



# Final 2011 Annual Adaptive Management Report for the Carlsbad Project Water Operations and Water Supply Conservation Environmental Impact Statement



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

**April 2012**

## **Mission Statements**

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

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

# 2011 Annual Adaptive Management Report for the Carlsbad Project Water Operations and Water Supply Conservation Environmental Impact Statement

Prepared by:

AAO Bureau of Reclamation

Contents	Page No.
Introduction	1
Methods	2
Indicator 1: Continuous River Flows	2
Indicator 2: Flow Monitoring at Taiban and Acme Gages	4
Indicator 3: Incoming Flows Available for Bypass	5
Indicator 4: Block Releases	6
Indicator 5: Density for the Pecos Bluntnose Shiner (Shiner)	6
Indicator 6: Presence of the Interior Least Tern (Tern)	9
Indicator 7: Carlsbad Project Water Supply Status	12
Indicator 8: Aquifer Storage and Base Inflows from the Roswell Basin	13
Indicator 9: Decreasing Flow Target at Taiban to Conserve Water Supplies	18
Discussion	19
New Indicators for 2012	19

Cover photograph: Pecos River south of Bottomless Lakes State Park, 9.22.2010 by M. Carra



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

**April 2012**

## Introduction

This report covers the period January 1, 2011, through the end of the calendar year December 31, 2011, as stated in the Carlsbad Project Water Operations and Water Supply Conservation Environmental Impact Statement (EIS), June 1, 2006. This report describes the actual Adaptive Management Plan (AMP) as published in the EIS, including the criteria, triggers, monitoring and responses, then the actions taken this calendar year. The final portion of this report will describe the changes required in the AMP, establishing new procedures for monitoring the results of management action and integrating this new knowledge into future policy and management actions.

**Adaptive Management Plan** The AMP outlines a procedure for monitoring indicators (which serve as signs or symptoms) and modifying river operations when needed. It is a means to address uncertainty by monitoring EIS targets, identifying actions to be taken for targets that are in jeopardy, and applying lessons learned in the future management of river operations by modifying operations within established parameters.

The AMP was designed to ensure compliance with the Biological Opinion (BiOp) and the Record of Decision (ROD) and EIS, completed August 2006.

### **Adaptive Management – Carlsbad Project Water Operations: Taiban Constant Alternative**

The AMP appropriately addressed the range of alternatives under consideration. Since the Bureau of Reclamation (Reclamation) has identified the Taiban Constant as its preferred alternative and consulted with the U.S. Fish and Wildlife Service (Service) regarding the effects on endangered species, it is meaningful to reformulate an AMP that is focused on the Taiban Constant alternative. In fact, to better determine potential future effects on Pecos bluntnose shiner, it is necessary. Seven objectives were identified for the development of adaptive management guidelines specifically for the Taiban Constant alternative:

1. Develop a monitoring, decision-making, and response program for the long-term management of the Pecos River flows;
2. Identify agency responsibilities for monitoring and response;
3. Conserve populations of the Pecos bluntnose shiner;
4. Conserve the Carlsbad Project water supply;
5. Assure critical habitat remains wetted;
6. Meet flow criteria at the Taiban gage as specified in the EIS, and;
7. Minimize river intermittency in reaches not designated as critical habitat.

The AMP provides structure for making decisions based on changing environmental and hydrological conditions and offers a forum to stakeholders for developing consensus. Communications for the AMP are carried out throughout the year primarily through conference calls among the Pecos River Stakeholder Group and the preparation of the Annual AMP report. Members of the Pecos River Stakeholder Group include the Service, Reclamation, Carlsbad Irrigation District (CID), Ft Sumner Irrigation District (FSID), New Mexico Department of

Game and Fish, New Mexico Office of the State Engineer (NMOSE), New Mexico Interstate Stream Commission (NMISC), and the US Army Corps of Engineers (Corps).

### **Criteria, Triggers, Monitoring, and Response**

The core components of the AMP for the Taiban Constant alternative are criteria, triggers, monitoring, and response. These four components are described for the following eight indicators for 2009:

- (1) Continuous River Flows
- (2) Flow Monitoring at Taiban and Acme Gages
- (3) Incoming Flows Available for Bypass
- (4) Block Releases
- (5) Density for the Pecos Bluntnose Shiner (Shiner)
- (6) Density for the Interior Least Tern (Tern)
- (7) Carlsbad Project Water Supply Status
- (8) Aquifer storage and base inflows from the Roswell Basin.

This report describes the actions taken in the calendar year January 1, 2011, through December 31, 2011, and future recommendations which are in the AMP report for monitoring and river management for CY2012.

**Methods** - All methods are discussed in detail in the final AMP available on the web site: <http://www.usbr.gov/uc/albuq/library/eis/carlsbad/carlsbad.html>

#### **Indicator 1 - Continuous River Flows**

**Criteria:** During the irrigation season or other periods of time when FSID is entitled to their direct diversion right from the Pecos, water will only be diverted into storage in Sumner and/or Santa Rosa Reservoirs when the following three conditions are all being met:

1. there is available reservoir inflow in excess of FSID's flow entitlement as calculated on a two-week basis by the New Mexico Office of the State Engineer
2. the 35 cfs river flow target at Taiban Gage is being met
3. there is no risk of river intermittency

During the non-irrigation season or other times when FSID is not entitled to utilize their direct diversion right from the Pecos, water will only be diverted into storage in Sumner and/or Santa Rosa Reservoirs when the following two conditions are being met:

1. the 35 cfs river flow target at Taiban Gage is being met
2. there is no risk of river intermittency

**Trigger:** The river flow trigger is activated when the flow rate measured and reported by USGS at Taiban is 40 cfs or less, or the flow rate measured and reported by USGS at Acme is 10 cfs or less.

**Monitoring:** River flow and reservoir elevation data are collected electronically every four hours from gage sites and relayed, via satellite links, to US Geological Survey and Army Corps

websites. Reclamation staff monitors these sites daily. During the irrigation season, Reclamation holds weekly conference calls. Gage data is collected and recorded on logs and discussed on the calls at the beginning of each week. Participation from all Pecos Stakeholders is encouraged on the weekly operation management conference calls. These weekly conference call logs are available from Reclamation staff upon request and available online, Reclamation Albuquerque Area Office webpage.

**Response:** When the trigger is activated by reaching the target point at either gage, Reclamation initiates additional monitoring (i.e. flow measurements, observation flights, video camera observations, or other methods) to establish the accuracy of the gage data. Depending on the accuracy of the data, Reclamation may initiate corrective actions.

If bypass water is available, Reclamation will begin bypassing inflow to target 35 cfs at Taiban and/or keep the river continuous. If bypass water is not available and the Vaughan Conservation pipeline (pipeline) is operational and available for use, Reclamation will order the operation of the pipeline to support flow targets at Taiban and Acme. If bypass water is unavailable and the pipeline is unavailable, Reclamation will release Fish Conversation Pool (FCP) water at a rate needed to avoid intermittency. Reclamation has on-going water leases for artesian groundwater on the Pecos River, which is also used to avoid intermittency.

**Actions taken in CY 2011** During the irrigation season, Reclamation prepared weekly logs of the conference calls. These are available from Reclamation staff upon request. Data provided is provisional.

Drying occurred between Sumner Dam and Brantley Dam on the Pecos River between August 29 and October 11 of the time period covered by this report. Drying occurred on approximately 19 river miles. The trigger for Indicator 1 was activated on numerous occasions throughout the year. A total of four incidents required action. The other instances Taiban flow was still above 35 cfs and Acme was well above 10 cfs.

Action 1: From January 1 through February 12, 2011, Taiban gage measured below 40 cfs. Water was bypassed through Sumner Dam from January 1 through February 12 supplementing the river. Acme did not drop below 15 cfs during this time and the average over the time was 34 cfs. With the supplemental water, Taiban did not drop below 33 cfs and averaged 34 cfs during this time.

Action 2: From February 20 through March 8, 2011, Taiban gage measured below 40 cfs. Water from Sumner Dam was used to supplement the river starting. Supplemental water release was increased up to 16 cfs with an average of 11 cfs. Acme was never below 21 cfs during this time.

Action 3: The Taiban gage dropped to 30 cfs on May 4 through July 4. Acme dropped below 10 cfs June 19- July 8 until the second block release occurred. The supplemental water release was increased by 20 cfs during these times.

Action 4: During the period of July 27 through October 28 the Taiban gage dropped below 10 cfs except during a monsoon flow July 31 through August 6. Additional supplemental water

exchanged with CID was released July 19 through August 14 until all stored water was depleted. Reclamation entered into a fallowing agreement with FSID farmers and releases from the Sand Gate Weir began on August 18 and continued through the rest of the irrigation season with average flow of 27 cfs. Without this agreement there would have been no supplemental water available and more of the River would have dried. A total of 19 miles experienced durations of drying.

From November 1, 2010, through October 31, 2011 (the 2011 water year), Reclamation had water lease agreements with five Pecos River pumpers, one of whom is also a Hagerman Irrigation Company irrigator, to lease 1,513 af (consumptive use portion) of surface water rights and 356 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.

The Vaughan pipeline was built by the State of New Mexico to supplement flows on the Pecos to assist with 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 8 and 13 cfs. Reclamation has a 25-year contract for a minimum of 1100 af of water annually. The pipeline provided 1568 af to the Pecos River in 2011.

Draft 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 2,475 af more water into the Pecos River than the additional depletions incurred by the modified operations of Sumner Dam. The supplemental water and agreements with FSID and CID allow Reclamation the flexibility to meet target flows and keep the Pecos River continuous consistent with the EIS and BiOp for the federally threatened Pecos bluntnose shiner (*Notropis simus pecosensis*) (shiner).

### **Indicator 2 - Flow monitoring at Taiban and Acme Gages**

**Criteria:** Correctly operating gages are important to river management. The USGS is responsible for measurement and maintenance of their gages. For Reclamation's Pecos River operations for the shiner, the two most important gages are Taiban and Acme, although other gages are used for operations. These two gages provide data on intermittency and flow targets.

**Trigger:** The gage trigger is activated when the Taiban or Acme gage is malfunctioning or non-operational.

**Monitoring:** Monitored gages by independent contractor as well as USGS. Reclamation funds USGS to operate and maintain the gages along the Pecos River. Inoperable gages are reported to the USGS and Reclamation initiates contracted monitoring as necessary to measure gage sites and report all findings immediately.

**Response:** Have contractor out during these times to manually measure flows as often as necessary until gages are repaired.

**Actions taken in CY2011:**

Reclamation, in coordination with the Service, intensively monitors the river by the best methods available at the time, including website gage readings, field site verification and measurements, flights to monitor river connectivity, monitoring the video field camera, or other technology as it becomes available.

Five flights over the Pecos to monitor flows were made in the 2011 irrigation season.

Additionally, Reclamation hosted weekly operation management conference calls throughout the irrigation season on flows and river operations. The Service was a part of the weekly events and the calls served as a condition of consultation, informing the Service of any necessary corrective actions taken or that were expected to be taken as a result of low flows.

Reclamation had the contractor measure flows five times to verify gage readings during 2011. Reclamation requested USGS verify gage readings during the 2011 irrigation season. These requests were made during the weekly, Monday morning conference calls.

### **Indicator 3 – Incoming Flows Available for Bypass**

**Criteria:** FSID is entitled to the natural river flow up to 100 cfs as measured at the Puerto de Luna gage upstream from Sumner Lake. FSID's entitlement is calculated every 2 weeks based on the NMOSE computations. Reclamation can divert to storage or bypass any inflows in excess of FSID's maximum water right (100cfs). Flow data are obtained from the NMOSE Pecos Water Master in the Roswell district office. Information collected by the NMOSE on flow entering Santa Rosa Reservoir and Sumner Lake, as well as USGS gage data, are used to determine the availability of water for bypasses. This information is used to assess whether there is available Carlsbad Project Supply to bypass through Santa Rosa and Sumner.

**Trigger:** The bypass trigger is activated when it is determined by NMOSE that incoming available flows exceed FSID's senior diversion rights.

**Monitoring:** The NMOSE measures flows at gage sites along the river for compact accounting purposes. These flows are calculated for FSID's senior water right and the results are faxed to Reclamation's staff on a bi-weekly basis. Flows are then calculated for the amount of water available for bypass through Sumner. If flows are not needed to keep the river continuous, water is diverted to storage for Carlsbad Project Supply.

**Response:** Make incoming available flows exceeding FSID's senior diversion rights available, as needed, for bypass during these time periods. After the end of FSID's irrigation season on October 31, all Sumner inflows will be made available for bypass for meeting in-stream target flows.

### **Actions taken in CY2011:**

During the period covered by this report, inflows did not exceed FSID's senior diversion right from February 13 through October 31. Reclamation did not make inflows available for Sumner bypass during these periods. Before February 13 and after the end of FSID's irrigation season on October 31, all Sumner inflows were available for meeting instream flow targets. Reclamation

made 2 bypasses totaling 4842 af during the 2011 calendar year, with 0 af during the irrigation season due to no availability.

During the periods when bypasses were not available, water was released from the FCP pool to meet instream flow targets. During the irrigation season 1,000 af of supplemental water was released from the FCP pool. Beginning November 1 Forbearance water was released to meet the flow targets, a total of 2,500 af were released from this pool.

#### **Indicator 4 – Block Releases**

**Criteria:** A block release is defined as moving water efficiently from Sumner to Brantley Reservoir for the purpose of irrigation. These block releases are a large quantity of water released within a short timeframe so as to avoid evaporation losses. Block releases also occur between Santa Rosa and Sumner. The frequency and duration of block releases from Sumner will be recorded as they occur and compiled into this annual report. Four key criteria are: (1) block releases will not exceed 15 days; (2) there will be at least 14 days between block releases; and (3) block releases should not occur during the 6-week period centered on August 1; or (4) the cumulative duration of block release from Sumner shall not exceed 65 days.

**Trigger:** The block release trigger is activated by at least one of the following four conditions: (1) the 15-day block release duration is exceeded; (2) there is less than 14 days between releases; or (3) a block release is expected in the 6-week period centered on August 1; (4) the cumulative duration of block release from Sumner exceeds 65 days.

**Monitoring:** Plans for future block releases will be compared to the trigger criteria to determine if trigger criteria will be activated. The start, end and duration of block releases will be measured and recorded based on the flows reported at the USGS gage: Pecos River below Sumner, NM, USGS 08384500.

**Response:** Coordinate all block releases with CID when flows have dropped below specified levels (Acme 10cfs, Taiban 40cfs) to keep the river continuous and meet CID demand. Notify CID and the Service when release time is exceeded, there is less than 24 days between releases, the release occurs in the inappropriate time or last too long.

#### **Actions taken: in CY2011**

None of the triggers occurred in 2010.

Two block releases were completed last year:

3/11/2011 through 3/21/2011	26,883 af
7/05/2011 through 7/11/2011	11,875 af

#### **Indicator 5 - Density for the Shiner**

**Criteria:** The density of the adult shiner, as stated in the BiOp, is based on a two year running average.

**Trigger:** If fish densities fall to a low level in one year, then this is a warning that next year an action would need to be taken based upon the likely cause of decline (e.g., intermittency).

**Monitoring:** Fish monitoring done monthly, year round at specified sites.

**Response:** Reclamation will give both CID and FSID as much advance notice as possible when there is potential for changes in water operations to benefit the Shiner.

**Actions taken in CY2011:**

Reclamation continues to monitor flows under the 2006 10-year BO operates 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 shiner. The purpose of the project was 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. Due to water shortage in 2011 and predicted drying, Reclamation worked with USFWS to best manage the water available for maintaining shiner habitat. Low flow conditions were present most of the year and drying did occur.

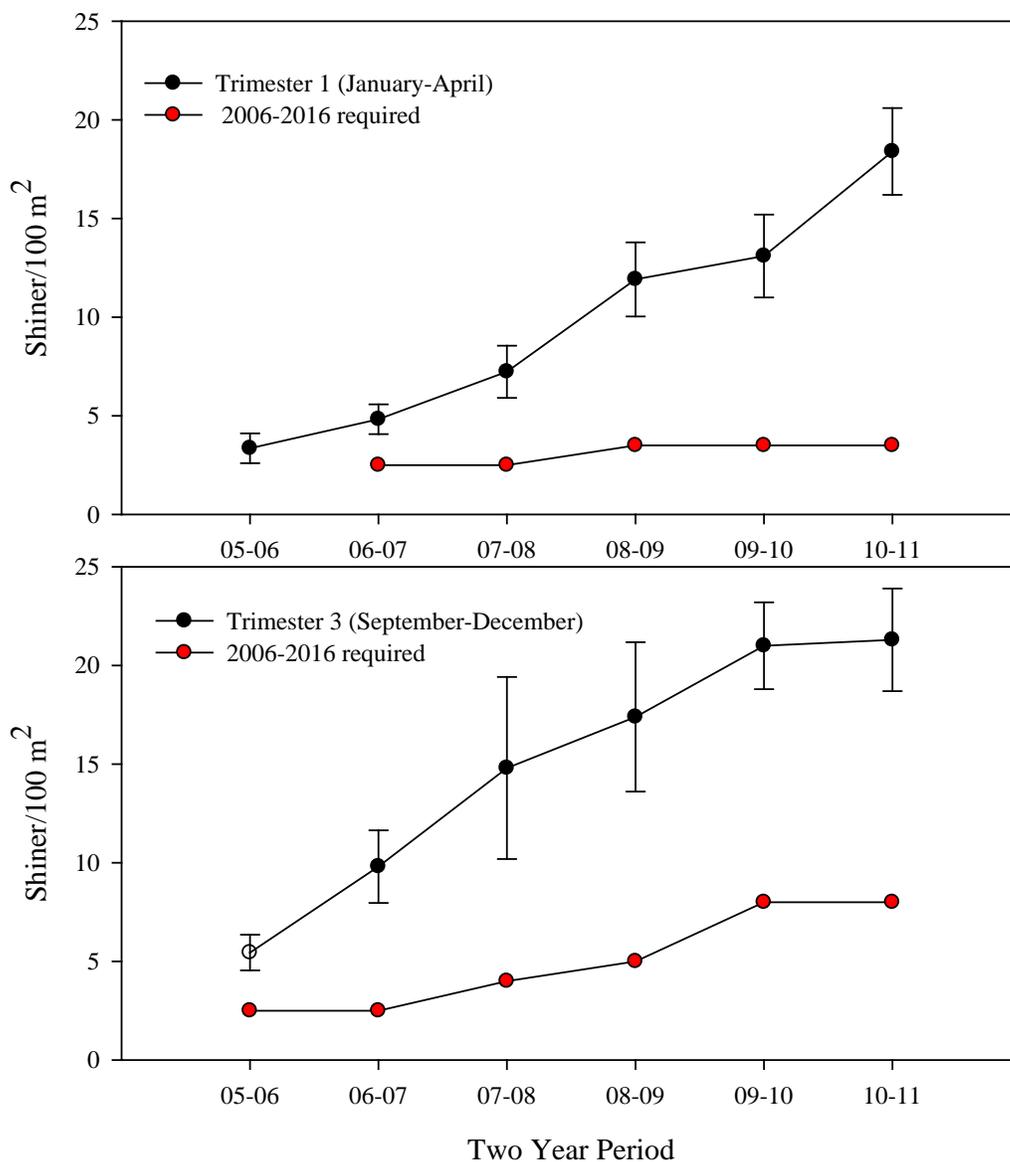
Reclamation received an annual update on the status of the shiner from the Service. Catch rates in all trimesters of 2011 were above 18.4 shiner per 100 m<sup>2</sup>. Cumulative catch-rate in 2011 continued to be well above the target densities set by the biological opinion (Figure 1). Shiner have not been collected at either of the sites in the tailwater section below Sumner near Fort Sumner since 1999. Catch-rates were greater than the density thresholds set by the 10-year BO for 2010 (Table 5) (from the Service draft report). The 10-year BO stated that take would be exceeded if density fell below 3.5 shiner per 100 m<sup>2</sup> in Trimester 1 and 8 shiner per 100 m<sup>2</sup> in Trimester 3. Density targets remain the same for the duration of the 10-year BO.

In 2009, Reclamation, in collaboration with the Service completed a fish restoration project at Bitter Lake National Wildlife Refuge which included plugging and diverting the river into a historic oxbow (Oxbow 4) in Reach 4, excavating a meandering channel within the oxbow (12 feet wide at the base and 44 feet wide at the top), removing nonnative vegetation, and lowering banks. Revegetation was initiated in cooperation with the Service. The reconnected channel replaced approximately 3,000 feet of the current channel with approximately 8,200 feet of channel in the historic oxbow. The Service conducted the first year of monitoring within the restored area in 2010 initial results showed high use of the area by shiner. Additional monitoring will begin in 2012 by USGS. Initial planning is underway for the second restoration project.

Table 4. 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 <sup>2</sup>	Trimester three PBS/100 m <sup>2</sup>	Any trimester 2006-2010
2006	<b>3.5</b> (± 0.75 SE, N = 48)	<b>5.3</b> (± 0.90 SE, N = 48)	> 2.7 (2.5)
2007	<b>5.0</b> (± 0.8 SE, N = 53)	<b>9.8</b> (± 1.8 SE, N = 50)	> 4.0 (2.5)
2008	<b>7.2</b> (± 1.3 SE, N= 62)	<b>14.3</b> (± 4.5 SE, N= 59)	> 9.8 (2.5)

2009	<b>11.9</b> ( $\pm 1.9$ SE, N= 64)	<b>17.4</b> ( $\pm 3.8$ SE, N= 73)	>15.2 (2.5)
2010	<b>13.1</b> ( $\pm 2.1$ SE, N= 60)	<b>21.0</b> ( $\pm 2.2$ SE N= 82)	>12.3 (2.5)
2011	<b>18.4</b> ( $\pm 2.2$ SE N = 58)	<b>21.3</b> ( $\pm 2.6$ SE N = 81)	> 18.4 (2.5)



**Figure 1. 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 taking 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.**

This figure and table are from the Pecos Bluntnose Shiner Monitoring Summary 2011 from the Service by Stephen Davenport 2012.

**Indicator 6 - Density of the Interior Least Tern (Tern)**

**Criteria:** The density of the adult interior least tern and activities at created nesting habitat sites.

**Trigger:** Nesting terns in the conservation pool of Brantley Reservoir

**Monitoring:** Monitor lake levels and water delivery plans to assess the potential for impact to nesting terns.

**Response:** Assess potential for take; coordinate with CID and other interested parties on water management to help prevent inundation of nests and/or young. If all other options are exhausted, consider moving nests to avoid rising water. If take is anticipated, coordinate in advance with the Service.

**Actions taken in CY2011:**

During the summer of 2011, a total of 8 individual terns were observed (1 confirmed pair, 4 additional adults and 2 1<sup>st</sup> summer adults). One nesting scrape was observed containing 2 eggs when 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<sup>th</sup>, 2011 and was moved 6 feet in the opposite direction of the shoreline to higher elevation. The following morning the nest contained 2 eggs and was moved an additional 6 feet, that afternoon the nest was moved an additional 4 feet. On the morning of July 9<sup>th</sup> 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 an incidental take of 1 tern nest during the summer of 2011. A complete 2011 report is in preparation. Contact Reclamation’s Albuquerque Area Office for a copy of the 2009-2010 tern monitoring report, or visit the following website for reports from 2008 or earlier:

<http://www.usbr.gov/uc/albuq/library/eaba/saltcedar/saltcedar.html>

Survey Date	Surveyor	Breeding Adult	Sub-Adult	Immature	Total Least Terns	Comments
May 25- May 26	Ryan	0	0	0	0	No terns of any kind observed. Lots of recreational activity. Other shorebirds observed include: killdeer, snowy egret, Franklin’s gull, spotted sandpiper, snowy plover, black-necked stilt, ruddy

						duck, northern pintail.
June 2- June 3	Ahlers	1	0	0	1	Tern observed resting briefly, then foraging for half an hour near Champion Cove. Reservoir very low with an abundance of exposed shoreline.
June 7- June 8	Ryan	0	0	0	0	Mostly quiet, not much recreational activity. Plovers appear to have started nesting activity. Other birds observed include Franklin's gull, black-necked stilt, killdeer, etc.
June 16- June 17	Moore	2	0	0	2	Likely pair, male observed presenting fish to female. Several empty scrapes were observed, however pair not defensive.
June 22- June 23	Moore	2	0	0	2	Pair observed, however, this time in a location farther southeast than what was observed during the survey on the 16-17 <sup>th</sup> . No active nests were found.
June 28- June 29	Moore	2	0	0	2	Foraging and courtship flight observed. Difficult to see with wind and heat. Lots of potential habitat exposed with lake water level so low.
July 7	Ryan	3	0	0	3	3 total terns observed. One obvious pair very aggressive and defending territory. Nest found and successfully moved 6 feet farther from the shoreline (nest contents: empty).
July 8	Ryan	3	0	0	3	Non-formal survey (focused on relocating nest). Successfully moved nest an additional 6 feet in the morning (nest contents: 2 eggs). Successfully moved an additional 4 feet in evening (nest contents: 2 eggs).
July 9	Ryan	1	0	0	1	Nest predated by coyote. Pair not observed, but one adult located along shoreline foraging.
July 12- July 13	Moore	8	0	0	8	Lake level very low, but started to rise on the 13 <sup>th</sup> . 6 breeding adults and 2 1 <sup>st</sup> summer adults observed near Champion Cove. No courtship or nesting activity observed.
July 19- July 20	Ahlers	2	0	0	2	Possible pair observed resting and foraging.
July 25- July 26	Ahlers	6	0	0	6	Detections ranged from a single foraging adult to a group of 5 foraging adults.



2011 locations where terms were observed. Central arrow represents the nesting location.

©2009 Google

Eye alt: 22456 ft

© 2011 Google  
Image © US DAF Farm Service Agency

19 S, 57 02 S, 88 W, E 360323.72 m, N, elev. 3250 ft

Apr 14, 2009

5479 ft

Image © Date: May 9, 2009

### **Indicator 7- Carlsbad Project Water Supply Status**

**Criteria:** One of the purposes of the EIS is to conserve Carlsbad Project water supply. Operation of Sumner for the benefit of the shiner could result in reductions to the available Carlsbad Project water supply, potentially impacting the CID. Water acquisition options have been developed to acquire additional water to compensate for net depletions to Carlsbad Project supply.

**Trigger:** The trigger is activated annually to evaluate whether a shortage or surplus is occurring with respect to the Carlsbad Project water supply. However, informal periodic discussions with CID should occur during the year to monitor the status of irrigation water supply and use.

**Actions taken in CY2011:** Reservoir content levels at end of CY2010:

Santa Rosa	10,136 af
Sumner	5,382 af
Brantley	11,076 af
Avalon	2,275 af

Supplemental water management tools generic order of use:

1. Bypass (when available up to depletion volume of water leases plus credit water)
2. Vaughan (until exhausted and meets flow requirement)
3. Vaughan with FCP (until either is exhausted)
4. FCP (if pipeline is exhausted before FCP)/ pipeline with Forbearance (if FCP exhausted before Vaughan)
5. Forbearance (can be used to pay for depletions at end of year)
6. Fallowing (agreement entered into during 2011 for only the 2011 year)

During the CY2011, Reclamation used the following amounts of supplemental water:

Bypass	4,834 af
Vaughan	1,568 af
FCP	1,000 af
CID Exchange	2,500 af
Forbearance	2,500 af
<u>Fallowing</u>	<u>4,221 af</u>
Total	16,623 af

### **Pecos River Basin – Summary of Annual Accounting for Pecos Bluntnose Shiner Bypass Operations**

All current 2011 annual accounting data is provisional. During the non-irrigation season prior to irrigation, between January 1 and February 28, 2,370 af was released for ESA purposes, 2,370 af from bypasses. During the irrigation season, which runs from March 1 through October 31, a total of approximately 1,000 af were released exclusively from the FCP. Additional water was exchanged with CID to create an additional 2,500 af of water available for ESA and all was

released during the irrigation season. All of the FSID forbearance water, 2,500 af was released during the irrigation season. During the non-irrigation season after irrigation, between November 1 and December 31. 2,472 af was bypassed for ESA purposes.

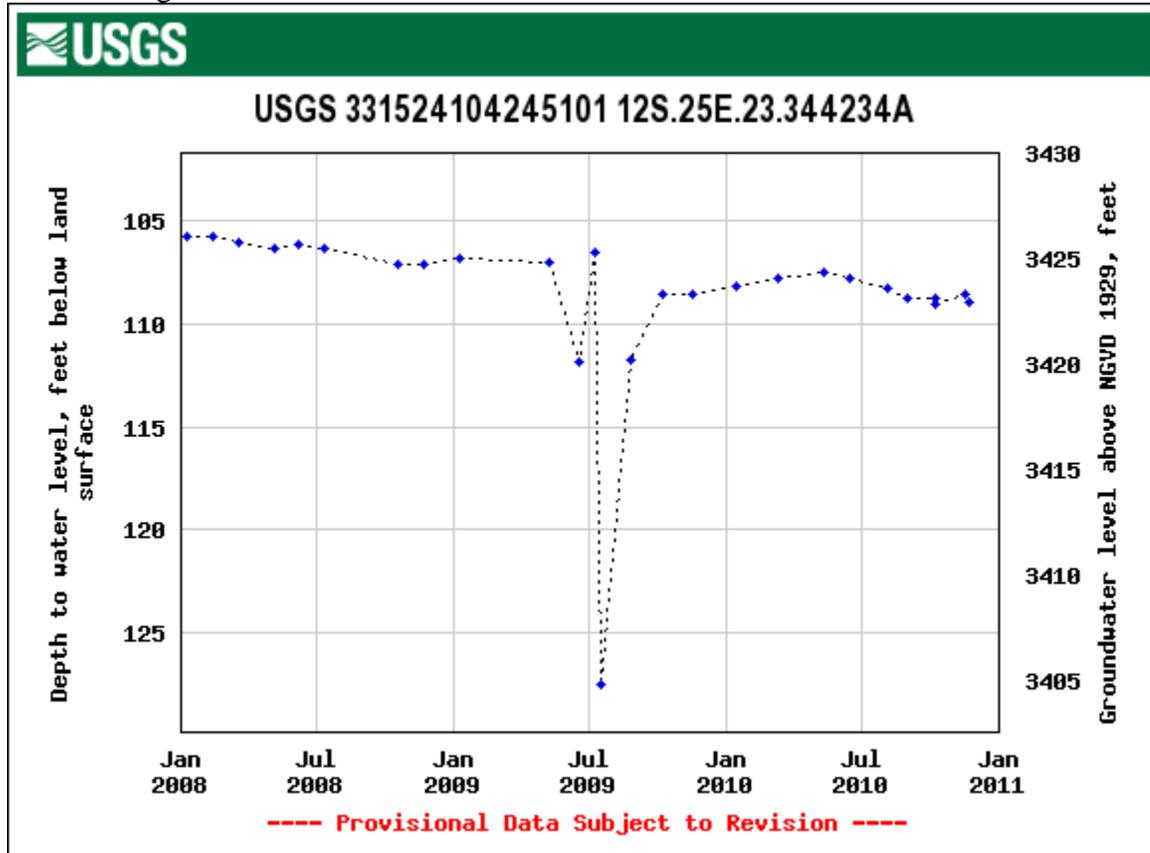
**Indicator 8- Aquifer Storage and Base Inflows from the Roswell Basin**

**Criteria:** Surface and ground water resources are interconnected. An increase in ground water supplies in the Roswell and Artesia basins is expected to eventually result in an increase in surface water supplies. Thus, improving groundwater conditions can indirectly benefit the Carlsbad Project, CID and the shiner. In addition, ground water resources can be lost to evapotranspiration as aquifer levels rise. The USGS maintains four monitoring wells in the Roswell and Artesia basins that provide regular data of groundwater depths. NMOSE and NMISC collect and review data on aquifer storage and base inflows.

**Trigger:** Aquifer storage and base inflows from the Roswell Basin are used as an indicator and do not contain a trigger.

**Actions taken in CY2011:** The USGS periodically measures the depth to water in a series of wells in the Roswell Basin. Some of the wells are in Chaves County, and others are located in Eddy County. Within Chaves County, two wells have been measured in the past few years. Depth to water measurements in these two wells suggests a decrease in aquifer storage for the artesian aquifer and a decrease in storage for the shallow aquifer in the Roswell Basin. The two wells are close together in a location approximately equidistant between Roswell and Dexter.

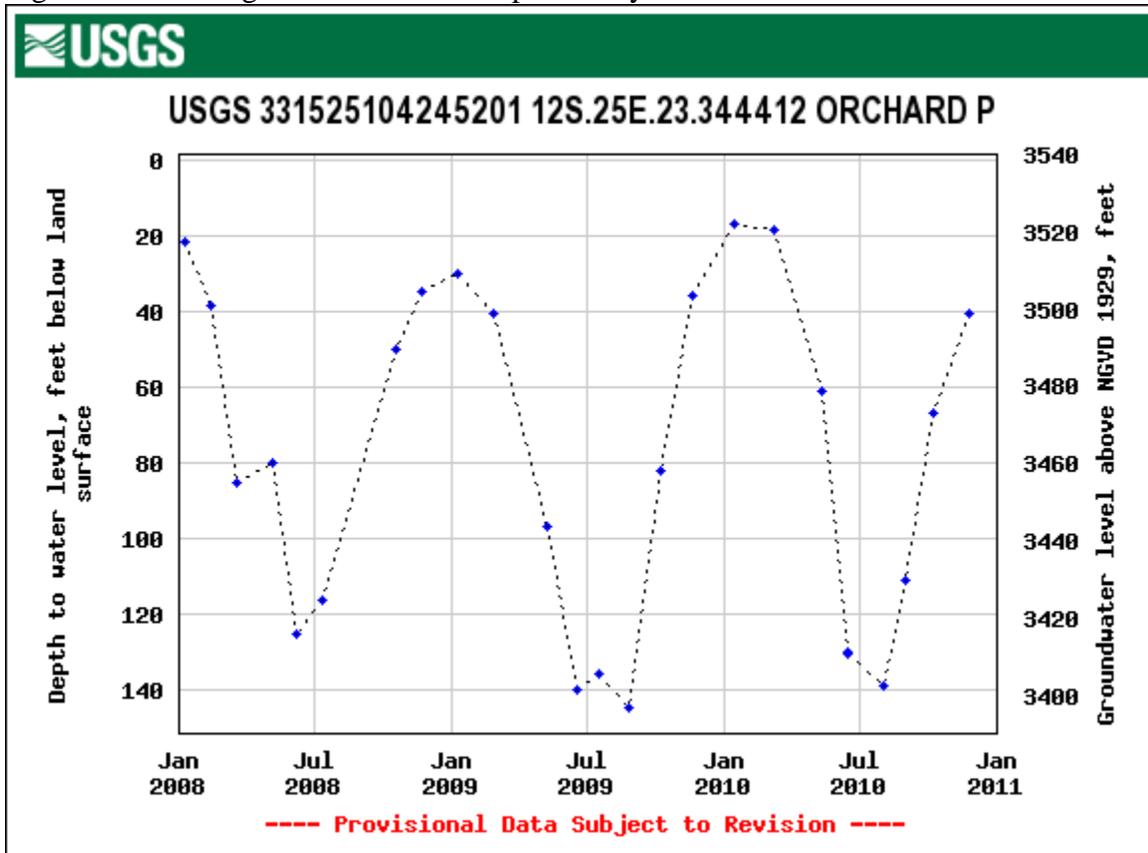
The first of these wells is designated USGS 331524104245101 and is completed at a depth of 231 feet below ground surface (bgs) in alluvial, bolson, and other surface deposits (see Figure 1). Based on nine measurements in 2011, the average depth to water was 109.12 feet bgs. In 2010 the average of eleven measurements was 108.42 feet bgs. Although the decrease in water levels between 2010 and 2011 is small (1 foot), a continuous downward trend from previous years can be seen in Figure 1.



Figure\_1. Depth to water for USGS shallow well 331525104245101 located in Chaves County, New Mexico.

The second Chaves County well, designated USGS 331525104245201, is 930 feet deep and is

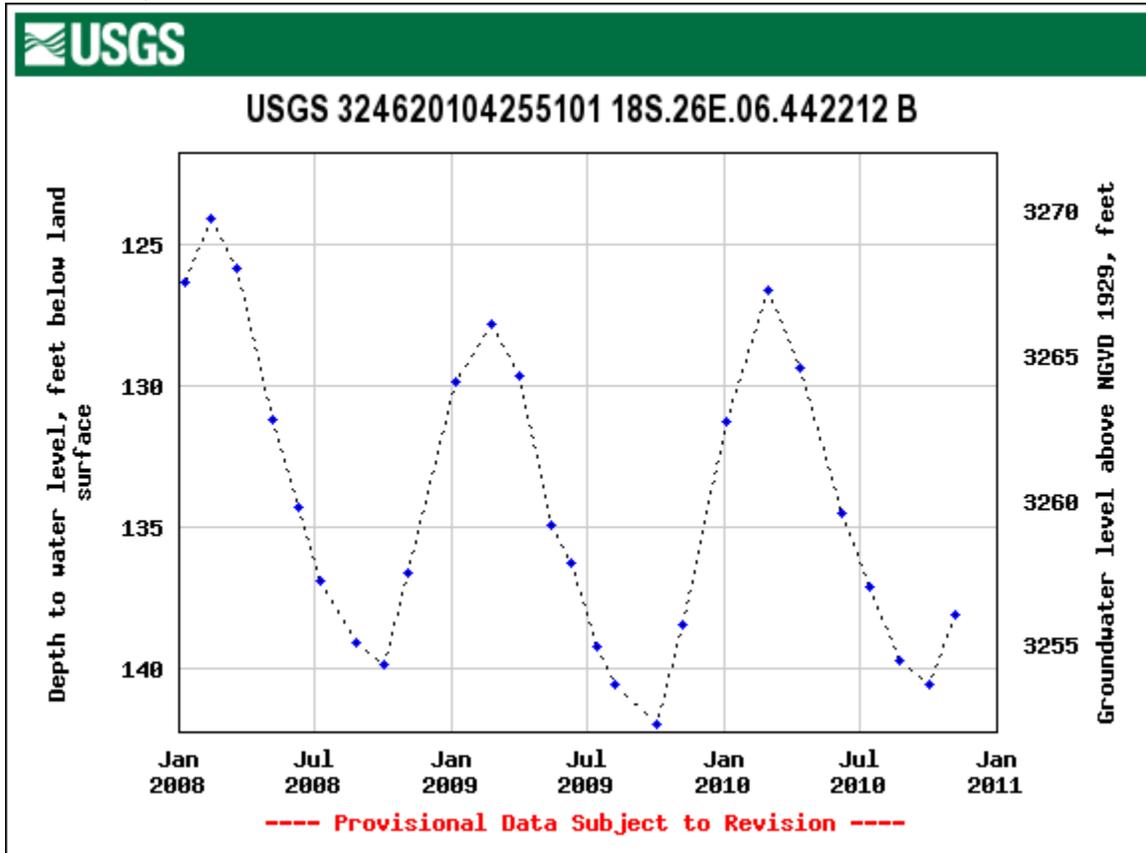
completed in the confined aquifer within the San Andres Limestone (see figure 2). Based on ten measurements in 2011, the average depth to water was 97.86 feet bgs whereas the 2010 average was 74.35 feet bgs. Confined aquifer water level measurements often show a dramatic response to irrigation pumping; consequently, yearly averages may not be a reliable indicator of aquifer storage. 2011 was a particularly dry year and water levels decreased from the 2010 calendar year. The measurements made during the non-irrigation season when water levels are the highest may be the most illustrative of aquifer conditions, as there is very little pumping occurring at that time. In this case, as shown in Figure 2, the water level at the end of the 2011 irrigation season began to rise similar to previous years.



Figure\_2. Depth to water for USGS Artesian well 331525104245201 located in Chaves County, New Mexico.

Within Eddy County, two wells have been measured in the past few years. The two wells are close together in a location south of Artesia. The first of these wells is designated USGS

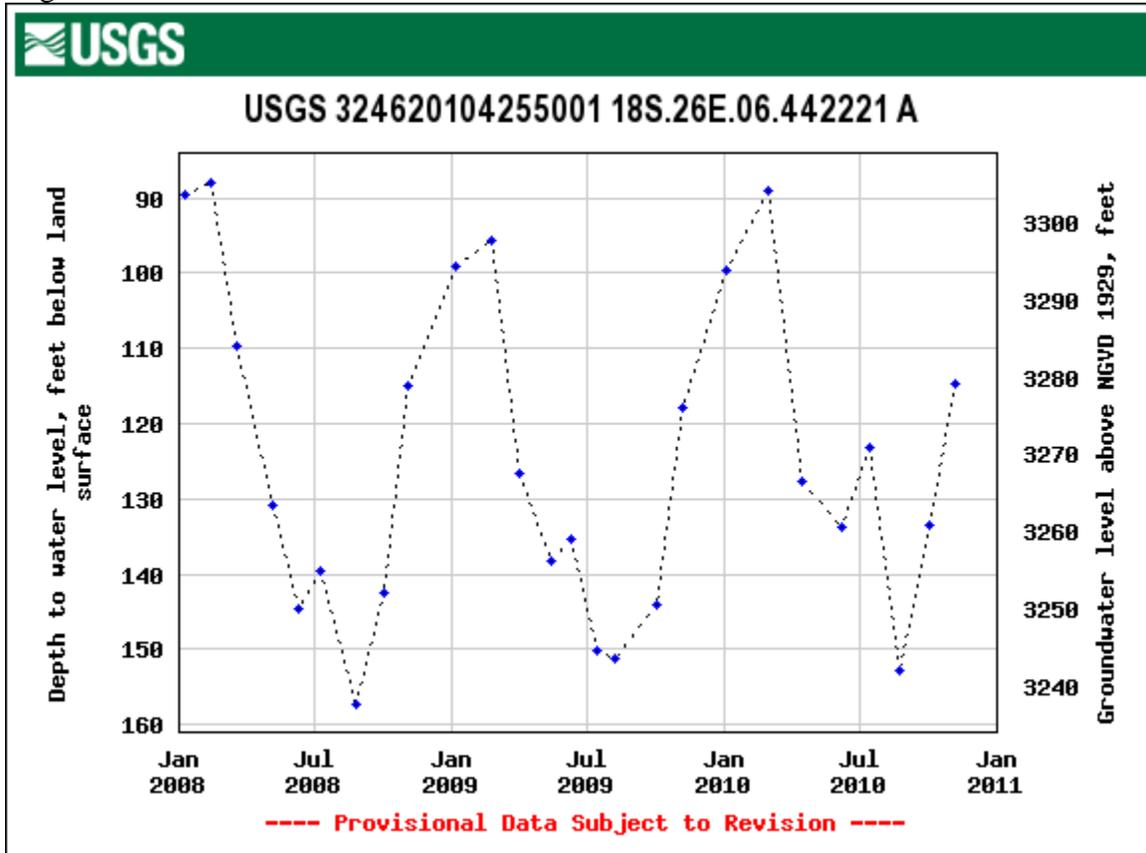
324620104255101 and is completed at a depth of 246 feet bgs in alluvial, bolson, and other surface deposits (see figure 3). Based on eight measurements in 2011, the average depth to water was 137.33 feet bgs which was 3 feet below the 2010 average of 134.64 feet bgs. Water levels in this well vary with season most likely due to irrigation pumping; in 2011 the peak and minimum water levels were lower than that of 2010, indicating that 2011 was drier than 2010 overall. Since 2008, this well has seen a downward trend in its water levels.



Figure\_3. Depth to water for USGS shallow well 324620104255101 located in Eddy County, New Mexico.

The second Eddy County well, designated USGS 324620104255001, is 1,008 feet deep and is completed in the confined aquifer within the San Andres Limestone (see Figure 4). Based on

seven measurements in 2011, the average depth to water was 129.02 feet bgs. The 2011 average water level is approximately 8 feet lower than the 2010 average of 121.78 feet bgs. Confined aquifer water level measurements often show a dramatic response to irrigation pumping; consequently, yearly averages may not be a reliable indicator of aquifer storage. By comparing the highest water levels in 2010 and 2011 it can be determined that both irrigation and non-irrigation season water levels were lower in 2011 than 2010.



Figure\_4. Depth to water for USGS Artesian well 324620104255001 located in Eddy County, New Mexico.

Because this water level data set is very small, these measurements may not be representative of aquifer storage conditions throughout the entire basin. There may be areas of the basin in which water levels are rising in response to conservation programs, increased recharge, or other factors and areas where water levels are falling due to proximity to pumping.

The Pecos Valley Artesian Conservancy District (PVACD) monitors water levels three times per month in ten wells in the Roswell Basin. Compared to 2009, the 2010 average water levels were higher in all ten wells. Four of the wells had less than 1 foot difference between 2009 and 2010 averages but the other six wells rose between 1.4 and 15.6 feet.

### Base Inflows

Beginning in 1985 and every year since then, the federal river master has determined and published base inflows for the Roswell Basin for the reach of the Pecos River between the Acme and Artesia stream gages. The base inflow for calendar year 2010 will be published at the end of June 2011. During calendar year 2009, the federal river master reported the base inflow was 19,800 acre-feet (af). This amount was less than that reported for calendar year 2008 when the base inflow was 28,600 af. Between 1985 and 2009 the average base inflow was approximately 30,400 af.

(NEW indicator from 2010 AMP)

**Indicator 9 – Decreasing Flow Target at Taiban to Conserve Water Supplies**

**Criteria:** Recognizing that keeping the river from intermittency throughout the year is higher priority and more beneficial to the endangered Shiner than always keeping Taiban gage at 35 cfs, Reclamation will drop flows in times of anticipated shortage and coordinate with the Service to conserve supplemental water supply.

**Trigger:** Consistently high flows at Acme (>10 cfs) gage while Taiban is at the target of 35cfs or lower. This usually occurs during weather events and commonly during non-irrigation months.

**Monitoring:** Reclamation funds USGS to operate and maintain the gages along the Pecos River. Inoperable gages are reported to the USGS and Reclamation initiates contracted monitoring as necessary to measure gage sites and report all findings immediately. Bureau of Reclamation Albuquerque Area Office Water Operations Group will initiate the need to begin this variance based on their evaluation of the current water situation.

**Response:** Reclamation will consult with the Service to determine the most prudent water management based on the well-being of the endangered species. If variance from the Taiban target of 35cfs is the most prudent action Reclamation will adjust its operations as such.

**Actions taken in CY2011:**

Action 1: Once continuous flows were reestablished throughout the river and bypass flows were available, Reclamation used this to save water from November 1 through December 31. Acme was between 10 and 20 cfs, while Taiban remained between 21 and 37 cfs. This was done after discussions with the Service and was agreed upon to conserve water with the uncertainty of the water supply for 2012.

## Discussion

Actions available to Reclamation include: 1) if bypass water is available, Reclamation will begin bypassing inflow to target 35 cfs at Taiban and/or keep the river continuous. 2) If bypass water is not available and the pipeline is operational and available for use, Reclamation will order the operation of the pipeline at a rate needed to keep the river continuous. 3) If bypass water is unavailable and the pipeline is unavailable or not enough, Reclamation will release Fish Conversation Pool or forbearance water at a rate needed to avoid intermittency. 4) Supplemental water pumpers (water leases) are used.

### **Recommendations:**

#### Improve Communication/Coordination

Improvements to communications between CID, FSID, and Reclamation should be incorporated into 2011 Carlsbad Project water operations. Irrigation districts should provide updates on the progress of repairs and maintenance on facilities critical to water delivery. Reclamation should actively prompt irrigation districts for timely updates or progress reports when maintenance is occurring on facilities that could become critical to Reclamation's operations to benefit the shiner. Specific recommendations include:

1. CID and FSID should promptly inform Reclamation of any potential delays in scheduled or on-going maintenance or repair activities.
2. Reclamation should actively request and obtain at least weekly updates on maintenance and repair activities for on-going work related to structures that could become critical to Reclamation's operations to benefit the Pecos bluntnose shiner.
3. Reclamation should give both CID and FSID as much advance notice as possible when there is the potential for changes in water operations to benefit the shiner or Tern.
4. CID/Reclamation improve communications on block releases
  - Water demand in CID
  - Need for river continuity
  - Advance notice to ranchers and Corp of Engineer
  - Status of Tern courtship and nesting

No new indicators for 2012 are suggested or indicated.