RECLAMATION

Managing Water in the West

Calendar Year 2011 Report to the Pecos River Commission

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April 2012

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

Cover photo- view of Brantley Lake during summer of 2011, courtesy of Vicky Ryan.

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Introduction

The Albuquerque Area Office (AAO) of the Bureau of Reclamation (Reclamation) is responsible for operation, maintenance, and oversight of three 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*; and the *Fort Sumner Project*, which includes the Fort Sumner Diversion Dam. Figure 1 depicts the general location of the Projects under the AAO's jurisdiction.

Reclamation prepared this Annual Report to the Pecos River Compact Commissioners to convey all reporting requirement information on the three projects mentioned above. It will also inform the Commission of proposed changes in programs and management activities and strategies that may affect operations, operating conditions, and/or the Compact, including Endangered Species Act (ESA) issues.

The gage data used within this report was downloaded from the United States Geological Service (USGS) web page, http://waterdata.usgs.gov/nm/nwis/dv. The dam tender recorded and reported to Reclamation on a monthly basis the provisional reservoir elevation data.

Pecos Basin Hydrology Summary

The Carlsbad Project, and the Pecos River Basin as a whole, endured exceptionally dry conditions during 2011. Storage in Pecos Basin reservoirs was at moderate levels at the beginning of the year, but minimal snowpack runoff and extreme drought conditions reduced it to minimum levels by the end of irrigation season. The National Resource Conservation Service's Wesner Springs Snotel site in the Pecos River headwaters hit a peak of 7.3 inches of snow water equivalent on March 15, 51% of average for that day and 47% of the average peak. This below average snowpack yielded only 3.3% of average runoff into Santa Rosa Lake, the lowest on record for Santa Rosa inflow. Early high winds and dry soil, in combination with the below average snowpack, likely caused for the minimal runoff.

Coupled with the poor runoff, rainfall in the basin was minimal during the rest of the year. From January 1 to June 30, 2011, Carlsbad received 0.47 inches of precipitation, 3.98 inches less than average. This minimal precipitation led the National Weather Service to increase the drought rating conditions from abnormally dry and moderate drought in January to exceptional drought, the worst possible drought category, by the end of June. Throughout the summer, the Pecos Basin received just 29% of average precipitation. Late precipitation, mostly in September, eased drought conditions somewhat, but most of the Pecos Basin entered 2012 under extreme to exceptional drought conditions.

Pecos Basin Water Accounting

Reclamation and the New Mexico Interstate Stream Commission (NMISC) account for water use based on a 5-year Depletions Agreement for ESA water use (2006-2012) and a final Pecos River Annual Accounting User's Manual.

As a tool for water management and accounting, Reclamation is constructing an accounting model for the Pecos Basin, using RiverWare® software. Reclamation has proposed using this management and accounting model as a replacement for the spreadsheet accounting detailed in the Depletions Agreement. Final details must be worked out before its use can be implemented.

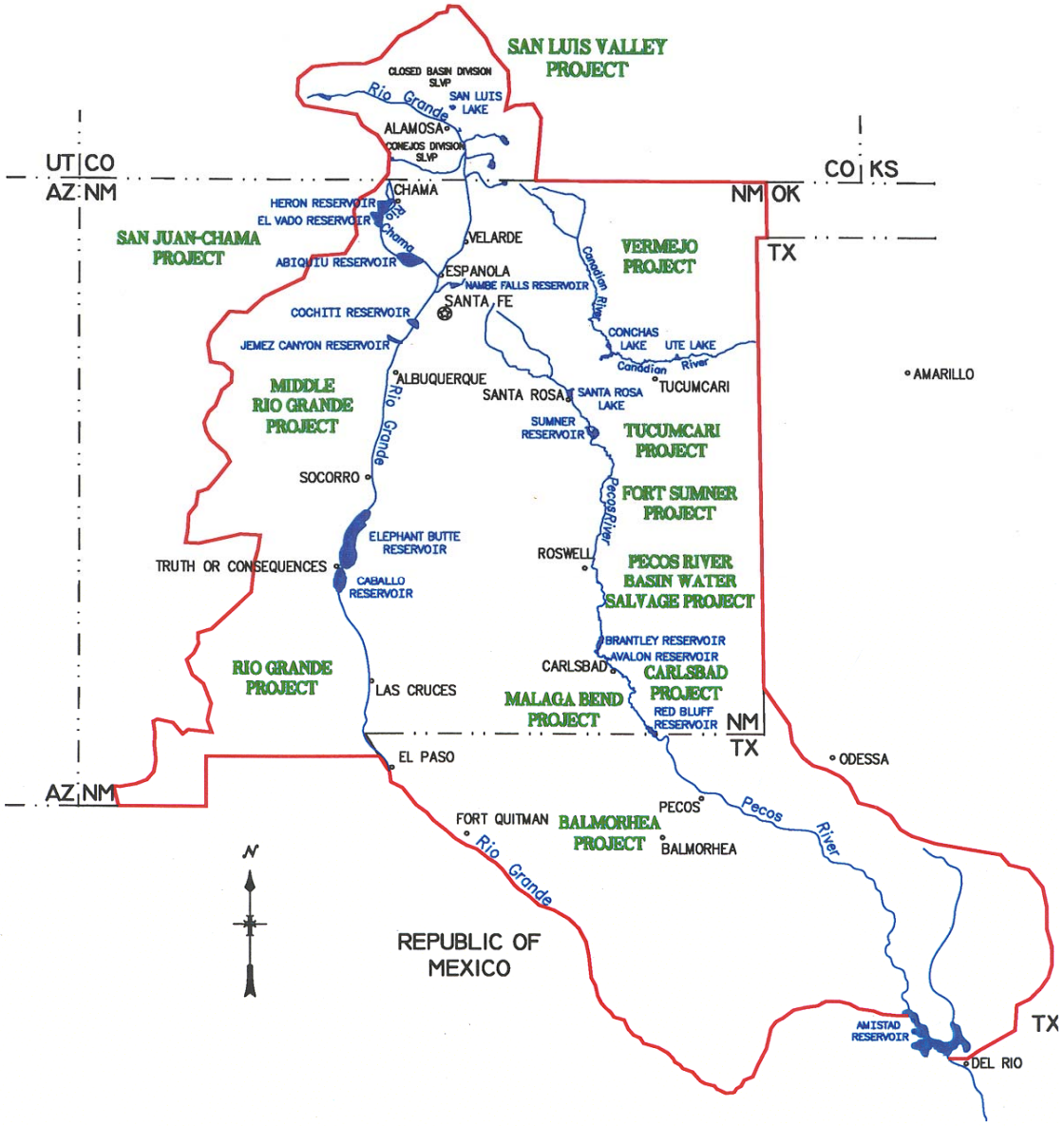

Figure 1. Project Map of Reclamation's Albuquerque Area Office

Carlsbad Project Operations

An agreement between Reclamation and Carlsbad Irrigation District (CID), finalized on October 2, 1989, provides funding for CID to operate and maintain Brantley Dam, Avalon Dam, Sumner Dam, and the Pecos River Water Salvage Project. 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.

Reclamation provides support to the Bureau of Land Management's (BLM) Carlsbad Field Office in the implementation of Section 365 of the Energy Policy Act of 2005 Pilot Project activities associated with the Carlsbad Project. This includes coordinating and assisting BLM with identifying efficiencies in processing oil and gas leasing and development activities.

Reservoir Storage Entitlements

All Carlsbad Project reservoirs are operated in accordance with the requirements of the Pecos River Compact and U.S. Army Corps of Engineers' (Corps) flood control criteria. Figure 2 depicts the location of the Carlsbad Project storage dams on the Pecos River.

Reclamation calculated annual total conservation storage entitlements for the Pecos River reservoirs that are in New Mexico. Table 1 presents the calendar year 2011 storage entitlements for the four Pecos River reservoirs. Note that Santa Rosa and Avalon elevations reference a project datum. Operation of the dams on the Pecos River is a joint effort between Reclamation, CID, and the Corps in coordination with the Fort Sumner Irrigation District (FSID) and the State of New Mexico.

The 2011 start-of-year total Carlsbad Project conservation storage in the four Pecos River reservoirs (Santa Rosa, Sumner, Brantley, and Avalon) was 44 percent of entitlement. Santa Rosa, Sumner, Brantley, and Avalon reservoirs on the Pecos River were at approximately 46, 53, 28, and 48 percent, of each Reservoir's entitled conservation storage, respectively. Table 1 lists the entitlement storage volume.

The April 1, 2011, most probable forecasted snowmelt runoff inflow into Santa Rosa Reservoir was approximately 11,800 acre-feet (af) or 22 percent of the 30-year average. The actual March through July 2011 inflow to Santa Rosa Reservoir was 1,759 af, approximately 3.3 percent of the 30-year average. On December 31, 2011, the total Carlsbad Project entitlement storage in the four Pecos Reservoirs was 18 percent of entitlement. Santa Rosa, Sumner, Brantley, and Avalon Reservoirs were at approximately 11, 22, 28, and 59 percent, of each Reservoir's entitlement storage, respectively.

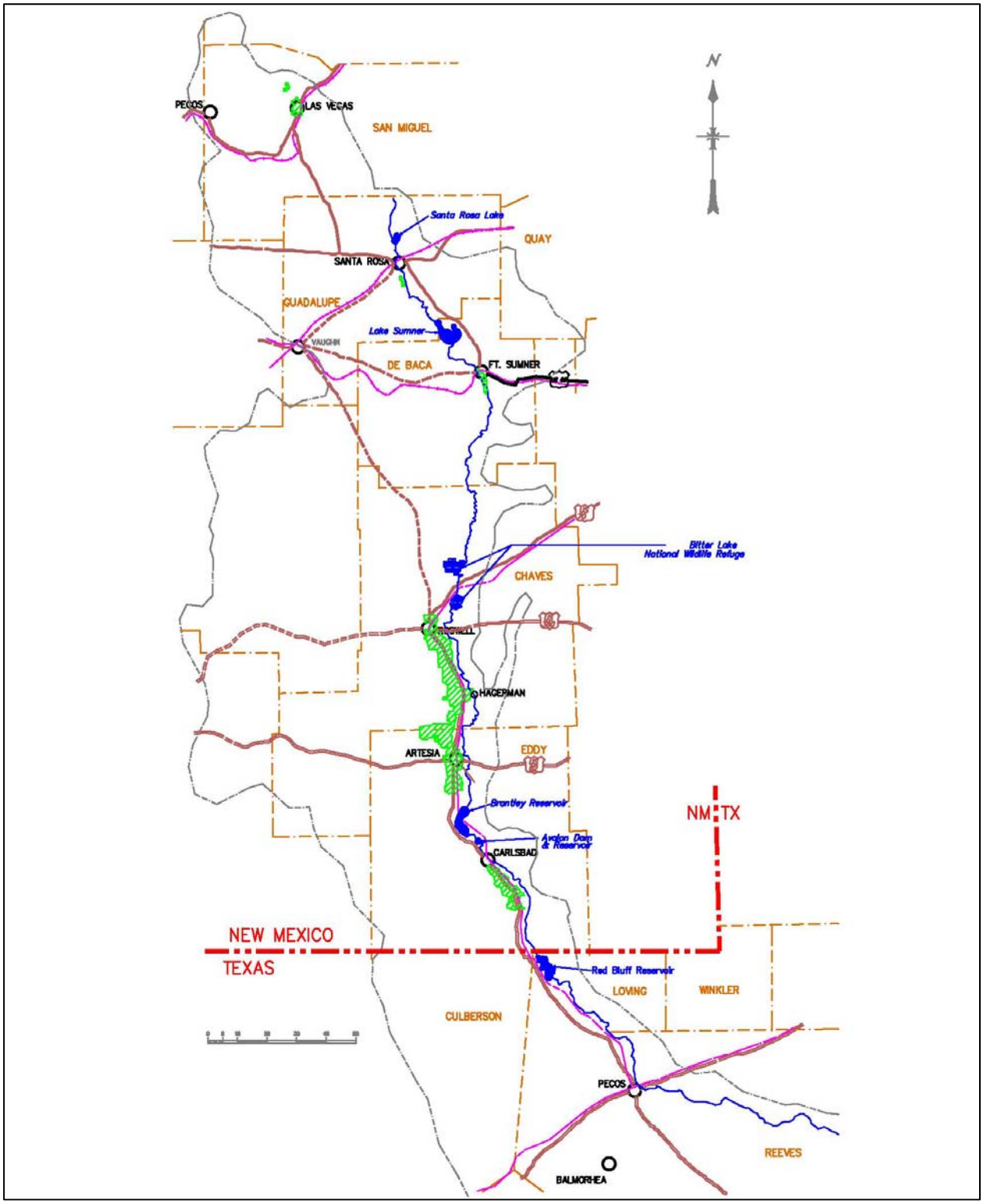

Figure 2. Area map of the Carlsbad Project

Table 1. Pecos River Reservoir Storage Entitlements for 2011

Reservoir	Entitlement Storage (af)	Minimum Pool (af)	Total Estimated Sediment Accumulation	Total Conservation Storage (af)	Conservation Elevation (feet)
Santa Rosa	***92,655***	0	5,547	98,202	4745.31 (Project datum)
Sumner	***39,979***	2,500	447	42,926	4,262.88 (NAVD88)
Brantley	***40,000***	2,000	1,718	43,718	3,256.46 (NAVD88)
Avalon	***3,866***	600	0	4,466	3,117.40 (Project datum)
TOTAL:	***176,500***				

Santa Rosa Reservoir Sediment Accumulation

The Corps calculates the sediment accumulation for Santa Rosa Reservoir. The Corps performed the most recent sediment survey in 1996. The area-capacity table was retroactive to January 1, 1997. Table 2 is an annual tabulation of estimated deposition since January 1, 1997. The estimated sediment deposition since the last sediment survey was 5,547 af.

Table 2. Estimated Sediment Accumulation for 2011 Santa Rosa Storage Entitlement

Calendar Year	Sediment Accumulation (af)
1997	760
1998	475
1999	532
2000	537
2001	327
2002	89
2003	81
2004	341
2005	711
2006	375
2007	264
2008	316
2009	252
2010	487
Total	***5547***

Sumner Reservoir Sediment Accumulation

The basis of the estimated sediment accumulation calculations for Sumner Reservoir is the ratio of total sediment deposition to total inflow during the period between the May 1989 and May 2001 sediment surveys. The USGS gage, Pecos River near Puerto De Luna, NM (PDL), was used to measure inflow to Sumner Reservoir. The total sediment deposition during this period was the difference in the content between 1989 and 2001 surveys at the top of conservation pool, elevation 4,262.88 feet (NAVD 88 vertical datum, 4261.00 feet referencing local vertical datum). The total sediment deposition divided by the total inflow obtained an average ratio of sediment

deposition to inflow during this period. Sediment deposition since the 2001 survey is estimated by multiplying this ratio by calendar year inflow. Table 3 shows an annual tabulation of the inflow and estimated sediment accumulation since June 1, 2001. The estimated sediment deposition since the last sediment survey was 447 af.

A new sediment survey is planned for the fall of 2012.

Table 3. Estimated Sediment Accumulation for 2011 Sumner Storage Entitlement

Calendar Year	Inflow (af)	Sediment Accumulation (af)
6-12/2001	68,140	29
2002	74,938	31
2003	77,328	32
2004	110,815	47
2005	121,739	51
2006	123,937	52
2007	120,331	51
2008	135,632	57
2009	108,464	46
2010	121,238	51
Total		***447***

Brantley Reservoir Sediment Accumulation

The basis of the estimated sediment accumulation calculations for Brantley Reservoir is the ratio of total sediment deposition to total inflow during the period between the September 1988 and May 2001 sediment surveys. The USGS gage, Pecos River near Lakewood, NM (Kaiser Channel), was used to measure inflow to Brantley Reservoir. The total sediment deposition during this period was the difference in the content between 1988 and 2001 surveys at the top of the designated conservation pool, elevation 3,272.69 feet (NAVD 88 vertical datum, 3271.00 feet referencing local vertical datum). The total sediment deposition was divided by the total inflow to obtain an average ratio of sediment deposition to inflow during this period. Estimates of sediment deposition since the 2001 survey are made by multiplying this ratio by the calendar year inflow. Table 4 shows estimated inflow and sediment accumulation since June 1, 2001. The estimated sediment deposition since the last sediment survey was 1,718 af.

A new sediment survey is planned for the fall of 2012.

Table 4. Estimated Sediment Accumulation for 2011 Brantley Storage Entitlement

Calendar Year	Inflow (af)	Sediment Accumulation (af)
6-12/2001	28,124	50
2002	77,850	139
2003	54,828	98
2004	140,612	250
2005	130,068	232
2006	125,889	224
2007	106,655	190
2008	111,291	198
2009	81,856	146
2010	107,209	191
Total		***1,718***

Sumner Dam and Reservoir

Sumner Dam Operations

Operations at Sumner Dam collect available natural inflow above FSID's allotted direct diversion water right, contingent on bypass water not being required. Bypasses are used to meet the 35 cubic feet per second (cfs) target at the USGS gage, Pecos River below Taiban Creek near Fort Sumner, or to maintain continuous flow in the river as required by the 10-year Biological Opinion (10-year BO) (2006-2016, Cons. #22420-2006-F0096) implemented in 2006 for the Pecos bluntnose shiner (shiner). FSID has a direct diversion right of up to 100 cfs of the natural inflow into Sumner Reservoir as calculated by the New Mexico Office of the State Engineer (NMOSE) in their two-week average inflow calculation.

Releases of stored Carlsbad Project water occur as block releases for CID. The duration of block releases is restricted to a maximum of 15 contiguous days, and the cumulative annual duration of all block releases is restricted to a maximum of 65 days. Scheduled block releases should have a minimum of 14 days between releases, and block releases should avoid the six-week period around August 1. These restrictions are in accordance with the 10-year BO. CID schedules block releases in cooperation with Reclamation to alleviate river intermittency as long as this scheduling does not constitute a wasteful use of water due to excessive net losses accrued during transit, or due to excessively high net downstream reservoir evaporation.

Under a water right permit granted by the State of New Mexico, the Carlsbad Project is allowed to store up to 20,000 af above its storage entitlement in Sumner Reservoir from November 1 to April 30 each year, provided that the entitled conservation storage of all four reservoirs on the Pecos River in New Mexico does not exceed 176,500 af. No additional storage under this water right permit occurred in 2011.

Sumner Reservoir began the year with 21,093 af in total storage. Total storage peaked on February 16 at 25,107 af, prior to the Reservoir being drawn down by block releases for the Carlsbad Project and evaporation. Sumner Reservoir's lowest total storage occurred on October

27 at 1,740 af, prior to the end of FSID's irrigation season. Sumner Reservoir ended the year with 8,765 af in storage.

Two block releases occurred during the 2011 calendar year. The first block release was initiated on March 11 and terminated on March 21 at an average rate 1,232 cfs, for a total release of 26,680 af. The second block release occurred July 6 through July11 when 11,853 af was released at an average rate of 998 cfs.

Figure 3 illustrates Sumner Dam's total storage, bypasses, and releases. A total of 2,370 af was bypassed for ESA related purposes during the non-irrigation season between January 1 and February 12 at an average rate of 28 cfs. During the irrigation season, which runs from March 1 through October 31, a total of approximately 1,000 af was released from the Fish Conservation Pool, 2,500 af from the FSID Forbearance Agreement Pool, and 2,500 af from the water exchanged with CID for ESA related purposes. During the non-irrigation season, between November 1 and December 31, 2,471 af of additional CID forborne water was bypassed for ESA related purposes. A total of 10,834 af were released from Sumner Dam in 2011 for ESA purposes.

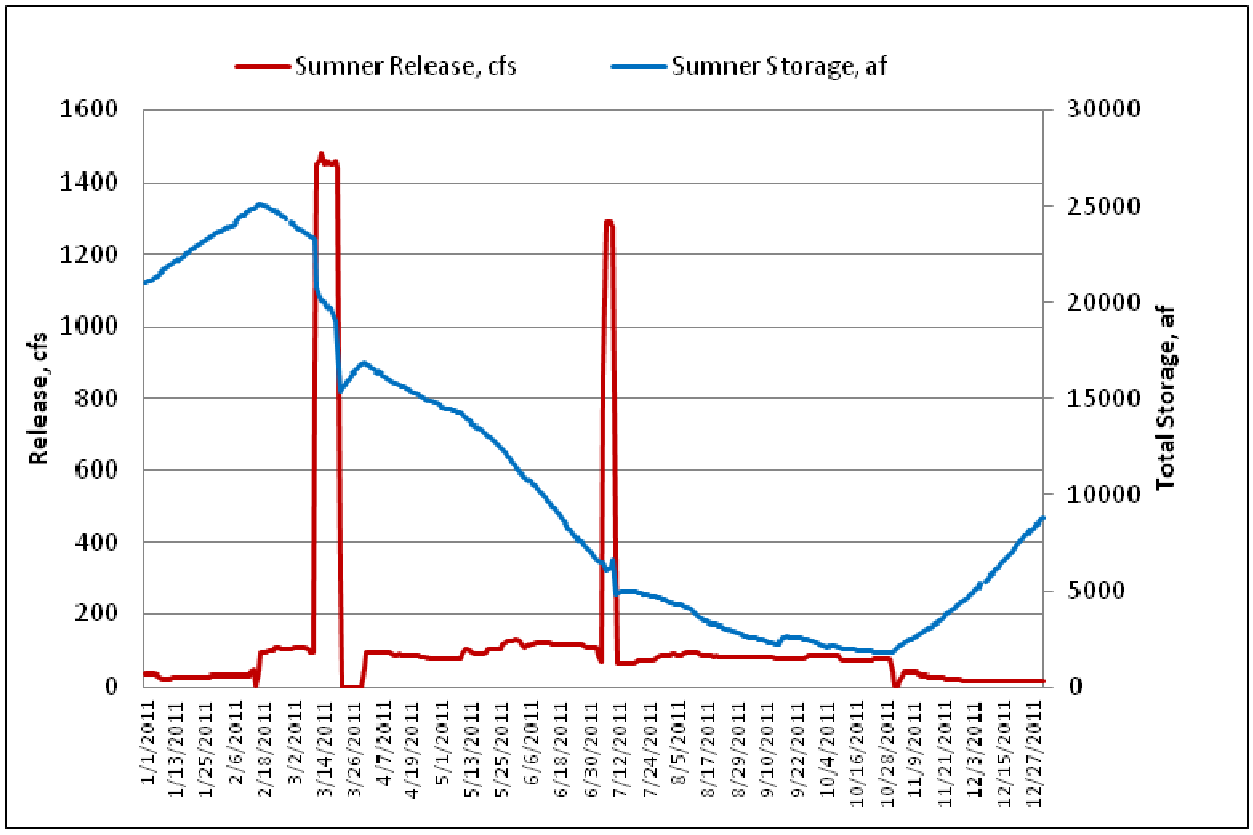

Figure 3. Release and Storage for Sumner Reservoir

During 2011, Reclamation stored 6,000 af in Sumner Reservoir to provide releases to achieve target flows at the Taiban gage and avoid intermittency in the river for the shiner. This water was stored and released under the Carlsbad Project Water Supply Management Agreement between the United States and CID. Of the 6,000 af stored, 1,000 af (known as the Fish Conservation Pool) was released out of Sumner Reservoir and Reclamation replaced the water with 750 af of

water pumped directly into Brantley Reservoir. Another 2,500 af was acquired through the Contract between the United States and FSID (Contract No. 08-WC-40-292) and released during the irrigation season. Reclamation stored this 2,500 af in February and March which was later released. Finally, an additional 2,500 af of supplemental water was released out of Sumner and Reclamation replaced the water with 1,875 af of water pumped directly into Brantley Reservoir.

The section on Reclamation's water offset program discusses the effects of these modified operations on the Carlsbad Project. Reclamation leased water from river pumpers and the Hagerman Irrigation Company to replace the depletions associated with the modified operations.

Sumner Dam Facility Review and Safety of Dams Programs

All three radial gates at Sumner Dam, with a total design capacity of up to 56,000 cfs, are in need of repairs. CID is responsible for performing the repairs and 68.36% of the cost. Reclamation is responsible for 31.64% of the cost. Reclamation helped CID to prepare for this project by providing information regarding planning, designs, schedules, cost estimates, and environmental compliance.

On October 31, 2011, the downstream side of the middle radial gate was blasted, stiffeners were added, and it was coated. Badly corroded areas on the upstream sides of each gate were repaired, and the downstream side of all gates was cleaned. Woody vegetation was removed from above right spillway chute and within 20 feet of toe of dam. CID plans to complete the remaining work on the radial gates on an annual basis, and should finish the entire rehabilitation by 2016.

The mechanical and civil Comprehensive Facility Review (CFR) and report for Sumner Dam were completed by Reclamation in 2011. There were three incomplete recommendations in 2011. A dive exam and report were completed on Sumner Dam in FY 2011. This exam was part of the CFR.

Brantley Dam and Reservoir

During periods without irrigation releases, Brantley Dam bypasses mitigation flows of 20 cfs. During the irrigation season (normally March through October), releases are made from Brantley Dam to Avalon Reservoir at a rate necessary to support the diversion into CID's main canal, generally between 75 and 350 cfs, as required by irrigation demand.

Brantley Reservoir began the year with a total storage of 11,283 af. Irrigation releases from Brantley commenced on March 24, then were adjusted as needed to meet demand and to conserve water. The final irrigation release from Brantley Reservoir occurred on September 16. Approximately 46,366 af were released from Brantley for irrigation during this period. Brantley Reservoir reached a maximum total storage of 29,834 af on March 28, 2011. The lowest total storage occurred on September 16 with a volume of 5,468 af. Brantley Reservoir ended the year with a total storage of 11,076 af. Figure 4 depicts Brantley Dam's total storage, bypasses, and releases.

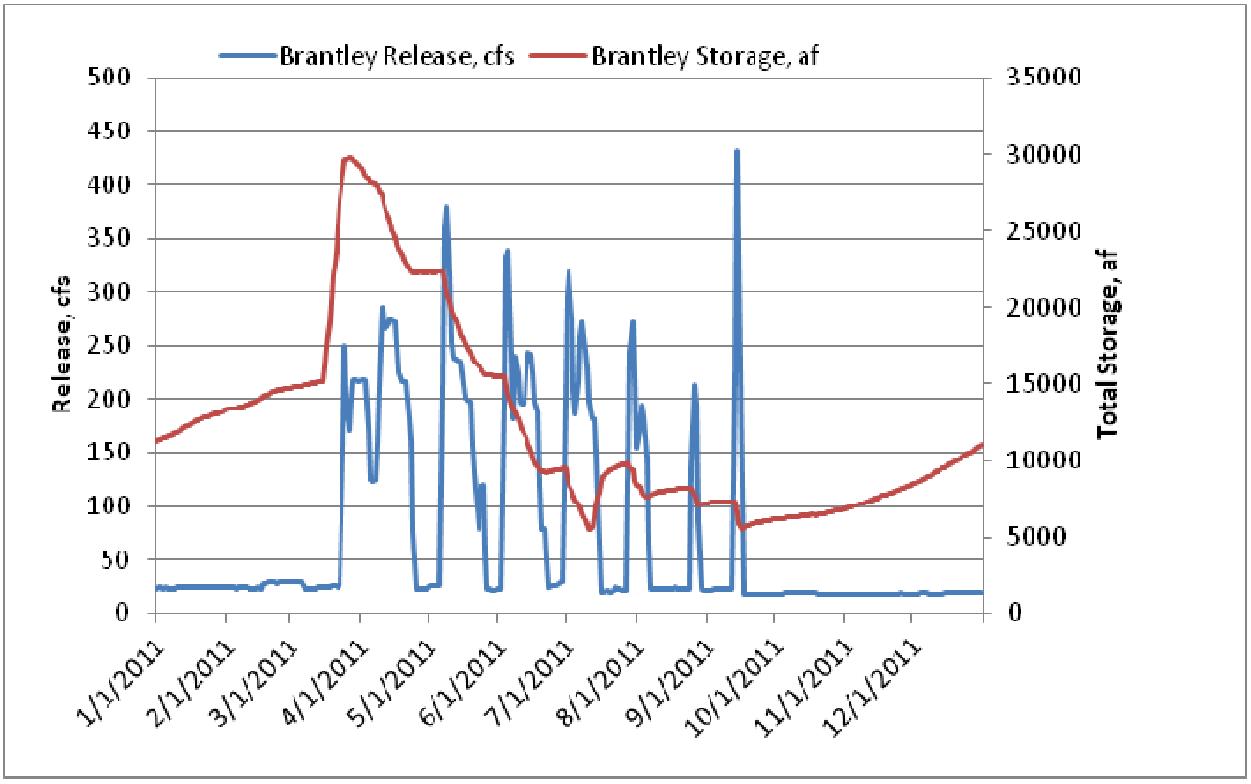

Figure 4. Release and Storage for Brantley Reservoir

Brantley Dam Facility Review and Safety of Dams Programs

The mechanical and civil Comprehensive Facility Review (CFR) and report for Brantley Dam were completed by Reclamation in 2011. A dive exam and report was completed on Brantley Dam in FY 2011. This exam was part of the CFR. At the end of the year, there were no incomplete recommendations.

The recommendation to recoat the trunion pin anchor bolts on all six radial gates was implemented in 2011.

There are sinkholes upstream and downstream on the left side of Brantley Dam. The sinkholes are visually monitored on a regular basis and are surveyed every six years. The latest survey was in March 2010. The sinkholes seem to be filling in naturally, and fewer have been found since the previous survey in 2005. A photogrammetric embankment and sinkhole survey is scheduled for 2012.

Avalon Dam and Reservoir

Due to the small reservoir capacity and the location of Brantley Dam 10 miles upstream, Avalon Dam is used primarily as a diversion dam to meet irrigation demand for CID. Water released from Brantley Dam and is re-regulated by the small reservoir at Avalon, which releases into the CID Main Canal. Avalon Reservoir began the year with 1,857 af and ended the year with 2,275 af. It reached a maximum storage of 2,948 af on March 21, and a minimum of 324 af on September 13. Diversions into the CID Main Canal began on March 21 and ended on October 19, 2011, delivering a total of 46,716 af.

Avalon Dam Facility Review and Safety of Dams Programs

In 2011, the mechanical and civil Comprehensive Facility Review and report were completed by Reclamation. There were four incomplete recommendations in 2011.

A dive exam and report were completed on Avalon Dam in FY 2011. This exam was part of the Comprehensive Facility Review.

Carlsbad Project Environmental Compliance

Reclamation's Direct Flow Operations

Reclamation has a lease agreement with the NMISC for up to 1,800 af (consumptive use) of shallow well water to be pumped into the Pecos River annually. The Vaughan Pipeline (Pipeline) supplements flows on the Pecos to meet the needs of the 10-year BO. The outfall structure of this pipeline is located upstream of the USGS Taiban Gage. Maximum output is between 10 and 12 cfs. The Pipeline provided 1,568 of 1,583 af purchased for 2011. Reclamation is working with the NMISC and NMOSE to get a five-year accounting period for the Pipeline. The extended accounting period would provide Reclamation greater flexibility in meeting the 10-year BO requirements and conserve water in wet years for use in dry years.

Another lease for 1,180.2 af of shallow well water, Lynch, remains in place. This lease provides up to 895 af of water to be pumped into the Pecos River near the USGS Near Acme Gage during the water year and is used to maintain streamflow for the shiner.

In addition to the lease agreements described above, Reclamation has established a 1,000 af fish conservation pool in Sumner Reservoir through an exchange of 750 af of water rights it owns at Seven Rivers. Water pumped directly into Brantley Reservoir from wells at Seven Rivers is exchanged for water released from Sumner Lake to maintain streamflow for the shiner. This water was released from Sumner in February, March, and June of 2011.

Under a forbearance agreement with FSID, 2,500 af were stored at Sumner Lake for Reclamation under CID's storage right. The water stored was released in May and June of 2011.

Additionally in 2011, Reclamation pumped additional water from wells at Seven Rivers into Brantley Reservoir and used over-delivered river pumper water to exchange for 2,500 af with CID in Sumner. This water was released in late June, July, and August.

Due to the extreme dry conditions in 2012, Reclamation entered into a new fallowing agreement with FSID farmers to assist in meeting flow targets. This water was diverted into the FSID diversion dam and returned to the river via the Sand Gate Diversion from the Ft. Sumner Canal. Water under this agreement began returning to the River on August 14 and continued through the end of the irrigation season on October 31. A total volume of 4,220 af was delivered to the River under this agreement.

Reclamation's Water Offset Program

Reclamation leases water rights from willing owners within the Pecos River Basin to offset the additional depletions caused by ESA related operations. Reclamation is dependent on the availability of willing water rights holders to meet the instream flow requirements of the 10-year BO.

From November 1, 2010, through October 31, 2011 (the 2011 accounting year), Reclamation had water lease agreements with five Pecos River pumpers, one of whom is also a Hagerman

Irrigation Company irrigator, to lease 1,842.9 af (consumptive use portion) of surface water rights and 507 af (consumptive use portion) of Hagerman Canal water rights. The land associated with the leased water was fallow. The Hagerman Canal water was pumped directly into the Pecos River.

Final calculations produced using the Pecos Annual Accounting Method, developed jointly by the NMISC and Reclamation, indicate that for the 2011 water year Reclamation's Carlsbad Project Water Acquisition (CPWA or offset) program put 1,973 af more water into the Pecos River than the amount of additional depletions incurred by the modified operations of Sumner Dam. Reclamation bypassed 3,342 af, released 3,592 af of 2011 and 2010 forbearance water, and stored 0 af of water at Sumner Dam, creating 1,826 af of additional depletions for the 2011 water year. CPWA amounts of 2,310 af (adjusted for consumptive use, transmission loss, and Brantley evaporation) was provided at Brantley Reservoir for the water year to eliminate these additional depletions, resulting in a Reclamation credit of 1,973 af for the 2011 water year.

Endangered Species Program

Pecos Bluntnose Shiner

Reclamation continues to monitor flows under the 10-year BO implemented in August 2006. The 10-year BO and Environmental Impact Statement (EIS) committed Reclamation to operate the Carlsbad Project with a target flow of 35 cfs at the Taiban Gage and to keep the river continuous in order to conserve the federally protected Pecos bluntnose shiner (shiner). The purpose of these actions is to meet the contracted irrigation needs of the Carlsbad Project, to avoid hindering New Mexico delivery requirements to Texas, and to establish partnerships in the basin. In 2011, river drying began in late August and extended approximately 19 miles, from the gas line crossing above HWY 70 to Bitter Lake National Wildlife Refuge. The river reconnected in mid October.

Reclamation received an annual update on the status of the shiner from the US Fish and Wildlife Service (USFWS). In 2011, catch-rates were greater than the density thresholds set by the 10-year BO for that year. Table 5 and figure 5, from a USFWS draft report, show catch rates from 2006 to 2011. Per the 10-year BO, take is exceeded if density falls below 3.5 shiner per 100 m^2 in Trimester 1, and 8 shiners per 100 m^2 in Trimester 3 for years after 2010. USFWS has not collected shiner at either of their two sites in the tailwater section below Sumner Dam near Fort Sumner since 1999.

Table 5. Pecos bluntnose shiner two year catch-rate mean ± one standard error and number of samples (N) 2006-2010. Standard error is not required under the 10 year Biological Opinion, but is provided to illustrate variation around the mean. Two year running average calculated from site means for the year stated and preceding year (for example in 2006, by calculating mean from all sites for trimester one in 2005 and 2006; same for trimester three).

Year	Trimester one PBS/100 m^2	Trimester three PBS/100 m^2	Any trimester 2006-2011
2006	**3.5** (± 0.75 SE, N = 48)	**5.3** (± 0.90 SE, N = 48)	> 2.7 (2.5)
2007	**5.0** (± 0.8 SE, N = 53)	**9.8** (± 1.8 SE, N = 50)	> 4.0 (2.5)
2008	**7.2** (± 1.3 SE, N= 62)	**14.3** (± 4.5 SE, N= 59)	> 9.8 (2.5)
2009	**11.9** (± 1.9 SE, N= 64)	**17.4** (± 3.8 SE, N= 73)	>15.2 (2.5)
2010	**13.1** (± 2.1 SE, N= 60)	**21.0** (±2.2 SE N= 82)	>12.3 (2.5)
2011	**18.4** (± 2.2 SE N = 58)	**21.3** (± 2.6 SE N = 81)	> 18.4 (2.5)

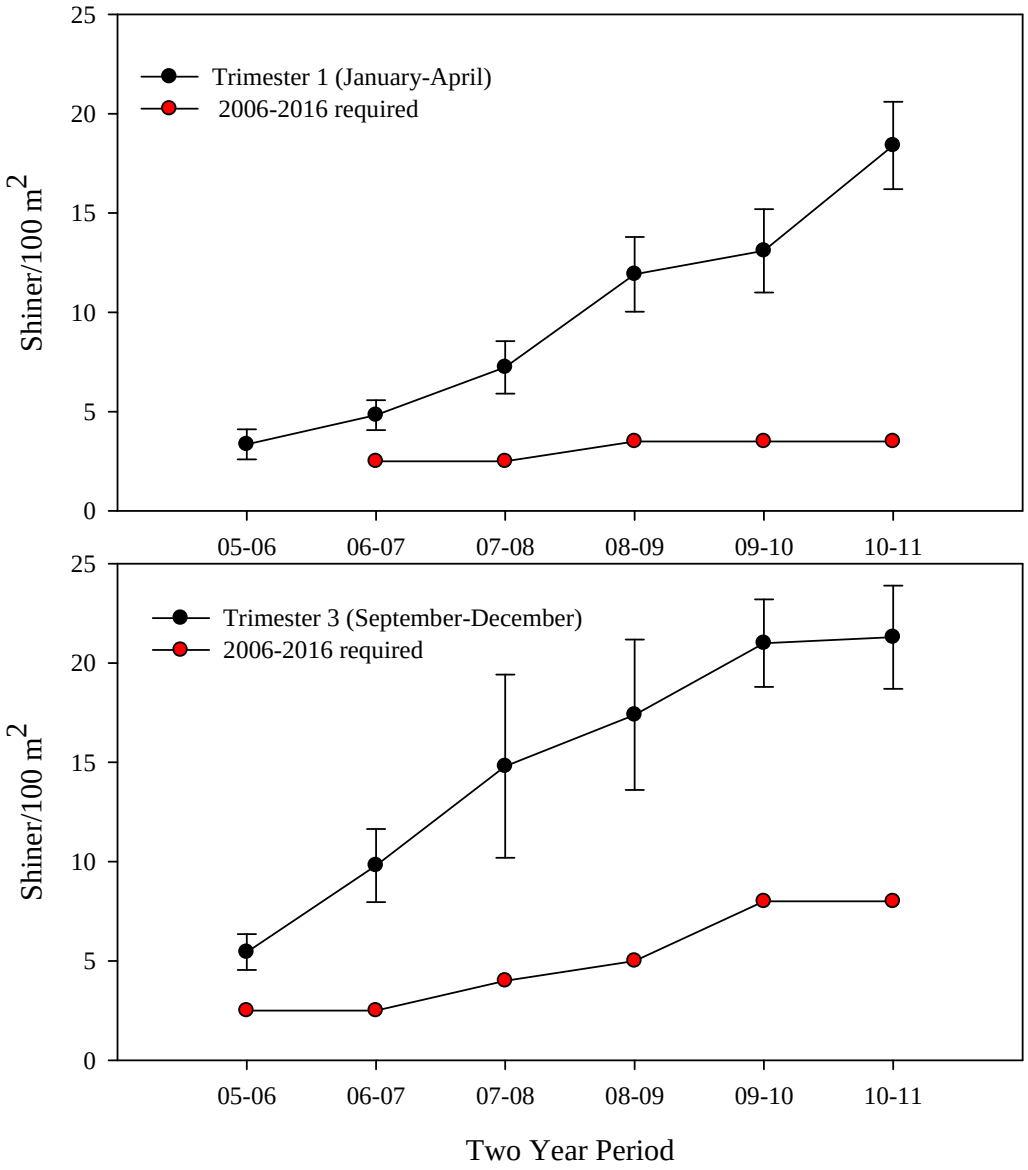

Figure 5. Pecos bluntnose shiner two year running average catch rates between 2005 and 2011. Top graph presents data for trimester 1 and bottom for trimester 3. Red highlighted data points are predetermined requirements taken from the USFWS Biological Opinion for Reclamation's proposed Carlsbad project water operations and water supply conservation 2006-2016. U.S. Fish and Wildlife Service Memorandum 18 May 2006, Cons # 22420-2006-F-0096.

Bitter Lake National Wildlife Refuge (BLNWR) Restoration Project

In cooperation with USFWS and to fulfill requirements under the 10-year BO, Reclamation restored flow to 1.5 miles of a cutoff oxbow, Oxbow 4, in BLNWR to improve habitat for the shiners, thus potentially improving population status. Restoration of Oxbow 4 is a part of a larger effort on BLNWR to restore several oxbows above and adjacent to this oxbow that have been cut off by natural fluvial processes. Flow was returned to the oxbow in September 2009. Initial surveys indicate that shiners were present in the restored habitat (S. Davenport, pers. comm.). Monitoring of the restored habitat was initiated with USFWS in 2010. The USGS will continue the monitoring the fish population starting in 2012.

Additionally, Reclamation provided partial funding to USFWS to begin the re-vegetation and treatment of salt cedar resprouts in the restored areas. Coyote willow, bacharis, and New Mexico olive cuttings from the BLNWR were propagated from mostly native stock for the re-vegetation to see if the local plants are more saline tolerant than standard green house stock. In addition to these species, salt grass, sacaton, and giant sacaton were planted during the summer of 2009 as a first attempt at native plant establishment on the Middle Pecos River. There was an 80% survival rate for planted coyote willow, bacharis, sacaton, and salt grass plugs. This is a much higher rate than anticipated since some of the plugs were intentionally planted in salty conditions in order to test the site-specific salt tolerances of these species.

Figure 6. Aerial photo of restored oxbow on Bitter Lakes National Wildlife Refuge from August 30, 2011.

Interior Least Tern

The 10-year BO includes coverage for the Interior Least Tern, which were discovered nesting at Brantley Reservoir in 2004. During the summer of 2011, a total of eight individual terns were observed (one confirmed pair, four additional adults and two first summer adults). One nesting scrape was observed containing two eggs before it was predated.

When the discovery of a nesting scrape appeared to be imminent, coordination between hydrologists and biologists began and it was determined that it would be most beneficial to move the nest farther from the shoreline before the block release. The nest was originally found empty on the afternoon of July 7, 2011, and was moved six feet in the opposite direction of the shoreline to higher elevation. The following morning the nest contained two eggs and was moved an additional six feet, that afternoon the nest was moved an additional four feet. On the morning of July 9th, the nest was empty, the pair was not detected, and what were likely coyote tracks were observed. There was plenty of bare shoreline to continue to move the nest in 2011 had it not been predated. Also, if the predation had not occurred, the combination of the smaller block release, the resulting water level elevation compared to that of the moved nest, and the head start in moving the nest would have likely resulted in a successful nest outcome.

After the nest was predated, additional terns were observed foraging and resting, but no aggressive or courtship behavior was observed. To the best of our knowledge, there was incidental take of one tern nest during the summer of 2011. A complete 2011 report is in preparation in accordance with the 10-year BO. Tern monitoring reports for 2009 – 2010 are

available from Reclamation's Albuquerque Area Office, and the following website has reports from 2008 and earlier: http://www.usbr.gov/uc/albuq/library/eaba/saltcedar/saltcedar.html.

At this time, Reclamation biologists are working with the USFWS and the New Mexico Department of Game and Fish to develop solutions for successful tern nesting and to minimize incidental take of terns in the future. In addition, Reclamation and USFWS are working with CID to adjust the timing of block releases, where possible, such that the water surface elevation is at its highest when terns are nesting, and flow will recede during incubation.

National Environmental Policy Act (NEPA) Activities

Currently, Reclamation is working on two Environmental Assessments (EAs) associated with Pecos River activities. One is the Pecos River Restoration at Overflow Wetlands EA. Under this EA, Reclamation proposes a second habitat improvement project under RPM #1 of the 10-year BO at the Bureau of Land Management (BLM) Overflow Wetlands Area of Critical Environmental Concern (ACEC) approximately 1 to 2 river miles south of the BLNWR restoration project. Lands in the proposed project area are managed by the Roswell Field Office of the BLM, the NM State Land Office that manages State Trust Land, and private landowners.

Reclamation is proposing to restore portions of the river channel beginning in 2012. Because the actions evaluated in this document would receive federal funding, would require federal permits and approvals, and portions would occur on federal land, environmental documentation under NEPA is required. In accordance with NEPA, Reclamation has prepared this EA to address the environmental effects of the proposed river channel restoration. The EA addresses direct, indirect, and cumulative effects of the proposed channel restoration and habitat enhancement activities.

Reclamation is considering two action alternatives to improve riparian habitat within the project area and a no action alternative. The alternatives are discussed commensurate with the current level of planning and proposed design.

Reclamation is the lead federal agency for this action and will assist in developing and funding the associated monitoring program. The BLM is a cooperating agency in this EA. As the primary land manager within the project area, the BLM will be responsible for the long-term maintenance of the restoration project.

The second EA is for title transfer of diversion facilities at Fort Sumner Irrigation District. Reclamation will determine the potential environmental consequences of title transfer and debt forgiveness in exchange for FSID entering into ESA Section 10 consultation on the Pecos River to address the effects of its operations on the shiner. FSID would continue to provide up to 25,000 af of water for Reclamation's Pecos River Supplemental Water Program in addition to other environmental commitments.

The agreement between FSID and Reclamation would provide for the parties to pursue transfer of title of any Fort Sumner Project facilities (e.g., diversion dam) held by the US to the district and to seek relief from the remaining payment obligation under an existing contract, subject to congressional authorization. The agreement would provide payments to FSID by Reclamation to

cover FSID's annual repayment obligation until debt relief is granted by Congress. Separate and specific NEPA and related ESA, Section 7, compliance documentation would be conducted prior to any transfer of title unless exempted by Congress.

Title transfer includes acquired rights held by the United States for the Ft. Sumner Irrigation District's facilities are three separate rights, fee title for the Fort Sumner Diversion Dam, an exclusive easement for the construction, operation and maintenance of the intercepting drain, and a license for crossing of the Atchison Topeka and Santa Fe Railroad by the main canal.

The diversion dam fee title land contains 16.84 acres, described generally as 14.46 acres. The intercepting drain was acquired as an exclusive easement by the United States from the Ft. Sumner Irrigation District for the purposes of constructing, operating and maintaining a ditch comprising approximately 42.06 acres. All remaining interests in facilities and lands encumbered by FSID facilities are in the name of the FSID.

Pecos River Basin Water Salvage Project

Under the authority of Public Law 88-594, in 2011 Reclamation continued to work with CID to control salt cedar growth from the Sumner Dam area to the New Mexico-Texas state line. This excludes the area between the Artesia bridge and north boundary of Reclamation's Brantley lands. CID performs the mechanical removal work with Reclamation support. Salt cedar removal is primarily accomplished utilizing rubber-tire tractors with root plows, and dozers with rake attachments.

Pecos River lands cleared in New Mexico total approximately 33,200 acres, although only a portion is cleared annually. Federal lands in the program make up about 36 percent of the cleared areas, and private lands make up about 64 percent.

The original authorizing legislation allowed clearing for approximately 58,000 acres, but was reduced because of litigation brought by the Audubon Society, and the completion of an EIS in 1979. NMISC provided a cost share in 2011 for this activity, and funded Reclamation’s involvement in obtaining annual cooperative agency agreements from private landowners for the Pecos River Basin Water Salvage Program.

Although the program did not achieve the original acreage intended, the Water Salvage Project is, to date, the largest and most successful effort to control the growth of salt cedar in the Pecos Valley.

Carlsbad Project Vegetation Management Program

Reclamation completed five-year (2006 – 2011) programmatic environmental and biological assessments for performing research and demonstration using integrated methods (herbicides, biological and mechanical) on salt cedar to determine effective methods of control and rehabilitation. Salt cedar spreads rapidly, grows in dense monotypic stands and out-competes native vegetation, potentially transpiring large amounts of water per acre in comparison to native vegetation. The work took place on lands within the Carlsbad Project area that include Brantley and Avalon Reservoirs, called the Research Project area.

Reclamation meets with other state, federal, and county agencies every six months to review and update on-going research and demonstration projects within the Research Project area. No new research was performed in 2011. The most recent meeting was in May 2011.

Fort Sumner Project

Operations

The irrigation season for FSID typically begins March 1 and ends October 31. FSID is also allowed to divert for two, eight-day periods during the winter. This winter right has generally been taken just prior to March 1.

In 2011, FSID forbore 498 af of their winter allotment to Reclamation under Contract No. 08-WC-40-292, and additional water between March 20 through March 31. The volume stored by Reclamation in Sumner Reservoir from the forbearance was 2,500 af. FSID began diverting water for irrigation on February 17 and ended irrigation for the year on October 31. No irrigation diversion occurred between March 21 and March 31. During the irrigation season, 63 to 95 cfs was bypassed through Sumner Reservoir depending on FSID's available water right. A total of 36,510 af were diverted into the FSID main canal as recorded by the USGS Fort Sumner Main Canal Near Fort Sumner, NM gage, shown in Figure 7. Gage data collection was discontinued on December 18, 2011, due to equipment failure.

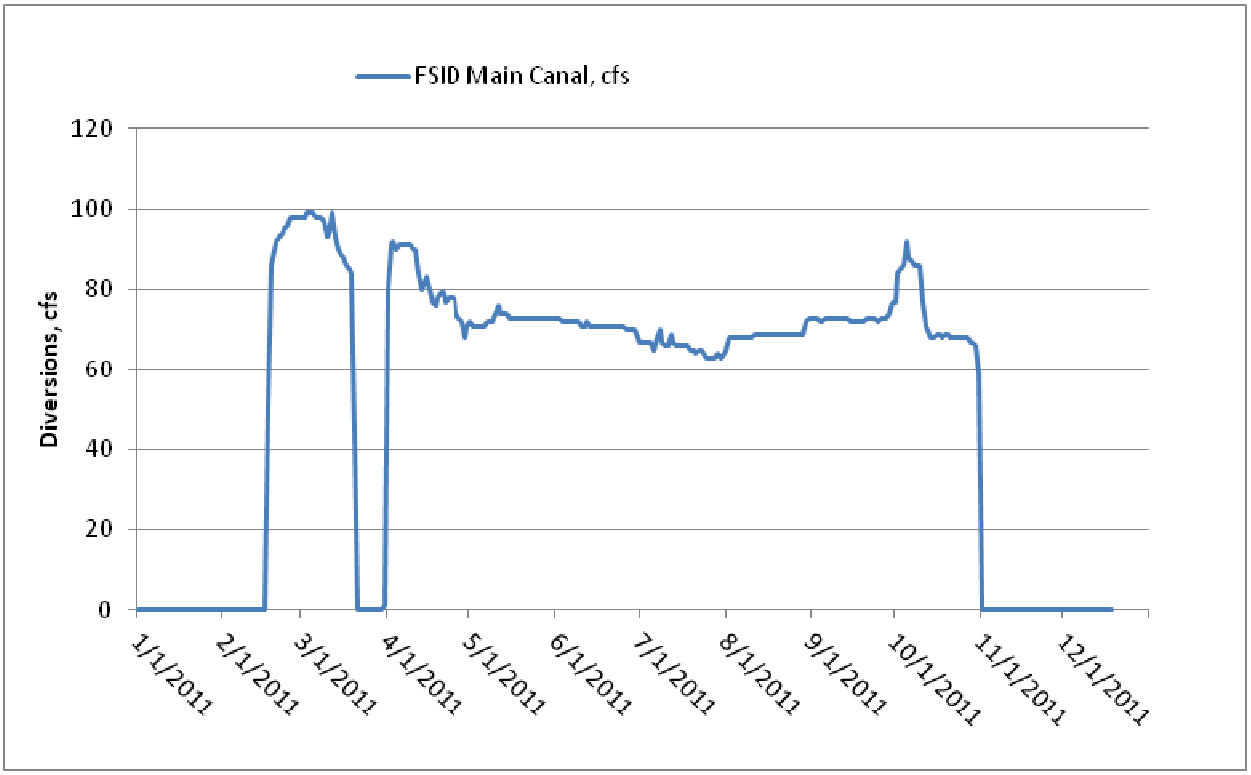

Figure 7. FSID Main Canal Diversion (data from USGS web site 1/23/2012)

Due to the extreme dry conditions in 2012, Reclamation entered into a new fallowing agreement with FSID farmers to assist in meeting flow targets. This water was diverted into the FSID diversion dam and returned to the river via the Sand Gate Diversion from the Ft. Sumner Canal. Water under this agreement began returning to the River on August 14 and continued through the

end of the irrigation season on October 31. A total volume of 4,220 af was delivered to the River under this agreement.

Fort Sumner Irrigation District Review of Operation and Maintenance

A Review of Operation and Maintenance (RO&M) examination of the FSID Diversion Dam was completed in June 2009. The next RO&M examination is scheduled for June 2015. There were no incomplete facilities O&M recommendations in 2011.

Other Pecos River Activities and Operations

Carlsbad Irrigation District Water Lease Program

Reclamation and the NMISC completed an Environmental Impact Statement in August 2006 clearing the way for a long term "Miscellaneous Purposes Contract," which is required to allow Carlsbad Project water to be leased and released for delivery to the state line. Reclamation and CID entered into a 40-year contract on November 21, 2006, providing for the use of Carlsbad Project water for purposes other than irrigation. This contract provides for the NMISC and CID to enter into third-party lease agreements for the purposes of leasing water from other district water users. It also provides for the NMISC to use water appurtenant to lands it owns within the district for purposes other than irrigation. Such leases must be approved by Reclamation. No third-party agreements have been executed and approved to date. No water was leased during 2011.

Pecos River Settlement Implementation

The State of New Mexico, the Pecos Valley Artesian Conservancy District, CID, and the United States signed the water rights Settlement Agreement (Settlement) on March 25, 2003. The Settlement and its implementation were vital to ensure the delivery requirements to Texas under the Pecos River Compact, provide additional water supplies to CID, and protect the Pecos Valley Artesian Conservancy District from a priority call on its junior groundwater rights. On June 11, 2009, the parties to the Settlement filed a Joint Declaration stating that they agree that the conditions for implementation have been substantially met.

The first full year of Settlement implementation was 2010, which meant it was the first year during which the parties enjoyed the benefits that the Settlement provides. However, good water conditions in 2010 did not trigger the groundwater pumping requirements of the Settlement. As 2011 was a very dry year, CID benefited from the use of 17,246 acre-feet of pumped groundwater, as well as the use of surface water appurtenant to land owned by NMISC in CID.

WaterSMART

The Department of the Interior's WaterSMART initiative assists communities and irrigation districts in the western United States with funding to meet critical water related needs. The Department is seeking to collaborate with local interests on projects that will help reduce the potential for water related conflicts. Under the WaterSMART program, Reclamation has available WaterSMART, Title XVI Water Reclamation and Reuse Programs, Basin Study Programs, and the Cooperative Watershed Management Program.

In March 2012, Reclamation awarded a Basin Study to the NMISC Pecos Bureau, as the lead for this study. The plan is to develop a numerical groundwater model for the Fort Sumner Underground Water Basin. Additional information on the WaterSMART program is at http://www.usbr.gov/WaterSMART/index.cfm.

Emergency Drought Relief Program

There was no construction under the Emergency Drought Relief Program in FY2011. In FY 2012, Reclamation drilled new municipal wells for the Community's of Capitan and Blue Water Estates, New Mexico. The municipal water well for Regina, New Mexico, should be completed by June 30, 2012.

Pecos Sinkhole Study

Brine wells are mining operations that pump fresh water underground to dissolve salts in the soil. The brine that is produced is then pumped to the surface to be used elsewhere. This type of solution mining of the salt results in an underground cavern. The stability of the caverns is dependent upon their depth, their width, and the strength of the materials above the void. Since July of 2008, three large sinkholes associated with brine wells in the Permian Basin have catastrophically developed. Another of these possible holes potentially threatens an irrigation canal, the Carlsbad Main Canal.

A drilling and sonar investigation performed in 2010 failed to identify a cavern of sufficient volume to account for the amount of brine produced, based on well production records. The lateral extent of the cavern relative to the main canal was also not well defined. Carlsbad Irrigation District requested Reclamation investigate the risk posed by the sinkhole and propose mitigation options for the canal. In 2010, Reclamation reserved funding for an appraisal study. Reclamation has received data from field investigations by the City of Carlsbad and the New Mexico Energy, Minerals and Natural Resources Department's Oil Conservation Division, the agency with oversight of brine wells. Appraisal studies rely primarily on existing data and information. The sinkhole appraisal study is scheduled for completion in June 2012.

Quagga and Zebra Mussels

In January 2007, an employee with the National Park Service at Lake Mead, NV, discovered the first quagga mussels in the western United States. The mussels were likely transported to the west via a contaminated boat from an eastern state. Since that time, mussels have expanded their range throughout many western states. Since 2009, Reclamation has been sampling seven of its New Mexico reservoir bodies (Navajo, Heron, El Vado, Elephant Butte, Caballo, Sumner, and Brantley) for mussels and processing these water samples through Reclamation's research lab in Denver. At this time, New Mexico has three reservoirs considered "suspect" for having quagga mussels: Sumner, El Vado and Navajo. Further testing and confirmation is necessary before these waterways meet the State of New Mexico's criteria for being deemed "contaminated."

In 2011, the American Recovery and Reinvestment Act (ARRA), along with funding obtained from the Upper Colorado Regional Office, paid for monthly sampling at six of the seven reservoirs. In 2012, funding for the monthly sampling and other related mussel work will come from Reclamation's budget.

Because Reclamation strongly believes that preventing the spread of mussels is the least costly option for protecting the state's water bodies, it is pursuing the following ongoing activities:

- Reclamation's Albuquerque Area Office has made a serious effort in public outreach activities since 2009, printing some 21,000 'Zap the Zebra' brochures and 1,000 mussel posters. These brochures and posters that have been dispersed throughout New Mexico: at the state parks, convenience and sporting good shops, libraries, etc.
- Permanent signs, with the "Stop Aquatic Hitchhikers!" message have been installed at boating docks and other key park locations that are under Reclamation's jurisdiction.
- Reclamation funded the hiring and training of temporary staff to assist New Mexico State Parks with inspections at key boating reservoirs within the state for 2011.
- Reclamation purchased three mobile decontamination units; one is permanently assigned to Elephant Butte Reservoir, one is available for the Chama River area, and the third unit is in the Pecos River basin area. However, these units, being mobile, can be moved where needed.
- State and Federal employees continue to be trained to perform watercraft inspections (Level 1) and decontamination procedures (Level 2).

To protect Reclamation's facilities, the following work has been completed:

- Reclamation developed a Technical Memorandum, Inspection and Cleaning Manual for Equipment and Vehicles to Prevent the Spread of Invasive Species, (2010, No. 86-68220-07-05).
- An action plan for Elephant Butte entitled, Elephant Butte Field Division Action Plan for Prevention and Rapid Response of Dreissenid Mussels, was developed.
- Facility Vulnerability Assessments have been developed for seven Reclamation reservoirs within New Mexico (Heron, El Vado, Elephant Butte, Caballo, Sumner, Brantley, and Avalon).