of hydrologic conditions from surplus to drought will be considered. The project is expected to continue through 2004.

Public scoping meetings began in June of 2000 and continued through October. Scoping meetings took place in nine locations from Alamosa, CO to El Paso, TX. Comments were received from various individuals and entities, and a scoping summary was prepared. One comment that was made frequently during the scoping process was that the public desired more input into the generation of alternatives. Therefore, another round of public meetings are currently being held as work continues on alternative development. These meetings will run through May 2002, at which time all comments will be incorporated into the alternatives as they are finalized.

Native American Affairs and Drought Relief Programs

Reclamation has numerous projects underway with pueblos and tribes. These projects fall under several categories, including the Native American Affairs Program, the Drought Relief Program, the Planning Program, and special projects funded through Congressional write-ins.

The subsurface drainage project scheduled for the Isleta Pueblo for the winter of 2001-2002 is postponed until the winter of 2002-2003.

Funds were appropriated to Reclamation in 2001 to undertake research, monitoring, and modeling of evapotranspiration, implement a program for the transplant of silvery minnow larvae and young-of-year for silvery minnow propagation, carry out habitat conservation and restoration in the middle Rio Grande River valley, and address complex issues related to recovery activities along the Rio Grande in New Mexico through a single comprehensive group (see **Middle Rio Grande Endangered Species Act Collaborative Program**). Funds through this program were provided for riparian habitat and river restoration projects on the Sandia, Santa Ana, and San Felipe Pueblos. This Sandia Pueblo project is a continuation of a pilot study to assess the feasibility of rehabilitating portions of its Rio Grande bosque. The objectives of the rehabilitation program are the removal of non-native

vegetative species, the re-establishment of native vegetative species, the creation of silver minnow habitat, jetty jack removal, and extensive water quality monitoring of the Rio Grande. The Santa Ana Pueblo's habitat restoration objectives are to improve fluvial conditions in the Rio Grande and to restore diverse riparian communities along the river floodplain for a variety of wildlife species, including the silvery minnow and flycatcher. Riparian restoration efforts at the San Felipe Pueblo are targeted at restoring portions of the bosque.

Installation of water measurement devices was completed at the PVID. These devices will be used to help eliminate the use of implied Indian over-diversions in the operation of PVID. The benefit will be more correct internal water accounting in Nambe Reservoir between Indian and non-Indian entities, which is unrelated to SJ-C water accounting.

Under the Drought Relief Program, plastic ditch liner was installed at Picuris Pueblo to conserve water in a particularly high seepage loss area. Windmills at Santo Domingo Pueblo are were repaired to open more areas to grazing. The new livestock well at Cochiti Pueblo scheduled for 2001 will take place in 2002. Rather than drilling a new well at Jemez Pueblo's Red Rocks area, which was scheduled for 2001, the funds were spent on windmill repair at Jemez Pueblo. Additional drought funds for PVID were used for the completion of the installation of the water measurement devices and telemetry at Nambe, Pojoaque and San Ildefonso Pueblos

Under the Planning Program, well drilling in the Taos area has been underway since late 1999 to help quantify water availability in a deep aquifer. These water sources could then be used to facilitate a negotiated settlement among the parties in the Abeyta adjudication. Well drilling and aquifer testing should be completed in 2002.

Negotiations are still underway between the Department of Interior (represented by the Bureau of Indian Affairs and Reclamation as primary and secondary leads, respectively) and the MRGCD for a new Operation and Maintenance Agreement for District facilities on lands of the six Middle Rio Grande Pueblos. The six Middle Rio Grande Pueblos have also proposed updating the El Vado Storage Agreement between the Pueblos and the Bureau of Reclamation for storage of Prior and Paramount waters in El Vado Reservoir.

Needs assessments to help tribes investigate their surface water, groundwater, wastewater, and water quality needs and issues are underway with six tribes: the Mescalero Apache tribe, Acoma Pueblo, Jemez Pueblo, Picuris Pueblo, San Ildefonso Pueblo, and Taos Pueblo. Funding is being provided through the Native American Program. Acoma and Taos Pueblo will be able to use some of the funding for water infrastructure improvement. Mescalero used some of their funding to drill a well which can be used to supplement the water supply for the Inn of the Mountain Gods.