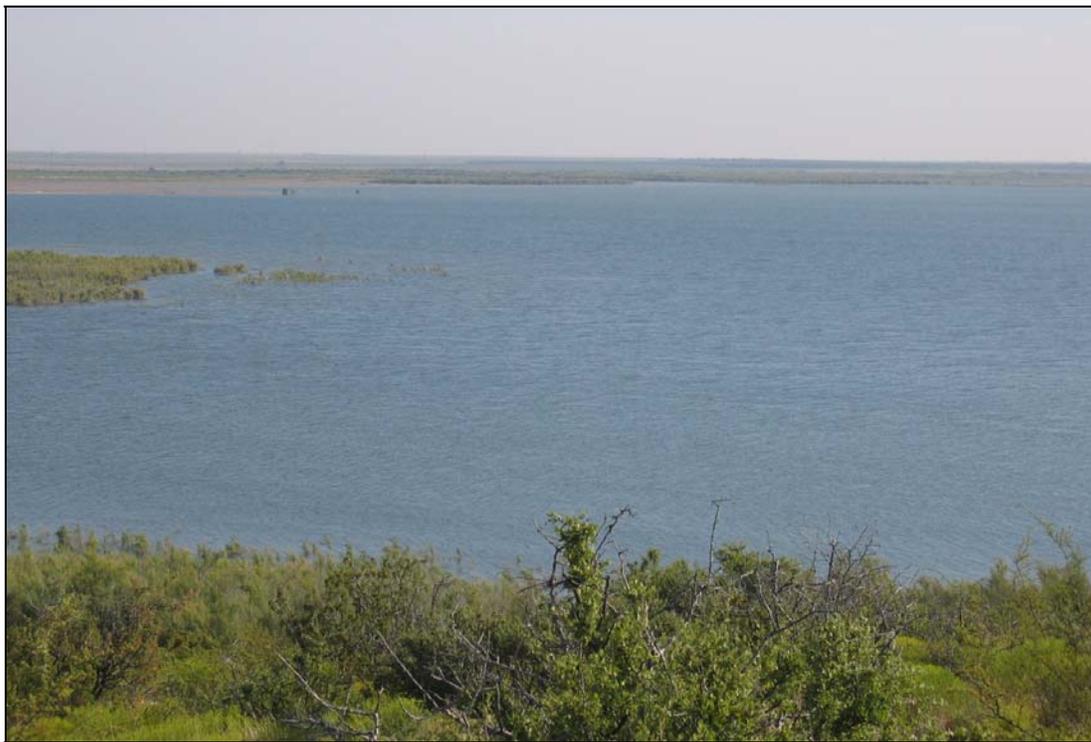


RECLAMATION

Managing Water in the West

2006 Interior Least Tern Monitoring Results

Brantley Lake, New Mexico



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

December 2006

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.

2006 Interior Least Tern Monitoring Results

Brantley Lake, New Mexico

Prepared by

Robert H. Doster, Wildlife Biologist

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Cover photograph: Brantley Lake as seen from the Brantley Lake State Park west side day-use area.



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Introduction

The Least Tern (*Sternula antillarum*) is the smallest member of the tern subfamily (Sterninae [Family Laridae]) in North America, with a body length of approximately 9 inches and a wingspan of 20 inches. The interior population of the Least Tern (*S. a. athalassos*) is recognized as a distinct subspecies (Interior Least Tern) based on studies of vocalizations and behavior (American Ornithologists' Union 1957, 1983; Thompson et al. 1997; Johnson et al. 1998). Three subspecies of Least Tern nest in the United States: the California Least Tern (*S. a. brownii*) nests from Baja California to the San Francisco Bay; the Interior Least Tern nests along the major tributaries throughout the interior U.S. from Montana to Texas and New Mexico to Louisiana; and the Eastern Least Tern (*S. a. antillarum*) nests along the coast from Texas to Maine. [Note: the Least Tern, previously positioned in the genus *Sterna*, was recently re-classified by the American Ornithologists' Union Committee on Classification and Nomenclature—North America (Banks et al. 2006) and placed within the genus *Sternula*.]

Breeding plumage of the Least Tern consists of a black cap, white forehead, throat and underside with a pale gray back and wings, and black-tipped yellow-orange bill. In flight, the species is distinguished by the long, black outermost primary feathers and the short, deeply forked tail. First-year birds have a dark bill, a dark gray eye stripe, and a dusky brown cap.

The Least Tern feeds primarily on small fresh- and saltwater fish, but its diet is varied and can include small crustaceans and insects (Thompson et al. 1997). Least Terns nest in shallow scrapes of sand, shell, soil, or other particulate materials throughout their breeding range. Clutches typically are 2 or 3 eggs and are incubated for approximately 21 days by both adults. Both adults also care for the young. Young are semi-precocial and typically take 21 days to become fully-feathered and flight-capable (Thompson et al. 1997).

Least Terns are Nearctic-Neotropical migratory birds that are widely distributed across North America in the breeding season and migrate to marine coastal areas throughout the Pacific coast of southern Mexico and along eastern coasts of Mexico, Central and South America, south to northern Argentina and southern Brazil (Thompson et al. 1997). The timing of arrival of Least Terns to North America varies by latitude. In New Mexico, Interior Least Terns typically begin to arrive in the Pecos River basin in early May and are present through August.

The Interior Least Tern was federally-listed as endangered on 27 June 1985 by the U.S. Fish and Wildlife Service (Service) (U.S. Fish and Wildlife Service 1985). This subspecies is also listed as endangered by the State of New Mexico. Within New Mexico, Least Terns primarily occur within the Pecos River basin where a small colony has nested at Bitter Lake National Wildlife (NWR) Refuge for the past 50 years (New Mexico Department of Game and Fish 2006). In 2004, up to seven pairs of Least Terns nested and produced at least six chicks that fledged at Brantley Lake (Fig. 1), the first known breeding in the state away from Bitter Lake NWR. In 2005 up to 9 pairs were present at Brantley Lake early in the summer but numbers declined during the breeding season and no successful nesting was documented.

In view of this recent occurrence of Least Terns at Brantley Lake, Reclamation consulted with the Service, pursuant to the Endangered Species Act, and was issued a Biological Opinion (BO;

consultation #2-22-03-F-171) from the Service on 14 April 2006 for the Pecos River dam operations. Subsequent to this BO, which expired 1 August 2006, Reclamation was issued a second, long-term BO (consultation #22420-2006-F-0096) for Carlsbad Project water operations and water supply conservation and covers the period from 2006 to 2016. In each of these BOs, Reclamation agreed to undertake several Reasonable and Prudent Measures (RPM) to benefit recovery of and avoid impacts or incidental take to Least Terns at Brantley Lake, as follows:

- 1) In cooperation with other willing land managers on the Pecos River and at Brantley Reservoir, Reclamation shall fund, implement and/or assist with enhancement of tern nesting and brood-rearing habitat on the Pecos River and at Brantley Reservoir prior to the arrival of terns in May of each year, in consultation with New Mexico Ecological Services Field Office (NMESFO). This measure will ensure that suitable habitat is available when terns arrive in spring.
- 2) Reclamation shall survey and monitor terns throughout the action area of the proposed action and consult with NMESFO if terns are detected at new sites.

The above RPMs are to be implemented through a number of terms and conditions. In summary, those terms and conditions include implementation of the following basic measures:

- 1) Create and/or maintain habitat for Least Terns each year, at least three times the size of the 28-acre site that terns used for breeding in 2004, equaling 84 or more acres of nesting and brood-rearing habitat by 2007. This includes 56 acres to be created in 2006. These areas of created habitat will be placed adjacent to the area where the terns nested in 2004, north of the South Seven Rivers inlet, and at a third location on the reservoir where human access is limited and predation is minimized.
- 2) Work with willing land managers to maintain a buffer zone of 1/4 mile or more around areas where terns are exhibiting breeding behavior and where nesting colonies are established.
- 3) Survey and monitor for tern throughout the action area each year.

The methods and results that follow are a summary of the activities undertaken in 2006 to fulfill Reclamation's commitments under the terms and conditions of the above-mentioned BOs.

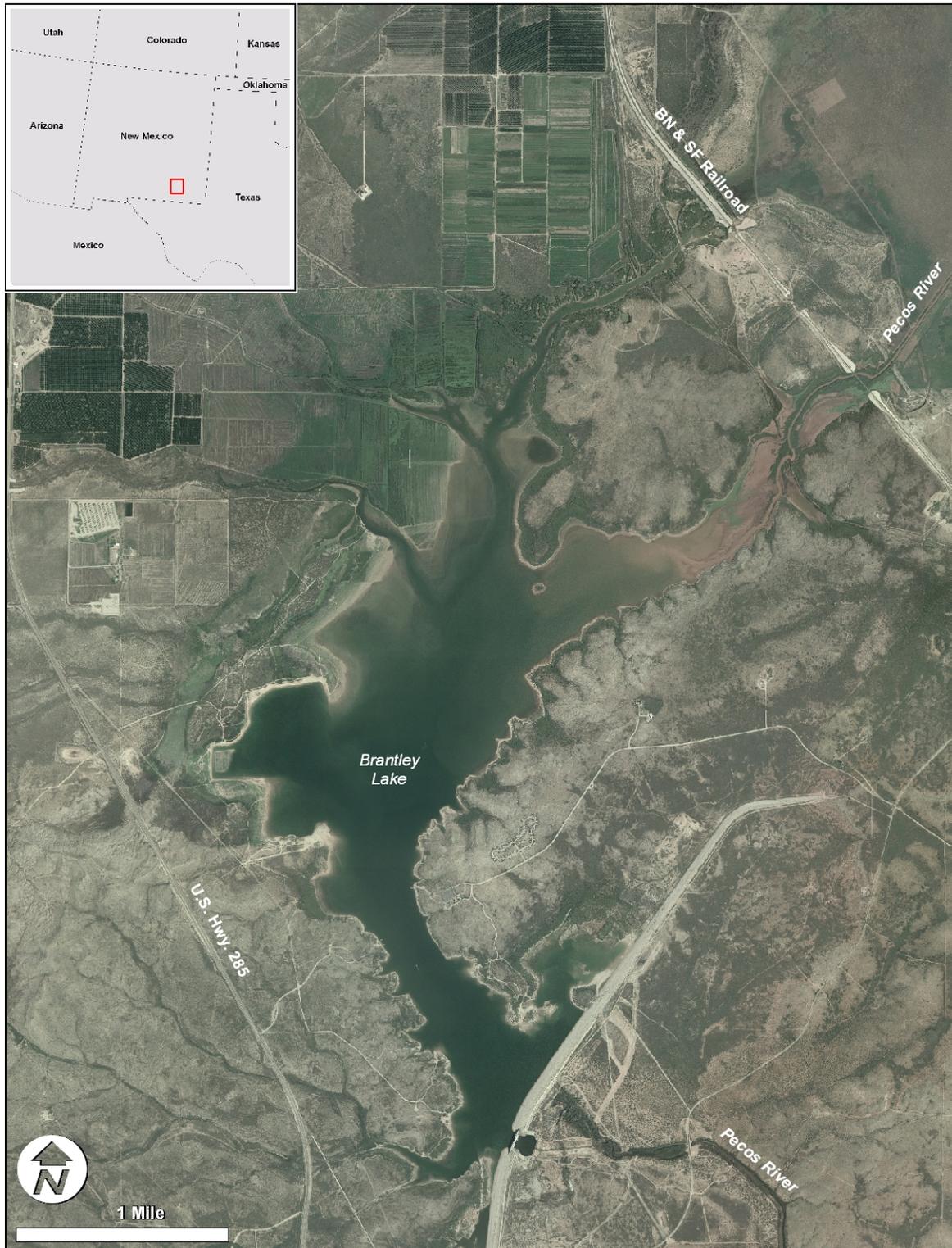


Figure 1. Aerial view of Brantley Lake, located approximately 12 miles north of Carlsbad, Eddy County, New Mexico. Photo date 25 August 2005; water surface elevation 3245.3 feet (MSL).

Methods

Presence/Absence Surveys

Surveys for Least Terns at Brantley Lake were conducted at approximately two-week intervals during the period May through August 2006. The first five visits included surveys on two days, the first of which occurred between 12:00 and 17:00 MDT and the second between 07:00 and 11:00 MDT. Surveying for two consecutive days and at two different time periods helped increase the likelihood that the maximum number of terns were detected. Complete-count surveys consisted of area searches of all potential nesting, roosting, and foraging sites along the western shoreline of Brantley Lake. Much of the eastern shoreline is not suitable for tern nesting because of the gypsum/limestone uplift forming that shoreline. However, the eastern shoreline was monitored, from the western side of the lake, for roosting and foraging terns. By using a spotting scope (20-60x), this was possible due to the narrow width (< 0.75 mile) of the lake in most locations. All survey count data were collected to be consistent with the reporting requirements of the Interior Least Tern range-wide survey (Lott 2006b) and were subsequently submitted to that program.

Nest Monitoring

Indicators of courtship and nesting activity by Least Terns were also watched for concurrently with presence/absence surveys. These indicators included pair formation and Fish Flight Display (Thompson et al. 1997), appearance of incubation, and fidelity to a potential nest scrape. If a nest was confirmed its contents were noted and its location was mapped using GPS (bearing-offset method). Observations were made from a distance (> 300 feet) via spotting scope to help avoid any disturbance to nesting terns.

Habitat Creation

Delineation of two areas for creation of nesting and brood-rearing habitat for Least Terns was accomplished using a geographic information system (GIS) and a mapping-grade global positioning system (GPS) receiver. In ArcGIS (version 9.0), recent aerial photography of the reservoir was overlain with a topographic contour of the reservoir and adjacent lands to determine where the lake's maximum conservation pool elevation is (3256 feet above mean sea level [MSL]). From this maximum pool elevation, two areas were then drawn and the resulting polygons were transferred to a Trimble GeoXT GPS receiver. With aid of the GPS receiver, outlines of the mapped polygons were flagged for vegetation clearing on the ground.

Using heavy equipment (Fig. 2), personnel with the Carlsbad Irrigation District (CID) began clearing vegetation from the two sites on 19 April 2006 and continued through 5 June 2006. Work began on 19 April and ended on 25 April at the first location and began on 26 April and ended on 5 June at the second site. Habitat creation sites were placed in two locations, immediately adjacent to the area where Least Terns nested in 2004 (north of the portion of the lake locally known as "champion cove") and immediately north of the South Seven Rivers inlet. Both sites were placed adjacent to and up-slope of the 3256-foot elevation contour so as to be

immediately outside of the reservoir's conservation storage pool. This placement will allow for nesting areas that will not be subject to flooding as a result of reservoir operations.

Vegetation clearing work was accomplished by using a bulldozer (Fig. 2B) to do coarse vegetation removal and a tractor with a specially-modified rake (Fig. 2A) to remove woody debris and reduce soil particle size to that resembling substrate used by Least Terns for nesting (Thompson et al. 1997). Vegetation on the southern site was largely herbaceous plants with some grasses and scattered mix of saltcedar (*Tamarix* sp.). The northern site was mostly covered in kochia (*Kochia scoparia*) with approximately 30 percent mature saltcedar. Approximately 1/3 of each of the two sites, nearest to open water, was finely raked to simulate nesting substrate while the remaining 2/3 of each site was left with more coarse soil particles, a greater mix of woody debris, and some sparse vegetation so as to serve as brood-rearing habitat.



Figure 2. Heavy equipment used to create Least Tern nesting and brood-rearing habitat at Brantley Lake, New Mexico. A tractor with a modified rake (A) was used of for soil raking and a bulldozer (B) was used for vegetation removal and coarse soil manipulation.

Results

Presence/Absence Surveys

Table 1 displays all observations of Least Terns at Brantley Lake in the spring and summer of 2006. Least Terns were first detected at Brantley Lake on 11 May with one adult observed. Numbers of Least Terns detected increased in late May until a peak of 20 adults were observed on 24 May. On 8 June 12 adult Least Terns were observed to be in the process of courtship and nesting. It is likely that these 12 adults comprised six pairs. Following the nesting attempts that occurred in early June, the number of terns at Brantley Lake diminished to between two and four adults for much of the remainder of the season.

In late June, one sub-adult Least Tern was noted and on 2 August a single, immature tern was observed. This hatch-year bird on 2 August may have arrived from the breeding colony at Bitter

Lake NWR (approximately 60 miles upstream on the Pecos River) or some other breeding area in the region. Because of the great fluctuations in the Brantley Lake pool over the course of the 2006 spring and summer, it is unlikely that this bird had its natal origins here.

Table 1. Summary of Least Tern observations at Brantley Lake, New Mexico in 2006.

2006 Date	Adult	Sub-adult	Immature	Nests [eggs]
11 May	1	0	0	0
12 May	0	0	0	0
24 May	20	0	0	0
25 May	14	0	0	0
8 June	12	0	0	4 suspected [unknown]
9 June	present ^a	0	0	2 confirmed [3 each]
22 June	4	1	0	0
23 June	3	1	0	0
5 July	0	0	0	0
6 July	0	0	0	0
18 July	2	0	0	0
2 August	2	0	1	0
24 August	0	0	0	0

^a Not counted due to efforts involved in nest searching.

Nest Monitoring

On 8 June four Least Terns were observed on the western shoreline of Brantley Lake that were exhibiting behavior suggestive of incubation and/or egg-laying (Fig. 4A). On 9 June two nests were located and confirmed to have three eggs each (Fig. 4B). The locations of these nests were east of one of the newly-created nesting habitat sites (Fig. 5), well into the reservoir pool at an approximate elevation of 3244 feet. The northern nest was estimated to be 290 feet horizontally from the lake surface and the southern nest was approximately 30 feet from water. At this elevation and distance to water surface, the nests were subject to possible inundation of as much as 12 feet of water. Subsequent to these discoveries, rising water levels due to upstream reservoir releases likely inundated the nests before the eggs could hatch and the semi-precocial chicks could move to avoid rising water. The incidental taking of these eggs was allowed by the Service as per the Incidental Take Statement of the 2006 BO. No additional nests, eggs, or nesting activity were observed during the remainder of the breeding season.



Figure 4. Adult Least Tern incubating (A) and nest with three eggs (B), both at Brantley Lake, New Mexico. Photos taken 9 June 2006.

Habitat Creation

Two areas, totaling 56.6 acres, of nesting and brood-rearing habitat were created for Least Terns by CID personnel off the western shore of Brantley Lake in the spring of 2006. One site, to the south of the South Seven Rivers inlet and immediately upslope of the 2004 Least Tern nest site (Figs. 5 and 6), was completed on 25 April resulting in a site that is 11.9 acres in area. The second, northern site is immediately north of the South Seven Rivers inlet and encompasses 44.7 acres (Figs. 5 and 7). Located on the Seven Rivers Waterfowl Management Area, this northern site was completed on 5 June. Because the northern site had several acres of mature saltcedar cover on it, there are remnant piles of woody debris that remain on the perimeter of the site. These debris piles will be removed by burning in winter 2006/2007 when the local fire danger is reduced.

After completion the southern tern habitat site was signed to deter human visitation. By the end of August, it appeared that, for the most part, the signs were effective in deterring human trespassers. No signage was necessary around the northern site because it is ideally-placed on the Seven Rivers WMA where public access is restricted and natural features, such as the South Seven Rivers inlet/arroyo, prevent human access.

Both of the recently-cleared habitat creation sites had become partially re-vegetated by late August 2006 due largely to late summer rainfall. In most portions of the created habitat areas the primary pioneer plant to cover the sites was kochia. In a few locations, saltcedar had also started to regrow.



Figure 5. Locations (yellow circles) of two Least Tern nests found on 9 June 2006 at Brantley Lake. Red polygons delineate areas where Least Tern nesting and brood-rearing habitat was created in April and May 2006.

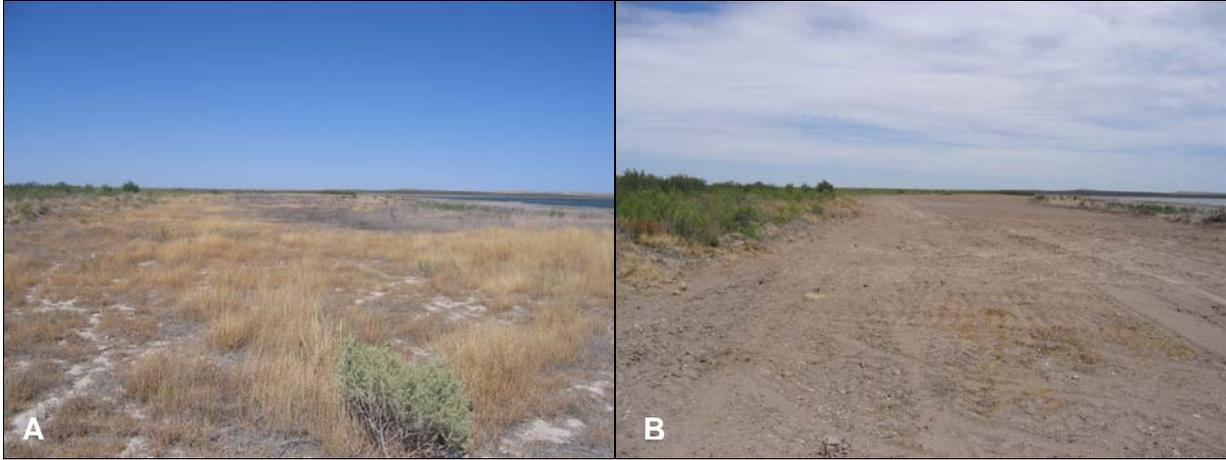


Figure 6. Southern site (11.9 acres) along Brantley Lake shoreline before (A) and after (B) Least Tern nesting and brood-rearing habitat creation work.

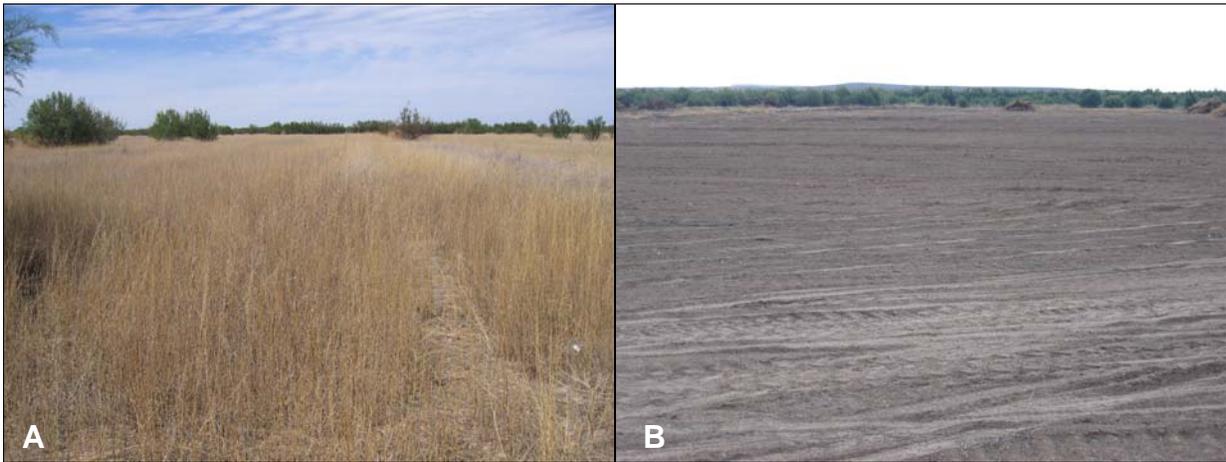


Figure 7. Northern area (44.7 acres) of Least Tern nesting and brood-rearing habitat creation before (A) and after (B) vegetation clearing and soil raking.

Discussion

Numbers of Least Terns observed at Brantley Lake during spring migration and the breeding season were similar to that observed the previous two years when monitoring for this species began. The peak in tern numbers observed on 24 May 2006 was likely due to stop-over of migrants passing north within the Pecos River valley. Therefore, the number of terns detected in early June (12 birds), when nesting was encountered, were likely all resident birds and this number is more indicative of the breeding season population. Numbers of resident Least Terns dropped in late June to just 4 birds after lake levels rose and inundated the nests that were either being initiated or incubated. It is unknown where the majority of these resident Least Terns dispersed to after the high-water event. In 2007, presence/absence surveys for terns will begin in early May and continue through August at approximately bi-weekly intervals.

There was no indication that terns used the newly-created nesting and brood-rearing habitat areas in 2006. A likely reason why these new areas were unused was because the lake was at a low level (approximate elevation 3243 feet) leaving large expanses of open, unvegetated mudflat habitat that were ideal for nesting. These expanses of bare lakebed were also in close proximity to open, shallow water where terns could easily forage for fish and other food items. With the lake level low, this left the new habitat areas (which were purposely placed at the top of the lake's conservation pool) distant from open water (> 800 feet) and less suitable for the species which prefers to nest in close proximity to open water (Thompson et al. 1997).

A third created nesting and brood-rearing habitat site will be delineated during winter 2007. As agreed to in the 2006 BO, this area will be at least 28 acres in area and will be in a separate location from the existing two sites. Maintenance of the other two habitat areas, which will involve removing the new vegetation that grew during late summer of 2006, will take place during winter/spring 2007, prior to the arrival of Least Terns in May.

In 2007, adaptive management plans to help make the created habitat sites more attractive to Least Terns for nesting will include the use of decoys as social attractants (Fancher 1984, Kotliar and Burger 1984, Burger 1988). Current plans include the placement of as many as 100 life-size decoys across the three areas of created habitat. Based on past success in luring terns to new nesting areas in other parts of the species' range, it is hoped that these decoys will be effective at establishing a nesting colony of Least Terns at Brantley Lake. Other means of making the created habitat areas attractive to nesting terns that may be explored in the future, if necessary, include the broadcasting of Least Tern vocalizations around the created nesting habitat and in conjunction with decoy use.

To further help ensure that the created habitat sites are utilized by terns, flexible water management in Brantley Lake should be considered where possible. Management of lake levels so that the water surface is high, and thus close to the managed habitat during the onset of Least Tern nesting (late May to early June), would help increase the likelihood that the created/managed habitat areas will be utilized by the birds.

Acknowledgements

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