

FINAL PERFORMANCE REPORT



Federal Aid Grant No. F13AP00223 (E-73-R-2)

**Least Tern Monitoring in the Canadian River Landowner
Conservation Cooperative**

Oklahoma Department of Wildlife Conservation

April 1, 2013 through March 30, 2016

FINAL PERFORMANCE REPORT

State: Oklahoma

Grant Number: F13AP00223 (E-73-R-2)

Grant Program: Endangered Species Act Section 6

Grant Title: Least Tern Monitoring in the Canadian River Landowner Conservation Cooperative

Reporting Period: April 1, 2013 - March 31, 2016

Principal Investigator: Priscilla H. C. Crawford, Oklahoma Biological Survey, University of Oklahoma

A. Abstract:

Recovery efforts for the federally-endangered Interior Least Tern (*Sternula antillarum*) along the Canadian River in central Oklahoma were initiated in the mid-1990s by Victoria Byre, who closely monitored and protected the species from human disturbance during its breeding season. After her death in 2000, monitoring efforts ceased. Priscilla Crawford, the current P.I., renewed the Least Tern monitoring program in 2007. Beginning in 2010, The P.I. partnered with the Oklahoma Department of Wildlife Conservation to receive financial assistance for the project through the Cooperative Endangered Species Conservation Fund provided by Section 6 of the Endangered Species Act. The current grant was proposed in order to both improve the status and facilitate species recovery (e.g. number of birds and their reproductive success) of the Interior Least Tern within this portion of its breeding range. A significant component of this grant has involved outreach to landowners that own or maintain property along this segment of the Canadian River. Through this project, we made contacts with landowners in order to educate them about the presence and ecological importance of the Interior Least Tern. We located and monitored tern nesting colonies in order to quantify the size of the population, the locations of nesting colonies, and the reproductive success of terns at each location. Protection of the nesting colonies themselves is two-fold; effort is made to educate people who recreate on the river through both presentations and the distribution of free informational material (e.g. brochures and posters). Secondly, temporary psychological barriers were constructed around nesting colonies to increase the awareness of tern presence and potentially reduce the risk of destruction or disturbance of Interior Least Tern nests and chicks.

B. Background:

The Canadian River is one of four rivers in Oklahoma that supports breeding populations of the federally endangered Interior Least Tern. For successful nesting, the Interior population of the Least Tern requires riverine habitat conditions that are maintained by periodic flooding events - long reaches of shallow, braided river channel containing numerous barren sandbars and islands. Over the past seven decades, the Interior Least Tern's nesting habitat has been reduced as a

result of the alteration of the natural flooding cycles on most major rivers, which in turn has been caused by manipulations to these rivers and their tributaries such as damming, dredging, channel straightening and dewatering. These changes have resulted in a reduction in the frequency and magnitude of flooding events that are necessary to scour vegetation within the flood plain and to redistribute the sediments that form sandbars. As a consequence of reduced flooding, invasive species such as the exotic salt cedar (*Tamarix* spp.) have encroached upon the river and further altered habitat structure. Both the decline in sandbar habitat and the alteration of the river ecosystem by invasive species are outlined as important conservation issues in the Least Tern Recovery Plan (USFWS 1990) and the Oklahoma Comprehensive Wildlife Conservation Strategy (ODWC 2005).

Additionally, the remaining suitable habitat along inland rivers can be locally affected by heavy human recreational activity (Hill 1993; Byre 2000). Recreational activities, such as the driving of off-road vehicles in the river channel, can disturb colonies of nesting terns that may lead to the abandonment of nests; in addition, such activities can cause the destruction of eggs and direct mortality of chicks. Although this potential impact to Least Tern nesting colonies is unintentional, it hinders the recovery potential for this species (Hill 1993; Byre 2000 & 2004). To potentially reduce recreational traffic within tern nesting areas, a need was identified to post visible signage and psychological fencing (e.g. flagging or caution tape) to deter and educate people. Developing strategies to successfully manage recreational activity in the riverbed may be the greatest step in the protection of the Interior Least Tern in high human-use areas such as the Canadian River in central Oklahoma. The USFWS Recovery Plan for the Interior Least Tern indicates a need for educational outreach and law enforcement actions in areas of high public use (USFWS 1990).

The USFWS Recovery Plan also cites the need to develop and implement public awareness and outreach programs about the Interior Least Tern (USFWS 1990). Reaching out to people who both live along and recreate in the Canadian River can be a significant part of the recreational activity management program. Outreach activities can be informal “chats” with people accessing the river or more structured activities for school groups, scout troops and civic groups, such as local chapters of the Audubon Society. There is a substantial base of voluntary land conservation and private landowner interest in habitat protection along the Canadian River near the city of Norman, Oklahoma. Currently, 16 private landowners representing over 4,500 acres in the central Oklahoma Canadian River corridor have become participants in the Canadian River Landowner Conservation Cooperative (CRLCC), a subset of properties enrolled within the state-wide Oklahoma Natural Areas Registry (ONAR) program. The ONAR is a voluntary landowner-recognition program conceived by the Oklahoma Biological Survey. As enrollees in the CRLCC, landowners have agreed to a variety of measures that aid in protection and recovery efforts for the Interior Least Tern; these include allowing property access for biologists and law enforcement and implementation of habitat management recommendations provided by ONAR staff for the benefit of the Interior Least Tern.

C. Objective:

To monitor the breeding population of Interior Least Terns (*Sternula antillarum*) and to build

support for the conservation of nesting colonies on private lands along the Canadian River in central Oklahoma over three nesting seasons.

D. Procedures:

1. Contact landowners each spring who are current or past members of the Oklahoma Natural Areas Registry about their continued involvement or reinvestment in the program, and identify those who are interested in greater habitat protection.
2. Inform additional landowners in the river corridor about the Oklahoma Natural Areas Registry and Canadian River Landowner Conservation Cooperative. Add interested landowners to Registry Program and Conservation Cooperative. Identify those interested in greater habitat protection.
3. Conduct educational programs using previously developed educational materials for school and adult groups on the ecology and conservation status of the Interior Least Tern and other co-occurring species within prairie river ecosystems.
4. Identify locations of Interior Least Tern nesting colonies and implement protective measures by flagging areas and using temporary psychological fencing to deter human disturbance near nesting birds.
5. Monitor Interior Least Tern colonies in the project area throughout each breeding season. Compare data to previously published data on the Canadian River to determine long-term population trends. Track habitat quality in the areas used by terns for their nesting colonies.
6. Evaluate the success of deterring human disturbance and bird reproduction; provide written reports to ODWC and USFWS regarding the results.

E. Results and Discussion:

Each spring, we contacted landowners who are members of the Oklahoma Natural Areas Registry within the Canadian River Landowner Cooperative. Upon landowner request, we distributed and posted “Oklahoma Natural Areas Registry - No Trespassing” signs on enrolled properties. No landowner was interested in assistance with habitat improvement or purchasing of new gates, fencing, or other trespassing deterrents. We also contacted additional landowners in the river corridor about the Oklahoma Natural Areas Registry and Canadian River Landowner Conservation Cooperative. No new landowners joined during this 3-year grant period.

We conducted educational programs in the community and distributed the “Life on a Prairie River” poster and Interior Least Tern pamphlet. During the last three years, we made contact with approximately 3000 people at various local events (Norman’s Earth Day Festival, Science in Action Day at the SNOMNH, Environmental Education Expo, Sierra Club meetings, and other community outreach programs). We acted in an advisory capacity to the Norman Area Land Conservancy regarding riverine and riparian habitat protection. We worked with the Canadian River Conservancy to promote the protection of an Interior Least Tern colony site within the Norman city limits.

We continued the monitoring program for Interior Least Tern colonies in the project area (See Appendix I for colony locations).

2013 Breeding Season – A total of 24 adult pairs were observed in the project area (12 Indian Hills Colony; 3 Lindsey Colony; 9 Green Valley Colony). During the first nesting period, 20 nests were initiated, with only 1 nest failure that was attributed to flooding. Twenty-nine (29) chicks hatched, but 9 were lost to flooding and 4 to human disturbance. Twelve (12) successfully matured to fledging. No renesting attempts were observed. The overall reproductive success (fledglings/pair) was 0.5. Compared to previous years, a combination of recurring high-flow events and human disturbance caused low reproductive success in 2013. (Refer to Appendix II for narrative and additional details).

2014 Breeding Season – A total of 30 adult pairs were observed in the project area; this included 19 at the Indian Hills Colony, 1 at the Lindsey Colony, and 10 at the Green Valley Colony. During the first nesting period, 10 nests were initiated, and 6 were lost due to flooding. Twelve (12) chicks hatched and 5 successfully matured to fledging. Three chicks were killed by ATVs. A total of 15 nests were established in renesting attempts; however, 4 were lost to high-flows, 5 were lost to predation events, and 4 were destroyed by human activities associated with ATVs. Six (6) chicks hatched from 2 nests, however only 2 made it to fledging. The overall reproductive success (fledglings/pair) was 0.233. Predation and human disturbance were attributed to be the primary causes of the low reproductive success this year. (Refer to Appendix III for narrative and additional details.)

2015 Breeding Season – A total of 14 adult pairs were observed in the project area; this included 5 at the Indian Hills Colony, 1 at the Lindsey Colony, 3 at the Green Valley Colony, and 5 at the newly-discovered Oxbow Colony. During the first nesting period, 10 nests were initiated and all were lost to flooding from high-flow events. There were 3 nests established in renesting attempts; one chick hatched, but did not survive to fledging due to human disturbance. The overall reproductive success (fledglings/pair) was 0.0. A combination of recurring high-flow events and human disturbance in 2015 caused 100% juvenile mortality. See Appendix IV for narrative and additional details.

Comparing our population data to that which had been previously published for Interior Least Terns in our project area (Byre 2000), we established that the colony size and reproductive success are both declining. We presented a preliminary analysis at the annual meeting of the American Ornithologists' Union and the Cooper Ornithological Society held in August of 2015. We are currently writing up a more detailed comparison for publication.

We also analyzed aerial photography of the project area to determine the change in nesting habitat since 1995. Our preliminary results (also presented at the AOU/COS meeting) indicate a significant decline in the amount of suitable habitat in the historic colony sites. Historically, high-flow events in the Canadian River watershed have maintained suitable nesting habitat for Interior Least Terns by scouring the sandbars and removing excess vegetation. Despite recurring, record-setting floods that were experienced in 2014 – 2015, a substantial amount of vegetation has remained on the sandbars throughout the CRLCC. We are currently writing up a more detailed analysis for publication.

Annually, Interior Least Tern colony locations were flagged and temporary psychological fencing was utilized to deter human disturbance near nesting birds. Although a level of success was achieved, there continued to be regular vandalism at all colony sites. Several nests were lost due to breaches in the fencing. Mortality of broods from human activities typically increased after the chicks hatched and became mobile. This is likely due to mobile juveniles moving outside of the fenced area; sandbar areas large enough for roaming juveniles are difficult to fence, making chicks potentially more susceptible to direct-mortality from human activities. Protecting chicks during this stage of development has proven to be challenging and thus far has been unattainable with our current methods.

F. Significant Deviations:

None

PREPARED BY:



Priscilla H. C. Crawford
Conservation Specialist, Oklahoma Biological Survey
University of Oklahoma

DATE:

25 April 2016

APPROVED BY:

Wildlife Division Administration
Oklahoma Department of Wildlife Conservation

Andrea Crews, Federal Aid Coordinator
Oklahoma Department of Wildlife Conservation

Appendix I Interior Least Tern (*Sterna antillarum*) Colony Locations in the Canadian River
Landowner Conservation Cooperative

Green Valley: 34.981049° -97.345266°

Indian Hills: 35.287021° -97.566153°

Jenkins: 35.150130° -97.438088°

Lindsey: 35.201269° -97.496188°

Noble: 35.138064° -97.408380°

Oxbow: 35.209982° -97.528497

Appendix II – Map Showing Segment of Canadian River within the Canadian River Landowner Conservation Cooperative



Appendix III – Interior Least Tern 2013 – 2015 Breeding Season Narratives, Canadian River Landowner Conservation Cooperative

MONTHLY SUMMARIES - 2013

MAY

Beginning 7 May, each nesting colony was observed weekly by the Principal Investigator and Michael Leitch, summer research assistant. The cool weather and late frosts this spring may have contributed to a slight delay in the return of Least Terns (LETE) to the area. Working closely with USFWS Special Agents Brian Gourgues and Matt Byrant, we made plans to thoroughly document all nests with photos and GPS, mark all nesting sites with signs and psychological fencing and to have law enforcement agents patrol the colony sites on weekends.

Indian Hills: Six adult LETE were observed during the month of May. No nests were established during May. No nest initiation was documented during the month. ATV traffic at all the sites appeared to be less during May than in previous years. Higher water levels in the river probably contributed to an inability for lengthy travel up and down the river corridor. Snowy Plovers were delayed as well, with only 3 sighted in May at this site.

Lindsey: Six adult LETE were observed at this site during the month of May. No nest initiation was observed at this site during the month.

Green Valley: This colony site was not surveyed during the month of May.

On 29 May, we surveyed the I-44/Canadian River bridge area for LETE activity. This survey was requested by the USFWS and USACE prior to the dismantling of the abandoned steel bridge that was damaged in a tornado earlier in the month. We observed 2 adult LETE fly by, but no nesting activity was observed within or adjacent to the project site.

Historic colony sites, Noble and Jenkins, were checked weekly for LETE presence throughout May. One or two terns were observed in fly-bys on a couple of the days, but no nesting activity or courting behavior was observed at these sites.

JUNE

During June, each nesting colony was observed weekly.

Indian Hills: Adult LETE observed at this site increased from 6 to 17 adults throughout the month. By the end of June, a total 14 nests were established and 7 chicks hatched from the first nests. One adult pair was courting and mating at the end of the month. The Indian Hills area continues to be the only site that Snowy Plovers (SNPL) were nesting. By the end of the month, 8 adults had been observed with 4 chicks and 2 nests.

There is continued ATV traffic at this site, with little in the upper colony area. Because of its inaccessibility to ATVs, we did not fence the upper colony area. However, we fenced and signed the lower nesting site that is on an island within the river.

Lindsey: We observed 7 adults on 18 June, but only 4 remained in the area and established 2 nests by mid-June. These two nests were fenced and signed. Human footprints were observed twice within the fenced off area, but both nests hatched 2 chicks.

Green Valley: This site had a small population during the month, with 6 adult LETE observed establishing 3 nests. No ATV tracks were seen during the month at this site.

On 19 July, we traveled via kayak from the historic Jenkins colony to the railroad bridge south of Noble (35.087675°, -97.378578°). There were no signs of colonies along the entire stretch. Otter tracks were observed at the historic Noble colony site, indicating a potential cause of abandonment by LETE.

JULY

During July, each LETE nesting colony was observed weekly.

Indian Hills: Due to high river flows at this site, the upper nesting site was not directly observed for 2 weeks. On 1 July, we observed ATV tracks within the fenced area on the island. We repaired the fencing and verified that both nests were unharmed. By 11 July, we observed 24 adults, 11 chicks, and 2 juveniles. A high water event on 27 July occurred on the Canadian, but these island nests were not affected. Nesting of SNPL seems to have only occurred at the Indian Hills site this breeding season. We continued to see up to 14 SNPL at this site during the month.

Lindsey: All eggs hatched by 1 July at this site. The 4 observed breeding adults successfully hatched a total of 4 chicks. However, after hatching, mobile chicks left the protected site. ATV traffic was heavy at this site throughout July. We attempted to fence off a larger area to accommodate their roaming, but this was unsuccessful. All chicks disappeared by 10 July. Adults remained at the site throughout the month, but did not re-nest.

Green Valley: During July, this population increased to 18 adult LETE, with 7 pairs tending nests. By the end of the month, 10 chicks hatched. A high water event on 27 July was the likely cause of mortality for many eggs and chicks at this site. At the end of month, 2 SNPL were observed at this site.

AUGUST

During August, each least tern nesting colony was observed weekly until terns were no longer in area.

Indian Hills: The majority of the LETE colony residents departed by 6 August.

Lindsey: No LETE were observed during August at this site.

Green Valley: The majority of LETE departed from this site soon after the occurrence of a high-flow event in July; only 2 adult and 1 juvenile LETE were observed on 8 August.

LETE colony observations concluded by 16 August.

SEASON SUMMARY - 2013

Human disturbance continues to be the greatest concern for LETE colonies along the Canadian River. However, this year, high water was responsible for greater mortality in the young. Our biggest challenge is to protect the young birds for the 2 week period that they are mobile but cryptic and flightless. A novel approach to protection is needed and will be explored during the off season to better protect the chicks in future years.

MONTHLY SUMMARIES - 2014

MAY

Beginning 16 May, each LETE nesting colony was observed weekly by the Principal Investigator and Angelina Stancampiano, summer research assistant. During May we observed the arrival of the nesting terns to the Indian Hills, Lindsey, and Green Valley colonies. At the end of May, one nest was established at both the Indian Hills and Lindsey colonies. By the end of May there were 5 adults at the Green Valley site, 3 adults at Lindsey, and 11 at Indian Hills. ATV traffic at all the sites appeared to be typical of each site.

Indian Hills: LETE were observed to arrive at the site. One nest was established during May. By the end of the month, 11 adult LETE had arrived at the site. SNPL were only observed at the Indian Hills Colony. We observed 4 adults throughout May. The Indian Hills site had minor ATV activity throughout May.

Lindsey: A total of three adult LETE were observed at the site during the month. One nest was initiated. ATV use was high at the Lindsey Colony site, which lies closest to urbanization.

Green Valley: A total of 5 adult LETE were observed at the site by the end of the month. The Green Valley site had no ATV activity and relatively high water limited travel to the site down the river bed.

Historic colony sites, Noble and Jenkins, were checked weekly for LETE presence throughout May. One or two LETE were observed in fly-bys on a couple of the days, but no nesting activity or courting behavior was observed at these sites.

JUNE

During June, each nesting colony was observed weekly.

Indian Hills: The observed Indian Hills LETE adult population grew to 19 LETE pairs during the month. By the end of June, a total of 13 nests had been established; this includes renesting attempts. Two high water events caused the loss of 7 nests during the month. Three chicks hatched from the first nests. Because of the ATV activity in the area, we erected twine and flagging fence around the colony on 5 June and repaired and expanded the fencing as needed throughout the month. The Indian Hills are continues to be the only site that SNPL were observed nesting. By the end of the month, 2 adults had been observed with 2 chicks.

Lindsey: We observed 3 adults with one pair establishing a nest that hatched 3 chicks on 20 June. This nest were fenced and signed. Eggs hatched in mid June and mobile chicks were observed on 20 June. By 30 June, chicks and adults had disappeared. Human activity was high and is the most likely cause of chick mortality and adult abandonment.

Green Valley: The site had a total of 10 adults present throughout the month, with 4 nests established by 4 June. A high water event caused the loss of 3 nests. These pairs renested with 3 new nests by 27 June. ATV tracks were seen occasionally during June at this site, but high water events limited activity on key weekends.

On 10 June, we traveled via kayak from the historic Jenkins colony to the Green Valley colony. There were no signs of any LETE colonies along the entire stretch. We observed otter tracks at the historic Noble colony site, which may be the cause for no nests currently on this sandbar.

JULY

During July, each LETE nesting colony was observed weekly.

Indian Hills: During July, ATV traffic became a significant problem at the Indian Hills site. At least 2 nests were lost during episodes of ATV traffic through the colony. Fencing and signposts were regularly vandalized and torn down. Predators were also a cause of nest and chick loss. Five nests had signs of nest predation by coyotes or bobcats. During July we observed 17 adults regularly. Two nests hatched and four juveniles matured to fledging by the 21 July. However, by the end of the month, no LETE were occupying the site.

Lindsey: In July, we observed 2 adults at the Lindsey site on one day. They did not reneest and did not exhibit any courting or nesting behavior.

Green Valley: During July, the Green Valley population grew to 10 LETE pairs, with 4 pairs tending nests. ATV traffic became a concern at the site during July. At least one nest was lost due to ATV activity. We fenced off the area on 24 July. A high water event during the month also caused losses of both nests and chicks. By the end of the month, 4 chicks from 2 nests hatched, with only 2 of those maturing to fledging.

AUGUST

During August, each least LETE nesting colony was observed weekly.

Indian Hills: All colony residents left in July; no LETE were seen at the site throughout August.

Lindsey: No LETE were observed during August at the Lindsey Colony.

Green Valley: The Green Valley colony remained plagued by ATV traffic.

LETE colony observations concluded by 25 August.

SEASON SUMMARY - 2014

The 2014 LETE season was less successful than other non-flood years. There were only 30 pairs at the monitored colonies, with 10 original nests established; of these, six were destroyed by flooding and subsequently failed. Of the four remaining nests, 12 chicks hatched and 4 successfully fledged. There were 15 reneest attempts; of these, two juveniles successfully fledged. The total number of fledged juveniles for all three colonies was six (6). For all LETE colonies within the project area, the minimum productivity during the 2014 nesting season was 0.20 fledglings/pair. The reproductive rate (fledgling/pair) for each colony and total was 0.211 for Indian Hills, 0.0 for Lindsey, and 0.20 for Green Valley.

Human disturbance continues to be the greatest concern for LETE colonies along the Canadian River. The biggest challenge appears to be protecting the young birds for the 2 week period during which they are mobile, but cryptic and flightless.

In addition, one factor that may negatively impact future LETE recruitment is the encroachment of riparian vegetation on previously occupied sandbars; this reduces the optimal habitat and may increase the vulnerability to flooding and predation. Predation on nests and chicks appeared to be high during this season as compared to previous years. The Principal Investigator noted that for reasons unexplained, nesting locations chosen at the Indian Hills site were much closer to vegetation than observed in previous years. The increased density in vegetation may have provided suitable cover for nest-predators (e.g. mammals), and thus contributed to the reduced number of successful nests at the Indian Hills colony site during the 2014 season.

The loss of nests from flood events was higher than expected given that the high water events were relatively minimal throughout the season. Some nesting sites were inexplicably selected by LETE at lower elevations on the sandbar; as a result, relatively small flood events destroyed multiple nests. A contributing factor in the selection of suboptimal nest sites may have been the result of an increase in the density of vegetation on the sandbar. Vegetation removal may be considered in the future to increase preferred sandbar habitat, which could potentially reduce overall loss of nests by flooding and predation.

MONTHLY SUMMARIES - 2015

MAY and JUNE

Monitoring the LETE colonies during this breeding season was challenging due to the record-setting rainfall, thunderstorms, and frequent flooding along the Canadian River. Our usual schedule is to visit colony sites at least once a week, and more often if possible and warranted due to frequent human disturbance. Because of the unsafe field conditions, we have not maintained our typical monitoring frequency. The LETE population along the Canadian River Landowner Conservation Cooperative this spring has been low. We have attributed this to the unusually wet spring and subsequent high water within the region. We have visited the regular colony sites approximately 5 times during the months of May and June.

Indian Hills: The Indian Hills site has had up to 10 adult LETE with nests initiated in early June. Unfortunately, a high water event in mid-June destroyed the nesting site. By the end of June, we observed 8 adult LETE displaying courtship and potential renesting behavior on the opposite side of the river; this bank lies at a higher elevation and is difficult to access by foot.

Lindsey: At the Lindsey Colony site, we have found no nesting activity this season, and only observed terns on two occasions as they flew over the site.

Green Valley: We have observed up to 5 adult LETE with one nest initiated. However, the site appears to have been abandoned with no sign of the nest or adult LETE by the end of June. High river flows made LETE observations low at the typical colony sites; therefore, we opted to conduct additional surveys by kayak.

Oxbow: On 23 June, we floated the Canadian River from the Indian Hills Colony Site downstream to the South Jenkins Colony Site via kayak. We observed one previously unknown colony. This site may be close to the historic Polo Farm, Newcastle, or West Main colony sites. However, given the significant change in the river channel and sandbars, I have opted to give it a new name, Oxbow. At that time, we observed 10 adult LETE and between 4-5 nests. A couple of the nests appeared that they might be susceptible to future high water events. We have not had conditions favorable for additional boat surveys. Thunderstorms, extreme high water, and scheduling have limited our abilities. However, we hope to survey from South Jenkins to Green Valley at least once and possibly resurvey both reaches of river in July.

Outside of the scope of this grant, biologists with Reagan Smith Energy Solutions, Inc. contacted the Principal Investigator in June to verify potential LETE nesting activity that had been observed on an oil pad site in Ellis County. After additional correspondence with project personnel, no further assistance was requested.

JULY

LETE numbers were low during this time and declined throughout the month.

Indian Hills: During the month, a total of 6-8 adult LETE were observed at the site. By mid-July, 3 pairs of LETE appeared to be tending nests on the opposite side of the river. On 24 July, we observed one mobile chick being attended by 2 adults. However, there was no sign of additional hatchlings or nest tending throughout the rest of the month.

Lindsey: By 10 July, no further observations of LETE occurred.

Green Valley: By 10 July, no further observations of LETE occurred.

Oxbow: Due to unsafe river conditions, we were unable to access this colony after our initial discovery of its existence in June. Since no follow-up survey was conducted in 2015, the fate of this colony is unknown. River conditions also prevented a survey for any additional colonies that may have existed on the Canadian River between Norman and Purcell during this period.

The P.I. was not contacted for further technical assistance pertaining to the LETE nesting behavior observed on the oil pad in Ellis County.

AUGUST

The LETE breeding season concluded in August along the Canadian River in central Oklahoma. No birds were observed nesting at neither the Green Valley colony nor Lindsey colony sites during the month. Although a few LETE flyovers were observed, no individuals lingered or foraged at any of colony sites during this period; in addition, no nesting behavior was observed.

Indian Hills: On 3 August, we visited the site in hopes of observing the only chick hatched of all the nesting sites we monitor. However, we saw no sign of the chick and we observed only one adult fly by a couple times with no behavior indicating that it was tending a nest or chick. Though we were unable to determine the cause of mortality, we speculate that the chick was lost either due to recent ATV traffic or another stressor combined with high seasonal temperatures. ATV tracks were followed and the area was search, but no deceased birds were found.

Lindsey: No nesting activity was observed at this site during the month, though 1-2 adult LETE were observed as fly-bys.

Green Valley: No nesting activity was observed at this site during the month, though 1-2 adult LETE were observed as fly-bys.

SEASON SUMMARY - 2015

The 2015 LETE nesting season experienced a 100% total brood loss within Canadian River Landowner Conservation Cooperative. The majority of LETE nests were destroyed by extremely high flow events, with the remaining losses attributed to human disturbance.

Although record-setting flooding was experienced in the Canadian River watershed, riparian vegetation was not scoured to the extent anticipated; as such, a significant amount of sandbar habitat suitable for LETE was not restored within the project area. Vegetation removal may be considered as a future option for LETE nesting habitat restoration. Such management activities may provide additional nesting sites and ameliorate future brood losses by flooding and predation in subsequent years.

Appendix IV - Outreach and Educational Materials Provided to the Public, Including Poster (Fig. 1) and Brochure (Fig. 2)

Fig. 1



Fig. 2

How Can You Help the Interior Least Tern?

Don't disturb nesting birds.

- ✓ If birds seem agitated or take flight, you are too close!
- ✓ Don't ride ATVs on sandbars in nesting areas.
- ✓ Keep pets on a leash when walking along river.
- ✓ Keep livestock away from nesting areas.

Inform others about the Least Tern and how we can protect it.

- ✓ Give this pamphlet to someone who hasn't heard about the Interior Least Tern.
- ✓ Call the Oklahoma Natural Areas Registry to schedule an educational program.

Report bird or nest disturbance.

- ✓ Call the Oklahoma Department of Wildlife Conservation. 1-800-522-8039
- ✓ Call the U.S. Fish and Wildlife Service. Law Enforcement Office: 1-405-715-0617

Become a volunteer monitor.

Contact the Oklahoma Natural Areas Registry program for more information on donating your time to monitor and protect the Least Terns.



Canadian River, Oklahoma

Kim Baker, www.oklahomaphotography.com

A Special Species Along Our Prairie Rivers



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Did you know that an endangered bird spends its summer along the sandy rivers of Oklahoma?

The Interior Least Tern travels from the Caribbean and South America every summer to court, nest, and raise its young on the sandbars of our prairie rivers.

Why Is the Interior Least Tern Endangered?

Interior Least Terns (*Sterna antillarum athalassos*) were added to the federal list of endangered species in 1985 due to the population decline in the Great Plains and Mississippi Valley caused primarily by the loss of breeding habitat in this region. Least Terns nest on the ground in bare sand, gravel, or shells, on dry mudflats, on salt plains, and in sand and gravel pits. The natural dynamics of prairie rivers maintain the sandbars that terns prefer for nesting. The water fluctuations that come with flooding and dry periods create bare sand bars, which terns find

attractive for nesting. However, much of the best breeding habitat has been lost or disturbed due to river damming, dredging, and straightening. By regulating the rivers, we have disrupted the flood cycle that scoured vegetation out of the riverbed and shifted sandbars in the wide river bottom. Regular flooding reduces the invasion of the riverbed by plants. However, floods during the breeding season can wash away tern nests, eggs, and chicks. Too little water in the river also can adversely affect the tern population. Not enough water in the river can result in fewer fish

Oklahoma Natural Areas Registry

111 East Chesapeake Street
Norman, OK 73019-5112
405/325-7658
email: okregistry@ou.edu
www.oknaturalheritage.ou.edu/registry_about.htm

A program of the Oklahoma Biological Survey and the State of Oklahoma.

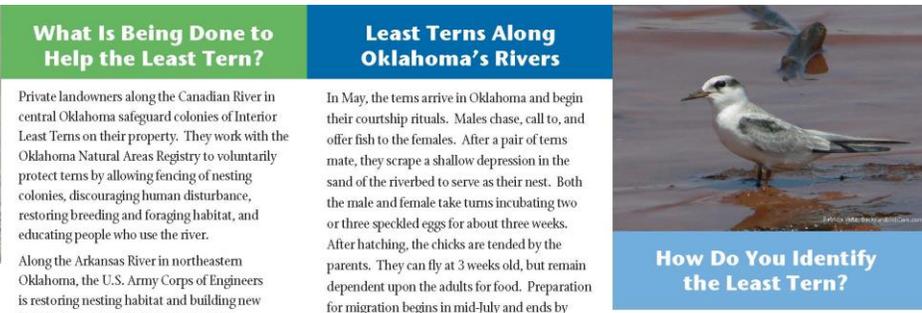
This project was funded in part by the Oklahoma Department of Wildlife Conservation and the U.S. Fish and Wildlife Service, Section 6 Grant 5-73-58-1. This publication, printed by University Printing Services, is issued by the University of Oklahoma. 4000 copies have been prepared and distributed at a cost of \$10000 to the Mayors of the State of Oklahoma.

January 2012

What Is Being Done to Help the Least Tern?

Private landowners along the Canadian River in central Oklahoma safeguard colonies of Interior Least Terns on their property. They work with the Oklahoma Natural Areas Registry to voluntarily protect terns by allowing fencing of nesting colonies, discouraging human disturbance, restoring breeding and foraging habitat, and educating people who use the river.

Along the Arkansas River in northeastern Oklahoma, the U.S. Army Corps of Engineers is restoring nesting habitat and building new islands from material dredged out of the navigation channel. In addition, the Corps is mindful of downstream tern colonies when discharging water from reservoirs. With the U.S. Fish and Wildlife Service, the Corps also helps to monitor the bird population on portions of the Arkansas, Canadian, and Red rivers.



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Least Terns Along Oklahoma's Rivers

In May, the terns arrive in Oklahoma and begin their courtship rituals. Males chase, call to, and offer fish to the females. After a pair of terns mate, they scrape a shallow depression in the sand of the riverbed to serve as their nest. Both the male and female take turns incubating two or three speckled eggs for about three weeks. After hatching, the chicks are tended by the parents. They can fly at 3 weeks old, but remain dependent upon the adults for food. Preparation for migration begins in mid-July and ends by early September. During this time, Interior Least Terns congregate in large flocks and fuel up for the long trip to the Caribbean and northern South America. Juvenile terns practice fishing and learn to become independent during this pre-migratory period.

How Do You Identify the Least Tern?

The Least Tern is the smallest member of the gull and tern family. The males and females are nearly identical in size and coloration. Distinguishing features of the Least Tern are: grey and white body color; black eye-stripe, cap, and nape; slightly forked tail; and narrow, pointed wings with a black edge (photos far left and front). Juvenile terns that are less than 1 year old are white underneath, grey above, and have less well defined black markings (photo above). Nests are simply a shallow depression in the sand. Chicks and eggs are tan with brown speckles, providing excellent camouflage on the sandbars and river beds (photo below).

How Can You Help the Interior Least Tern?

and consequently reduce the food source for terns. To be successful along Oklahoma's rivers, breeding terns need a combination of suitable sandbars, favorable water levels, and sufficient food during the nesting season.

In addition to changes in natural river processes, terns also are threatened by increased disturbance by humans. Our rivers have become popular recreation areas, and the number of people on the river is increasing. ATV use in and along rivers has grown, hurting ground-nesting birds. Because terns build well-camouflaged nests on the bare sand, their simple nests are vulnerable to trampling by people, pets, and livestock. Even if we do not destroy the nest, human activity can keep parent birds away from the eggs and chicks, leaving them subject to overheating in the summer sun or predation by animals such as coyotes, crows, or raccoons.

Did you know that an endangered bird spends its summer along the sandy rivers of Oklahoma?

The Interior Least Tern travels from the Caribbean and South America every summer to court, nest, and raise its young on the sandbars of our prairie rivers.

Oklahoma Natural Areas Registry

111 East Chesapeake Street
Norman, OK 73019-5112
405/325-7658
email: okregistry@ou.edu
www.oknaturalheritage.ou.edu/registry_about.htm

A program of the Oklahoma Biological Survey and the State of Oklahoma.

This project was funded in part by the Oklahoma Department of Wildlife Conservation and the U.S. Fish and Wildlife Service, Section 6 Grant 5-73-58-1. This publication, printed by University Printing Services, is issued by the University of Oklahoma. 4000 copies have been prepared and distributed at a cost of \$10000 to the Mayors of the State of Oklahoma.

January 2012

What Is Being Done to Help the Least Tern?

Private landowners along the Canadian River in central Oklahoma safeguard colonies of Interior Least Terns on their property. They work with the Oklahoma Natural Areas Registry to voluntarily protect terns by allowing fencing of nesting colonies, discouraging human disturbance, restoring breeding and foraging habitat, and educating people who use the river.

Along the Arkansas River in northeastern Oklahoma, the U.S. Army Corps of Engineers is restoring nesting habitat and building new islands from material dredged out of the navigation channel. In addition, the Corps is mindful of downstream tern colonies when discharging water from reservoirs. With the U.S. Fish and Wildlife Service, the Corps also helps to monitor the bird population on portions of the Arkansas, Canadian, and Red rivers.



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Appendix V. – Annual Letter Submitted to Participants of the Canadian River Landowner Conservation Cooperative

25 April 2013

LANDOWNER
ADDRESS

Dear LANDOWNER,

I hope you have been enjoying the spring rains this year – a welcome change from our drought conditions these past two years. The interior least tern will be returning to Oklahoma in the coming weeks and we at the Registry Program are gearing up to begin another year of colony observations.

My summer assistant this year is [insert name]. He/she is looking forward to learning about the least terns and coordinating additional bird surveys at other Registry sites.

We will continue monitoring the tern colonies along the Canadian River – locating colonies, watching the birds establish nests, and observing the chicks. The river level is up this year and we hope to kayak from south Oklahoma City to south of Lexington to look for all of the tern nesting sites. We know where the biggest colonies usually are, but some small groups nest along other sandbars of the river. We will continue to mark colonies with signs and flagging to deter human and pet disturbance. This effort was very effective in some of the heavily trafficked areas during the past few years.

As we did last year, we will be working closely with U.S. Fish and Wildlife Service Law Enforcement officers to better protect the large colonies. With their presence on the river during busy weekends, we hope that destructive recreation and ATV traffic will be less this year.

As members of the Registry Program you agreed protect the least tern by allowing Registry Program staff and volunteers access to your property to inspect, monitor, protect, and research the tern. I am requesting permission to access your property and, if colonies are found, to use signs or minimal fencing to designate the area as protected. Please contact me if you do not grant me this permission for this year's breeding season.

Also, I want to remind you that we have still have grant money allocated to protect least tern colonies and riparian habitat on Registry members' properties. This money may be spent on signs and barriers around colonies and to provide gates at river access points. I know many of the river landowners have problems with trespassing on your property; we might be able to help by providing gates, gate reinforcement, and/or signage. Please contact me if you are interested.

Any time you have questions or comments, you may contact me via phone or email.

Sincerely,

*Priscilla H. C. Crawford
Conservation Specialist*