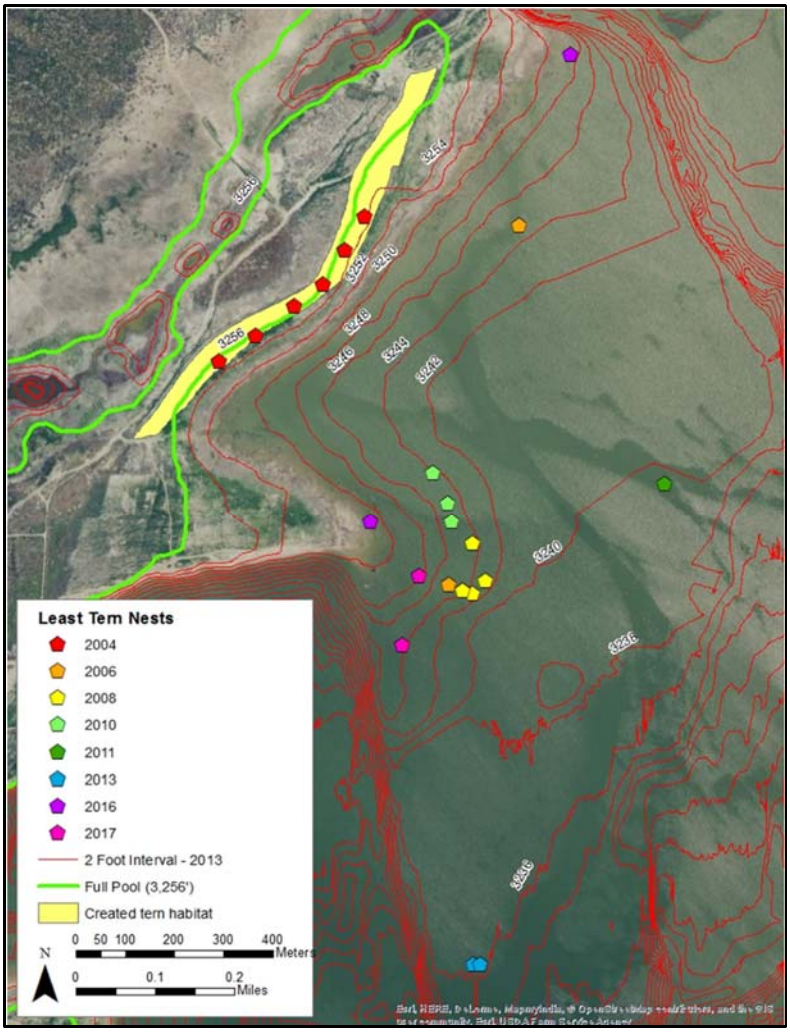
RECLAMATION

Managing Water in the West

Interior Least Tern Monitoring Results 2017

Brantley Reservoir, New Mexico

Carlsbad Project



U.S. Department of the Interior
Bureau of Reclamation
Fisheries and Wildlife Resources
Denver, Colorado

February 2018

Mission Statements

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

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.

Interior Least Tern Monitoring Results 2017

Brantley Reservoir, New Mexico

Carlsbad Project

Prepared for

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Executive Summary

The interior population of the Least Tern was Federally listed as endangered on May 28th 1985 by the U.S. Fish and Wildlife Service (USFWS) (USFWS 1985). The interior population of the Least Tern (*Sternula antillarum*) is recognized as a distinct subspecies – the Interior Least Tern (S. *a. athalassos*) - based on studies of behavior and colorimetrics (American Ornithologists' Union 1957; Thompson et al. 1997; Johnson et al. 1998). This subspecies is also listed as endangered by the State of New Mexico (New Mexico Department of Game and Fish 2014).

In New Mexico, Least Terns breed within the Pecos River basin where a colony has nested at Bitter Lake National Wildlife Refuge (NWR) for the past 60 years. In 2004, another small colony of nesting terns was discovered at Brantley Reservoir, approximately 60 miles downstream of Bitter Lake NWR.

Because of the 2004 occurrence of Least Terns at Brantley Reservoir, the Bureau of Reclamation (Reclamation) consulted with the USFWS, pursuant to the Endangered Species Act, and was issued a Biological Opinion (BO) (Consultation #2-22-03-F-171) from the USFWS on April 14th 2006 for Pecos River dam operations. Subsequent to this BO, which expired August 1st 2006, Reclamation was issued a second, long-term BO (Consultation #22420-2006-F-0096) for Carlsbad Project water operations and water supply conservation that covers the period from 2006 to 2016. On March 17, 2016, Reclamation again initiated formal consultation (#02ENNM00-2016-F-0506) with the USWFS regarding water operations on the Pecos River and was issued a new BO on December 4th, 2017. The December 2017 BO is intended to cover a 10-year period from 2017 through 2026. However, since the latest BO was not issued until December 2017 – after the Least Tern breeding season – conditions outlined in the 2006-2016 BO were adhered to for the 2017 season and addressed in this report. In 2018, conditions of the latest BO will be implemented.

In the 2006 -2016 BO, Reclamation agreed to undertake several Reasonable and Prudent Measures to avoid or lessen the likelihood of incidental take for Least Terns at Brantley Reservoir, 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 area of the proposed action and consult with NMESFO if terns are detected at new sites.

The following is a brief synopsis of Least Tern monitoring efforts at Brantley Reservoir since 2004:

2004 - At least seven pairs of Least Terns nested and produced a minimum of six chicks that fledged at Brantley Reservoir; the first known breeding in the state other than at Bitter Lake NWR.

2005 - Up to nine pairs were present at Brantley Reservoir early in the summer, but numbers declined during the breeding season and no nesting was documented.

2006 - Least Terns again attempted to nest at Brantley Reservoir when six pairs were observed during the breeding season and two confirmed nests were located within the reservoir pool. These nesting attempts were unsuccessful as they were inundated by rising reservoir levels.

2007 - No pairing or nesting activity was detected at Brantley Reservoir although a few terns were present most of the summer.

2008 – Up to 12 adult terns comprising 5 pairs with 4 nests were documented. However, rising reservoir levels inundated all nests.

2009 - Five adults and one sub-adult were observed between late May and late July. One pair was recorded based on courtship behavior, however, no nesting attempts were documented.

2010 - Nesting terns were again documented, when a total of 25 terns were observed during June surveys. These birds formed three breeding pairs; each built a nest and laid eggs. Rising reservoir water again inundated all nests and all eggs were lost.

2011 - During the summer breeding season an estimated two pairs were recorded and one nest was located which was subsequently lost to depredation.

2012 - Although several terns were observed on various occasions and an abundance of suitable nesting habitat existed, no courtship or pairing was observed and no nests were found. No irrigation block release and resulting rise in reservoir elevations occurred during the 2012 season due to insufficient storage in upstream reservoirs.

2013 – Several terns were observed on multiple visits and a low reservoir again presented an abundance of nesting habitat. The water level remained low during the breeding season due to a lack of upstream releases. Two nests (one depredated and one active) were located. The completed nest had apparently been depredated and the active nest was ultimately abandoned with two eggs left in the nest scrape.

2014 – Several terns were observed on multiple visits. No pairs or nests were observed during the breeding season. Reservoir levels rose in early May; inundating previously exposed areas and essentially eliminating all suitable nesting habitat upon the terns arrival. Reservoir levels remained relatively high throughout the summer and suitable nesting habitat was nearly absent.

2015 – No Least Terns were observed during any site visits throughout the breeding season. Reservoir levels began to rise to record levels in late 2014, peaking at 3264.6 feet (ft) in March 2015 – nearly 10 ft above full conservation pool. Reservoir levels remained at or near record

levels throughout the summer breeding season - inundating all previously exposed areas and essentially eliminating all potential nesting habitat.

2016 – Two pairs, and one individual adult Least Tern were observed during the summer breeding season. The two pairs each constructed a nest and laid two eggs each. One nest was abandoned, while the eggs of the remaining nest were collected by USFWS personnel prior to inundation from rising reservoir levels. The eggs were transferred to the Desert Willow Wildlife Rehabilitation Center in Carlsbad, NM, where they were successfully hatched and the chicks hand reared until their successful release back into the wild on September 13th at Bitter Lake NWR. The successful release of the two hand-reared terns documents the first "successful" fledging of young since 2004 at Brantley Reservoir.

2017 – Two pairs of Least Terns were documented during the 2017 breeding season. Both pairs constructed scrapes and each laid a single egg. Due to impending inundation of the nest scrape by rising water levels, both eggs were collected and taken to the Desert Willow Wildlife Rehabilitation Center in Carlsbad, NM for artificial incubation. Both eggs failed to hatch.

Introduction

The Least Tern (*Sternula antillarum*) is the smallest member of the tern subfamily (Sterninae - Family Laridae) in North America, with an approximate body length of nine inches and wingspan of 20 inches. Three breeding populations of Least Tern are tentatively (Boyd and Thompson 1985) recognized by the American Ornithologists' Union (1998) in the United States: the California Least Tern (*S. a. brownii*) nests from Baja California to the San Francisco Bay; the Interior Least Tern (*S. a. athalassos*) (hereafter referred to as Least Tern or tern) nests along major tributaries throughout the interior U.S. from Montana to New Mexico, Texas, and Louisiana (Lott 2006); and the Eastern Least Tern (*S. a. antillarum*) nests along the Atlantic coast from Texas to Maine. *S. a. athalassos* and *S. a. browni* are both Federally listed endangered species, and also classified as protected species in many States where they breed. *S. a. antillarum* is not a Federally listed species, but protected in many States where it breeds from Texas to Maine.

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 (Figure 1). 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.

Figure 1. Interior Least Tern adults with characteristic dark bill tip and plumage.

Least Terns are Nearctic-Neotropical migratory birds that are widely distributed across North America during the breeding season. They overwinter in 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 seasonal arrival of Least Terns to North America varies by latitude. In New Mexico, Least Terns typically begin to arrive within the Pecos River basin by mid-May and are generally present into August. Based on nesting data gathered from several reports specific to Brantley Reservoir and Bitter Lake NWR, including those from Montgomery (2004, 2005, 2006, 2007, and 2008) and Doster (2006, 2007, and 2009), the typical tern nesting period within the Pecos Basin extends from the third week of May through the third week of July (i.e. May 21st to July 21st).

The Least Tern feeds primarily on small fish, but its diet is varied and can include small crustaceans and insects (Thompson et al. 1997). Terns will pair monogamously for the breeding

season, nesting in tight to loose colonies. Least Terns nest in shallow scrapes of sand, shell, soil, or other particulate materials throughout their breeding range. Least Terns construct their scrapes on shorelines, sandbars or islands that are devoid of vegetation and in close proximity to water. Clutches typically are two or three eggs and are incubated for approximately 21 days by both adults. Least Terns are known to renest, particularly following a failed attempt. Both adults care for the young after hatching. Young are semi-precocial and typically take 21 days to become fully-feathered and flight-capable (Thompson et al. 1997). Nest depredation can be high; in some instances as many as 80 percent of the eggs or chicks from tern colonies have been lost to depredation (Thompson et al. 1997). Common local predators observed at Brantley Reservoir include skunks, coyotes, raccoons, unleashed dogs, crows, ravens, herons, and ring-billed gulls.

Nesting Least Terns were first documented within the Pecos Basin in 1949 at Bitter Lake National Wildlife Refuge (NWR) (Montgomery 2005). In 2004, nesting was documented at Brantley Reservoir (Montgomery 2004 - Figure 2). Due to the potential impacts to nesting terns as a result of Pecos River dam operations, the Bureau of Reclamation consulted with the U.S. Fish and Wildlife Service who identified several Reasonable and Prudent Measures (RPMs). The RPMs identified in the Service's Biological Opinion (BO) were to be implemented through the following terms and conditions:

1) Enhance 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 depredation is minimized. Placement of these sites should be as close as possible to the full conservation pool of the reservoir (elevation 3255.3 feet). Adaptive management methodology shall be used annually to modify enhancement locations and/or techniques until a stable tern colony is established.

2) Work with willing land managers to maintain a buffer zone of one fourth mile or more around areas where terns are exhibiting breeding behavior and where nesting colonies are established.

3) Survey and monitor for terns throughout the action area each year.

The methods and results that follow are a summary of the activities undertaken in 2017 to continue to fulfill Reclamation's commitments under the terms and conditions of the 2006-2016 BO and associated RPMs. As previously discussed, measures identified in the December 2017 BO will be implemented in 2018.

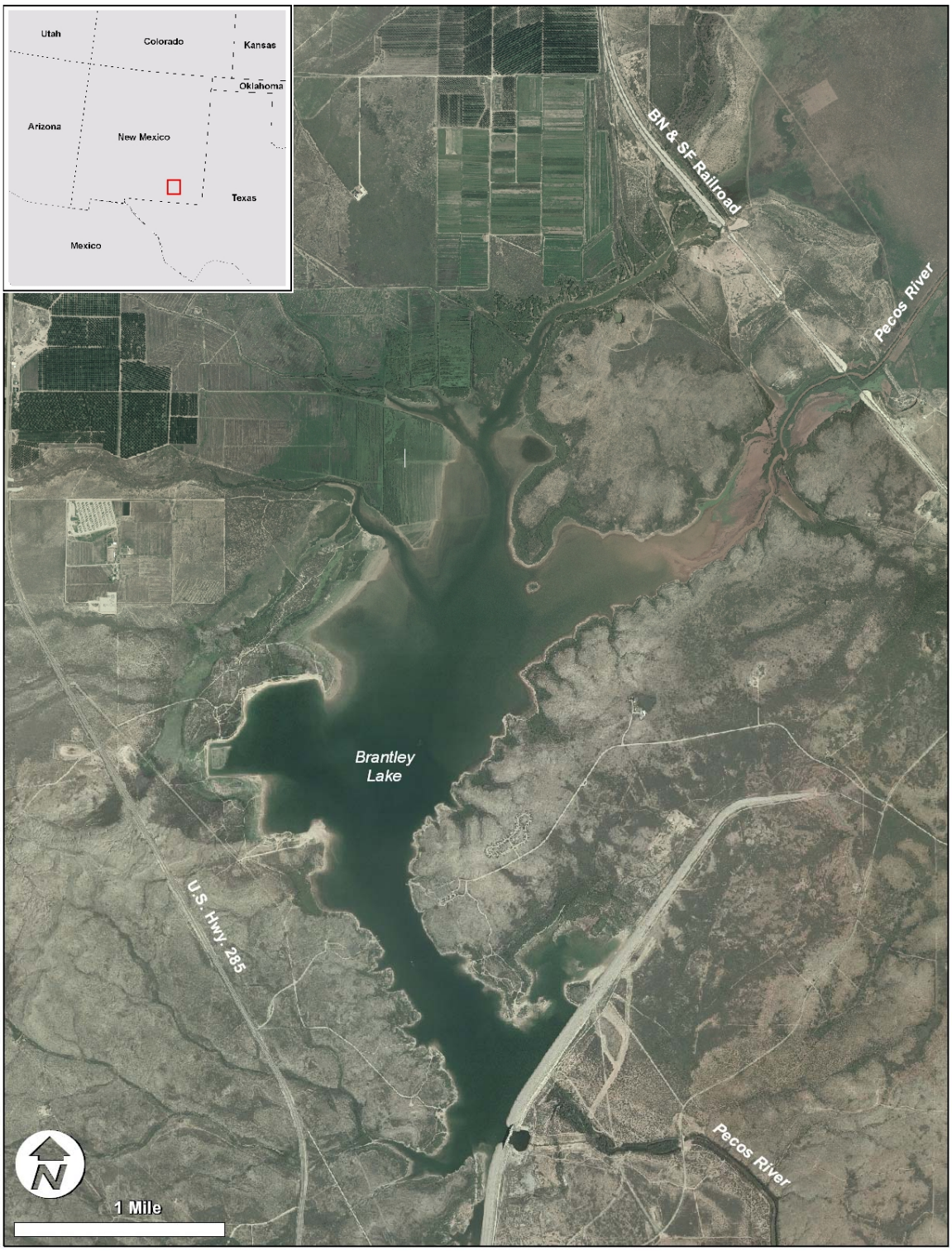

Figure 2. Brantley Reservoir with general concentration of Least Tern activity from 2004 through 2017. Photo date August 25th 2005; water surface elevation 3245.27 feet (MSL).

Methods

Presence/Absence Surveys

Surveys for Least Terns at Brantley Reservoir were conducted weekly from late May to early August. All visits included surveys on two consecutive days, the first of which typically occurred between 17:00 and 20:00 MDT and the second between 05:30 and 11:00 MDT. Surveying on two consecutive days and at two different diurnal periods increases the likelihood that the maximum number of terns will be detected. Complete-count surveys consisted of area searches of all potential nesting, roosting, and foraging sites along the western and northern shoreline of Brantley Reservoir.

Monitoring efforts were concentrated at historic use areas in the vicinity of Champion Cove, and areas where the reservoir was most constricted – such as between the east and west boat ramps, and the dam breach at old Lake McMillan. These constricted areas provided choke points and were monitored for potential foraging terns moving through the area. As much shoreline as possible was monitored from various vantage points with the aid of a 60 power zoom spotting scope in an effort to locate roosting and foraging terns. In addition to monitoring terns through the use of the spotting scope, the shoreline of the upper reservoir pool was also periodically surveyed via kayaking and/or walking during the 2017 season (Figure 2). Kayaking and/or walking also increased the probability of detection since some areas could not effectively be observed through the spotting scope.

All survey count data collected were consistent with the reporting requirements of the Least Tern range-wide survey (Lott 2007).

Nest Monitoring

If Least Terns were detected, indicators of courtship and nesting activity were watched for concurrently while conducting presence/absence surveys. These indicators included pair associations and fish flight displays (Thompson et al. 1997), appearance of incubation, and fidelity to a potential nest scrape. If a nest scrape was confirmed, its contents were noted and its location was mapped using a global positioning system (GPS) receiver (bearing-offset method). Observations were typically made from a distance of greater than 100 meters (m) via spotting scope to help avoid any disturbance to potential nesting terns. The surface elevation of a nest was also estimated in an effort to predict potential impacts from rising reservoir levels caused by a possible upstream irrigation block release.

Beginning in 2016, through collaboration with the USFWS and in lieu of nest relocation, eggs that were in immediate threat of inundation were collected and transferred to the Desert Willow Wildlife Rehabilitation Center in Carlsbad, NM. The Desert Willow Wildlife Rehabilitation Center was equipped and prepared to artificially incubate the eggs until hatching, and then hand-rear the young until they would be capable of flight and released back into the wild. The chronology of the nest, in conjunction with the scheduling of the irrigation block release, was considered in coordination with the USFWS to determine if, or when, the eggs should be collected. Although all nest scrapes were monitored, only those containing eggs were recorded as active nests.

Created Habitat

Cleared Sites
In compliance with USFWS RPMs to create tern nesting habitat in close proximity to full conservation pool (3255.3 ft), 56.6 acres in 2006 and 27.4 acres in 2007 were cleared (Figure 3). Annual maintenance of these created Least Tern nesting and brood-rearing habitat sites was last conducted by New Mexico Department of Game and Fish and Carlsbad Irrigation District personnel in early 2009. This work was accomplished by using a tractor and disks to break down and remove the vegetation growth [primarily kochia (*Kochia scoparia)*] from the previous summer.

Floating Platform
Also, in an attempt to create habitat in proximity to water that was not susceptible to flooding, a nesting platform was installed in the reservoir adjacent to Least Tern use areas on June 23rd 2009. The platform consisted of four smaller platforms cabled together to allow for flexibility in the wind/waves. Total dimensions were approximately five meters by five meters. This platform was covered by sand and driftwood to mimic shoreline habitat and gaps were sealed to prevent bird entrapment. However, by August 2009, the platform was rendered inoperable by high winds and corresponding wave action. The platform was removed in February 2010 after being deemed a safety hazard by Reclamation's Dam Safety Program and the State Park.

Reservoir Elevations

In an effort to more effectively address potential impacts to the Least Terns due to fluctuating reservoir levels, an annual review and assessment of reservoir conditions was initiated in 2012. An evaluation of habitat availability was conducted from early May through August. Reservoir elevations and the corresponding shoreline were assessed to determine the extent and distribution of available nesting and brood rearing habitat. Reclamation's 1992 Area Capacity Tables for Brantley Reservoir were utilized to determine surface area at various seasonal reservoir elevations through 2013. Beginning in 2014, updated 2013 Area Capacity Tables were used.

Results

Presence/Absence Surveys

Most survey efforts were focused adjacent to the western shoreline in proximity to historic nesting and foraging areas. As many shoreline and open water areas as possible were monitored in an effort to locate any tern foraging, roosting, or nesting activity.

Due to the gently sloping nature of this shoreline, a vast expanse of suitable habitat in the form of sand/gravel and mud flats typically becomes available when reservoir elevations drop to 3244 ft. or lower (Figure 3). During the 2017 breeding season, reservoir elevations reached a season low of approximately 3242 ft on June 24th, which provided relatively abundant exposed, unvegetated shoreline suitable for nesting.

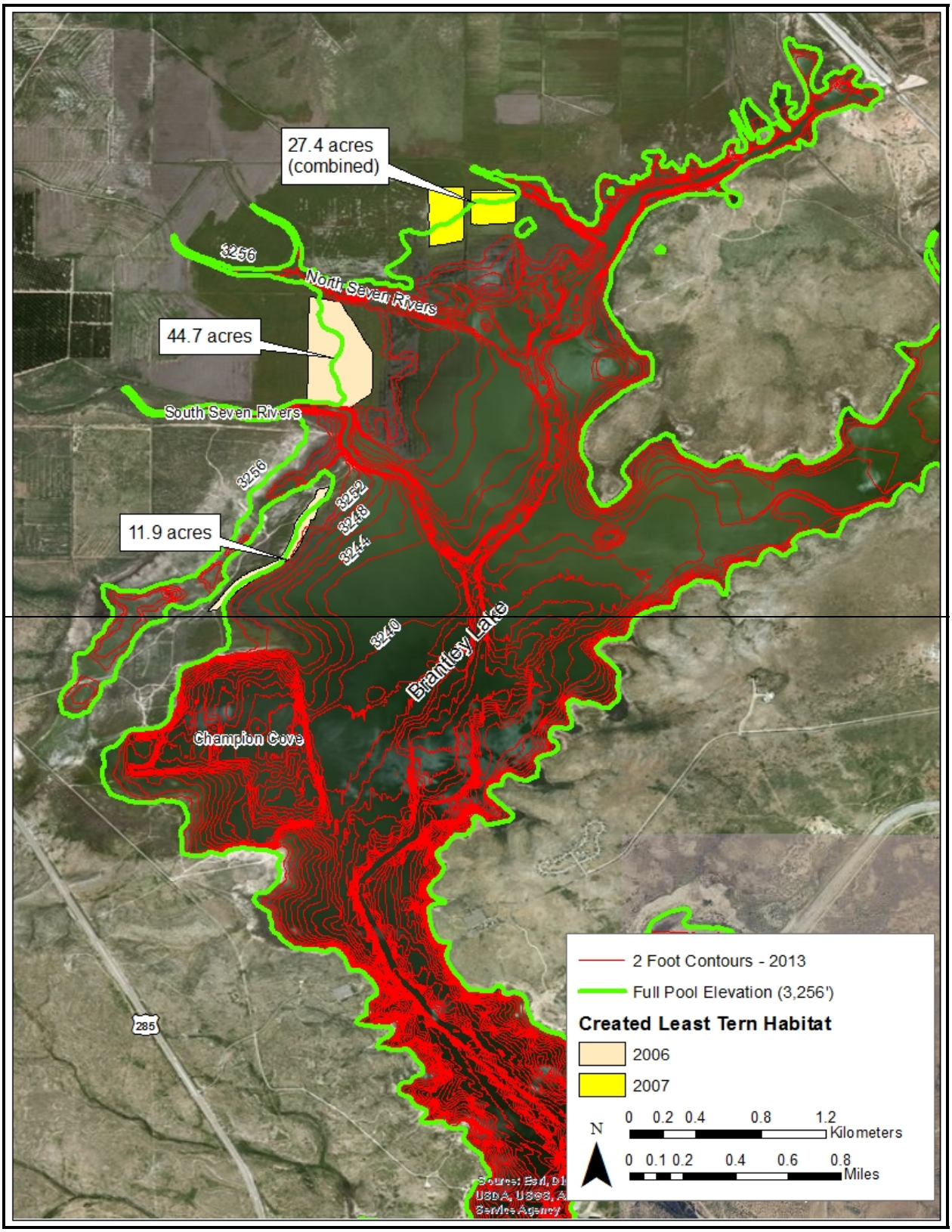

Figure 3. Reservoir levels and locations of Least Tern nesting and brood-rearing habitat restoration sites.

Much of the eastern shoreline is not typically suitable for tern nesting because of the gypsum/limestone uplift at the water's edge – particularly at elevations above 3240 ft. However, when reservoir elevations drop below 3240 ft, an abundance of sandy, exposed shoreline becomes available to nesting terns along the eastern shoreline. Figure 3 illustrates the extent of shoreline at various reservoir elevations, including full conservation pool of 3255.3 ft. Suitable nesting habitat adjacent the eastern shoreline was very limited during the 2017 season.

Survey dates and observation results for Least Terns at Brantley Reservoir during the spring and summer of 2017 are presented in Table 1. Least Terns were observed from June 27th through July 3rd. A daily log of survey conditions and results is presented in the Attachment. Least Tern surveys were discontinued following the July 26th visit (with concurrence from the USFWS), due to the absence of terns since July 4th, and since it was past the end of the typical tern nesting season.

Table 1. Summary of 2017 Least Tern observations at Brantley Reservoir, NM.

Date	Adult	Sub-Adult	Immature	Nests
May 23/24	0	0	0	0
May 30/31	0	0	0	0
June 6/7	0	0	0	0
June 11/12	0	0	0	0
June 20/21	0	0	0	0
June 27/28	2	0	0	0
June 29	2	0	0	0
June 30	4	0	0	1
July 1	4	0	0	2
July 2	4	0	0	1
July 3	4	0	0	1
July 4/5	0	0	0	0
July 11/12	0	0	0	0
July 20/21	0	0	0	0
July 25/26	0	0	0	0
2017 Totals*	**4**	**0**	**0**	**2**

* Presumed number of individual Least Terns observed.

Nest Monitoring

Two pairs of nesting Least Terns were confirmed during the 2017 breeding season. Both pairs constructed nest scrapes and laid one egg each before the eggs were collected and transported to the Desert Willow Wildlife Rehabilitation Center for artificial incubation. Both nest scrapes were constructed in relatively close proximity to the reservoir pool. The first nest was inundated within two days of discovering the nest and salvaging the egg. Upon discovery of the second nest, the area was cordoned off with t-posts and flagging to restrict vehicle access and to reduce human disturbance to the nest site (See Attachment – Daily Log). The t-posts and flagging were removed once all nesting efforts had terminated. Table 2 summarizes the nesting chronology and actions taken to increase the likelihood of nest success. All nest monitoring activities were coordinated with the USFWS.

Table 2. Chronology of 2017 Least Tern nest monitoring at Brantley Reservoir, NM.

Date	Nest Monitoring Activity
6/28/17	An active scrape, not containing eggs was found immediately north of Champion Cove. The nest (Nest 1) was approximately 75m (250ft) from the water's edge at an estimated elevation of 3245.5 ft. Brantley Reservoir was at an elevation of 3244.5 ft, and rapidly rising. Frank Weaver (USFWS) was notified and shown the nest scrape. Frank agreed to assist with nest monitoring activities.
6/30/17	A single egg was found in Nest 1. Due to rapidly rising reservoir levels, the egg was collected and transported to the Desert Willow Wildlife Rehabilitation Center for artificial incubation.
7/1/17	Nest 1 was only about a meter (3ft) from the water's edge – validating the decision to salvage the egg on 6/30. Nest 2 - a second active scrape not containing any eggs - was discovered approximately 150m (500ft) north of Nest 1 at an elevation of approximately 3248 ft. It was confirmed that this was not a renest of the first pair, but that of a second pair. The general area was cordoned off to restrict vehicular access.
7/2/17	Nest 2 remained active and now contained a single egg. Nest 2 was less than 25m (80ft) from the water's edge.
7/3/17	Nest 2 remained active, still containing only a single egg. Water levels had risen quickly overnight and Nest 2 was approximately 6m (20ft)from the water's edge. Brantley Reservoir was at 3247.5 ft – 1m (3ft) higher than on 6/28 when the first scrape was discovered. Due to impending inundation, the egg was collected and transferred to the Desert Willow Wildlife Rehabilitation Center for artificial incubation.
7/5/17	Reservoir levels were approaching 3249 ft. Nest 1 was approximately 80m (260ft) from the shore and had been inundated by more than 1m (3.5ft) of water. Nest 2 was about 25m (80ft) from shore and had been inundated by approximately .3m (1ft) of water. Both pairs of Least Terns had dispersed and were not observed for the remainder of the 2017 season.
7/20-25/17	Although artificial incubation was initiated on the two salvaged eggs, both failed to hatch.

Created Habitat

Cleared Sites

The three sites initially cleared of vegetation in 2006 and 2007 (Figure 3) were last maintained in 2009. During the summer of 2016, all three sites were covered with dense kochia, exceeding 2m in height in some areas (Figure 4). The cleared habitat sites were not inspected or monitored in 2017. [It should be noted that the December 2017, BO does not recommend the creation or maintenance of artificially cleared nesting sites.]

Created Habitat 11.9 acre site 8/3/16

Created Habitat 44.7 acre site 8/3/16

Created Habitat 27.4 acre site 8/3/16

Figure 4. Photographs of unmaintained tern nesting/brood rearing sites in August 2016.

Reservoir Elevations

The New Mexico State Parks Division considers 3,250 ft as a "normal" elevation for Brantley Reservoir (New Mexico EMNRD 2012). In 2017, reservoir elevations during the May 21st through July 21st breeding season averaged 3,246.7 ft, with a maximum elevation of 3,250.2 ft and a minimum of 3241.8 ft. (Figure 5).

When reservoir elevations are at a "normal" level of 3,250 ft, the surface area of Brantley Reservoir is approximately 2,219 acres (Ferrari 2013), and very little nesting shoreline is typically available to terns (Figure 3). On May 21st, when reservoir elevations were at 3,247.9 ft, (Figure 5) the surface area of Brantley Reservoir covered approximately 1,915 acres. Although somewhat limited, exposed suitable shoreline was available for arriving terns. The Reservoir elevation slowly declined over the next few weeks, reaching its lowest level of the season on June 24th at an elevation of 3241.8 ft. – exposing an additional 600 acres of shoreline. On June 28th when the first nest was discovered the reservoir elevation was at 3244.5 ft and rising (Figure

5). Reservoir levels continued to increase as a result of the upstream irrigation block release, reaching a seasonal high of 3250.1 ft on July 14th.

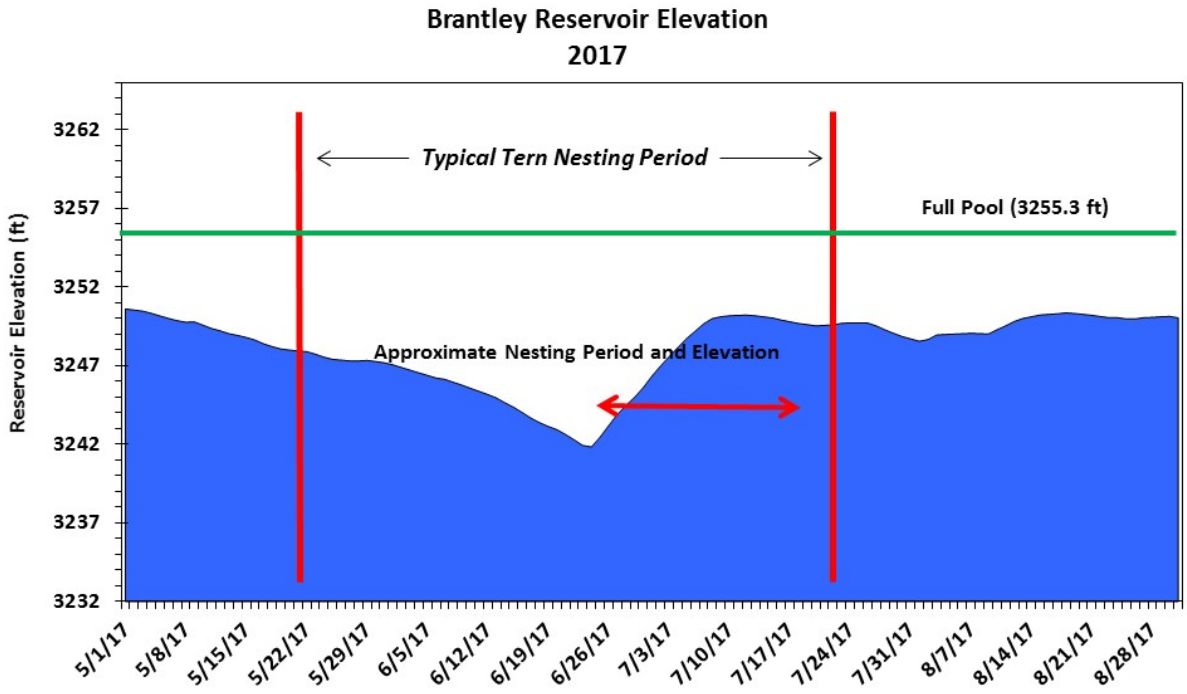

Figure 5. Brantley Reservoir elevations during the 2017 Least Tern breeding season.

Discussion

Since nesting was first documented in 2004, the Least Tern breeding population at Brantley Reservoir has been greatly affected by reservoir levels and their influence on available nesting habitat (Figure 6). The typical tern nesting period within the Pecos Basin extends from the third week of May through the third week of July (i.e. May 21st to July 21st) (Montgomery 2004, 2005, 2006, 2007, 2008, and Doster 2006, 2007, and 2009). Nest locations at Brantley Reservoir during the past ten years have varied in elevation from a high of approximately 3,256 ft in 2004 to a low of 3,236 ft in 2013 (Figure 7).

The following is a brief synopsis of annual Least Tern activity at Brantley Reservoir from 2004 through 2017:

> ***2004*** – This was the first year that Least Terns were documented at Brantley Reservoir. Terns were attracted to the area since a unique set of conditions prevailed to provide suitable nesting habitat. After saltcedar was cleared from the reservoir's northwest shoreline in early 2004, high water levels during the spring kept this freshly-disturbed area free of new plant

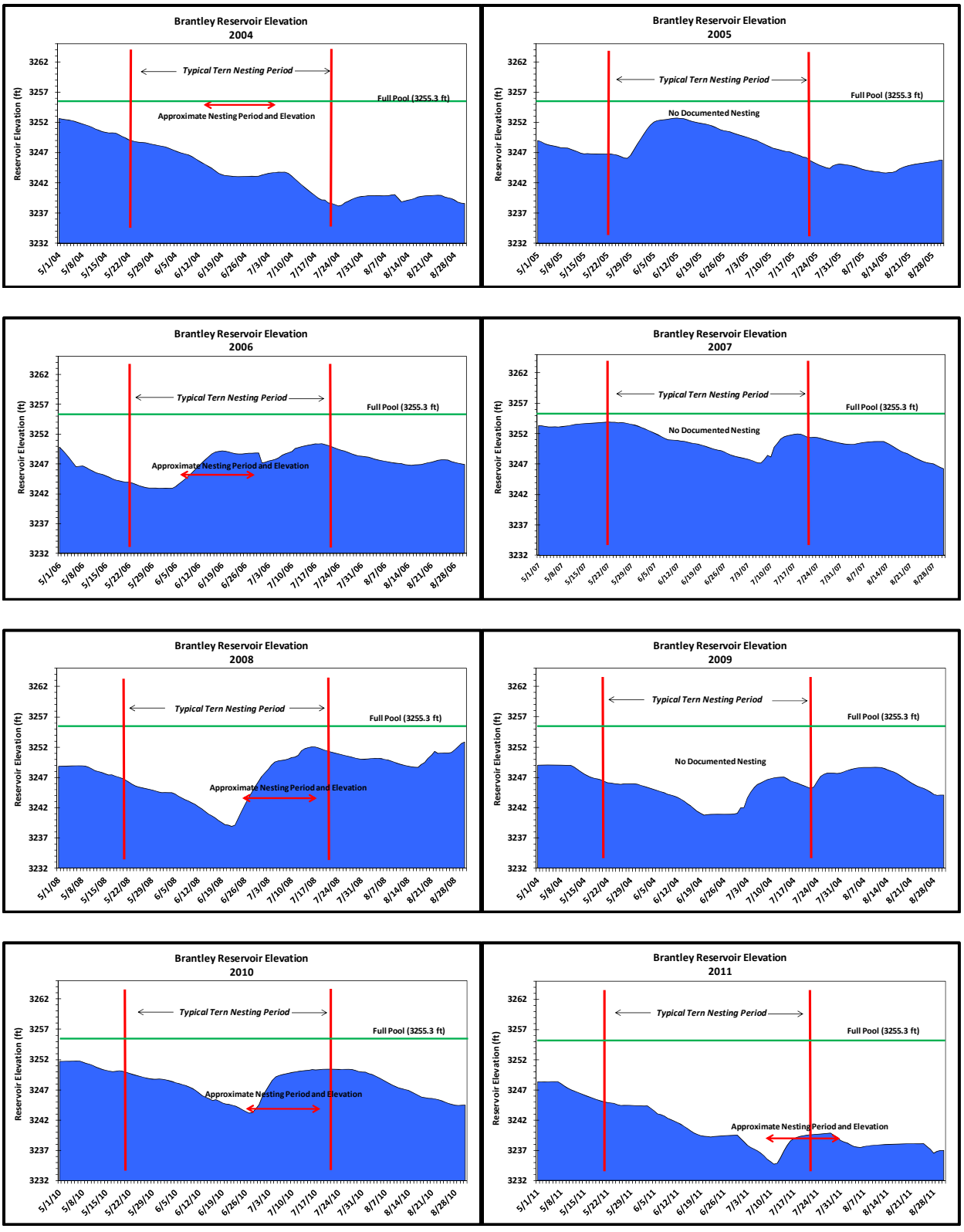

Figure 6. Annual reservoir elevations during the Least Tern nesting period (2004 to 2017).

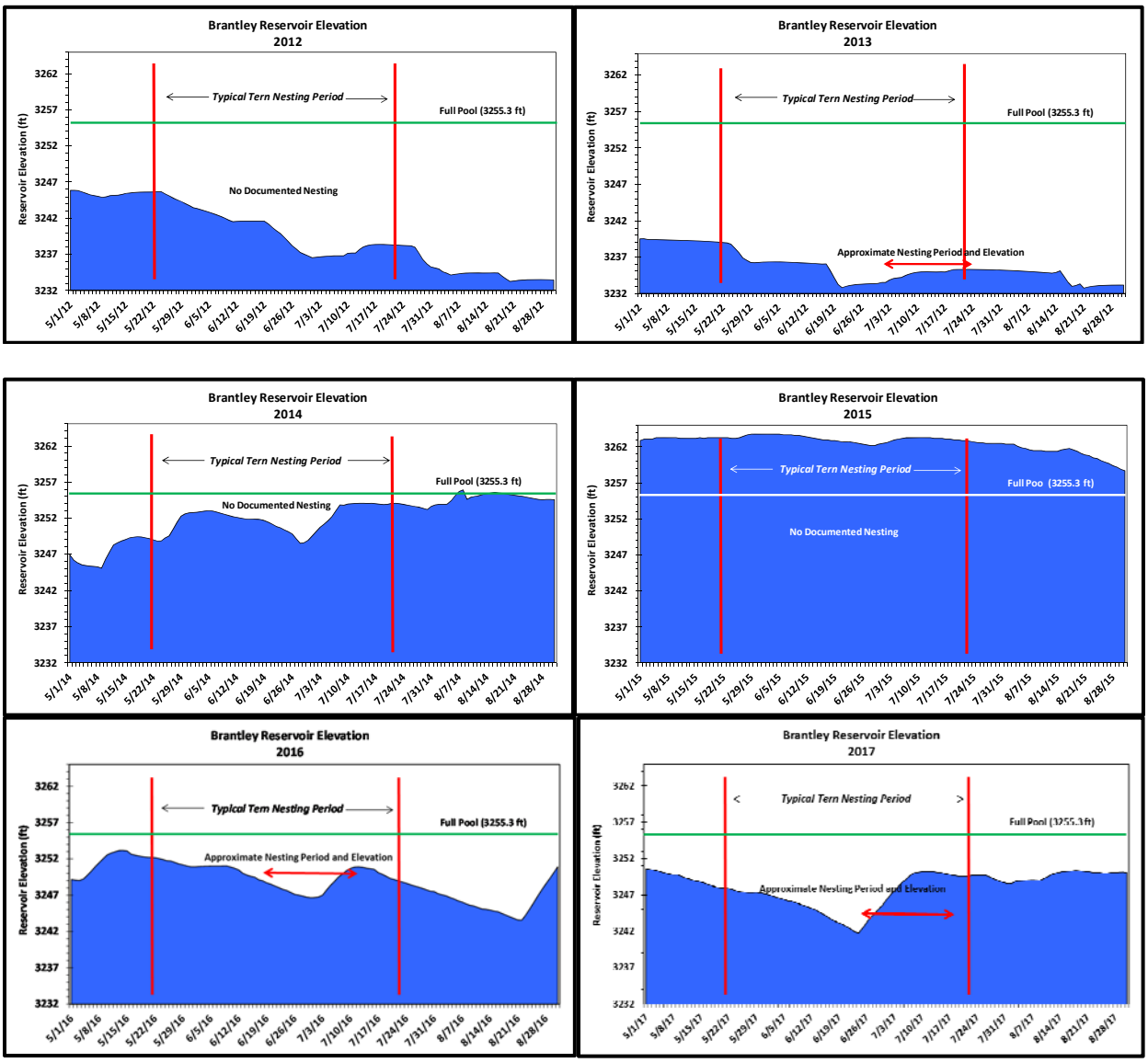

Figure 6 (cont'd). – Annual reservoir elevation during the Least Tern nesting period (2004 to 2017).

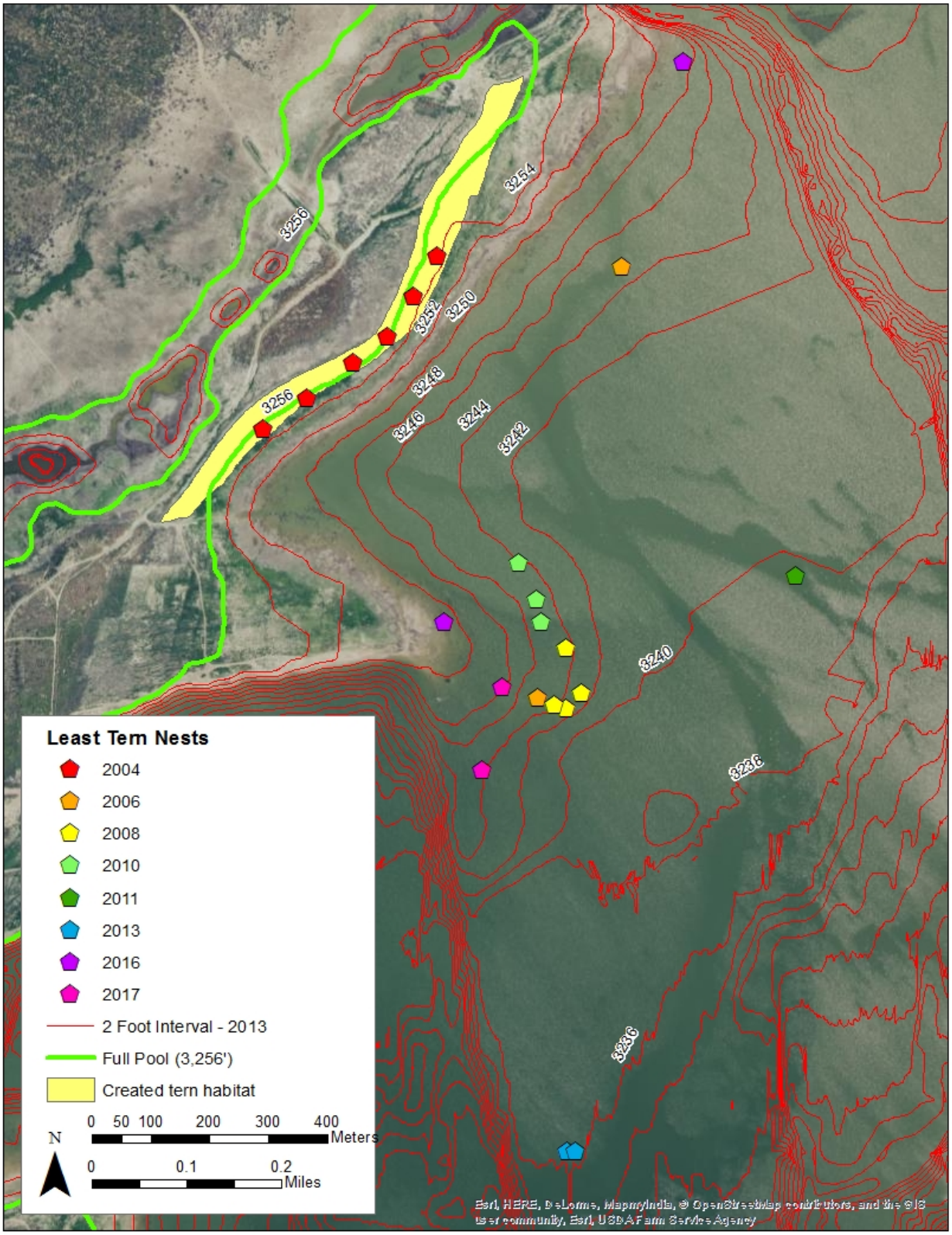

Figure 7. Least Tern nest sites (2004 to 2016) in relation to reservoir elevations (nesting was not documented in 2005, 2007, 2009, 2012, 2014, or 2015).

growth (Montgomery 2004). As water levels receded in May (Figure 6), large expanses of drying mud flats were exposed which provided ideal nesting conditions, attracting Least Terns migrating north through the Pecos River Valley. Conflicting reports make an estimation of pairs and nests difficult for the 2004 season. The number of pairs ranged from 7 to 11, and either 6 or 7 nests were documented. This number of pairs and nests have not been documented in a single year at Brantley since. (Table 3). After terns successfully fledged in this area during the summer of 2004, herbaceous vegetation quickly covered the site making it less suitable for future nesting use. As shown in Figure 6, the decline of reservoir levels throughout the tern breeding season led to more ideal nesting conditions.

2005 – Initially, reservoir levels declined through most of May, exposing shoreline within the upper pool (Figure 6). Approximately six to eight terns were recorded on May 19th and courtship was observed (Montgomery 2005). Water levels began to rise in late May and remained relatively high through the early summer, preventing the exposure of suitable shoreline for nesting. If terns had nested in late May it is likely that all nests would have been lost due to the rising reservoir levels. Again, conflicting reports put the total number of Least Tern pairs at either one or nine (Table 3). However, there were no reports of any nesting activity.

2006 – From early May through early June, declining reservoir water levels exposed large expanses of the reservoir where Least Terns attempted to nest. These nesting attempts failed as rising water inundated two nests that were under incubation in early June. The rise and fall of reservoir levels by 10 ft or more is common during the spring and summer at Brantley Reservoir as water is released for irrigation use downstream and then replaced by water in storage from upstream reservoirs (Figure 6). Terns were observed throughout the entire survey period of early May through early August, reaching a high of 14 individuals observed on May 24th (Doster 2006).

2007 - Terns were first observed on May 22nd, and a few individuals remained through late August (Doster 2007). No evidence of pairing, courtship, or nesting was documented. This was probably due to high water levels that were the result of greater than normal spring precipitation. Reservoir levels during the 2007 season were the highest observed between 2004 and 2013 (Figure 6). These wet conditions through the spring also prevented access to and clearing of vegetation on the southern created habitat site, the most likely of the three sites to be used by terns. For comparison purposes, there were 11 pairs of Least Terns at Bitter Lake, NWR in 2007 (Table 4). The Least Tern has been breeding at the Bitter Lake NWR for the past 50 years.

2008 – Reservoir levels steadily declined from early May until late June when the upstream irrigation block release was delivered (Figure 6). During the drawdown period, Least Terns were discovered in the early stages of nesting (some three to four weeks later than observed in previous years). Terns were observed from mid-May through late July, peaking in numbers on June 26th when 12 individuals (five pairs) and four active nests were discovered (Doster 2009). This year was second only to 2004 in the number of active tern nests discovered (Table 3). The irrigation block release resulted in an increase in water elevations from 3239 ft on June 22nd to over 3252 ft by July 17th; an increase of 13 ft in elevation and a

corresponding increase in surface area of nearly 1,500 acres. This rise in water levels resulted in the loss of all Least Tern nests at Brantley Reservoir in 2008.

Table 3. Summary of Least Tern survey and nest monitoring since 2004.

Year	Est. Pairs	Nests*	Successful Nests
2004	7[1] to 11[2]	6[2] to 7[1]	2
2005	1[3] to 9[1]	0	0
2006	6	2	0
2007	0	0	0
2008	5	4	0
2009	1	0	0
2010	3	3	0
2011	2	1	0
2012	0	0	0
2013	4	2	0
2014	0	0	0
2015	0	0	0
2016	2	2	1**
2017	2	2	0**

*Only nests containing eggs were considered active. Empty scrapes were not tallied in the total.

** Eggs were collected and transferred to the Desert Willow Wildlife Rehabilitation Center.

[1]Doster 2006, [2] Montgomery 2004, [3] Montgomery 2005

Table 4. Summary of Least Tern nesting pairs at Bitter Lakes, NWR since 2007.

Year	Number of Nesting Pairs
2007	11
2008	7
2009	6
2010	7
2011	5
2012	4
2013	5
2014	5
2015	4
2016	2
2017	2

2009 - Following the events of 2008, only six terns were documented at Brantley during the entire summer of 2009. Of these, one breeding pair was confirmed by courtship behavior (although nesting was never confirmed), three were lone adults, and one was an immature bird observed in late July. Reservoir levels either declined or remained stable until June 30th when the irrigation block release began to arrive. The resulting seven foot rise in water elevation had flooded all suitable breeding habitat along the edge of the reservoir and the last terns were observed on July 24th.

2010 - Least Tern activity increased at Brantley Reservoir in 2010. Although overall reservoir elevations remained relatively high when compared to other years (Figure 6), the steady decrease in elevation levels from early May through late June created an abundance of suitable nesting habitat. Several terns were observed during most of June, and nests were located for three pairs. All three nests failed despite relocation attempts due to rapidly rising reservoir levels resulting from upstream releases. Reservoir levels increased more than five feet over a five day period from June 30th to July 5th. Following the nest failures, all terns dispersed from the area and, presumably, either began their southward migrations or relocated to other nearby bodies of water. The last terns were observed on June 30th.

2011 – Several Least Terns were observed throughout the survey season at Brantley Reservoir from early June through early August. Two presumed pairs were documented on two different occasions, however only one pair was confirmed by nesting. The nest belonging to the one confirmed pair was discovered on July 7th and contained two eggs. Due to the impending delivery of the irrigation block release, nest relocation was initiated (after contacting the USFWS New Mexico Ecological Services Field Office) and continued on July 8th. However, on July 9th the nest was depredated. Over the next four days, reservoir levels increased over four feet, inundating a significant portion of the exposed shoreline.

Courtship flights observed from afar indicated a second pair may have also been breeding. It is possible that the second pair nested on the northeastern side of the reservoir, which is fairly inaccessible due to a lack of roads, and the nest was not located. However, without being in closer proximity to the pair this was impossible to determine. Later in the summer, several adult and first-year birds were observed foraging and resting on gravel bars. These birds displayed no territorial or courtship behaviors and were likely vagrants from the nearby breeding population at Bitter Lake NWR or were early southbound migrants.

2012 – Several terns were observed from May 31st through July 21st however no courtship behavior suggesting pairing or nesting was observed. Reservoir levels remained relatively low throughout the survey season (Figure 6). Due to the severe drought conditions and limited quantity of water stored in upstream reservoirs, no irrigation block release occurred in 2012, which was the first year during this study in which an irrigation block release did not occur. Unfortunately, no nesting terns were present to take advantage of the abundant nesting habitat resulting from this year's reservoir conditions.

2013 – Water levels in Brantley Reservoir during 2013 were the lowest observed since terns were first documented nesting at Brantley in 2004, reaching a low of 3,232.8 feet on June 21st. Reservoir levels remained low throughout the spring and summer due to the lack of an upstream irrigation block release, exposing vast areas of potential nesting habitat throughout

the tern breeding season. Terns were first observed on May 24th and a presumed total of 110 Least Terns, including 99 adults and 11 first summer adults, were observed in total during 2013. Eight or more individuals were observed on several occasions and multiple instances of courtship and/or copulation were recorded. It was assumed that up to four breeding pairs were residing at Brantley during the tern breeding season. A total of two nests were located on the water's edge on July 19th and the area was cordoned off two days later to prevent disturbance by recreational users of the State Park. One nest had apparently been depredated as evidenced by broken tern eggshells nearby. The second nest was active, containing two eggs upon discovery. It was monitored for 17 days and was ultimately abandoned. The cause of abandonment is unknown, however as discussed above, it was likely due to the late initiation of nesting and the onset of migration. Terns were last observed at Brantley on August 5th.

2014 – Several terns were observed on three separate occasions (June 5th, 14th, 28th) during the breeding season, however no courtship behavior suggesting pairing or nesting was observed. Water levels observed in 2014 were the highest since 2007, reaching a high of 3,254 ft in mid-July (Figure 6). Herbaceous and woody vegetation had become established on the exposed portion of the Reservoir between 2011 and 2013. Therefore, very little – if any – barren shoreline was present in early 2014.

2015 - This was the only year Least Terns were not observed since surveys began in 2004. Although high reservoir levels essentially eliminated all exposed shoreline and potential nesting areas, it is unclear why no terns were observed foraging. Brantley Reservoir experienced record levels in 2015. Reservoir levels peaked in March 2015 at 3264.6 ft. At the beginning of the 2015 tern nesting period, the reservoir remained high at an elevation of 3,263.8 ft, an increase of nearly 10 ft since the end of the 2014 breeding season, and an 18 ft increase since the end of the 2013 breeding season when the last nesting attempt was documented. As previously discussed, the record reservoir elevations inundated all historic nesting areas, but significantly increased the extent of shoreline. In 2015, Brantley Reservoir filled and backed water far into old Lake McMillan – covering more than 6,700 surface acres and creating an expansive length of shoreline. In contrast, Brantley Reservoir covered approximately 2,600 acres in 2014, and only 650 acres in 2013. Although there was a significant increase in shoreline habitat, the shoreline was typically heavily vegetated and unsuitable for nesting terns.

2016 – Two breeding pairs of Least Terns were confirmed at Brantley Reservoir (Table 3). Only one other adult Least Tern was observed. Each pair constructed a scrape and laid two eggs. The nests were discovered on June 17th and June 26th, respectively. The USFWS was notified, and a cooperative monitoring effort between Reclamation and USFWS was initiated. Nest elevations and chronologies were estimated and correlated to predicted reservoir elevations over the remainder of the tern's incubation period. The immediate nesting areas were cordoned off to restrict vehicle access, and to minimize human disturbance. Interestingly, there were only two breeding pairs at Bitter Lake NWR as well (Table 4).

Nest 1- Based on the predicted reservoir levels and the chronology of the nest found on June 17th, the decision to closely monitor the nest and allow it to be naturally incubated by the adults was initiated. It was believed that sufficient time existed to allow the eggs to hatch and the young to vacate the nest area prior to being inundated by rising reservoir levels, which was predicted to occur on approximately July 9th. Unfortunately, by July 2nd – approximately one week prior to hatching – the adults abandoned the nest, and on July 6th it had been depredated. Although reservoir levels did eventually approach the nest site, it was not inundated and would have likely been successful, had it not been abandoned or depredated.

Nest 2 – Based on the chronology of this nest found on June 26th, and the anticipated rise in reservoir elevations as a result of the irrigation block release, it was believed that this nest would be inundated prior to hatching. USFWS and Reclamation personnel closely monitored the nest, allowing the adults to incubate the nest until inundation was imminent. On July 7th, the two eggs were collected by USFWS personnel and delivered to the Rehabilitation Center in Carlsbad, NM. Both eggs were successfully incubated and hatched by Rehabilitation Center personnel, under the supervision of Dr. Sammie Uhrig (Figure 8). The chicks were hand-reared over the next two months, until they were capable of flight and then successfully released into the wild at Bitter Lake NWR on September 13th.

Figure 8. Least Tern chicks at Desert Willow Wildlife Rehabilitation Center – 2016.

2017 – Two breeding pairs of Least Terns were confirmed at Brantley Reservoir (Table 3). No other Least Terns were observed. Each pair constructed a scrape and each laid a single egg. The nests with eggs were discovered on June 30th and July 2nd, respectively. The USFWS was notified, and a cooperative monitoring effort between Reclamation, USFWS, and the Bureau of Land Management (BLM) was initiated. Due to rapidly increasing reservoir levels, the egg from the first nest was collected on the day which it was discovered

and transferred to the Desert Willow Wildlife Rehabilitation Center for artificial incubation. Upon discovery of the second active scrape, the area was cordoned off to vehicular traffic in an effort to minimize human disturbance. The egg from the second nest was collected and transferred to the rehabilitation center on July 3rd, the day after it was discovered. Surveys conducted on July 4th, failed to find either pair of breeding terns in the study area. Repeated weekly surveys over the next month also failed to document any Least Terns, and with concurrence from the USFWS, the final surveys of 2017 were conducted on July 26th. [Two breeding pairs of Least Terns were also confirmed at Bitter Lake NWR in 2017 (Table 4).]

Created Habitat

Of the three created nesting and brood-rearing habitat sites last cleared and maintained in 2009, none have been utilized by Least Terns. This was likely due to their distance from open water and the presence of other, higher quality nesting habitat immediately adjacent to the reservoir during years when the reservoir was less than 3,250 ft in elevation. Additionally, the presence of dense herbaceous vegetation reduced the suitability of the created habitat. It is highly unlikely that these areas, even if maintained, would have been used by nesting Least Terns given the affinity of the species for nesting in close proximity to the water's edge, with the possible exception of the 11.9 acre site. In 2014 and 2016, the 11.9 acre site was situated in proximity to the water's edge during portions of the respective June/July nesting period, but was somewhat overgrown, and lacked the exposed shoreline typically preferred by Least Terns for nesting. It should be noted that no pairs were determined to be present during the 2014 breeding season, and no nesting habitat of any type was utilized. In 2016, a sufficient amount of exposed shoreline was available to attract two breeding pairs which both nested near the water's edge immediately to the east of the 11.9 acre site. The created habitat sites were not monitored or inspected in 2017.

Factors Limiting Nest Success

Three primary factors limit the likelihood of nest success at Brantley Reservoir: 1) fluctuating reservoir levels (inundation); 2) recreational disturbance (abandonment); and, 3) depredation. Without a doubt the leading cause of nest failure over the past 13 years has been inundation due to rising reservoir levels.

It should be noted that, although rising reservoir levels can be detrimental to nesting terns, fluctuating reservoir levels are essential for the establishment of suitable tern nesting habitat. High reservoir levels early in the spring before the terns arrive are critical to prevent the growth and development of woody and herbaceous vegetation. As reservoir levels decline in late-May to mid-June, due to irrigation and downstream releases, exposed unvegetated shoreline suitable for nesting terns becomes readily available.

Terns will typically nest within 100m of Brantley reservoir shoreline. As previously discussed, due to the relatively gentle topography of the historic tern nesting area (Figure 7) nests that are within100m of the shoreline are generally less than than 0.5m (1.5 ft) vertically above the reservoir pool. Since reservoir elevations can rise more than .3m (1ft) per day during a block

release, these increases have the potential to inundate more than a 100 acres/day. For example: In 2008, over a 12 day period from June 23rd to July 5th, reservoir elevations rose more than 10 ft, and nearly 1200 acres of exposed shoreline was inundated (Figure 9). Since 2004, there have been 16 Least Tern nesting attempts; all but 3 of these were subject to inundation. Of the three that were not inundated, one was depredated and two were abandoned.

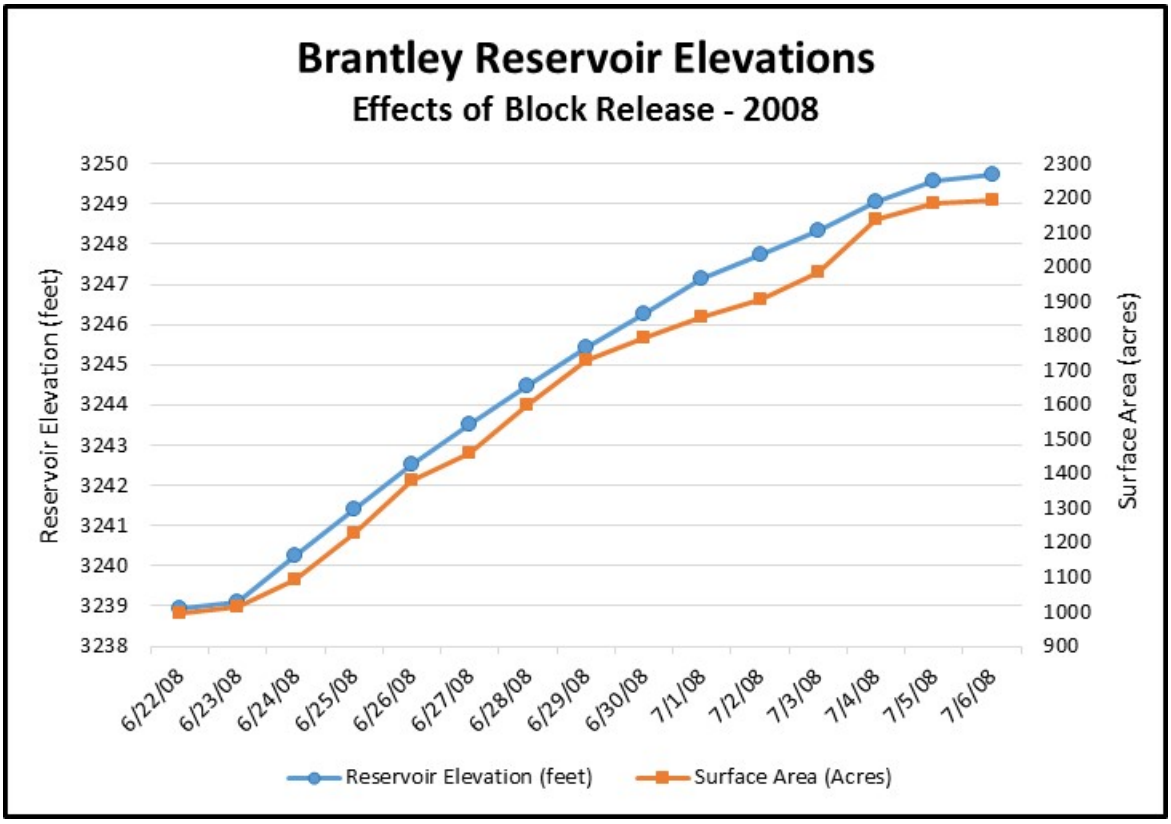

Figure 9. 2008 Reservoir level increase during Least Tern nesting season.

Brantley Reservoir experiences relatively high recreational use due to the limited water-based recreational resources in the area (Figure 10). Boating, jet skiing, fishing, and camping is very common during the summer months, especially on weekends and holidays such as July 4th. Champion Cove is particularly desirable for recreational use due to the exposed shoreline and abundance of camping sites. Recreational use, including off-road vehicle use of the exposed shoreline, presents potential disturbance to nesting terns, as well as the direct and indirect loss of eggs. Although recreational use is relatively high during the Least Tern nesting season, the areas which have been cordoned off in 2013, 2016, and 2017 using caution tape and t-posts have not been disturbed – reflecting a willingness of the general public to comply with this restriction.

Depredation is another major threat to nesting terns. Domestic dogs, coyotes, raccoons, skunks, and gulls all present potential risks. As the exposed shoreline is reduced by rising reservoir levels, the potential for depredation likely increases since predators have a reduced search area. Although, it is unlikely that adult terns themselves would be preyed upon, the eggs and young chicks are highly vulnerable.

Figure 10. Recreational use along north shore of Champion Cove in the vicinity of historic Least Tern nesting areas.

Conclusions

Considering the results of Least Tern monitoring conducted at Brantley Reservoir during the past 14 years, it appears unlikely that a stable breeding population will become established under current operating conditions. A very specific set of circumstances, similar to those occurring in 2004 and 2016, must occur for successful tern nesting. These include:

- High reservoir levels through April or May that prevent vegetation growth on mud flats around the perimeter of the reservoir;
- A reduction in reservoir level in mid-May to early June that exposes habitat suitable for tern nesting;
- Terns nesting between mid-May and early June ahich allows sufficient time for incubation prior to water transfer into Brantley that typically inundates nests; and
- The nest must not be depredated or abandoned.

Given the current constraints on water management in the Pecos River and the high recreational use at Brantley Reservoir, it appears as though these specific conditions will not occur frequently enough to establish a naturally successful breeding colony at Brantley Reservoir. However, as proven by the collection and artificial incubation of least tern eggs in 2016, successful rearing and release of Least Tern fledglings is possible.

Another difficulty Reclamation faces in its Carlsbad Project water operations is the challenge of protecting both the threatened Pecos bluntnose shiner (*Notropis simus pecosensis*) and the Least Tern, both of which have distinct habitat needs. The management of annual block irrigation deliveries of water to Brantley Reservoir is fundamentally based on the Carlsbad Irrigation

District irrigation demand and Pecos River flow objectives to sustain the Pecos bluntnose shiner. Reclamation will continue to look for opportunities to meet the needs of both species, while also complying with water delivery mandates.

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ATTACHMENT

INTERIOR LEAST TERN
DAILY SURVEY LOG
2017

Attachment

2017 DAILY LOG

Date	Observer	Time Start	Time End	Weather	Survey Type	Tern Detection Time	# of Terns Observed	Age (# adult, # juvenile)	Activity	Observation Easting	Observation Northing	Bearing to birds	Distance to Birds	Comments
5/23/2017	Bullard (Reclamation)	17:00	20:30	Clear skies - calm winds. Low 70's	Formal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Reservoir levels at this time of the year are lower than that of previous year, exposing suitable shoreline habitat for LETE. Saltcedar along the reservoir is defoliated from Diorhabda spp, and a lot has died off from being flooded. Several FOTE were observed near dead cottonwood tree near the rock pile. Six FOTE were observed foraging throughout the eveing in this area before flying north towards Lake McMillian. One FOTE was seen flying along the Seven River's drainage. No LETEs were observed.
5/24/2017	Bullard (Reclamation)	6:00	11:00	Clear skies - High 50's early in the morning and low 70's by early afternoon. 5-10mph wind	Formal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	The reservoir has receded far below Lake McMillian, limited habitat along the Pecos River to the north. A few ergrets and herons at the north end of the reservoir. Lots of dead saltcedar along the reservoir's shoreline. The FOTE from the night before was not seen again. No LETEs were observed
5/30/2017	White (Reclamation)	16:45	20:00	Temperature low to mid 80's, mostly cloudy, winds 0 to 10 mph. Storm clouds present, but no rain during survey.	Formal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Reservoir levels still low. A lot of exposed, unvegetated areas (including dead vegetation), but not a lot of gravelly habitat present. Black necked stilts, killdeer, plovers, gulls and egrets present at previous detection sites. Moderate human activity in water and along shoreline. No terns, including LETEs, were observed.
5/31/2017	White (Reclamation)	5:45	11:15	Temperature low 60's to 70's, partially cloudy and winds 2 to 4 mph, with some stronger, sporadic gusts.	Formal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Reservoir levels rose a bit from previous day. At 8:55 two CATE and one FOTE were detected just south of the Seven Rivers input and loafed on the shore until 9:08. CATE were later detected near the dead cottonwood and FOTE joined them at 9:37. No LETEs were observed.
6/6/2017	Ahlers (Reclamation)	17:30	19:30	Overcast, light breeze, low 80's	Formal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Reservoir level about 3246.5 ft with abundant, unvegetated shoreline in the vicinity of historic nesting area. Substrate not well drained (i.e. mostly clay). Observed two CATEs, and two FOTEs . No LETEs were found.
6/7/2017	Ahlers (Reclamation)	6:00	11:00	Clear, light breeze, mid 80's	Formal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Kayaked upper shoreline of Brantley Resrvoir - east and west sides. Suitable nesting areas along eastern shoreline are very limited due to the limestone outcrops. One CATE was observed. No LETEs.

2017 DAILY LOG (Cont'd)

Date	Observer	Time Start	Time End	Weather	Survey Type	Tern Detection Time	# of Terns Observed	Age (# adult, # juvenile)	Activity	Observation Easting	Observation Northing	Bearing to birds	Distance to Birds	Comments
6/11/2017	Ahlers (Reclamation)	16:45	19:30	clear, mid 80's, light breeze	Formal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Available unvegetated shoreline in the vicinity of historic nesting area has nearly doubled in the past week. Approximately 100m of exposed shoreline is currently available. Reservoir level approx. 3245 ft. No terns of any species were observed.
6/12/2017	Ahlers (Reclamation)	6:00	11:00	calm, clear, low 80's	Formal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Kayaked upper shoreline of Brantley Resrvoir - east and west sides. Suitable nesting areas within several small coves along eastern shoreline are beginning to be exposed. The substrate within these small coves is well drained (i.e. mostly sand). No LETEs were found.
6/20/2017	Moore (Reclamation)	17:00	19:30	hot, mid 90's, mostly sunny, breezy	Formal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Lots of exposed shoreline, lake very low, distance from rockpile to waterline on point (Champion Cove) is 240m, abundant tern nesting habitat, block release from Sumner began yesterday morning, should hit Brantley in the next day or two, abundant shorebirds in shallow water habitats on west side of lake.
6/21/2017	Moore (Reclamation)	6:00	10:15	calm becoming windy by 0700, 70 degrees warming to 91 by end of survey	Formal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Glassed entire lake from several vantage points, observed one Forster's tern foraging along the west side of lake, no other terns observed, abundant SNPL and KILL on mudflats, few BNST.
6/27/2017	Moore (Reclamation)	17:00	19:15	hot, windy, clear skies	Formal	17:20	2	2 adults	foraging, courting	556725	3604210	0	0	Lake level is almost a foot higher than last visit, still abundant shoreline available as tern nesting habitat, least terns observed on/near rockpile point on NE side of Champion Cove, observed courtship behavior (food offerings) and was divebombed briefly as I walked out on point, no scrape located and it appears that they are not nesting quite yet.
6/28/2017	Moore (Reclamation)	6:00	10:45	cool early warming to 90 degrees, breezy, mostly clear	Formal	6:15	2	2 adults	loafing, foraging, courting	556770	3604221	0	0	Least terns located resting on sand/gravel point, one appeared to be tending to an egg or preparing scrape. Observed for 30 minutes and bird stayed on same spot. Once they left to forage I went to location and located scrape, empty but definitely an established scrape. Birds defensive upon their return. Scrape located 75m from water's edge and maybe a foot vertically above water line. Frank Weaver (USFWS) agreed to help monitor and I showed him the scrape's location. No egg laid upon last check at 10:45. No other terns observed.
6/29/2017	Denniston (BLM)	6:00	7:30	cool early warming to ~80 degrees, breezy, mostly clear	Formal ?	6:00	2	2 adults	female on nest, both defending nest	556770	3604221	0	0	Least terns located resting on sand/gravel point, one appeared to be tending to an egg or preparing scrape. Observed for 30 minutes and bird stayed on same spot. Once they left to forage I went to location and was unable to locate eggs, I believe I was very close to nest site, but never really located either nest or eggs.

2017 DAILY LOG (Cont'd)

Date	Observer	Time Start	Time End	Weather	Survey Type	Tern Detection Time	# of Terns Observed	Age (# adult, # juvenile)	Activity	Observation Easting	Observation Northing	Bearing to birds	Distance to Birds	Comments
6/30/2017	Denniston, Reid (BLM)	7:00	9:30	cool early warming to ~80 degrees, breezy, mostly clear	Formal ?	6:00	4	4 adults	female on nest, both defending nest	556770	3604221	0	0	Female on nest, both defending nest, other 2 also were also acting a little aggressive, but may have just been flying with first pair. 2nd pair never dive bombed us, just flying with 1st pair very closely. Located one (1) egg. Was told by USFWS Frank Weaver to leave egg until he could determine what next steps were to be taken.
6/30/2017	Denniston, Reid, Brooks (BLM)	13:30	14:45	cool early warming to ~80 degrees, breezy, mostly clear	Formal ?	7:00	4	4 adults	female on nest, both defending nest	556770	3604221	0	0	Returned to nest site after receiving permission from USFWS Frank Weaver to pick up egg following proper protocol. Female on nest, both LETE defending nest, other 2 also were acting a little aggressive, but may have just been flying with first pair. 2nd pair never dive bombed us, just flying with 1st pair very closely. Cassie felt 2nd pair didn't want us there either. I would have to agree. Picked up one egg following protocol and turned egg over to Desert Willow Veterinary Clinic.
7/1/2017	Denniston (BLM)	7:30	10:00	Overcast, light breeze, low 80's	Formal ?	7:30/09:45	3	3 adults	No more eggs at nest, pink flagging at waters edge.	556770	3604221	0	0	Returned to nest site to check for any additional eggs which may have layed overnight. No additional eggs present. Pink flagging at waters edge. Nest only a couple feet from waters edge will be covered by water very shortly. Water lever came up about 40 feet overnight. As I was leaving I scanned area for birds and spotted a female which appeared to be nesting. See line 20 for additional information. Returned to site later same day to block off site per instructions from Frank Weaver USFWS Biologist.
7/1/2017	Denniston (BLM)	12:30	16:00	Overcast, windy, low 80's	Formal ?	12:30	4	4 adults	2nd nest located 0945. Female on nest, both defending nest. Other 2 Terns in same general area seen flying and walking in area.	556805	3604362	68°E	~100yds	Returned to nest after receiving confirmation from USFWS Frank Weaver with flagging and t-posts. First attempt: using flagging and t-posts to keep people from using the immediate placed flaffing aroound nest in ~8 paces x 10 paces. Terns did not return. 2nd attempt: enlarged flagged area approximately 25 paces x 25 paces. Terns still would not return to nest. Did not like flagging. Received permission from USFWS Frank Weaver to block off vehicle traffic by flagging off road access into site area.
7/2/2017	Denniston (BLM)	7:00	9:30	cool around 70. Partly cloudy	Formal ?	7:00	4	4 adults	Female on nest, both defending nest. Other two terns close by.	556805	3604362	68°E	~100yds	Returned to nest, female on nest. Egg at nest, no damage from vehicular traffic overnight. Nest to water distance approximately 50-75 ft.
7/3/2017	Denniston (BLM)	7:00	7:30	cool around 70. Partly cloudy	Formal ?	7:00	4	4 adults	Female on nest, both defending nest. Other two terns close by.	556805	3604362	68°E	~100yds	Returned to nest, female on nest. Egg at nest, no damage from vehicular traffic overnight. Nest to water distance approximately 20 ft. USFWS Frank Weaver instructed me to return to office and be ready to pickup supplies from Desert Willow Wildlife Rehab Center
7/3/2017	Denniston, Mudgett (BLM)	8:30	9:15	cool around 70. Partly cloudy	Formal ?	8:30	4	5 adults	Female on nest, both defending nest. Other two terns close by.	556805	3604362	68°E	~100yds	Received authorization from Frank Weaver to pickup LETE egg. Returned to LETE nest site, picked up egg according LETE protocol and turned egg over to Desert Willow Wildlife Rehab Center.

2017 DAILY LOG (Cont'd)

Date	Observer	Time Start	Time End	Weather	Survey Type	Tern Detection Time	# of Terns Observed	Age (# adult, # juvenile)	Activity	Observation Easting	Observation Northing	Bearing to birds	Distance to Birds	Comments
7/4/17	Ahlers	17:45	19:30	Clear and hot 100 degrees. Relatively calm.	Formal	Formal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Reservoir levels rising quickly. Extensive recreational use along north shore of Champion Cove with 32 vehicles at multiple camp sites. No LETEs observed.
7/5/17	Ahlers	6:00	11:00	Heavy rains overnight. Temps in 80s rising into the low 90s. Clear and calm.	Formal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Due to rising reservoir levels, essentially all unvegetated shoreline is now inundated and suitable nesting habitat is very limited. Approximately 10-15 meters of shoreline in the vicinity of historic nesting activity was inundated just overnight. Both tern scrapes previously documented have also been inundated. The first one is about 80 m from the shore and the second one is about 25 meters. No LETEs were observed.
7/11/2017	Moore	17:00	19:00	Hot (mid-90s), windy, clear skies	Formal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	The block release out of Sumner has been completed and lake level has stabilized at just above 3,250 ft in elevation. Water is up past the rockpile and lone cottonwood. Very little unvegetated shoreline remaining aside from recreational areas on the north and south shores of Champion Cove. Minimal suitable least tern nesting habitat currently present. Two Forster's terns observed. No LETE were observed.
7/12/2017	Moore	6:00	10:00	Mid-70s to upper 80s, breezy, clear skies	Formal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Conditions similar to last evening. Two Caspian and four Forster's terns observed. No LETE were observed.
7/20/17	Ahlers (Reclamation)	18:00	19:30	Light cloud cover, 90's Relatively calm.	Formal	Formal	N/A	(1/1)	Foraging and loafing	N/A	N/A	N/A	N/A	Reservoir levels approx. 3250 ft. All unvegetated shoreline has been inundated. Observed two FOTE and one CATE. Also, observed two LETE - one adult and one juvenile with clear carpal bar. LETEs observed near rockpile and old cottonwood on northeast edge of Champion Cove. No suitable LETE nesting habitat currently exists.
7/21/17	Ahlers (Reclamation)	6:00	11:00	Clear, low 80's warming to low 90's. calm	Formal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No recreational use of Champion Cove. Observed 32 adult and juvenile FOTEs foraging and loafing near rockpile and cottonwood tree at NE edge of Champion Cove. Also, observed three Black Terns. No LETEs observed.
7/25/17	Ahlers (Reclamation)	17:45	19:30	Partly cloudy, breezy 15-20 mph, mid 90's	Formal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Reservoir levels approx. 3250 ft. Observed six FOTE on northeast edge of Champion Cove. All unvegetated shoreline has been inundated. No suitable LETE nesting habitat currently exists. No LETE were observed.
7/26/17	Ahlers (Reclamation)	6:00	11:00	Partly cloudy, mid to upper 80's, calm	Formal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Limited recreational use of Champion Cove. Observed 13 adult and juvenile FOTEs, and 12 adult and juvenile BLTEs. No LETEs observed.

PEER REVIEW DOCUMENTATION

PROJECT AND DOCUMENT INFORMATION

Project Name: LETE Monitoring, Brantley Reservoir, NM WOID FA070

Document: Interior Least Tern Monitoring Results 2016: Brantley Reservoir, NM Date: 3/23/17

Team Leader Darrell Ahlers

Document Author(s)/Preparer(s) Darrell Ahlers

Peer Reviewer Kristen Dillon

Peer Reviewer _____

REVIEW REQUIREMENT

Part A: Document Does Not Require Peer Review

Explain _____

Part B: Document Requires Peer Review: SCOPE OF PEER REVIEW

Peer Review restricted to the following Items/Section(s):	Reviewer:
Entire Document	Kristen Dillon

REVIEW CERTIFICATION

Peer Reviewer - I have reviewed the assigned Items/Section(s) noted for the above document and believe them to be in accordance with the project requirements, standards of the profession, and Reclamation policy.

Reviewer: Kristen Dillon Review Date: 2/22/18 Signature: 

I have discussed the above document and review requirements with the Peer Reviewer and believe that this review is completed, and that the document will meet the requirements of the project.

Team Leader: Darrell Ahlers Date: 3/23/18 Signature: