

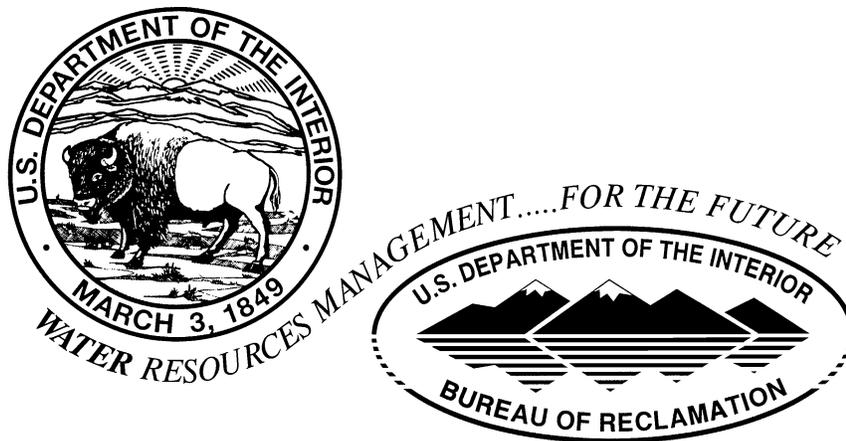
*1996 Calendar Year Report to the
Rio Grande Compact Commission*

*COLORADO
Hal D. Simpson*

*NEW MEXICO
Thomas C. Turney*

*TEXAS
Jack Hammond*

*FEDERAL CHAIRMAN
Kenneth L. Salazar*



UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF RECLAMATION

Upper Colorado Region

Albuquerque Area Office

March 13, 1997



United States Department of the Interior

BUREAU OF RECLAMATION

Albuquerque Area Office
505 Marquette NW, Suite 1313
Albuquerque, New Mexico 87102-2162

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MAR 13 1997

To: All on Enclosed List

Subject: Bureau of Reclamation's 1996 Report to the Rio Grande Compact Commission

Enclosed is your copy of Reclamation's 1996 Report to the Rio Grande Compact Commission. This report will be presented at the Rio Grande Compact meeting in Austin, Texas, on March 27, 1997. If you have any questions, please contact Karl Martin of my staff at (505) 248-5321.

Sincerely,

Garry M. Rowe
Area Manager

Enclosure

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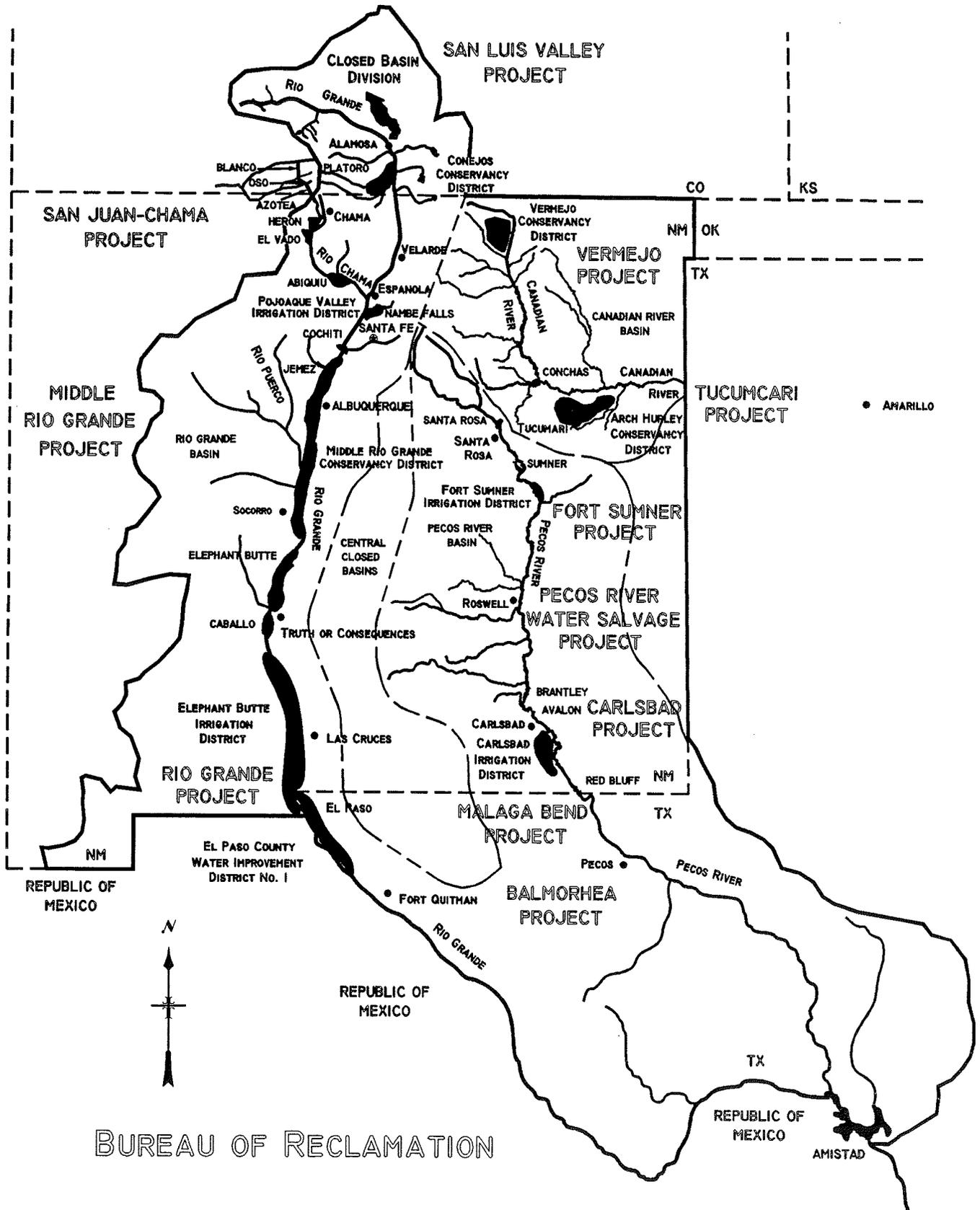
BUREAU OF RECLAMATION

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March 13, 1997

ALBUQUERQUE AREA OFFICE PROJECTS MAP - OCTOBER 1994



BUREAU OF RECLAMATION

TABLE OF CONTENTS

INTRODUCTION	1
SAN LUIS VALLEY PROJECT, COLORADO	3
Conejos Division, Platoro Reservoir	3
Closed Basin Division	4
Closed Basin - Operations and Maintenance	4
Operations	4
Maintenance	5
Water Quality	6
Rio Grande Water Conservation District	6
San Luis Lake	7
Water Deliveries	7
Stockman's Water Company Development Proposal	7
SAN JUAN-CHAMA PROJECT, COLORADO-NEW MEXICO	9
San Juan-Chama Diversion Dams	9
Heron Dam and Reservoir Operation	9
Heron Resource Management Plan	10
Pojoaque Tributary Unit - Nambe Falls Dam and Reservoir	10
Sediment Deposition in U.S. Corps of Engineers Reservoirs	10
San Juan-Chama Water Accounting	11
MIDDLE RIO GRANDE PROJECT, NEW MEXICO	13
El Vado Dam and Reservoir Operations	13
Channelization Works	14
Endangered Species	15
Rio Grande Silvery Minnow	15
Southwestern Willow Flycatcher	17
Cooperative Program with the State of New Mexico	17
Rio Puerco Sedimentation and Water Quality Study	18
Low Flow Conveyance Channel Investigations	19
Upper Rio Grande Water Operations Model	20
RIO GRANDE PROJECT, NEW MEXICO - TEXAS	21
Water Supply Conditions	21
Project Irrigation and Drainage Systems and Title Transfer	23
Rio Grande Project Adjudication	24
New Mexico	24
Texas	25
Elephant Butte Reservoir and Powerplant	25
Cooperative Vegetation Management Program	25
Caballo Dam and Reservoir	25
Elephant Butte Reservoir Flood Study	26

Data Automation and Instrumentation and Flow Monitoring System	26
Elephant Butte and Caballo Reservoirs Resource Management Plan	27
El Paso Field Division Planning Studies and Interaction with New Mexico - Texas Water Commission	27
Aquifer Storage and Recovery	27
Delivery of Surface Water on a Year Round Basis	27
Rio Grande/Rio Bravo International Basin Assessment	28
Rio Grande Project Agronomy Study	28
Wildlife Studies - Bald Eagles	28

PHOTOGRAPHS

Excavation Activities at San Marcial	29
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TABLES

Table 1 - San Luis Valley Project-Closed Basin Division-Water Accounting. . .	30
Table 2 - Diversions through Azotea Tunnel	31
Table 3 - San Juan-Chama Water Deliveries from Heron Reservoir	32
Table 4 - Monthly Water Storage-SJ-C Project-Heron Reservoir	33
Table 5 - San Juan-Chama Water at Otowi-San Juan-Chama Project	34
Table 6 - Monthly Water Storage SJ-C Project-Nambe Falls Reservoir	35
Table 7 - Reservoir Storage Adjusted Sediment Deposition in SJ-C Pools . . .	36
Table 8 - Reservoir Operation for El Vado Dam	37

**U.S. Bureau of Reclamation
Upper Colorado Region
Albuquerque Area Office
1996 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/or 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.

The San Luis Valley Project consists of Conejos Division (Platoro Reservoir) and the ground water salvage project known as the Closed Basin Division.

The San Juan-Chama Project consists of a system of diversion structures and tunnels 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 San Juan-Chama Project provides water from storage in Heron Reservoir for municipal, domestic, industrial, recreation, and fish and wildlife purposes within the State of New Mexico and also provides supplemental water for irrigation.

The Middle Rio Grande Project consists of El Vado Dam and Reservoir and irrigation and drainage facilities in the middle Rio Grande Valley, as well as river channel maintenance from Velarde, New Mexico, southward to Caballo Reservoir. It also includes the Low Flow Conveyance Channel south of San Acacia, New Mexico. Together, these projects supply water for more than 173,000 acres of irrigated land.

The Rio Grande Project includes Elephant Butte and Caballo Dams and Reservoirs, as well as irrigation and drainage facilities in the lower Rio Grande Valley of southern New Mexico and just downstream of El Paso, Texas. The portion of the Rio Grande Project above Percha Diversion Dam is the responsibility of the Elephant Butte Field Division. The El Paso Field Division is responsible for facilities of the Rio Grande Project from Percha Diversion Dam downstream and for coordinating water release rates from Caballo Reservoir. Both field divisions are under the jurisdiction of the Albuquerque Area Office. Rio Grande Project responsibilities include operation and maintenance of the two dams and reservoirs and reservoir releases that furnish an irrigation water supply for about 178,000 acres of land designated within the Elephant Butte Irrigation District in New Mexico and the El Paso County Water Improvement District No. 1 in Texas. The project also releases irrigation waters from Caballo Reservoir 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. In addition,

the Rio Grande Project, at Elephant Butte Dam, was responsible for generation of electrical power for communities and industries in southern New Mexico.

Pursuant to Public Law 102-575, in January 1996, Reclamation transferred title to easements, ditches, laterals, canals, drains, and other rights-of-way originally acquired on behalf of the Rio Grande Project to the respective irrigation districts, Elephant Butte Irrigation District and El Paso County Water Improvement District No. 1. Specifically exempted in the legislation was the transfer of Elephant Butte and Caballo Dams, Percha, Leasburg, and Mesilla Diversion Dams and the works necessary for their protection and operation. Water rights within the Rio Grande Project remain unaffected by the transfer.

SAN LUIS VALLEY PROJECT, COLORADO

Conejos Division, Platoro Reservoir

Platoro Dam and Reservoir is operated and maintained by the Conejos Water Conservancy District in Manassa, Colorado. The reservoir began 1996 with a content of 45,213 acre-feet (af) and was filled to the top of the conservation pool at 53,570 af on May 21. For 1996, the reservoir was used extensively to regulate the spring and summer flows to maximize the use of the short runoff period. The reservoir was not operated for flood control purposes during the 1996 spring runoff.

The May 1 forecast for the Conejos River near Mogote was estimated to be 115,000 af, which was 57-percent of the 30-year average. The reservoir was drawn down to 21,135 af by October 31, the end of the irrigation season for the Conejos Water Conservancy District. Due to the low runoff, supplemental irrigation releases were relatively high at 32,200 af. On November 1, the release was set at 7.1 cubic-feet per second (cfs), which exceeds the 7 cfs minimum required by statute. The end-of-year storage for Platoro was 21,850 af.

During the year, there was one 3-day outage of supervisory equipment due to phone lines taken out of service by lightning. In addition, the transmission on the fluid data gage was replaced on May 2 due to its erratic behavior.

Closed Basin Division

The Alamosa Field Division of the Albuquerque Area Office operates and maintains a water salvage project constructed in the Closed Basin area of the San Luis Valley, Colorado. The project was formulated as a ground water salvage project to pump water that would otherwise be lost through evapotranspiration, from a shallow, unconfined aquifer. 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, a complex remote control and monitoring system, 96 miles of overhead primary electric lines, 31 miles of underground primary lines, and 42 miles of underground secondary lines - a total of 169 miles of electrical distribution system.

Reclamation continues working under the guidance of the Closed Basin Operating Committee, using appropriate operating criteria as the framework for management of Closed Basin operations and water deliveries.

Closed Basin - Operations and Maintenance

Operations

The project was pumped at high levels consistent with cold weather operations from the first of January throughout most of March. At the March 27 meeting of the Closed Basin Operating Committee, it was recommended that, because of the projected poor runoff forecast, Colorado would have a minimal obligation for Compact deliveries, and therefore, the Closed Basin Division should salvage only a minimum amount of water. This amount would be adequate to maintain mitigation deliveries, provide aeration for grass carp, protect the conveyance system, and control aquatic weeds in the canal.

On August 2, 1996, in response to a request by the Rio Grande Water Conservation District, the Closed Basin Operating Committee recommended that the Closed Basin Division increase production to maintain 35 cfs at Lobatos gaging station for the purpose of protecting the Rio Grande ecosystem between the conveyance channel outfall and the Colorado State line.

Operations activities included calibration and repairs of the project check structure, turnout, observation and salvage well electronics system; communication and data transfer via the UHF radio network; water deliveries and maintenance of water levels; and testing of new pressure transducers. Repair and maintenance of the 9000 series Remote Terminal Units continued, and installation and testing of the new 8200 series Remote Terminal Units for elevation well monitoring was completed. Power outages caused some minor operational problems throughout the year.

Flowmeters were purchased and installed at the water delivery structures in the Alamosa National Wildlife Refuge.

Abnormally arid conditions required modifications to the water delivery schedule for the U.S. Fish and Wildlife Service at the Alamosa National Wildlife Refuge. Mitigation water deliveries of 4,500 af were accomplished as requested by the U.S. Fish and Wildlife Service to optimize the brooding habitat for waterfowl.

Mitigation water deliveries to the Blanca Wildlife Habitat Area included the annual water right of 800 af and a Colorado Division of Wildlife transmountain substitution delivery of 212 af.

In cooperation with the U.S. Geological Survey's Pueblo Office, Reclamation is continuing to review quality control of its observation well network.

Maintenance

Maintenance activities included work at salvage and elevation well sites; upkeep of canal structures and pumping plants; new electrical installations; aquatic weeds control; ice removal; herbicide application along canal right-of-way; shelter belt equipment repair; and repair of vehicles and heavy equipment. Lightning, ice, iron bacteria, and weeds are continual maintenance problems.

Work to initiate a triploid grass carp relocation plan is on-going. These fish tend to drift downstream over time which creates a situation of insufficient numbers of fish to control weeds at the north end of the canal and the possibility of inadequate feed for fish at the south end of the canal. Several grass carp have been examined to determine the cause of health problems discovered during capture technique exercises. As a result of these examinations, the consensus is that the fish may be suffering from malnutrition. Commercial feed is presently being made available for the grass carp. A Reclamation Technical Service Center Botanist is providing technical assistance to field division staff.

Iron bacteria continues to be a problem at many salvage wells. A contractor was hired to investigate well performance and assess biofouling problems which contribute to poor well production. The contractor completed field work and recommendations for rehabilitation treatment and preventive maintenance measures are expected soon.

The channel from San Luis Lake through the forebay of the San Luis Lake Pumping Plant was cleaned of sand and debris. Material between the lake and trashrack was removed with a trackhoe, but a more thorough cleaning is needed. Work on this section of the channel will resume when a long-reach trackhoe becomes available. Sand deposits were eliminated from the area between the trashrack and the traveling screen assembly by

means of a 4-inch trash pump. In addition, the traveling screen assembly was inspected and minor repairs were made, including removal and inspection of the backwash pump, replacement of corroded pipe, and repair and adjustment of flush nozzles. The conveyor screen and screen slides of the mechanism used to remove weeds from the immediate area of the traveling screen were replaced. Removal of the traveling screen unit for replacement of the corrosion protection coating and overhaul of all mechanical components is scheduled for Fiscal Year 1999.

Water Quality

Water quality monitoring of project wells, the Rio Grande, Parshall Flume, Feeder Canal, Head Lake, and San Luis Lake continued in 1996. During the spring, summer, and fall months, water quality was monitored at Big Spring Creek Flume and in early spring at San Luis Lake Flume.

The Water Quality Laboratory participated in the U.S. Geological Survey's Evaluation Program for Standard Reference Water Samples. Two sets of samples were distributed, one in May and the other in September. Results are rated on a scale of 0 to 4, 0 being the poor and 4 being excellent. The ratings were 3.5 for May and 3.4 for September.

All historical water quality data has been entered into a computer database using Microsoft Access. Current data is entered as results are obtained. The database has facilitated data retrieval.

Rio Grande Water Conservation District

The Rio Grande Water Conservation District continues to perform civil maintenance on the project. Work included maintenance of canal berms and lateral access roads, mowing of canal berms and rights-of-way, removal of aquatic weeds from structures when necessary, repair of fences, mounding of pit run material around observation wells to provide safer access for maintenance purposes, and assisting Reclamation personnel with equipment maintenance. Approximately 4 miles of canal berm roadway was resurfaced in 1996. The Rio Grande Water Conservation District continued its involvement in the ground water monitoring program and continues maintenance of the irrigation systems for the shelter belt areas.

San Luis Lake

The project continued flow-through operations at San Luis Lake during 1996 with 2,967 af delivered to the lake through San Luis Lake Feeder Canal. Natural flows into the lake were estimated to be 368 af as measured at the San Luis Lake Parshall Flume and estimated at the spillway and culverts. During the year, 3,370 af was pumped from the lake.

Water Deliveries

A total of 28,340 af of project water was delivered to various points, of which 22,830 af was creditable deliveries to the Rio Grande pursuant to the Rio Grande Compact. Creditable deliveries for 1996 were 12,650 af higher than 1995. Closed Basin water deliveries in 1996 included deliveries to the Blanca Wildlife Habitat Area, Alamosa National Wildlife Refuge, San Luis Lake, and the Rio Grande. Table 1 summarizes 1996 operations of the project.

Stockman's Water Company Development Proposal

Stockman's Water Company is exploring the possibility of constructing a well field and pipeline system to export San Luis Valley water for sale to Colorado Front Range communities. The proposed development is adjacent to and may impact Closed Basin Division facilities and operations.

The Company's proposal, as presented by the developers, is similar to American Water Development Incorporated's past proposal. The primary difference is that Stockman's Water Company has acknowledged the "tributary" nature of the water they propose to export and have presented a plan for augmentation that is intended to compensate any damage to the water rights of others. The American Water Development Incorporated plan did not address the tributary nature of ground water and was objected to by numerous local, private, and governmental entities. The plan was denied permission to proceed in a lawsuit tried in the water court.

Stockman's Water Company has said that they would provide 25,000 af of water to the Closed Basin Division at no cost to the Government as part of their augmentation plan. In exchange, they propose that Reclamation stop operating Stages 4 and 5 of the project. While Stockman's Water Company presents this as a cost-saving benefit, the cost of ceasing operation of this part of the project in an operationally ready state has not been addressed. Further, the change in operational flexibilities that may be related to such an augmentation plan has not been analyzed as to true benefits or adverse impacts to the project over time. No specific data has been made available to Reclamation to determine the affects the proposal would have on Closed Basin facilities and operations. Reclamation staff has visited with Stockman's Water Company's water resources consultant and are available to analyze potential impacts when the consultant provides sufficient information.

SAN JUAN-CHAMA PROJECT, COLORADO-NEW MEXICO

San Juan-Chama Diversion Dams

During the winter of 1996, Chama Field Division personnel postponed some of the maintenance on the tunnels due to a deficient runoff and the corresponding need to divert as much San Juan-Chama Project water as was available by extending the diversion period. No tunnel invert concrete repair work was performed in 1996. However, repairs were completed for the Little Oso and Oso Siphons in March. During the fall, riprap was placed at two box culvert crossings along Willow Creek, and erosion control riprap was placed on the dike at Heron. Diversions began on March 21 and continued through December 3. A total of 58,530 af was diverted through Azotea Tunnel during 1996 (see Table 2).

Heron Dam and Reservoir Operation

The poor snowpack and resulting low runoff volume in 1996 resulted in one of the lowest total diversion volumes on record. As a result, 1996 was the first year that Heron did not fill since the early 1980's. To compensate, the diversion period was extended into December. In most years since 1980, diversions have ceased during the fall, and maintenance of the diversion system has begun. Heron began the year at its highest elevation of 7,185.85 feet (ft) (376,681 af). The reservoir continued to decline and ended the year at its lowest elevation of 7,168.67 ft (305,916 af). Reclamation remains prepared to take water to start the 1997 season.

Reclamation again was offered waivers, by the San Juan-Chama contractors, extending the required delivery date of December 31, 1995 to April 30, 1996. This extension provided an opportunity to stabilize the flows below El Vado Dam to provide fishery benefits and allow for additional operational flexibility. Reclamation is transitioning away from utilizing annual waivers and plans to deliver all 1997 San Juan-Chama Project water by December 31, 1997. A summary of San Juan-Chama Project water releases from Heron Reservoir, monthly reservoir inflow and storage computations, and San Juan-Chama water delivered to the Otowi river gage index station during 1996 are shown in Tables 3, 4, and 5.

Heron Resource Management Plan

The Heron Resource Management Plan is addressing the land resource issues within the Heron Reservoir management boundaries in north-central New Mexico. Phase II activities are slightly behind schedule. It is anticipated that the Draft Environmental Assessment will be distributed for public comment in April 1997. Reclamation previously expected the Final Environmental Assessment to be completed by the same date. After incorporation of public comments on the Draft Environmental Assessment, a Final Environmental Assessment with the preferred alternative will be included in the completed Resource Management Plan document.

Pojoaque Tributary Unit - Nambe Falls Dam and Reservoir

Nambe Falls Reservoir began the year with 1,472 af (elevation 6,816.10 ft) and ended with 1,346 af (elevation 6,813.33 ft). As was the case with Heron and El Vado, Nambe Falls Reservoir could not be filled during the 1996 spring runoff season because of low precipitation and snowpack conditions. The maximum storage occurred prior to any significant runoff inflows and was 1,936 af on March 26. The reservoir reached its lowest point of the year on September 12 at elevation 6,783.78 (429 af). As a result of the low runoff inflows, irrigation storage releases began in March which is earlier than normal. Releases continued off and on throughout the irrigation season as supplies were available. An average release of 1.0 cfs was set as agreed to by the Pojoaque Valley Irrigation District and Indian water users to maximize conservation storage during the winter. Summer rains in July provided some relief to the poor water supply conditions. A maximum release of 37 cfs was reached on August 13 and 15. In an attempt to maximize water use, three times through the irrigation season releases were made for a specified period of time then stopped to allow for additional storage to take place. As a result of the cyclical operation, a higher than normal depletion of 1,374 af was computed at Otowi. San Juan-Chama replacement water was released from June to December (excluding November) to offset the depletions for Nambe Falls operations in the amount of 1,402 af (equivalent release from Heron). A summary of the reservoir operation is shown on Table 6.

Sediment Deposition in U.S. Corps of Engineers Reservoirs

At Abiquiu Reservoir, Public Law 97-140 authorizes storage of up to 200,000 af of San Juan-Chama Project water at Abiquiu Reservoir. Adjustments for sediment reduced the available storage allocations to 183,016 af in 1996.

At Cochiti Lake, the San Juan-Chama pool was adjusted monthly to compensate for displacement of San Juan-Chama content by deposited sediment. The maximum allowable surface acreage (including wetlands) of the San Juan-Chama pool is 1,200 acres.

At Jemez Canyon Reservoir, arrangements were made to replace sediment pool evaporative losses during 1996. Since 1991, City of Albuquerque San Juan-Chama Project water in Abiquiu Reservoir, up to 5,500 af (less 69 af of transportation losses) has been used to replace sediment deposition and evaporative losses in Jemez Canyon Reservoir. Such water is provided by contract between the City of Albuquerque and the New Mexico Interstate Stream Commission dated February 21, 1986, and amended May 16, 1991.

In 1996, the City of Albuquerque, in an agreement with the New Mexico Interstate Stream Commission, offered an additional 1,500 af to help fill the sediment space up to a maximum amount of 7,000 af. A total of 6,602 af (equivalent release from Heron) was released from March to July and October to December. It suffered 91 af of transportation losses. The releases in November and December provided additional water to stabilize winter fishery flows below Abiquiu.

Table 7 shows the estimated accumulated sediment deposition and San Juan-Chama contents in Abiquiu Reservoir, Cochiti Lake, and Jemez Canyon Reservoir for 1996.

San Juan-Chama Water Accounting

Reclamation, with assistance from the U.S. Corps of Engineers, continued to make improvements to its storage, handling, and dissemination of water accounting data. The biggest improvements in 1996 were conversion of daily, monthly, and annual water accounting spreadsheets to Lotus Release 5 for Windows. The new spreadsheets automatically import data from our water accounting database. This has eliminated hand entry of over 2,800 values and has further reduced the possibility of data entry error. In addition, significant progress was made developing a spreadsheet "greenbook" (the San Juan-Chama contracts accounting book), to initially back-up and eventually replace the existing paper, hand-worked greenbook. Reclamation continues to provide daily and monthly water accounting data to interested users via e-mail. Requests for data can be made to water operations staff in Albuquerque by telephone at (505) 248-5321, faxogram at (505) 248-5356, or e-mail at kmartin@uc.usbr.gov.

Probably the most significant effort to bring together resources, programs, and data, started in 1996, was the Upper Rio Grande Water Operations Model (URGWOM). (Refer to the URGWOM section to follow in this document.)

MIDDLE RIO GRANDE PROJECT, NEW MEXICO**El Vado Dam and Reservoir Operations**

El Vado Reservoir storage at the beginning of 1996 was as follows:

Rio Grande Water:	22,340 af
San Juan-Chama Water:	
Middle Rio Grande Conservancy District	46,069 af
City and County of Santa Fe	19,371 af
Department of Energy	9,315 af
City of Española	5,376 af
Village of Los Lunas	2,777 af
Town of Taos	1,292 af
Twining Water and Sanitation District	82 af
	San Juan-Chama total = 84,282 af

Total San Juan-Chama plus Rio Grande = 106,622 af

In late November 1995, releases from El Vado were maintained between 230 and 250 cfs with the natural inflow bypassed and San Juan-Chama water used to supply the balance through mid-March of 1996. The Middle Rio Grande Conservancy District offered a small part of their remaining storage space in El Vado Reservoir to the City of Santa Fe. The maximum total San Juan-Chama water in storage was 100,837 af on April 30, 1996. The total San Juan-Chama water in storage at the end of the year was 39,426 af.

Due to the spill in 1995, the State of New Mexico began 1996 with a balance of zero in accordance with the Rio Grande Compact, so the Middle Rio Grande Conservancy District, from mid-March to April, captured a portion of the total Rio Grande inflow.

The poor spring runoff resulted in earlier than normal demands for supplemental irrigation releases. On April 4, the Middle Rio Grande Conservancy District began using San Juan-Chama water to supplement its needs and continued to do so until the end of the irrigation season. During the season, the Middle Rio Grande Conservancy District used 134,710 af of San Juan-Chama water for these purposes. Of the total San Juan-Chama water used, 85,658 af was given by various San Juan-Chama contractors to the Middle Rio Grande Conservancy District for irrigation purposes. The balance of 49,052 af came from the Middle Rio Grande Conservancy District's supply which includes 20,000 af given each year by the City of Albuquerque to the Middle Rio Grande Conservancy District in exchange for the Middle Rio Grande Conservancy District to operate the system to assure flows at the

Central Bridge in Albuquerque are maintained at 250 cfs or above. A portion of the San Juan-Chama water released from El Vado storage during irrigation season was to payback the City pool in Abiquiu for water borrowed earlier in the season. Those releases also provided flows for rafting on seven weekends below El Vado Dam on the designated Wild and Scenic reach of the Rio Chama.

By September 10, 1996, El Vado Dam releases were set at around 340 cfs until the end of October when they were reduced to between 160 and 185 cfs for winter fishery flows. The natural inflow to El Vado was bypassed and augmented with San Juan-Chama water from Heron to maintain the total release below El Vado. Under a normal year, payback water from the Middle Rio Grande Conservancy District to the City of Albuquerque in Abiquiu would be used to maintain fishery flow releases below El Vado. By the end of the 1996 irrigation season, the Middle Rio Grande Conservancy District used their San Juan-Chama water; therefore, 1996 City of Albuquerque San Juan-Chama water was delivered from Heron to Abiquiu to enhance the fishery spawning success.

El Vado Reservoir ended the year at an elevation of 6,836.55 ft (44,380 af). The reservoir should continue to increase through mid-March 1997 as San Juan-Chama water is delivered from Heron Reservoir. A summary of El Vado Reservoir operations can be found in Table 8.

During 1996, a total of 7,105 af of stored water was available in El Vado Reservoir for potential use by the Six Southern Pueblos on their prior and paramount water rights lands. The Pueblos made no call for such water in 1996.

Channelization Works

The Albuquerque Area Office'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.

In 1996, Reclamation performed river bank stabilization work in the Española reach with a total of 300 cubic yards (cy) of boulders placed and 30 rootballs placed. The work was located on the Santa Clara Tribal Reservation and was part of an experimental bio-engineering effort.

Channel development work in the Elephant Butte Reservoir headwater area continued through 1996. A total of 20,000 cy of fill material was placed to raise the San Marcial levee. A total of 30,000 cy of material was excavated in a pilot channel from the south boundary of the Bosque Del Apache National Wildlife Refuge to an area north of Black Mesa. The excavation was performed through a 4-mile long sediment plug.

Minimal inflow to the reservoir was experienced during the spring runoff of 1996 resulting in a lowering of the reservoir at the headwaters of Elephant Butte. The resultant change in reservoir pool content from 1995 to 1996 was a decrease of approximately 300,000 af. Excavation of a new temporary channel into Elephant Butte commenced in January of 1997. The work will involve construction of a temporary berm and excavation of a new channel alignment to the reservoir pool. Approximately 20,000 cy of fill material will be used to construct the temporary berm. The temporary channel will involve approximately 100,000 cy of excavation.

In the river channel between Elephant Butte Dam and Caballo Dam approximately 30,000 cy of sediment material deposited by tributaries was removed from the river channel. The material removal was necessary to maintain a channel delivery capacity of 5,000 cfs. Approximately 300 cy of riprap material was placed for bank stabilization of private property along the river channel.

Endangered Species

Rio Grande Silvery Minnow

The U.S. Fish and Wildlife Service listed the Rio Grande silvery minnow as endangered in 1994. The silvery minnow is currently found in about 170 miles of the Rio Grande in central New Mexico, from Cochiti Dam to the headwaters of Elephant Butte Reservoir. This reach of the river, commonly referred to as the middle Rio Grande, comprises less than 10-percent of the silvery minnow's historic range. Proposed critical habitat was designated as the reach of the middle Rio Grande from the State Highway 22 bridge below Cochiti Dam downstream to the railroad bridge crossing near San Marcial, New Mexico. Final designation of critical habitat has been postponed. Reclamation projects that potentially affect both the river flow and the channel of the middle Rio Grande are largely defined by the Middle Rio Grande and San Juan-Chama Projects.

The Rio Grande experienced an extremely low runoff in the spring of 1996. In April 1996, water diversions for irrigation needs resulted in the dewatering of a reach of the Rio Grande below San Acacia Diversion Dam and above Elephant Butte Reservoir. Working with the U.S. Fish and Wildlife Service, Middle Rio Grande Conservancy District, U.S. Corps of Engineers, and the State of New Mexico, Reclamation immediately initiated negotiations and actions to return water to a portion of the river. During the irrigation season, the Middle Rio Grande Conservancy District operated its system of irrigation works to allow native Rio Grande water to remain in the river undiverted for the silvery minnow, and the City of Albuquerque and other entities made approximately 44,500 af of San Juan-Chama Project water available to the Middle Rio Grande Conservancy District for use by irrigators at no cost to water users in the Middle Rio Grande Valley.

Reclamation's involvement with the other entities continued through the irrigation season to assure no additional mortality to the endangered fish. Endangered Species Act, section 7, consultation was completed jointly with the U.S. Corps of Engineers for specific water operations of the Middle Rio Grande Project during the 1996 irrigation season. Actions taken during this period included: securing additional water in compliance with State law; improvements to portions of the Middle Rio Grande Conservancy District's water conveyance system in partnership with the New Mexico Interstate Stream Commission and the Middle Rio Grande Conservancy District; intensive water measurement and operations; and increased biological monitoring.

During the summer, four environmental groups sent Reclamation and other involved agencies *Notices of Intent to Sue* for noncompliance with the Endangered Species Act. To date, no suits have been filed. Reclamation and the key agencies, including the City of Albuquerque, prepared a *draft white paper* in November 1996 outlining water management strategies that could contribute to seeking long-term solutions to providing water for the silvery minnow and other water users in the middle valley. Reclamation is evaluating some form of forbearance as an alternative. Water operations are constantly being evaluated for short- and long-term opportunities to maximize available water supplies.

Reclamation has taken a proactive approach to Rio Grande aquatic issues, especially silvery minnow issues, by developing and funding aquatic research and monitoring programs. Last year, 1996, marked the fourth year in a 5-year research effort to determine the distribution and abundance, as well as life history and habitat needs, of the silvery minnow. Agencies involved with these research efforts include New Mexico Department of Game and Fish, U.S. Fish and Wildlife Service, U. S. Corps of Engineers, and University of New Mexico.

Additionally, in 1996, Reclamation completed Endangered Species Act, section 7, consultation with the U.S. Fish and Wildlife Service for several critical river maintenance projects such as the removal of sediment plugs in the San Marcial reach of the middle Rio Grande and creating a river channel through the delta area of Elephant Butte Reservoir to enhance the efficiency of water and sediment transport. These projects have far reaching impacts throughout the Middle Rio Grande Project area by alleviating operational bottlenecks and increasing the flexibility of managing the system for both water delivery and environmental benefits. Through cooperation with the U.S. Fish and Wildlife Service and other stakeholders, these projects were constructed without the likelihood of adverse effects on the silvery minnow.

Southwestern Willow Flycatcher

The Southwestern willow flycatcher was listed as endangered by the U.S. Fish and Wildlife Service effective March 29, 1995. Reclamation and its contractor, New Mexico

National Heritage, conducted flycatcher surveys and nest monitoring at several locations along the Rio Grande from Velarde, New Mexico to Elephant Butte Reservoir during 1996. The major concentrations of flycatchers continues to be the Velarde area in the Española Valley and the San Marcial area upstream of Elephant Butte Reservoir. The lack of water in the Rio Grande channel and floodplain near San Marcial during May and June likely contributed to unsuccessful nesting. There was evidence of nest predation at both Velarde and San Marcial. Cowbird parasitism remains a strong concern, especially near San Marcial. Reclamation proposes to continue flycatcher surveys and nest monitoring along the Rio Grande.

A cowbird trapping effort was initiated by Reclamation near San Marcial to reduce the incidence of cowbird parasitism on nesting flycatchers. Reclamation proposes to expand this effort in 1997 to include a pre-trap census of cowbirds to better evaluate the success of the program. A grazing management plan will also be developed for Reclamation lands at Elephant Butte and Caballo Reservoirs to reduce the effects of grazing on flycatchers.

Cooperative Program with the State of New Mexico

Reclamation cooperates with the New Mexico Interstate Stream Commission on water salvage and drain improvement efforts. During 1996, Reclamation performed maintenance such as vegetation mowing for Drain Unit 7 and the Escondida Drain. Reclamation also performed work along a 3-mile reach of the Upper Belen Riverside Drain to reduce sloughing of banks and increase the effectiveness of the drain.

Reclamation also performed work for the Drought Relief Program for the State of New Mexico in 1996. The purpose of this project was to divert approximately 30 to 40 cfs from the Bernardo Drain to the San Francisco Riverside Drain. The Middle Rio Grande Conservancy District discharges most of its flows from the Belen area into the Bernardo Drain. Since the Bernardo Drain was not capable of handling the additional flows to transport water past San Acacia Diversion Dam, the water was discharged back to the river. Reclamation rehabilitated approximately 33,000 ft of the San Francisco Riverside Drain in order to increase its capacity to convey flows past San Acacia Diversion Dam.

Rio Puerco Sedimentation and Water Quality Study

Reclamation released a final report on the reconnaissance phase of the Rio Puerco Sedimentation and Water Quality Study in October 1996. The study concluded that adverse effects of sediment deposition in Elephant Butte Reservoir would not justify development of a major sediment control project in the Rio Puerco Basin at the present time or in foreseeable future.

There is some evidence that trace metals and radionuclide contaminants are being transported out of the Rio Puerco Basin. The quantities of contaminants and potential threat to the Rio Grande system are not completely understood, but there is no current indication that they pose a serious problem.

As part of the Rio Puerco study, Reclamation joined in an effort with U.S. Geological Survey, Texas Natural Resource Conservation Commission, and El Paso County Water Improvement District No. 1 to better characterize the history of contaminant deposition in the sediments of Elephant Butte Reservoir. U.S. Geological Survey collected sediment core samples from the reservoir which will be analyzed for heavy metal, radionuclide, and other contaminants. The core analysis will provide baseline data on the types of contaminants that may be present in the reservoir's sediments. It will also provide an indication of any discernable trends in contaminant deposition and accumulation. Findings of the core sampling study will be published by U.S. Geological Survey in the near future.

In 1996, Congress passed legislation relating to the Rio Puerco watershed (HR 4236 Sec. 401) and the bill has been signed into law. The Act provided for the establishment of a Rio Puerco Management Committee having a broad representation of government agencies, Indian tribes, and members of the public. The Bureau of Land Management is tasked with convening this committee of which Reclamation is to be a member. The Act requires that the Bureau of Land Management and the committee establish a clearinghouse for research and information on management practices in the Rio Puerco Basin, inventory the existing management practices and related monitoring activities, and develop and implement alternative management practices appropriate for the basin. Within 2 years, the Bureau of Land Management will prepare a report on means to improve watershed conditions in the Rio Puerco Basin. The Act also authorizes \$7,500,000 over 10 years for these activities.

Low Flow Conveyance Channel Investigations

Reclamation is in the second year of a 3-year comprehensive study of the Rio Grande Floodway and the Low Flow Conveyance Channel system between San Acacia Diversion Dam and Elephant Butte Reservoir. In recent years, increased streamflow in the Rio Grande and continuing sediment deposition have put the existing system under great stress, especially in the reach below San Marcial. Diversions to the Low Flow Conveyance Channel have been suspended since 1985 due to high reservoir levels at Elephant Butte Reservoir and sediment deposition in the head waters area.

This study will result in a plan for configuring and operating the system 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. A full range of river flow and reservoir level conditions will be

analyzed. Management of the heavy sediment load of the Rio Grande is an especially important consideration. Facets of the study will include geomorphic, hydrologic, and biologic investigations. The study will consolidate and incorporate engineering and biological studies currently on-going under the Middle Rio Grande Project program. The New Mexico Interstate Stream Commission is providing cost sharing and in-kind support for hydrologic and engineering studies.

Preparation of an Environmental Impact Statement will be integrated with these planning studies. A Notice of Intent to prepare an Environmental Impact Statement was published in the Federal Register in December 1996, and in early 1997 formal public scoping meetings were held in Albuquerque and Socorro.

Upper Rio Grande Water Operations Model

In January 1996, Reclamation, U.S. Corps of Engineers, Bureau of Indian Affairs, U.S. Geological Survey, and U.S. Fish and Wildlife Service, signed a Memorandum of Understanding, agreeing to explore the feasibility and desirability of developing an Upper Rio Grande Water Operations Model (URGWOM) . Later in 1996, the International Boundary and Water Commission-U.S. Section, also signed the agreement. After extensive scoping and coordination with organizations in the water management community, the signatory agencies concluded that such a hydrologic model is critically important for improved water management. The agencies prepared and distributed a draft plan of study in the fall. It was concluded that the model would extend from the headwaters of the Rio Grande in Colorado, down to Fort Quitman, Texas. Power and Reservoir System Model (PRSYM) was selected to form the “backbone” of the modeling effort.

In December 1996, the URGWOM technical team, which consists of representatives from Reclamation, U.S. Corps of Engineers, and U.S. Geological Survey, began developing a model for the “test-case”; the Rio Chama Basin. The test-case model, to be completed late in 1997, will have the ability to account for both San Juan-Chama and Rio Grande water (sometimes referred to as “colors of water”). Furthermore, it will operate on the separate San Juan-Chama contracts (i.e., water ownership/accounting). One facet of the entire effort is for URGWOM to replace the current water accounting system with a tool that helps water managers make better and more timely decisions, and handles complex, after-the-fact, San Juan-Chama water accounting, as well as data-supported forecasts and projections.

RIO GRANDE PROJECT, NEW MEXICO - TEXAS

The El Paso Field Division in El Paso, Texas, and the Elephant Butte Field Division in Truth or Consequences, New Mexico, were jointly responsible for operations of the Rio Grande Project during 1996. The Elephant Butte Irrigation District and El Paso County Water Improvement District No. 1 operated the Reclamation reserved works along the Rio Grande, including Percha Diversion Dam, Leasburg Diversion Dam, and Mesilla Diversion Dam in New Mexico, and the Riverside Diversion Cofferd Dam in Texas. The Elephant Butte Irrigation District maintained the three diversion dams in New Mexico under a contract with Reclamation. The International Boundary and Water Commission operated and maintained the American Diversion Dam and American Canal which are used along with the International Dam to separate the U.S. waters and deliver irrigation water to Mexico. The El Paso County Water Improvement District No. 1 operated and maintained the diversion into the Riverside Canal in Texas. The Riverside Diversion Dam failed June 9, 1987, after high flood control releases in the Rio Grande. The temporary coffer dam constructed downstream of the failed diversion dam by El Paso County Water Improvement District No. 1 is still in use.

Water Supply Conditions

Inflow into Elephant Butte Reservoir during 1996, measured at the Rio Grande Floodway plus the Low Flow Conveyance Channel at San Marcial (FW+ LFCC), was 464,400 af. The 82-year average annual inflow, measured at San Marcial (FW+LFCC), is 883,000 af. The actual 1996 March through July runoff, measured at San Marcial (FW+LFCC), was 132,000 af which was 26-percent of the 30-year average of 501,000 af. During 1996, 647,000 af of water was released from Elephant Butte Reservoir. There was a release of 774,000 af to meet the irrigation requirements of project water users from Caballo Reservoir.

The January through June National Weather Service and Soil Conservation Service coordinated forecasts for the 1996 March through July runoff were as follows:

Month	Otowi Runoff (af) (Mar-Jul)	% of 30-Year Average	San Marcial Runoff (af) (Mar-Jul)	% of 30-Year Average
Jan 01	245,000	36	101,000	20
Feb 01	270,000	39	120,000	24
Mar 01	270,000	39	120,000	24
Apr 01	230,000	34	85,000	17
May 01	200,000	29	60,000	12
Jun 01	200,000	29	60,000	12

Combined storage for Elephant Butte and Caballo Reservoirs was 1,759,910 af on December 31, 1996. This combined storage was 73.4-percent of the total capacity of both reservoirs (Total Combined Capacity = 2,065,000 + 331,510 = 2,396,510 af), and 77.5-percent of the available storage of 2,271,510 af. The available storage for both reservoirs during the winter months is equal to the capacity of Elephant Butte Reservoir, 2,065,000 af minus 25,000 af that Reclamation reserves for operational flood control space (50,000 af during irrigation season), plus the capacity of Caballo Reservoir, 331,510 af minus 100,000 af of flood control space, or 2,271,510 af.

A full allotment was declared by Reclamation in December 1995 for the 1996 irrigation season. This was the eighteenth consecutive year that a full allotment has been declared. A full allotment was also declared in December 1996 for the 1997 irrigation season.

The coordinated forecast from the National Weather Service and the Soil Conservation Service for the 1997 March through July runoff season so far is as follows:

Month	Otowi Runoff (af) (Mar-Jul)	% of 30-Year Average	San Marcial Runoff (af) (Mar-Jul)	% of 30-Year Average
Jan 01	900,000	131	700,000	140
Feb 01	1,175,000	171	920,000	184
Mar 01	1,125,000	164	880,000	176

Project Irrigation and Drainage Systems and Title Transfer

The irrigation and drainage system continued to be operated and maintained by Elephant Butte Irrigation District in the New Mexico portion of the project and by El Paso County Water Improvement District No. 1 in the Texas portion of the project in 1996. Reclamation administers the lands and right-of-way activities of reservoir and diversion dam areas. In 1992, Congress authorized the transfer of title to certain irrigation facilities to the districts. Activities to complete National Environmental Policy Act requirements for transfer of facilities were conducted during 1995. The Final Environmental Assessment and Finding of No Significant Impact for the transfer of lands and irrigation facilities to Elephant Butte Irrigation District and to El Paso County Water Improvement District No. 1 was completed January 19, 1996. Reclamation announced the official transfer of the irrigation and drainage rights-of-way and facilities to the districts on January 22, 1996.

Reclamation retained 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 retained the rights-of-way and title of reserved works for Percha, Leasburg, and Mesilla Diversion Dams. The districts performed water accounting flow measurements at canal headings, river stations, and lateral headings during 1996. Reclamation coordinated and maintained central control of releases, river operations, and water accounting. The International Boundary and Water Commission continued to operate and maintain the American Diversion Dam and the American Canal during 1996 in accordance with the International Treaty. In addition, the International Boundary and Water Commission operated the International Dam which diverts irrigation waters into the Acequia Madre head gates operated by the Republic of Mexico. The water allotment accounting was accomplished by the districts using their own 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 summarized the end-of-year project water supply use for 1996. Reclamation continued working with the districts to analyze and review District efficiencies with the end goals of improving water use and conservation.

Drainage waters from Rio Grande Project lands provided a supplemental irrigation water supply for approximately 18,342 acres of the Hudspeth County Conservation and Reclamation District No. 1. Total flows out of the project to Hudspeth County, through the Hudspeth Feeder Canal, Tornillo Canal, and Tornillo Drain were 137,683 af during 1996. Under the Warren Act contracts, Hudspeth County Conservation and Reclamation District No. 1 was charged for drainage water from the project between March 1 and September 30 which amounted to 70,057 af.

Water flows measured by International Boundary and Water Commission at the Rio Grande at Fort Quitman Station, below the project and Hudspeth County Conservation and Reclamation District No. 1 boundaries, amounted to 167,600 af during 1996.

Rio Grande Project Adjudication

There are currently two distinct legal and administrative processes involving Reclamation with regard to water rights issues on the Rio Grande. One is a stream adjudication within the court system in the State of New Mexico. The other is an administrative process begun by the Texas Natural Resource Conservation Commission in the State of Texas.

New Mexico. At the February 4, 1997, hearing in the Third Judicial District Court, State of New Mexico, Doña Ana County, New Mexico, the Judge ruled from the bench denying motions to dismiss for lack of jurisdiction filed by the United States and El Paso Water Improvement District No. 1; therefore, the adjudication process for water rights from Elephant Butte Dam to the State line (New Mexico-Texas) is proceeding in the New Mexico court system. The New Mexico State Engineer's Office is moving forward in its selection process for a consulting firm to prepare the Lower Rio Grande Hydrographic Survey to be used in the judicial process. While there has been no commitment to be an active player in the hydrographic survey, the capacity of work required from Federal government staff related to the survey could be substantial. Reclamation, as well as the Department of Interior Regional Solicitor's Office in Salt Lake City, Utah, and the Department of Justice Environment and Natural Resources Division in Denver, Colorado, will continue to take part in this procedure as it evolves.

Texas. In September 1996, there was a request by many of the parties, including Reclamation, El Paso County Water Improvement District No. 1, and the City of El Paso Water Utilities Public Service Board, to dismiss or, in the alternative, abate the administrative adjudication before the State Office of Administrative Hearings so that a unified adjudication of water rights within the Rio Grande Project might be obtained. The

administrative process was abated pending the outcome of the hearing in New Mexico (refer to the above information on the February 4 hearing). At this time, the solicitors from the Departments of Justice and Interior are preparing a briefing on jurisdictional issues for the Texas Natural Resource Conservation Commission, due March 31, 1997.

Elephant Butte Reservoir and Powerplant

Elephant Butte Reservoir reached a high storage of 2,045,290 af, at elevation 4,406.46 ft, on January 2, 1996. This temporarily exceeded the winter storage limit of 2,040,000 af imposed by Reclamation as prudent operational control space.

Net power generation for 1996 was 91,385,340 million kilowatt-hours which was 126-percent of the 57-year average (1940 through 1996) of 72.5 million kilowatt-hours.

Cooperative Vegetation Management Program

For 37 years, Reclamation and the State of New Mexico have cooperatively controlled vegetation on 11,200 acres of selected floodplain of Elephant Butte and Caballo Reservoirs. The currently proposed inter-governmental agreement is for \$110,000 of which each agency provides half. In addition, the State has contributed all equipment used in the vegetation management program. Mowing has been the main method of reducing vegetative growth. Maintenance of saltcedar regrowth is restricted to previously cleared floodplain sites; clearing of wood phreatophytes on new floodplain sites is not permitted under the program.

Caballo Dam and Reservoir

Caballo Reservoir was filled to a high storage of 223,790 af, at elevation 4,171.61 ft, on February 20, 23, and 27, 1996. According to Court Order No. CIV-90-95 HB/WWD, which resulted from negotiated settlement with Elephant Butte Irrigation District and El Paso County Water Improvement District No. 1, Caballo Reservoir storage level is targeted not to exceed 50,000 af, at an elevation of 4,144.95 ft, during October 1 through January 31 of each year when conservation storage space is available in Elephant Butte Reservoir. Significant variation above 50,000 af requires collaboration efforts by the District and Reclamation. Reclamation's proposal for operation of Caballo Reservoir during February 1 through September 30, 1997, is to maintain storage levels within a flexible range of 30,000 af, such that the storage level would not be less than 50,000 af (elevation 4,144.95 ft) and not to exceed approximately 80,000 af (elevation 4,151.63 ft) as long as usable conservation space is available in Elephant Butte Reservoir. These operational procedures will keep more water in Elephant Butte Reservoir in order to reduce evaporative losses and at the same time provide for sufficient operational hydraulic head for releases, a reserve pool in case releases are interrupted from Elephant Butte Reservoir and minimize changes

to release rates from Elephant Butte Reservoir. This will be coordinated with Elephant Butte Irrigation District and El Paso County Water Improvement District No. 1 in September of each year.

Elephant Butte Reservoir Flood Study

Reclamation's Technical Service Center has completed a study to evaluate the need for prudent flood control space in Elephant Butte Reservoir. Copies of the report will be provided to the Rio Grande Compact Commission, International Boundary and Water Commission, and U.S. Corps of Engineers. The study may be instrumental in investigating the distribution of flood control capacity between Elephant Butte and Caballo Reservoirs as coordinated between Reclamation, International Boundary and Water Commission, and U.S. Corps of Engineers. Initial indications are that the flood study supports the concept of an approximate 100-year prudent operating space of 50,000 af in Elephant Butte Reservoir. The International Boundary and Water Commission continues to pursue funding to develop flood hydrology for Elephant Butte and Caballo Reservoirs, in coordination with their on-going levee design studies downstream of Caballo Dam.

Data Automation and Instrumentation and Flow Monitoring System

Historical and new hydrologic data related to the Rio Grande Project will be converted to digital format including graphical images of hard copy information. The information will be placed in a database for easy access.

The instrumentation and flow monitoring system will be upgraded over the next 2 years. Data collection platform units will be replaced with newer models and connected to telephone lines for real-time data access.

Elephant Butte and Caballo Reservoirs Resource Management Plan

Development of a Resource Management Plan for Elephant Butte and Caballo Reservoirs was initiated in late-1995. The intent of the Resource Management Plan is to produce a guide for Reclamation and other relevant agencies in the management of Elephant Butte and Caballo Reservoirs' land-associated resources. During Phase I, of a three-phased project, a resource inventory was completed and analyzed, issues and problems defined, goals and objectives established, and additional data needs identified for Phase II. In Phase II, initiated in January 1997, additional data is being collected, management alternatives identified, and preparations made toward development of a draft Environmental Impact Study, scheduled for completion in late-1998. 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 and development activities. 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.

El Paso Field Division Planning Studies and Interaction with New Mexico - Texas Water Commission

The New Mexico-Texas Water Commission was a voluntary court settlement in the El Paso v. Reynolds (563 F. Supp. 379 D.N.M. 1983) ground water appropriation case. The Commission seeks to affect the best management practices for the water resources of the west Texas and southern New Mexico area. Reclamation is cooperating with the Commission on the following studies:

Aquifer Storage and Recovery. This study investigates possible storage of excess surface water flows in the ground water aquifer via recharge zones for later extraction under water short or drought conditions.

Delivery of Surface Water on a Year Round Basis. This investigation will seek alternatives for supplying surface water to municipal and industrial water users on a year round basis. The primary focus will be to address water quality of Rio Grande Project drains. Reclamation is participating in the surface water computer modeling effort.

Rio Grande/Rio Bravo International Basin Assessment. Reclamation is working with the Transboundary Resources Inventory Project to form a consortium of water managers and stakeholders to guide a comprehensive compilation of water resources data and information needed to facilitate sound water resource management decisions for the tri-city regional area encompassed by Las Cruces, New Mexico; El Paso, Texas; and Juarez, Mexico. A bi-national water resources information network will be developed to provide a focal point for the collection, maintenance, and distribution of water resources information and data.

Rio Grande Project Agronomy Study. In 1996, an agronomy study was performed on the Texas portion of the Rio Grande Project. The final study report, to be available in late 1997, will address the general salinity status of the project and a preliminary evaluation of a beneficial use of irrigation water. The report will also address crop specific salinity guidelines suggesting which crops can be successfully grown at various water salinity levels, water quality requirements for production of high value crops in major soil types, water quality requirements for production of salt tolerant crops by major soil type, and the apparent leaching fractions occurring on district soils. An estimate of the current soil salinity and sodicity status of the irrigated lands of the El Paso Valley will be made.

Wildlife Studies - Bald Eagles

Studies on the wintering bald eagle population at Elephant Butte and Caballo Reservoirs continued in 1996 under a Cooperative Agreement between Reclamation and New Mexico State University. The study consists of an eagle nest watch program on the nests near Caballo Reservoir, observation of the number of eagles using the reservoir, prey item consumption, perch use, and availability of fish. Population and nest monitoring and related work will continue for the foreseeable future.

PHOTOGRAPHS

AND

TABLES



San Marcial, New Mexico
Looking south at the start of the tiffany plug, center of the river.
June 6, 1996



San Marcial, New Mexico
Looking south at completed excavated trench in the middle of the tiffany plug.
June 6, 1996

1996

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			PROJECT TOTALS
	CH03 STA. 730+00	CH04 STA. 798+60	MONTHLY TOTALS	TOTAL PASSING FLUME	CREDIT- ABLE AMOUNT AT FLUME	CH01 CHICAGO TURNOUT	CH02 MUM TURNOUT	PUMPING PLANT	MONTHLY TOTALS	TOTAL AT FLUME MINUS DEL. @ ANWR	Credit. Amt. del. to RGrande & not used by ANWR	NON- CREDIT- ABLE @ LOBATOS	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
JAN	0	0	0	3590	3590	0	0	0	0	3590	3590	0	3590
FEB	0	21	21	3880	3880	168	167	0	335	3545	3545	0	3901
MAR	99	80	179	4750	4750	133	617	144	894	3856	3856	0	4929
APR	5	0	5	1070	1070	168	386	87	641	429	429	0	1075
MAY	30	0	30	851	851	0	310	83	393	458	458	0	881
JUN	25	50	75	873	873	195	300	56	551	322	322	0	948
JUL	150	150	300	791	791	307	307	60	674	117	117	0	1091
AUG	102	102	204	2040	2040	186	186	33	405	1635	1635	0	2244
SEP	91	70	161	2170	2170	288	288	0	576	1594	1594	0	2331
OCT	12	26	38	2190	2190	17	17	0	34	2156	2156	0	2228
NOV	0	0	0	2040	2040	0	0	0	0	2040	2040	0	2040
DEC	0	0	0	3080	3080	0	0	0	0	3080	3080	0	3080
ANNUAL	510	500	1010	27330	27330	1460	2580	460	4500	22830	22830	0	28340

QUANTITIES FOR ANNUAL AMOUNTS HAVE BEEN ROUNDED TO THE NEAREST 10 AC-FT.

(1), (2), (6), (7) AND (8) = FROM MONTHLY CLOSED BASIN REPORTS.

(3) = (1) + (2)

(4) = TOTAL FLOW PASSING CBPALACO GAGING STATION

(5) = MONTHLY PARSHALL FLUME ACCOUNTING. THIS IS NOT NECESSARILY THE SAME NUMBER AS CREDITABLE AMOUNT AT LOBATOS

(9) = (6) + (7) + (8)

(10) = (4) - (9)

(11) = (10) - AMOUNT OF WATER NOT CREDITABLE TO RIO GRANDE BUT USED BY ANWR

(12) = (10) - (11)

(13) = (3) + (9) + (10)

(3) OF THE 1010 AF DELIVERED TO THE BLANCA WILDLIFE HABITAT AREA, 800 AF WAS THE ANNUAL WATER RIGHT, AND 210 AF WAS THROUGH A TRANSMOUNTAIN SUBSTITUTION WITH THE COLORADO DIVISION OF WILDLIFE AS PER THEIR LETTER TO THE COLORADO DIVISION OF WATER RESOURCES DATED APRIL 5, 1996.

1996

TABLE 2.

DIVERSIONS THROUGH AZOTEA TUNNEL

(ROUNDED TO NEAREST 10 ACRE-FEET)

Azotea											
MONTH	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	10 YEAR TOTAL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
JANUARY	0	0	0	0	0	0	0	0	0	0	0
FEBRUARY	0	0	0	0	0	0	0	0	0	0	0
MARCH	0	0	0	0	250	820	0	0	0	1400	2470
APRIL	16850	8270	11750	9880	27020	27880	7430	21060	10010	16370	156520
MAY	22680	22000	20780	25160	42650	44700	46170	48050	36090	30760	339040
JUNE	41950	23880	11200	23790	35650	9330	37050	12320	37200	5820	238190
JULY	1570	4650	2170	4260	5700	2870	3050	780	1900	2620	29570
AUGUST	0	3370	2590	2370	1030	1310	3430	0	1050	70	15220
SEPTEMBER	0	1360	40	4660	1080	150	1670	0	0	210	9170
OCTOBER	0	40	1590	5350	20	0	10	0	0	270	7280
NOVEMBER	0	0	0	710	0	0	0	0	0	980	1690
DECEMBER	0	0	0	0	0	0	0	0	0	30	30
ANNUAL	83050	63570	50120	76180	113400	87060	98810	82210	86250	58530	799180

TEN YEAR AVERAGE = 79920

1996

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

(UNIT = ACRE-FEET)

TABLE 4 SJ-C Heron Rel.	MRGCD	SANTA FE	COCHITI	CITY OF ALBUQ- UERQUE	POJO- AQUE UNIT	TAOS	DEPART- MENT OF ENERGY	CITY OF ESPAN- OLA	TWINING SANI- TATION	VILLAGE OF LOS LUNAS	TOWN OF BERNA- LILLO	BELEN	RED RIVER	OTHER SJ-C	TOTAL
MONTH															
JANUARY	0	0	1361	0	164	0	0	0	0	0	0	0	0	0	1525
FEBRUARY	0	0	0	0	67	0	0	0	0	0	0	0	0	0	67
MARCH	0	2190	0	10128	0	0	0	0	0	0	199	0	0	0	12517
APRIL	19290	3415	1976	15122	0	0	0	0	0	39	157	68	0	0	40067
MAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JUNE	0	0	0	7271	0	0	0	0	0	0	0	0	0	0	7271
JULY	0	0	0	7663	0	400	1200	1000	15	358	0	432	60	8330	19458
AUGUST	0	0	0	0	0	0	0	0	0	0	0	0	0	2962	2962
SEPTEMBER	0	0	0	6404	0	0	0	0	0	0	0	0	0	198	6602
OCTOBER	0	0	0	13908	0	0	0	0	0	0	0	0	0	0	13908
NOVEMBER	0	0	517	7059	0	0	0	0	0	0	0	0	0	0	7576
DECEMBER	0	0	0	7438	1402	0	0	0	0	17	0	29	0	0	8886
1996 CY Total	19290	5605	3854	74993	1633	400	1200	1000	15	414	356	529	60	11490	120839
Annual Alloc.	20900	5605	5000	48200	1030	400	1200	1000	15	400	400	500	60	11490	96200
1995 AY Total	20900	5605	9108	32588	581	0	0	0	0	42	400	68	0	0	69292
1995 to MRGCD				15612		400	1200	1000	15	358	0	432	60	11490	30567
1996 Alloc. Rel.	0	0	517	34131	1402	400	1200	1000	15	375	0	461	60	11490	51051
1996 Alloc. Bal.	20900	5605		14069		400	1200	1000	15	383	400	471	60	11490	55993

CY - CALENDAR YEAR FROM JANUARY TO DECEMBER

AY - ALLOCATION YEAR WHICH EXTENDS TO APRIL OF THE NEXT CY IF WAIVERS ARE GRANTED

1996 Alloc. Bal. - WATER AT END OF CY 1996 FOR DELIVERY BY APRIL 1997 IF WAIVERS ARE GRANTED

BY LETTER OF AGREEMENT FROM ALBUQUERQUE, TAOS, DOE, ESPANOLA, TWINING, LOS LUNAS, BELEN, AND RED RIVER, A TOTAL OF 19,077 AC-FT WAS DELIVERED TO MRGCD IN 1996. IN ADDITION, 11,490 AC-FT OF JICARILLA APACHE AND UNCONTRACTED SAN JUAN-CHAMA WATER WAS ALSO DELIVERED TO MRGCD IN 1996.

1996

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

(ROUNDED TO NEAREST 10 ACRE-FEET)

TABLE 3 Heron Storage		INFLOW		OUTFLOW		SAN JUAN CHAMA LOSS	END-OF-MONTH CONTENT			ELEVATION (FEET)
MONTH	RIO GRANDE	SAN JUAN CHAMA	RIO GRANDE	SAN JUAN CHAMA	RIO GRANDE		SAN JUAN CHAMA	TOTAL		
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DEC. 1995						-190	376870	376680	7181.85	
JANUARY	150	0	240	1520	1230	-280	374120	373840	7181.35	
FEBRUARY	220	0	190	70	20	-250	374030	373780	7181.34	
MARCH	420	1400	150	12520	160	20	362750	362770	7179.38	
APRIL	740	16340	490	40070	2170	270	336850	337120	7174.68	
MAY	470	30700	150	0	2080	590	365470	366060	7179.97	
JUNE	860	5810	1450	7270	130	0	363880	363880	7179.58	
JULY	1840	2610	1840	19460	0	0	347030	347030	7176.52	
AUGUST	340	70	300	2960	1480	40	342660	342700	7175.72	
SEPTEMBER	320	210	380	6600	1100	-20	335170	335150	7174.31	
OCTOBER	140	270	150	13910	230	-30	321300	321270	7171.67	
NOVEMBER	1620	980	1580	7570	0	10	314710	314720	7170.40	
DECEMBER	1220	30	1160	8890	0	70	305850	305920	7168.67	
SUB-TOTAL	8340	58420	8080	120840						
ADJUST.						-350 (A)				
ANNUAL		66760		128920	8600	-280	306200	305920		

(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) 351 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 348 ACRE-FEET TO REPLACE EVAPORATION LOSSES.

1996

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

(UNIT = ACRE-FEET)

TABLE 5. SJ-C @ Otowi	RELEASE FROM HERON	HERON RELEASE STORED IN EL VADO	RELEASE FROM EL VADO	TOTAL BELOW EL VADO	RELEASE FROM-OR STORAGE IN ABIQUIU	TRANS. LOSSES	NAMBE FALLS USE ABOVE OTOWI	RETURN FLOW CREDIT- POJOAQUE UNIT	SAN JUAN WATER AT OTOWI
MONTH	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
JANUARY	1525	0	11107	12632	-11114	153	169	22	1218
FEBRUARY	67	0	10307	10374	-10353	114	162	19	-236
MARCH	12517	10575	4912	6854	-5615	87	143	18	1027
APRIL	40067	33382	404	7089	2627	165	59	22	9514
MAY	0	0	262	262	4831	49	73	73	5044
JUNE	7271	7271	13117	13117	5865	315	82	97	18682
JULY	19458	19458	25143	25143	6346	560	339	71	30661
AUGUST	2962	2962	33370	33370	1066	677	10	48	33797
SEPTEMBER	6602	198	11659	18063	9884	450	111	104	27490
OCTOBER	13908	63	1799	15644	904	321	238	48	16037
NOVEMBER	7576	251	2223	9548	-7737	121	341	38	1387
DECEMBER	8886	6249	7271	9908	-6450	140	242	35	3111
ANNUAL	120839	80409	121574	162004	-9746	3152	1969	595	147732

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.

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

1996

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

(UNIT = ACRE-FEET)

TABLE 5 NF Monthly MONTH	INFLOW	OUTFLOW			RESER. LOSSES	TOTAL OUTFLOW + LOSSES	END OF MONTH	
		BY PASSED	STORAGE RELEASE				CONTENT	ELEVATION
			OPER.	IRRIG.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
DEC. 1995						1472	6816.10	
JANUARY	231	62	0	0	0	62	1641	6819.60
FEBRUARY	223	61	0	0	2	63	1801	6822.67
MARCH	246	102	0	47	9	158	1889	6824.27
APRIL	417	346	0	478	17	841	1465	6815.95
MAY	565	477	0	587	20	1084	946	6803.29
JUNE	343	257	0	264	4	525	764	6797.52
JULY	634	283	0	50	12	345	1053	6806.27
AUGUST	377	326	0	600	41	967	463	6785.38
SEPTEMBER	532	421	0	35	-1	455	540	6788.93
OCTOBER	435	197	0	0	-1	196	779	6798.05
NOVEMBER	405	64	0	0	3	67	1117	6807.94
DECEMBER	294	41	0	12	12	65	1346	6813.33
ANNUAL	4702	2637	0	2073	118	4828	1346	6813.33

1995 EOY CONTENT + TOT. INFLOW - TOT. OUTFLOW - LOSSES = 1346 ACRE-FEET

SJ-C REQUIRED AT OTOWI = (INFLOW - BYPASS - RETURN FLOW CREDIT - LOSSES
ACCRUED DURING DRAWDOWN) = (4702 - 2637 - 595 - 96) = 1374 ACRE-FEET

ACTUAL SJ-C RELEASED FOR NAMBE FALLS IN 1996 = 1386 ACRE-FEET (A)
EQUIVALENT SJ-C RELEASED FROM HERON IN 1996 = 1402 ACRE-FEET

COL. (5) LOSSES ACCRUED DURING RESERVOIR DRAWDOWN = 96 ACRE-FEET
ACCRUED DURING RESERVOIR RISE OR STEADY STATE = 22 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

TABLE 7. 1996
**RESERVOIR STORAGE ADJUSTED FOR SEDIMENT DEPOSITION
 IN THE SAN JUAN-CHAMA POOLS**

Sed. Deposition in SJ-C Pools	EOM ELEVATION	APPARENT R. GRANDE CONT (INCLUDES ANY SEDIMENT VOL- UME IN FLOOD CONTROL POOL)	SAN JUAN CHAMA CONTENT	ESTIMATED SEDIMENT DEPOSITION IN SAN JUAN-CHAMA POOL		TOTAL CONTENT BASED ON LATEST CAPACITY TABLES
				Month	Accumu.	
				(1)	(2)	
			COCHITI			
DEC. 1995	5340.47	160	49484	64	7264	56908
JANUARY	5341.33	51	50726	72	7336	58113
FEBRUARY	5341.53	461	50538	60	7396	58395
MARCH	5340.96	36	50054	107	7503	57593
APRIL	5340.83	-167	50033	42	7545	57411
MAY	5340.96	288	49680	80	7625	57593
JUNE	5341.18	186	50001	91	7716	57903
JULY	5340.84	136	49455	118	7834	57425
AUGUST	5340.28	-192	48900	100	7934	56642
SEPTEMBER	5340.22	96	48463	66	8000	56559
OCTOBER	5340.18	151	48300	52	8052	56503
NOVEMBER	5340.34	71	48585	18	8070	56726
DECEMBER	5340.56	-16	48958	21	8091	57033
			Annual Sed	827		
			ABIQUIU			
DEC. 1995	6226.99	58792	153709	14	6291	218792
JANUARY	6224.78	38288	164682	15	6306	209276
FEBRUARY	6222.98	20644	174715	13	6319	201678
MARCH	6219.16	70	179469	17	6336	185875
APRIL	6218.06	117	174904	69	6405	181426
MAY	6216.13	116	167097	129	6534	173747
JUNE	6214.07	-233	159294	130	6664	165725
JULY	6212.30	351	151687	262	6926	158964
AUGUST	6211.67	128	149223	300	7226	156577
SEPTEMBER	6208.69	-159	138258	185	7411	145510
OCTOBER	6208.35	241	136478	141	7552	144271
NOVEMBER	6210.25	28	143641	34	7586	151255
DECEMBER	6211.97	263	149833	32	7618	157714
			Annual Sed	1327		
			JEMEZ			
DEC. 1995	5192.95	10	19030	1	3433	22473
JANUARY	5192.80	-24	18873	1	3434	22283
FEBRUARY	5192.60	-41	18638	2	3436	22033
MARCH	5192.42	-158	18521	9	3445	21808
APRIL	5192.73	74	18669	7	3452	22195
MAY	5191.80	54	17535	1	3453	21042
JUNE	5191.02	18	16624	1	3454	20096
JULY	5190.80	-191	16525	43	3497	19831
AUGUST	5190.05	-25	15437	31	3528	18940
SEPTEMBER	5189.34	-20	14601	5	3533	18114
OCTOBER	5189.54	199	14589	24	3557	18345
NOVEMBER	5190.84	828	15492	2	3559	19879
DECEMBER	5191.93	199	17442	2	3561	21202
			Annual Sed	128		

1996

TABLE 8.

RESERVOIR OPERATION FOR EL VADO DAM

(ROUNDED TO NEAREST 10 ACRE-FEET)

El Vado Res. Op. MONTH	INFLOW		OUTFLOW		LOSSES		EOM CONTENT		
	RG	SJ-C	RG	SJ-C	RG	SJ-C	RG	SJ-C	TOTAL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DEC. 1995	4390	0	3170	12300	60	80	22340	84280	106620
JANUARY	5940	1520	4600	12630	70	50	23610	73120	96730
FEBRUARY	5230	70	3360	10370	80	-10	25400	62830	88230
MARCH	7560	12520	7490	6870	120	150	25350	68330	93680
APRIL	39670	40070	17210	7080	190	480	47620	100840	148460
MAY	37530	0	44660	260	460	890	40030	99690	139720
JUNE	4910	7270	30900	13120	120	590	13920	93250	107170
JULY	3310	19460	6340	25140	-150	570	11040	87000	98040
AUGUST	2210	2960	7930	33370	-80	590	5400	56000	61400
SEPTEMBER	2030	6600	6660	18060	-70	220	840	44320	45160
OCTOBER	1350	13910	1920	15640	30	150	240	42440	42680
NOVEMBER	4500	7570	1540	9540	190	0	3010	40470	43480
DECEMBER	3170	8890	1180	9910	50	20	4950	39430	44380
ANNUAL	117410	120840	133790	161990	1010	3700			

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

