

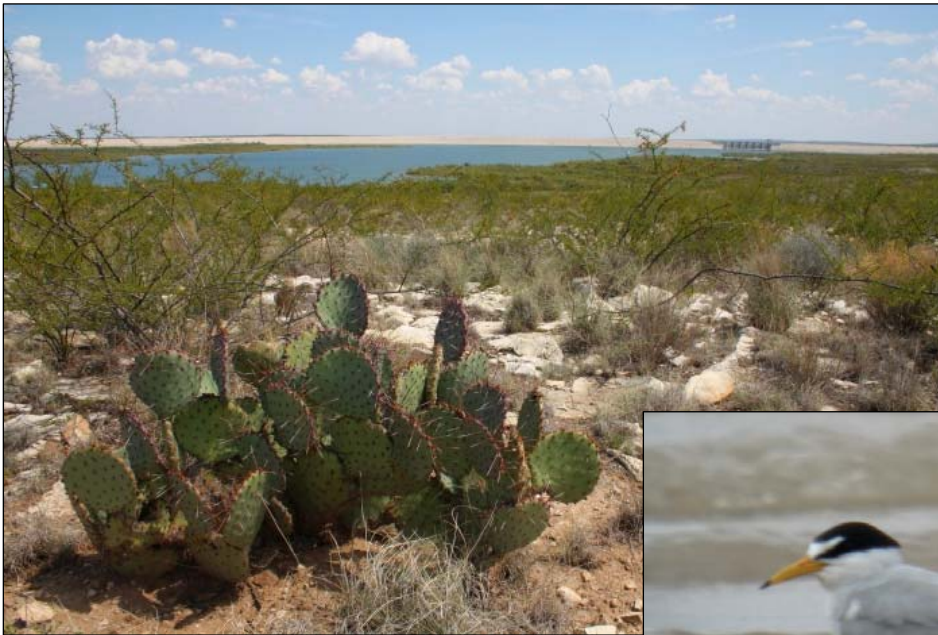
RECLAMATION

Managing Water in the West

Interior Least Tern Monitoring Results 2008

Brantley Lake, New Mexico

Carlsbad Project



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

February 2009

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.

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Prepared by

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Cover photographs:

Brantley Lake and surrounding Chihuahuan Desert landscape.

Adult Interior Least Tern (*Sternula antillarum athalassos*).

(Photos/ R. Doster)



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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 an approximate body length of nine inches and 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 (Lott 2006); and the Eastern Least Tern (*S. a. antillarum*) nests along the coast 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. 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 two or three eggs and are incubated for approximately 21 days by both adults. Both adults also 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).

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 mid-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 (New Mexico Department of Game and Fish 2006). Within New Mexico, Least Terns primarily occur within the Pecos River basin where a small colony has nested at Bitter Lake National Wildlife Refuge (NWR) 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 nine pairs were present at Brantley Lake early in the summer but numbers declined during the breeding season and no successful nesting was documented. This species again attempted to nest at Brantley Lake in 2006 when four possible nests (two confirmed) were located within the reservoir pool. These nests, however, were unsuccessful as they were inundated from rising lake levels. No nesting activity was detected at Brantley Lake in 2007, though a few terns were present most of the summer.

Because of the recent occurrence of Least Terns at Brantley Lake, Reclamation consulted with the Service, pursuant to the Endangered Species Act (ESA), 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 that covers the period from 2006 to 2016. In each of these BOs, Reclamation agreed to undertake several Reasonable and Prudent Measures (RPMs) to avoid or lessen the likelihood of incidental take and to minimize the effects of incidental take of 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 area of the proposed action and consult with NMESFO if terns are detected at new sites.

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

- 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 predation is minimized. Placement of these sites should be as close as possible to the full conservation pool of the reservoir (elevation 3256 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 2008 to continue to fulfill Reclamation's commitments under the terms and conditions of the above BO and associated RPMs.



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 2008. All visits included surveys on two consecutive days, the first of which occurred between 12:00 and 17:00 MDT and the second between 07:00 and 11:00 MDT. Surveying on two consecutive days and at two different diurnal 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 at the water's edge. However, from the western side of the lake, the eastern shoreline was monitored 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 2007) and were subsequently submitted to that program.

Nest Monitoring

Indicators of courtship and nesting activity by Least Terns were watched for concurrently with 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 was confirmed its contents were noted and its location was mapped using a global positioning system (GPS) receiver (bearing-offset method). Observations were made from a distance (> 300 feet) via spotting scope to help avoid any disturbance to potential nesting terns.

Created Habitat Maintenance

Maintenance on two of the three created Least Tern nesting and brood-rearing habitat sites (Fig. 2), first cleared in 2006 (44.7 ac.), was conducted by New Mexico Department of Game and Fish (NMDGF) personnel (those sites on the Seven Rivers Waterfowl Management Area). 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. The third, southern site (11.9 ac.), which is directly upslope of the location where Least Terns nested successfully in 2004, was prepared in the same manner by Carlsbad Irrigation District personnel.

Decoy Use

Life-sized Least Tern decoys were deployed for use as social attractants (Fancher 1984, Kotliar and Burger 1984, Burger 1988) in an attempt to establish a breeding colony outside of the Brantley Lake conservation pool (above 3256 feet elevation). Fifty decoys were placed in pairs in the southern created habitat site in early May 2008 and monitored throughout the spring and summer.



Figure 2. Locations of 84 acres of Least Tern nesting and brood-rearing habitat sites created and maintained in 2008 at Brantley Lake. Areas where tern habitat was created in 2006 are indicated in red; yellow polygons mark habitat sties created in 2007.

Results

Presence/Absence Surveys

All observations of Least Terns at Brantley Lake in the spring and summer of 2008 are presented below in Table 1, below. Least Terns were first detected at Brantley Lake on 14 May with two adults observed. Numbers of Least Terns remained constant into late May and early June, and then numbers of adult terns began to increase on 12 June. By the third week of June the number of Least Terns detected had grown to 12 adults with nesting activity observed. This peak in bird numbers and nesting activity declined two days later as lake levels began to rise precipitously (Fig. 3) due to irrigation releases upstream. By early July most adult Least Terns had dispersed and only one or two individuals were detected the remainder of the summer. On 24 July one immature Least Tern was observed with a pair of adults. This trio presumably constituted a family group that was in transit as evidenced by their absence the next day.

Table 1. Summary of 2008 Least Tern observations at Brantley Lake, New Mexico.

2008 Date	Adult	Sub-adult	Immature	Nests [eggs]
14 May	2	0	0	-
15 May	2	0	0	-
28 May	2	0	0	-
29 May	0	0	0	-
11 June	0*	0	0	-
12 June	4	0	0	-
25 June	8	0	0	3 [2, 0, 0]**
26 June	12	0	0	5 [2, 2, 1, 0, 0]
28 June	6	0	0	-
29 June	6	0	0	-
8 July	1	0	0	-
9 July	0	0	0	-
24 July	2	0	1	-
25 July	1	0	0	-
14 August	0	0	0	-
15 August	0	0	0	-
26 August	0	0	0	-
27 August	0	0	0	-

* High wind conditions likely prevented detection of birds on this date.

** Nests with "0" eggs were nest bowls observed being attended by an adult but without eggs.

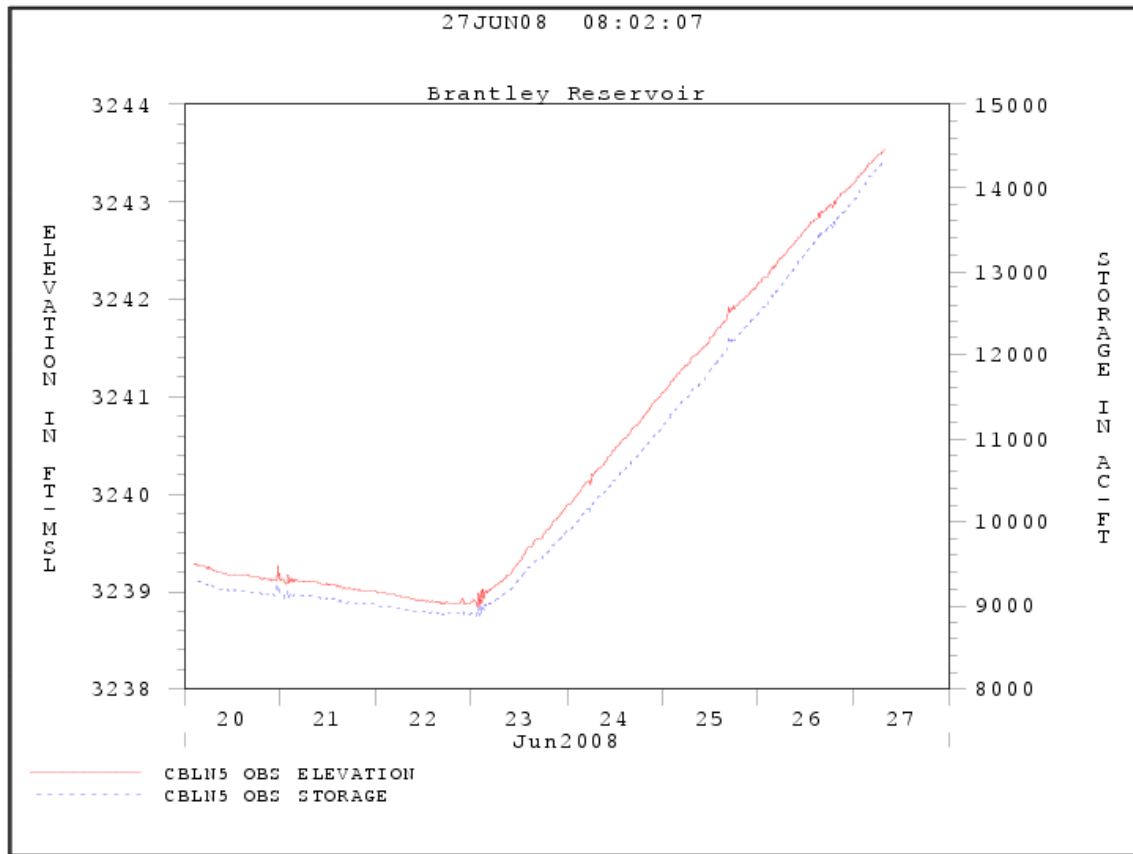


Figure 3. Hydrograph of Brantley Lake surface elevation and storage volume for the week beginning 20 June 2008. Data from U.S. Army Corps of Engineers gauging station.

Nest Monitoring

Least Tern nesting activity was first discovered on 25 June 2008 along the western shoreline of Brantley Lake, northeast of the Champion Cove area (Fig. 4). On this date three nests were located, one of which had two eggs (Fig. 5A) while the others appeared to be nest scrapes without eggs but occupied by adults, presumably attempting to lay eggs (Fig. 5B). On 26 June, five nests were discovered, two nests with two eggs each, one nest with one egg, and two nests scrapes without eggs. An additional egg was located on 27 June in one of the nest bowls that were previously empty (H. Walker, pers. comm.) bringing the total number of known Least Tern eggs to six (in five nests). All nests were positioned well into the reservoir pool at an approximate elevation of 3241 feet. As the irrigation water block release from upstream at Sumner Lake was complete, all eggs and nests at Brantley Lake were inundated. This incidental take of nests and eggs was allowable under the Incidental Take Statement of the 2006 BO. No additional nests, eggs, or nesting activity were observed during the remainder of the 2008 breeding season.



Figure 4. Location of Least Tern nests (yellow circles) found on 25 and 26 June 2008 at Brantley Lake. Red polygon indicates a created tern nesting habitat area. (Note that the water level in this image [3245 feet elevation] is higher than when nests were initiated [~3241 feet]).

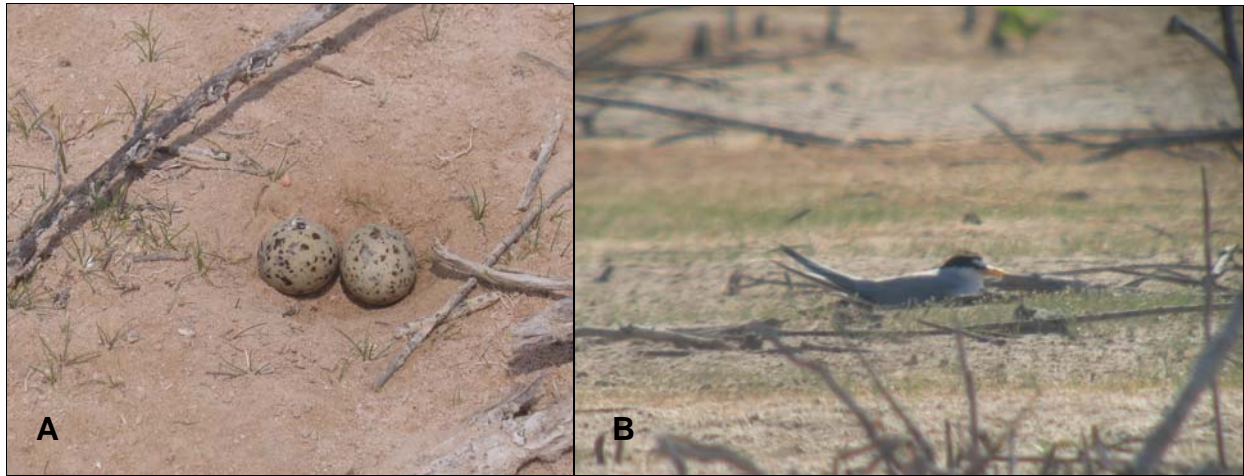


Figure 5. *Least Tern nest (A) and adult Least Tern incubating (B) at Brantley Lake. Photos taken 25 June 2008.*

Because of the rising water levels from the irrigation block release, an attempt to relocate the nests to higher ground was made by H. Walker (NMDGF) and T. Breen (U.S. Fish and Wildlife Service – Carlsbad Office). This relocation attempt, on 26 June, was unsuccessful. The adult terns immediately ignored the moved nests and began to disperse. Additionally the difficulty of moving nests of loosely-consolidated soils and immovable woody debris was apparent as the nests lost form with the attempted move. Monitoring of this attempted nest relocation continued on 27 June when the rising water covered the nesting area. Eggs from all known nests that were facing inundation were collected by H. Walker for later testing for environmental contaminants.

Created Habitat Use

In summer 2008 there was no evidence of use by Least Terns of any portion of the 84 acres of created nesting and brood-rearing habitat. At the time when most terns began to arrive (late June this year), water levels in Brantley Lake were quite low leaving the created habitat sites > 0.25 mile from the water's edge and consequentially much less attractive to tern who prefer to nest in close proximity to the water's edge.

Decoy Use

Use of decoys to attract Least Terns to the southern created nesting habitat site proved unsuccessful in summer 2008. Unlike the summer of 2007 when rapid growth of kochia covered the decoys, invasive vegetation on the created nesting areas was much less of a problem. However, because the water level of Brantley Lake was very low when most of the Least Terns arrived, and the created habitat areas were at least 0.25 mile away from this surface water, terns were not attracted to the site where decoys were set in place.

Discussion

Over the past five years the Least Tern population at Brantley Lake has been largely affected by lake levels which, in turn, influence available nesting habitat. Least Terns nested at Brantley Lake in 2004 because 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 spring kept this freshly-disturbed ground covered and free of new plant growth. As water levels receded in May, large expanses of drying mudflats were exposed and provided ideal nest locations, attracting Least Terns migrating north through the Pecos River valley. After terns successfully fledged young in this area in summer 2004, herbaceous vegetation covered the site making it less suitable for future nesting use. In 2005 high water levels throughout the spring and early summer at Brantley Lake prevented the exposure of suitable shoreline or lake bottom nesting habitat. In spring 2006 low water levels in Brantley Lake again exposed large expanses of lake bottom where Least Terns attempted to nest. This nesting attempt failed as rising water inundated as many as four nests that were under incubation. The rise and fall of reservoir levels, sometimes by more than 20 feet, is common in summer at Brantley Lake as water is released for irrigation use downstream and then replaced by water in storage at reservoirs upstream. In 2007 only small numbers of Least Terns returned to Brantley Lake and none nested. This was probably due to high water levels that were the result of greater than normal spring precipitation. 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.

In 2008 the lake conditions mirrored that of spring 2006—low water levels through the spring with large expanses of exposed lake bottom. In late June, when Least Terns were discovered in the early stages of nesting (some three to four weeks later than observed in previous years) a large volume of water was already moving down the Pecos River for storage in Brantley Lake. This delivery of water to meet irrigation demands of the Carlsbad Irrigation District resulted in the loss of all Least Tern nests at Brantley Lake. All efforts to move the nests with eggs to nearby higher areas failed for several reasons: the nest substrate was unable to withstand movement without collapse; the woody debris that was an integral part of the nest sites was not movable; and the rate at which the lake level was rising was too rapid to allow for gradual movements of nests (H. Walker, pers. comm.). It is important to note that had nest initiation occurred in late May or early June, as has been observed in recent years, incubation of the eggs possibly could have been completed with hatched chicks (mobile within three days of hatching) likely able to move in advance of floodwaters, thus resulting in some successful reproduction.

After the dispersal of adult Least Terns associated with the inundated nests, only one or two adults were observed at Brantley Lake into July and then no Least Terns were detected in August. A single immature Least Tern was observed on 24 July along with two accompanying adults. This immature tern was unlikely to have originated from Brantley Lake, rather it probably dispersed from nesting locations elsewhere in the region, such as Bitter Lake NWR. In 2009 presence/absence surveys for terns will again begin in early May and continue through August at weekly intervals.

Of the three created nesting and brood-rearing habitat sites cleared and maintained in 2008 none were utilized by Least Terns for their intended purpose. The southern-most site (11.9 ac.), which

has the greatest potential for use by terns because of its location (open to large expanses of water) and past use as a nesting area, was not utilized probably due to the low lake levels at the time terns arrived. Maintenance of these three habitat sites, all totaling 84 acres in area, will occur again in early 2009. This maintenance work will involve removing the vegetation that grew during spring and summer of 2008 and breaking the topsoil into small particles.

In the future, for Least Terns to utilize the created nesting and brood-rearing habitat sites, flexible water management in Brantley Lake, and throughout the Pecos River system, 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 late June), could increase the potential for tern use of the managed habitat areas. One 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 which have distinct habitat needs. The management of block irrigation deliveries of water to Brantley Lake is fundamentally based on the Carlsbad Irrigation District irrigation demand and river flow target objectives to sustain the Pecos bluntnose shiner. Reclamation will continue to look for opportunities to meet these needs and additionally benefit the Least Tern. Reclamation is continuing to utilize adaptive management methods to modify enhancement techniques with the goal of establishing a stable tern colony at Brantley Lake.

Acknowledgements

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