

***1994 Report to the  
Pecos River Commission***

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*NEW MEXICO*

*TEXAS  
Brad Newton*

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**UNITED STATES DEPARTMENT OF THE INTERIOR**

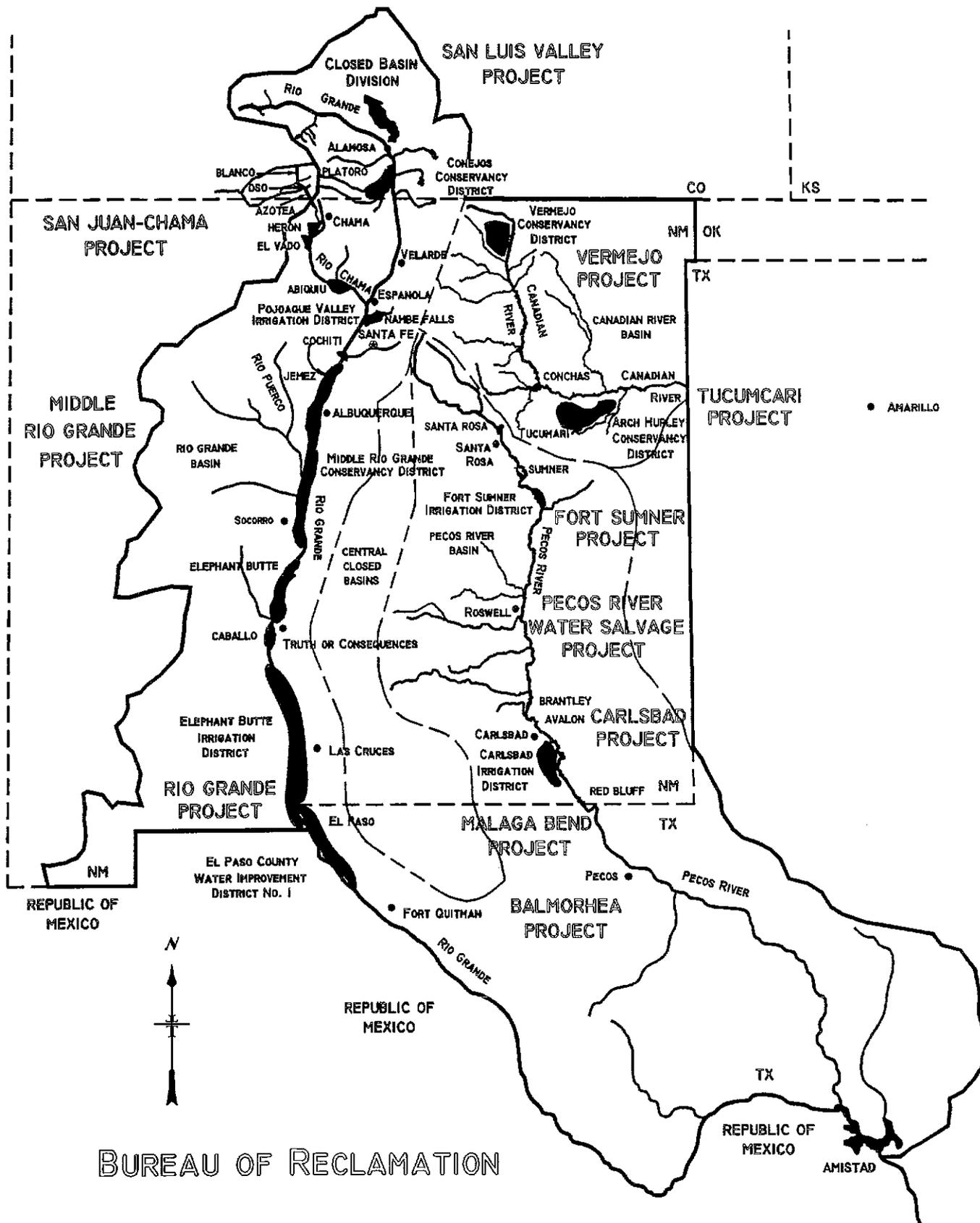
**BUREAU OF RECLAMATION**

**Upper Colorado Region**

**Albuquerque Area Office**

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# ALBUQUERQUE AREA OFFICE PROJECTS MAP - OCTOBER 1994



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**U. S. Bureau of Reclamation  
Upper Colorado Region  
Albuquerque Area Office  
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## **INTRODUCTION**

There were significant organizational realignments within Reclamation's Upper Colorado Region during 1994. Reflecting a significantly expanded mission directing current and future operations, the Albuquerque Projects Office was redesignated and restructured as the Albuquerque Area Office (AAO), with greater authority being delegated to the Area Office Manager. During June 1995, the Rio Grande Projects Office and its Elephant Butte Power and Storage Division will become, respectively, the El Paso Field Division and the Elephant Butte Field Division of the Albuquerque Area Office. During a transition period beginning in September 1994, effective realignment of both offices under AAO was initiated. Geographically, AAO jurisdictional boundaries on the Rio Grande were expanded to include a reach from the Closed Basin in southern Colorado to Amistad, Texas. The Albuquerque Area Office remains responsible for Reclamation programs administered from its Alamosa, Chama, and Socorro Field Divisions, and its Carlsbad representative office. For purposes of this report, the nomenclature under which the various organizations operated during most or all of 1994 has been retained, with the exception of the redesignated Albuquerque Area Office.

The Albuquerque Area Office of the Bureau of Reclamation (Reclamation) is responsible for operation, maintenance, and/or oversight of four projects on the Pecos River. These projects are: the Carlsbad Project, which includes Sumner, Brantley, and Avalon Dams; the Pecos River Basin Water Salvage Project; the Fort Sumner Project; and the Malaga Bend Salinity Alleviation Project. During 1994, the Rio Grande Projects Office in El Paso, Texas, was responsible for coordinating study activities relating to the Malaga Bend Salinity Alleviation Project.

An agreement between Reclamation and Carlsbad Irrigation District (CID), finalized on October 2, 1989, provided for CID to operate and maintain Brantley and Sumner Dams, and the Pecos River Water Salvage Project. This contract was implemented during 1990 and has continued during 1994. Reclamation continues to be responsible for assuring that this work is accomplished in compliance with all applicable agreements, contracts, regulations, compacts, and other related laws.

## CARLSBAD PROJECT

### Crop Production

The major crops grown in 1994 were alfalfa and cotton, with 17,719 acres being irrigated out of a total of 25,055 acres of irrigable area. Total gross crop value was \$10,090,800, with an average crop value of \$569.00 per irrigated acre. The irrigation demand for 1994 was 106,903 acre-feet (ac-ft) with 74,248 ac-ft delivered to farms or 4.19 ac-ft delivered per irrigated acre.

### Reservoir Storage Entitlements

All Carlsbad Project reservoirs were operated in accordance with the requirements of the Pecos River Compact and Flood Control Criteria of the Corps of Engineers.

Storage entitlements in 1994 were granted by the New Mexico State Engineer. The following table represents 1994 storage entitlements for the four Pecos River Reservoirs:

Reservoir	Total Storage (ac-ft)	Min. Pool + Sed. Pool (ac-ft)	Conservation Storage (ac-ft)	Conservation Elevation (ft)
Santa Rosa	99,912	5,881	94,031	4,745.78
Sumner	43,768	4,860	38,908	4,261.00
Brantley	47,448	7,448	40,000	3,255.53
Avalon	4,334	773	3,561	3,177.40
<b>TOTALS:</b>	<b>195,462</b>	<b>18,962</b>	<b>176,500</b>	

### Sumner Dam

On January 1, 1994, Sumner Reservoir was at elevation 4,252.23 feet (ft) (total storage 23,290 ac-ft, conservation storage 18,430 ac-ft). Under a water right permit granted by the State of New Mexico, CID is allowed to store up to an additional 20,000 ac-ft in Sumner Reservoir from November 1 to April 30 each year, provided that the accumulated conservation storage of all four reservoirs on the Pecos River in New Mexico does not exceed 176,500 ac-ft. No additional storage under this water right permit occurred in 1994.

A block of water was released downstream to Brantley beginning in February. This release was necessary to improve water quality and increase water quantity in Brantley for the beginning of CID's irrigation season. The release was ramped beginning on February 15 to a maximum discharge of 1,130 cubic-feet per second (cfs) on March 2 and 3. The flows were ramped down beginning on March 4 until the release ended on March 10.

Following this release, approximately 25 cfs was released above the amount needed to meet irrigation demands for the Fort Sumner Irrigation District (FSID) from Sumner Reservoir. The water was used as part of the on-going endangered species studies with the U.S. Fish and Wildlife Service and provided flows between the FSID Diversion Dam and first return flow point near Fort Sumner Park. This 25 cfs release was discontinued by the end of September.

Fort Sumner Irrigation District's irrigation season typically begins March 1 and ends October 31. They are also allowed to divert for a two week period during the winter which is usually just prior to the March 1 irrigation season. During irrigation season, 80 to 100 cfs is usually released from Sumner Reservoir for FSID depending on demand or their available water right.

The next Sumner release, excluding the 80 to 100 cfs to FSID and extra 25 cfs, began on May 27 and continued through the end of June. This was in response to spill conditions, where the reservoir elevation approached and went above the conservation elevation because of snowmelt runoff. Outflows were made to match inflows while Sumner was above its allocated irrigation entitlement.

Beginning on July 25 and continuing through August 29, an irrigation release was made to cover demand from Brantley for irrigation water and to assist the State of New Mexico in its delivery of water to the State of Texas for Pecos River Compact purposes. The release was ramped up to approximately 1,100 cfs on August 2, and remained there before being ramped down on August 26.

The next release began on October 1 and ended on October 10. Flows were ramped up to approximately 1,100 cfs where they remained for five days before being ramped down. This release was also made to meet irrigation demands from Brantley Reservoir and for compact purposes.

On November 1, all releases from Sumner were ended for the winter. Sumner ended the year at an elevation of 4,251.26 ft. The total storage was 21,571 ac-ft, and conservation storage was 16,711 ac-ft.

During the year, a maximum pool elevation of 4,261.42 ft (total storage 44,967 ac-ft, conservation storage 40,107 ac-ft) occurred on June 23 and 24. A minimum pool

elevation of 4,244.90 ft (total storage 12,239 ac-ft, conservation storage 7,379 ac-ft) occurred on October 30. A maximum release of 1,400 cfs was made on June 1.

### **Brantley Dam**

On January 1, 1994, Brantley Reservoir was at elevation 3,246.90 ft (total storage 25,049 ac-ft, conservation storage 17,601 ac-ft). A minimum 20 cfs release continued from January 1 to March 20, when CID began releases from Brantley Dam to start the irrigation season. Releases from Brantley during the irrigation season (which is generally from March 1 to October 31) varied from a minimum 15 cfs on March 17 and 18 to a maximum 878 cfs on July 19, depending on irrigation and compact delivery requirements.

After the irrigation season, the minimum 20 cfs release continued until mid-November, when releases were varied for the remainder of the year for maintenance purposes at Avalon Dam and Reservoir. Brantley ended the year at elevation 3,245.53 ft. The total storage was 22,308, ac-ft and conservation storage was 14,860 ac-ft.

The minimum pool elevation for 1994 was 3,238.59 ft on August 4 (total storage 11,580 ac-ft, conservation storage 4,132 ac-ft). Maximum pool elevation for 1994 was 3,253.92 ft on March 19 (total storage 42,496 ac-ft, conservation storage 35,048 ac-ft). The maximum release was 878 cfs on July 19. Brantley Reservoir did not fill its conservation space in 1994.

### **Avalon Dam**

Avalon Dam is used to provide hydraulic head for diversion into the Carlsbad Main Canal. On January 1, Avalon Reservoir started 1994 at elevation 3,173.50 ft (total storage 1,277 ac-ft, conservation storage 504 ac-ft). Diversion into the main canal for small grain irrigation took place from February 20 to 27. The irrigation season began in earnest on March 18, and ended on October 31. The maximum diversion into the Carlsbad Main Canal was 375 cfs on March 24. Carlsbad Irrigation District diverted a total of 105,088 ac-ft into the Carlsbad Main Canal during 1994. The reservoir reached its maximum level for the year from February 10 to 20 at elevation 3,174.60 feet (total storage 2,031 ac-ft, conservation storage 1,258 ac-ft).

From July 18 to 22, 3,832 ac-ft was released to the Pecos River for delivery to the State of Texas for Pecos River compact purposes as part of the State of New Mexico's lease agreement program with CID. A second release of 14,370 ac-ft for the same purpose took place between October 3 and 25. The total release to Texas for 1994 was 18,202 ac-ft. The peak release to the river during these periods was 569 cfs and occurred on July 19.

In November, CID completely drained Avalon Reservoir in an attempt to control an aquatic weed that could potentially cause maintenance problems for CID in the reservoir and irrigation system. In addition, the minimum release from Brantley was varied after November 18 to eliminate storage in Avalon Reservoir.

### **Land Acquisition Program**

Reclamation's cumulative land acquisition program consisted of the following at the end of 1994:

<u>Tracts Acquired</u>	<u>Cost</u>
193 surface tracts	\$14,118,600 - 2 tracts acquired in 1994
105 mineral tracts	\$ 1,026,428 - None in 1994
114 easements	\$ 1,179,814 - 2 easements acquired in 1994
1 water right tract	<u>\$ 679,600</u> - None in 1994
<b>Total:</b>	<b>\$17,004,442</b>

The land acquisition program for the Brantley Project is nearly complete except for four small tracts to be utilized for access in the Seven Rivers Draw and Champion Coves areas.

### **PECOS RIVER BASIN WATER SALVAGE PROJECT**

Public Law 88-594, approved September 12, 1964, authorized the Pecos River Basin Water Salvage Project to reduce non-beneficial use of water in the Pecos River Basin and provided that no work should be commenced to clear the McMillan Delta floodway unless provision is made to replace CID's terminal storage. This replacement of CID's terminal storage was accomplished with the completion of Brantley Dam.

Reclamation continued its annual salt cedar clearing operation, which covers 53,750 acres. Under the Operation and Maintenance (O&M) agreement with Reclamation, CID is responsible for removing the vegetation from six miles above Sumner Reservoir through Red Bluff, Texas, to Old Highway 80 in Pecos, Texas. Root plows attached to wheel and crawler tractors are generally used to accomplish this work. Extraordinary maintenance efforts were required in 1994 to combat the increased growth of phreatophytes in the Red Bluff area.

Approximately 280 tracts (135 in New Mexico and 145 in Texas), representing 14,000 easement acres of private lands in both New Mexico and Texas, are being

cleared in areas where the original term easements have expired. In 1994, 40 easements were acquired in New Mexico bringing the total to date to 122. Another 13 easements remain to be acquired to complete all easements in New Mexico. The State of New Mexico provided \$75,000 in the spring of 1995 as its final participation in the program. The program is expected to be completed in the fall of 1995. By letter of March 9, 1994, Reclamation notified Texas of requirements for cost sharing and obtaining easements that would be needed to continue maintenance of cleared areas in Texas beyond September 1995. In March 1995, Reclamation and Texas mutually agreed to cease all clearing operations in Texas by September 30, 1995.

Reclamation is co-funding a study with the U. S. Department of Agriculture to investigate a method of biological control of saltcedar. The method proposes use of a mealybug from Israel. Currently, only the State of New Mexico has granted approval for an experimental field release of the mealybug, with approvals to do so pending from the States of California, Arizona, Colorado, and Texas. The first field release test site is the lower Gila River in Arizona, where it is thought survival rates will be the greatest. If sufficient numbers of the mealybug can be produced, other possible release sites include southern California, New Mexico, and Texas.

## **FORT SUMNER PROJECT**

### **Crop Production**

A total of 42,130 ac-ft was diverted during 1994 from the Pecos River by the Fort Sumner Irrigation District (FSID), as measured at the FSID Main Canal heading.

The major crops grown in 1994 were hay, alfalfa, and irrigated pasture. Sorghum and wheat are other important crops. Fort Sumner Irrigation District reported that 5,938 acres were irrigated out of a total of 6,500 acres of irrigable area. Total gross crop value was \$1,002,830 plus an additional revenue of \$27,880 from Federal Agriculture and Conservation Stabilization Service (ACSS) payments resulted in an average crop value of \$173.58 per irrigated acre. The irrigation demand for 1994 was 43,898 ac-ft, with 30,728 ac-ft delivered to the farms (or 5.17 ac-ft delivered per irrigated acre).

### **Water Conservation Activities with FSID**

In 1994, FSID and Reclamation formed a water conservation program partnership. Activities identified in 1994 were installation of water measurement devices and two Data Collection Platforms to measure and monitor flows at various locations within the project. One problem identified was the lack of accurate measurements on the High Line Canal. In February 1995, staff gages were installed and will be calibrated

by the U. S. Geological Survey (USGS). Once the canal section is calibrated, FSID will be able to determine flows based on staff gage readings.

As part of the water conservation work with FSID, Reclamation will provide assistance through its Technical Assistance to States Program to identify areas where the District can improve current facilities and operations.

Reclamation, FSID, CID, and the State of New Mexico are collectively exploring ways to manage FSID's water conserved through its water conservation efforts.

## **PECOS RIVER OPERATIONS - ENDANGERED SPECIES WORK**

In 1987, the Pecos bluntnose shiner was listed as a federally threatened species under the Endangered Species Act of 1973 with critical habitat designated within the reach between Sumner Dam and Brantley Reservoir. Reclamation subsequently entered into Section 7 Consultation with the U. S. Fish and Wildlife Service (Service) to insure that Reclamation activities in the basin would not jeopardize continued existence of the Pecos bluntnose shiner or adversely modify its critical habitat. An outcome of the consultation was a Memorandum of Understanding (MOU) between Reclamation, the Service, New Mexico Department of Game and Fish (NMDGF), and Carlsbad Irrigation District (CID) to release, study, and protect flows of the Pecos River from Santa Rosa Dam to Brantley Reservoir for the benefit of the native fish community, especially the Pecos bluntnose shiner, as well as downstream water users. Analysis of flow effects on native fishes, especially the threatened Pecos bluntnose shiner, is required by the MOU. The MOU also requires development of a computer model to simulate river operation on a daily basis.

Releases from Sumner Dam are planned by all MOU signatories. In general, Sumner releases simulate a naturally shaped hydrograph. Historically, releases from Sumner were brought up to 1,100 cfs within about one day and left there until the desired quantity of water was released. Since the study began, flows have been ramped up, with smaller flows preceding the 1,100 cfs flow to form a more gradually rising limb. For example, a release might begin with 350 cfs for eight days, followed by four days of 600 or 850 cfs before stepping up to 1,100 cfs. At the end of the release, flows are typically ramped down from 1,100 cfs to 600 cfs for two days, followed by two more days at 350 cfs.

During releases, biological and hydrological data are collected at various locations along the Pecos River between Sumner Dam and Brantley Reservoir. For the hydrological study, there are now 13 continuous stream flow recorders on the mainstem of the Pecos River, and one on each of the two FSID return flow drains (6 Reclamation and 9 USGS). Reclamation installed its six recorders in July 1994 to supplement data collected by established USGS recording stations. In 1994,

Reclamation funded installation and maintenance of one additional USGS gaging station at the Fort Sumner railroad bridge crossing. To date, Reclamation has funded installation and maintenance of 4 USGS gaging stations since 1992. During each release, streamflow measurements were made to determine flows at cross sections next to each recorder. These measurements were taken on the rising limb of the releases, but not on the descending limb. Three irrigation releases were made during 1994, during February-March, July-August, and October. Each of the releases was successfully measured on all three flow rates (350, 600, and 1,100 cfs) on the rising limb. Sumner releases made in June for keeping reservoir levels out of the flood control pool did not have a controlled flow rate and were thus unsuitable for measurement.

Other hydrological data collected during flow measurements are Manning's roughness coefficient and cross section geometries. Travel times at each flow rate to the different recorders are obtained from the recorder strip charts. Loss coefficients at the different river stations are calculated from strip chart information and streamflow measurements. Beginning in 1995, water quality measurements to determine total dissolved solids along the Pecos River will be made during each of the hydrographic data collection trips.

Development of a river simulation computer model continued in 1994. Reclamation is using the PRSYM (Power and Reservoir Systems Model) framework to develop a Pecos version of PRSYM. The PRSYM development is a joint effort between Reclamation, Tennessee Valley Authority, and CADSWES (Center for Advanced Decision Support for Water and Environmental Systems), an organization based at the University of Colorado in Boulder. Development of PRSYM is on-going; however, hydrological data collected thus far was used to create a working version for the Pecos River by December 1994. During the next two years of the study, this model will be expanded to include more historical data and calibrated with different streamflow and reservoir routing methods to obtain a better simulation of Pecos River operations.

Biological data was collected during 1994 to evaluate the effects of Pecos River operations on the distribution and status of the Pecos bluntnose shiner, as well as other native and non-native fish communities. The focus was on distribution and abundance of Pecos River fishes and availability and use of aquatic habitat. In addition, analysis of relationships between flow and native and non-native larval fishes continued in 1994. The effects of non-native fish species on the native fish community was also studied. Water quality monitoring in Brantley Reservoir continued in 1994, as did on-going characterization of responses of channel morphology and physical habitat characteristics to varying flows in the Pecos River.

These collective hydrologic, biologic, and water quality studies will also benefit other interested water users in the basin in properly managing and maintaining the limited water resources within the Pecos River basin.

### **SEVEN RIVERS FARM**

To meet mitigation requirements associated with the Brantley Project, a waterfowl management area is being established at the Seven Rivers Farm, located approximately 15 miles northwest of Carlsbad, New Mexico. The property will be managed by the NMDGF.

The waterfowl management area will consist of a 640-acre parcel of land that will be farmed to feed migratory waterfowl. Nearby backwater pools from Brantley Reservoir will provide water and resting areas for the seasonal wintering birds.

In March 1995, an application was made to transfer artesian ground water rights from Brantley Reservoir to the Seven Rivers property. To replace this water, application has been made to transfer surface water rights from Karr Farm to Brantley Reservoir. Artesian water rights are also being acquired from the Service and moved to the Seven Rivers Farm to help meet the management area's additional water requirements. Karr Farm is an upland game area managed by NMDGF and located east of Artesia, New Mexico.

### **TECHNICAL ASSISTANCE TO STATES PROGRAM**

Reclamation initiated work with FSID to provide a preliminary assessment of canal seepage losses in unlined and deteriorated canal sections to evaluate the potential for water savings through reduction of conveyance losses between the diversion point and serviced farms. In addition, work to update cost estimates for additional ditch lining and for replacement of deteriorated linings was planned for 1995.

### **PECOS RIVER UPPER WATERSHED WATER QUALITY STUDY**

Reclamation, under the terms of a cost-sharing agreement with the New Mexico Institute of Mining and Technology (New Mexico Tech), completed its second year of water quality research in the Pecos River's upper watershed. The purpose of the study is to identify, to the degree possible, point and non-point sources of contamination. The first year of the investigation, 1993, was spent characterizing the situation. This included rain and snowpack sampling as well as stream sampling. In 1994, Reclamation and New Mexico Tech intensified the stream measurement and sampling program to further quantify and identify sources of contamination. New

Mexico Tech maintained the database and initiated preliminary analysis of the data. The investigation will culminate in a final report to be issued in October 1995.

## **MALAGA BEND SALINITY ALLEVIATION PROJECT**

A study and analysis of the downstream hydrologic benefits of three assumed levels of salt reductions at Malaga Bend was undertaken by Reclamation through its Technical Assistance to the State Program. On December 6, 1994, a meeting was held in El Paso with representatives from the Pecos River Commission, the State of Texas, the New Mexico Interstate Stream Commission, the Texas Natural Resource Conservation Commission, Reclamation's El Paso Projects Office, and Reclamation's Technical Services Center in Denver. The Technical Services Center subsequently initiated work and will complete the analysis by September 1995.

### **Scope of Work**

Upward-leaking brine, from a confined aquifer, mixes with fresher water in a shallow aquifer, resulting in discharge to the Pecos River at Malaga Bend in Eddy County, New Mexico. Reclamation was authorized under PL 85-333, 72 Stat. 17, Act of Feb 20, 1958, to construct on a non-reimbursable basis, a salinity alleviation project at Malaga Bend on the Pecos River. This work was to be in accordance with a report entitled, "Possible Improvement of Quality of Water of the Pecos River by Diversion of Brine, Malaga Bend, Eddy County, New Mexico," prepared by the Water Resources Division, USGS dated December 1954. The salinity alleviation project was constructed by Reclamation in 1963 and remained active through 1968. A well was drilled into the saline aquifer under the Pecos River at Malaga Bend. During a twenty-four hour test, the well yielded 600 gallons per minute of brine and created a draw-down of 42 feet in the brine aquifer. From July 1963 to December 1968, approximately 3,878 ac-ft of brine had been pumped. The head in the brine aquifer was lowered, and discharge to the river decreased. The brine was pumped to an unlined but compacted 50-acre evaporation pond. Subsequent leakage from the pond contributed salts to the river downstream.

There are six gaging stations on the Pecos River from Malaga to the confluence with the Rio Grande that have sufficient salinity data to provide a reasonable number of paired salinity/flow data sets. The hydrologic analysis will focus primarily on these stations. There is also a gaging station on the Rio Grande just upstream from Amistad Reservoir that will help determine the salinity load to the Rio Grande imposed by the Pecos River. A list of the gaging stations and there periods of record is in the following table.

Gaging Station Name	Station ID	Period of Flow Record	Period of Salinity Record
Pecos River near Malaga, NM	08406500	1921-1925 1932-1993	1965-1986
Pecos River at Pierce Crossing, NM	08407000	1938-1941 1951-1993	1965-1986
Pecos River at Red Bluff, NM	08407500	1938-1993	1965-1982
Pecos River near Orla, TX	08412500	1939-1993	1965-1982
Pecos River near Girvin, TX	08446500	1981-1982	1981-1982
Pecos River near Langtry, TX	08447410	1967-1975 1976-1990	1965-1985
Rio Grande at Foster Ranch near Langtry, TX	08377200	1961-1990	1974-1981

### **Task 1 - Hydrologic Analysis Update**

This task will build upon earlier works by the Texas Water Development Board, Pecos River Commission, and USGS. Much data has been collected from several sources over the years and needs to be checked before records can be extended or gaps filled with available data. Trends over time in the amounts and location of water uses will also be studied. Temporal and spatial comparisons of salt loading will be done to learn the mechanics of surface salt transport through the reach below Malaga Bend. This task will highlight the strengths and weaknesses of available data, make recommendations as to the reliability and appropriate use of the data, and suggest methods and procedures for extending records to fill critical data gaps. A technical report that documents the analysis and recommendations described above should be completed by May 1995.

## **Task 2 - Develop Salt/Flow Relationships**

This is a data development task such as usually required before modeling of future conditions can proceed. Generally, insufficient salinity data has been collected to form a credible time series of salt/flow pairs or because the record may have been collected during a time of significant changes in water use or salt loading. For this study, the analysis and recommendation from Task 1 will define the methods, procedures, and amount of work required, if any, before Task 3 can begin. A short technical report that documents which data were generated statistically and the method(s) used to generate that data, and includes a statement about the reliability of the artificial data, should be completed by June 1995.

## **Task 3 - Impacts of Alternative Salt Removal**

This task will evaluate the surface water and salinity impacts of future salt removal alternatives. Three alternatives have been suggested: remove 30 percent, 65 percent, and 100 percent of salt gains, respectively between Malaga and Pierce Canyon gaging stations. The result of this task will be a "stand alone" technical report that will include a summary of tasks 1 and 2, a description of the simulation methods used to model the various alternatives, and detailed descriptions of the surface water effects caused by the various assumed future alternatives. Completion of this task is scheduled for August 1995.