

FINAL PERFORMANCE REPORT



Federal Aid Grant No. F17AP00204 (E-73-R-4)

**Monitoring and Protection for the Interior Least Tern in the Canadian
River Landowner Conservation Cooperative**

Oklahoma Department of Wildlife Conservation

April 1, 2017 – March 31, 2019

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State: Oklahoma

Grant Number: F17AP00204 (E-73-R-4)

Grant Program: Endangered Species Act Traditional Section 6

Grant Name: Monitoring and Protection for Interior Least Tern in the Canadian River
Landowner Conservation Cooperative

Grant Period: April 1, 2017 -March 31, 2019

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

A. ABSTRACT:

The Interior Least Tern has been monitored and protected in central Oklahoma along the Canadian River for many years. Work began in the mid-1990s to study this population and protect the species from human disturbance during its breeding season. Work lapsed after the death of the original PI, Victoria Byre, in 2000. The current PI, Priscilla Crawford, renewed the monitoring in 2007, with Section 6 financial assistance beginning in 2010. The current grant was proposed in order to improve the status (e.g. number of birds and their reproductive success) of Least Terns. Through this project, we made contacts with landowners along the Canadian River in order to educate them about the presence, ecology, and importance of Least Terns in their area. 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. In conjunction with monitoring, we protected tern colonies from human disturbance by educating people who recreate on the river and by implementing temporary psychological barriers to warn people away from colonies.

B. OBJECTIVES:

Monitor the breeding population of Interior Least Terns along a ~40 mile stretch of the Canadian River during the 2017 and 2018 seasons, and to build support for the conservation of nesting colonies on private lands along the Canadian River in central Oklahoma.

C. BACKGROUND:

The Canadian River is one of four rivers in Oklahoma that supports breeding populations of the federally endangered Interior Least Tern (*Sterna antillarum*). 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 2015).

Additionally, the remaining suitable habitat along inland rivers can be locally affected by heavy human recreational activity (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, eggs and chicks, or the direct destruction of eggs and chicks by these vehicles. Although this potential impact to Least Tern nesting colonies is unintentional, it hinders the recovery potential for this species (Byre 2000). To reduce the recreational traffic in areas with nesting birds, the colonies need to be posted and psychological fencing (e.g. flagging or caution tape) erected 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 the people who live along these rivers and who potentially recreate in the riverbeds 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 Audubon clubs. There is a substantial base of voluntary land conservation and private landowner interest in habitat protection along the Canadian River near Norman. Currently, 16 private landowners, representing over 4,500 acres, in the central Oklahoma Canadian River corridor have become members of the Oklahoma Natural Areas Registry program. In particular they have agreed to protect the Interior Least Tern, provide biologists and law enforcement with access to properties, and have implemented, to the best of their abilities, habitat management recommendations made by the biologists associated with the Oklahoma Natural Areas Registry program.

D. APPROACH:

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 (see part II, Appendix). Add interested landowners to Registry Program and Conservation Cooperative. Identify those interested in greater habitat protection.
3. Conduct educational programs and using previously developed educational materials for

school and adult groups on the plight of the Interior Least Tern and prairie river ecosystems.

4. Monitor Interior Least Tern colonies in the project area each breeding season. Compare data to previously published data on the Canadian River to determine the long-term population trend. Track habitat quality in the areas used by terns for their nesting colonies.
5. Protect breeding bird colonies where warranted by flagging areas and using temporary psychological fencing to deter human disturbance near nesting birds.
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:

In spring of 2017 and 2018, we contacted landowners who are members of the Oklahoma Natural Areas Registry within the Canadian River Landowner Cooperative. We distributed and posted “Oklahoma Natural Areas Registry - No Trespassing” signs to those landowners requesting them. No landowner was interested in assistance with habitat improvement or purchasing of new gates, fencing, or other trespassing deterrents. We contacted additional landowners in the river corridor about the Oklahoma Natural Areas Registry and Canadian River Landowner Conservation Cooperative. No new landowners agreed to become Registry members during 2018.

We conducted educational programs in the community and distributed the “Life on a Prairie River” poster and Interior Least Tern pamphlet (see part I, Appendix). During the last year, we made contact with approximately 500 people at various local events (Norman’s Earth Day Festival, Oklahoma Chapters of the Sierra Club, OU conservation biology classes, and other community outreach programs).

Because the habitat has not improved for the Interior Least Tern on the Canadian River in central Oklahoma, monitoring colonies was minimal through the 2018 season. Sand bars have grown up in vegetation, making them increasingly unsuitable for tern nesting.

Regarding the Interior Least Tern, our effort has been focused on researching, conducting GIS analysis, and writing up the results of these 10 years of monitoring with documentation and analysis of population and habitat decline in the region.

2017 Breeding Season Summary

MAY: We initiated Interior Least Tern colony surveys this breeding season in mid-May. We began weekly site visits to each known colony site on 17 May. The number of observed LETE along the Canadian this spring has been low, which has been the trend for the past couple years. Previous colony sites will have 5-10 birds arrive then the numbers will dwindle over a series of weeks. Most colony sites have very poor habitat conditions again this year. The exposed sand that is devoid of vegetation is either too low to the water table (at high risk for flooding) or too narrow. The only good colony site in our region is the West Lexington site.

At the Lindsey Colony site, we observed no LETE and habitat is non-existent. At Green Valley, we observed at the most 6 adult LETEs during May, but the number declined and there is only a narrow sandbar available for nesting. The Indian Hills site began the season with 10 adult LETEs on 17 May, but the number dwindled to 2 pairs that were courting. There is potentially some habitat for nesting on the far side of the river that we have not been able to explore. Jenkins, which has not been an active colony site for years, continues to be unsuitable for nesting terns due to the lowering of the sandbar as a result of sand mining.

The only colony site with active nesting is West Lexington. The population of the colony site started low with 4 adult LETEs, but grew to at least 10 adult birds by the end of the month. By 31 May, at least two nests were initiated. This may be the earliest egg laying I have observed for terns on the Canadian in the years I have been monitoring the colonies. On 31 May, I posted the West Lexington Colony with signs and put up psychological fencing around the entire colony (approximately 2,200 ft perimeter).

I contacted State Game Wardens for Cleveland Co, Tell Judkins and Chad Strang. I asked the Game Wardens to add the site to their patrol if possible and gave them the details. I also spoke with Greg Snow the owner of Sundog Trails ATV, which is adjacent to the colony, and told him about the nesting LETEs. He remembered the situation from last year and he asked for flyers for his patrons.

JUNE: At the beginning of June, the only colony site with active nesting was West Lexington. This may be the earliest egg laying I have observed for terns on the Canadian in the years I have been monitoring the colonies. On 1 June, 8 nests had been laid. That number rose to 15 nests by 21 June, with hatching of chicks beginning 19 June. By 26 June, there were 22 chicks at this colony. During June, we had no vandalism of the site by ATV riders. We had one break in the fencing, but it appears to have been an accident, and tracks didn't travel far into the colony. This is the most populous and successful colonies we have monitored for several years. Unfortunately, our relationship with the landowner was severely damaged when we allegedly left the gate unlocked, which allowed his cattle to get out of the pasture. Although, I apologized profusely, we are no longer allowed to access the property.

We continued to visit Indian Hills and Green Valley during June, but there were no signs of nesting at their previous locations.

We did find a colony initiated south of the Indian Hills site on a low sandbar on the west side. On 13 June, we observed 10 adult terns, but no nesting activity. On 22 June, we observed 16 adults and 8 nests. We did not fence this area as we do not have landowner permission and this site is prone to malicious vandalism (meaning that signs and fencing have in the past attracted negative attention to the colony). ATV tracks were present, but minimal. However, we do believe at least 2 nests were lost to ATV traffic, either crushed or abandoned. No evidence was found. By the end of the month we observed 5 nests with no chicks yet hatched.

JULY: During July we continued to monitor the Indian Hills South Colony. In early July we observed at least 12 adults with 6 chicks. They appeared to be 3 family groups of 2 chicks each. Two adults appeared to be continuing to incubate eggs. One new nest had been initiated, probably a re-nest from one lost in June. In mid-July, two nests were still being incubated, with 8

chicks having been hatched. By the end of the month, 7 juvenile least terns were flying around the colony site with 4 additional chicks hatching (11 total young hatching from this colony).

ATV traffic was present at the site, but remained light throughout the month.

We began inquiries into hiring an airboat operator for next (2018) season. Our plan was to conduct fewer surveys, but along entire river reaches that are not currently being monitored by the USACE. We were unsuccessful in our attempts to hire an airboat operator.

AUGUST: Due to the unusually rainy August, we were unable to monitor the Indian Hills South Colony, which is on the other side of the river from our walk-in access. There were no observations to report for August.

2018 Breeding Season Summary

We made cursory survey trips to the Green Valley Colony, South Jenkins, and an overlook of the West Lexington Colony. During April and May, we only observed 1-3 terns at each location with no nesting behavior at the sites. One nest was observed at Green Valley with 1 chick hatching by the end of the month. This juvenile was observed during July on the sandbar. During August, we only observed 0 or 1-2 terns at each location, with no nesting behavior evident.

We wrote a revision of the NatureServe Explorer entry for the Interior Least Tern, including a revision of the conservation status to G4T2T3Q (see part III, Appendix). Our submission to NatureServe is attached (the online database has not yet been updated).

COLONY LOCATIONS

Green Valley: 34.981049° -97.345266° (historic colony site, but not active in 2016-17)

Indian Hills: 35.287021° -97.566153° (historic colony site, but not active in 2016-17)

South Indian Hills: 35.284520° -97.556456° (new colony site active 2017)

Jenkins: 35.150130° -97.438088° (historic colony site, but not active in 2009-18)

Lindsey: 35.201269° -97.496188° (historic colony site, but not active in 2015-18)

Noble: 35.138064° -97.408380° (historic colony site, but not active in 2012-17)

Oxbow: 35.209982° -97.528497° (active in 2015)

North Lexington: 35.035977° -97.349955° (active in 2016)

West Lexington: 35.022962° -97.352460° (new colony site active 2016-17)

F. RECOMMENDATIONS:

Due to the degradation and channelization of the Canadian River below Norman, OK, and the continuous vehicular traffic by recreational users, Interior Least Tern colonies will likely remain small and fragmented in this area. The decline in the amount of suitable sand bar habitat for nesting colonies remains to be the biggest threat to the species' long-term viability in this stretch of the Canadian River. Least Terns should continue to be monitored along this stretch, at least every few years, to assess their persistence and nesting success. In addition, habitat improvement, such as clearing of encroaching vegetation on sandbars, should be explored near historic Least Tern colony sites.

G. SIGNIFICANT DEVIATIONS:

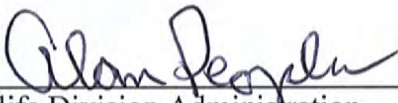
None.


H. EQUIPMENT

N/A.

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APPENDIX

I. "Life Along a Prairie River" poster distributed at various outreach events to educate the public about the Interior Least Tern.



II. Portion of the Canadian River monitored for Interior Least Terns and contained within the Landowner Conservation cooperative.



III. NatureServe Explorer Revision for the Interior Least Tern

Sternula antillarum athalassos

Least Tern (Interior)

Concept reference citation: Occ.Pap.Mus.Zool.LSU no.10 p.173

Avibase – the world bird database, <https://avibase.ca/AFF1059B>

Taxonomic Serial Number: [825083](#)

Concept reference

Three geographic subspecies have been described for North America, but descriptions are based largely on range. There appear to be no significant differences of body measurements between subspecies and all are similar to the coastal *S. a. antillarum* (Thompson et al. 1992). Thompson et al. (1992) conducted electrophoretic analyses of *S. a. antillarum* and *S. a. athalassos* from 4 Texas sites which revealed no genetic distinction among the tested populations. Further, they found extensive overlap of the physical characteristics of the three subspecies. Additionally, geography may not be a rigid barrier for these subspecies. Boyd and Thompson (1985) observed a chick hatched and banded on the Texas coast later nested in Kansas. This evidence of subspecies mixing of Least Tern populations suggests regular genetic exchange across North America (Thompson et al. 1997).

Conservation Status

Global Status: G4T2T3Q

NatureServe Status

Reasons - Interior populations of the Least Tern were formerly well distributed within the Mississippi Basin. Range-wide declines occurred until the USACE's management of nesting habitat on the Mississippi and Arkansas Rivers and conservation partnerships on the Platte River. Current viable populations are reliant on continued management of habitat by the USACE (USFWS 2014). These populations have seen a rebound, but habitat quality continues to decline on the periphery of the geographic range. Interior subspecies is generally not recognized as a distinct taxonomic entity, but continues to be listed as a Federally Endangered population by the USFWS.

NatureServe Global Conservation Status Factors

Range Extent: 200,000 – 2,500,000 sq km (80,000 – 1,000,000 sq mi)

Range Extent Comments:

BREEDING: Historically throughout the Colorado, Red, Arkansas, Missouri, Ohio, and Mississippi river systems. Has been eliminated from much of former habitat. Now breeds locally on the Missouri River through eastern Montana, North Dakota, South Dakota, and Nebraska; on the Platte River in Nebraska; on the Arkansas and Canadian Rivers through Oklahoma; on the Arkansas River through Arkansas to the Mississippi; on the Mississippi and Ohio River from western Indiana to Louisiana, and on the Red River along the borders of Oklahoma and Texas and into Louisiana. Sporadic observations of

small colonies have been noted in eastern Colorado, central Kansas, eastern New Mexico, and western, southern, and central Texas (Lott et al. 2013).

NON-BREEDING: Least terns winter primarily in marine coastal areas. It is likely that interior populations mix with other populations during winter months. Because interior birds are morphologically indistinguishable and recovery rate of banded birds is low, biologists are not capable of defining winter areas for Atlantic and Gulf coastal populations versus interior populations. Least terns winter throughout western coast of southern Mexico, and along eastern coasts of Mexico, Central, and South America, extending south to southern Brazil. First year birds may remain in wintering areas before migrating north for breeding during their second year (Thompson et al. 1997).

Number of Occurrences: >300 (approx. 700, since 2000)

Population Size: 2,500 – 100,000 individuals (fluctuating between ~13,000 - 22,000 since 2005)

Population Size Comments: The last comprehensive survey of the interior populations was in 2005 with 17,591 individuals observed throughout the range. Partial surveys were conducted in 2010 (21,855 individuals observed), 2011 (15,403 individuals observed), and 2012 (13,855 individuals observed). The majority of the increase in birds in the past 20 years is a result of increased populations on the Mississippi River. Populations on the Platte, Missouri, Ohio, and Arkansas River systems have remained low or declined further. Although the numbers have exceeded the range-wide recovery target as designated in the USFWS Recovery Plan (1990), the majority of the specific river system target numbers fall short (USFWS 2014)

Threat – high

Overall Threat Impact Comments: Primary threats are loss of suitable nesting habitat on open sandbars and islands due to channelization and flood control of rivers systems, hydrological changes due to groundwater usage and climate change, vegetation encroachment on sandbars, sand and gravel mining activities, human disturbance by those recreating along the rivers, and predation.

CHANNELIZATION AND FLOOD CONTROL: Channelization of river systems reduces the amount of exposed sand and restricts the sandbar formation processes, therefore reducing the amount of habitat available for colony formation (Alexander et al. 2018). Scouring floods are a necessary process to maintain bare sandbar habitat. By controlling flooding, dams and other structures reduce the potential of flood events that maintain suitable habitat.

HYDROLOGICAL CHANGES: Increased groundwater usage has lowered the water table throughout the Great Plains (McGuire 2017), flow rates for rivers in the Great Plains have declined, and stream drying is becoming common throughout the region (Kustu, Fan, Robock 2010). These hydrologic changes negatively affect sandbar maintenance and formation. Stream drying reduces the fish availability for Least Tern foraging (Perkin et al. 2017).

VEGETATION ENCROACHMENT: Reduction of scouring floods due to flood control or decreases in stream flow allow for vegetation encroachment on sandbars. Least terns prefer nesting habitat devoid of all vegetation and at least 70m from trees and shrubs over 2m (Lott et al. 2013). When flooding is infrequent, sandbars become more resistant to scouring due to the increased vegetation coverage by woody species, both native and exotic. In western parts of the Interior Least Tern range, salt cedar (*Tamarix* spp.) has become well established on along river channels and has withstood high water events. Native willow (*Salix* spp.) and cottonwood (*Populus deltoides*) also become well established and stabilize the sandbars.

SAND AND GRAVEL MINING: Mining operations regularly occur on and create areas of bare sand and gravel along rivers that are suitable nesting habitat for Interior Least Terns. Most operators are unaware of the birds attempting to nest on the bare ground within their work zone. Programs have successfully worked with miners to monitor and protect nesting sites (Brown et al 2018). However, cooperation is a continual process that requires significant contribution of time and effort by both dedicated conservationists and willing industry partners. Although sand and gravel mining operations may cooperate with conservation efforts, removal of material from the floodplain will lower the sandbar elevation and increasing the likelihood that nesting sites will be inundated during minor high water events (Farnsworth et al. 2018).

HUMAN DISTURBANCE: Wide and shallow prairie river channels are common areas for off-road vehicle recreation. Interior Least Tern nests are well camouflaged and are easily overlooked by drivers. Vehicles can directly crush nests and chicks, but nests can also be abandoned by repeated disturbance to the colony by traffic (Carney and Sydeman 1999).

PREDATION: Because habitat quality is decreasing, vulnerability to nest predation is increasing for Interior Least Terns. Vegetation encroachment allows predators to approach nesting birds while being hidden undercover. Human habitation near colony sites may be increasing generalist, urban, and exotic species, such as raccoons, coyotes, Norway rats, domestic cats, and feral hogs, that are predators of ground nesting birds (Carney and Sydeman 1999).

Short-term Trend:

Short-term Trend Comments: The last comprehensive survey of the interior populations was in 2005 with 17,591 individuals observed throughout the range. Partial surveys were conducted in 2010 (21,855 individuals observed), 2011 (15,403 individuals observed), and 2012 (13,855 individuals observed). The majority of the increase in birds in the past 20 years is a result of increased populations on the Mississippi River, due to a change in channel design implemented by the USACE. Populations on the Platte, Missouri, Ohio, and Arkansas River systems have remained low or declined further. Although the numbers have exceeded the range-wide recovery target as designated in the USFWS Recovery Plan, the majority of the specific river system target numbers fall short (USFWS 2014).

Management Summary:

From the Interior Least Tern (*Sternula antillarum*) 5-Year Review: Summary and Evaluation, USFWS 2014

“At least some proportion of Interior Least Tern (ILT) range-wide increase is due to increased awareness, survey efforts, management, and protection. ILT have colonized numerous anthropogenic sites (~15% of sites throughout their range, such as sand pits, rooftops, reservoirs, industrial sites), and the persistence of some of these are reliant upon aggressive management (e.g., predator or vegetation control) and protection (e.g., seasonal avoidance).

ILT nesting habitat availability and quality are primarily controlled by stochastic events (droughts and floods) affecting river flow and habitat quantity and quality (Sidle et al. 1992). Productivity peaks may also be influenced by stochastic drought events or cycles in some drainages. For example, despite severely altered flow regimes and aggressive ILT habitat management in the Missouri River, ILT distribution and population size have remained relatively stable over the period of record. Evidence suggests that habitat condition in this drainage, as well as annual ILT numbers and productivity, are strongly influenced by current hydrologic patterns. While periodic major flow events reset nesting habitat and the forage base, annual reservoir operations can provide some ILT habitat suitability during drought years. On the Mississippi River, channel training structures (dike fields) and their potential to lead to vegetation encroachment of ILT sandbar habitat were considered causes of decline and imminent threats to the species (Smith and Stuckey 1988). However, population estimates have increased from <500 birds occupying a short reach of the river in 1985, to >10,000 nesting birds/year along >800 mi of river channel over the past decade (Jones 2012). Most ILT colonies on the Mississippi River are associated with dike fields, which create 39 higher sandbars with less exposure to flooding during the summer nesting season. Current management practices on the Mississippi River include new dike designs incorporating notches toward the landward end, allowing flow to isolate nesting bars through most of the nesting season (USACE 2008, USFWS 2014, USACE 2013). Additionally, there is an aggressive program to build notches into existing dikes during maintenance activities (DuBow 2011, USACE 2013). In other navigation systems that require maintenance dredging (e.g., lower Ohio, Red, and Arkansas rivers), it is becoming standard practice to use the dredged material to build or replenish islands, which are being utilized for nesting by ILT (Ciuzio et al. 2005, Fischer 2012). Reservoir storage and releases have also been modified to minimize impacts and benefit ILT. In the Arkansas and Red river drainages, seasonal pool plans are considered to allow extended water storage to provide minimum flow requirements during the late ILT nesting season (USACE 2002). On the Loup River, ILT forage species are benefitted by the maintenance of minimum flows into a channel bypass reach (Loup Power District 2012). In the Missouri River, the USACE has historically monitored and managed ILT nesting areas and reservoir releases to reduce impacts to nesting birds (USACE 2012). Anthropogenic changes in some river drainages supporting ILT may also have benefitted the bird in ways that have partially compensated for habitat losses. For example, in the Lower Mississippi River, impoundment of the major tributaries and channelization of the river have resulted in earlier and shorter duration spring and summer high water events (Schramm 2004), possibly reducing egg and chick flood related mortality events, extending the nesting season, and increasing re-nesting opportunities. Dam construction in arid regions unsuitable for the species allowed expansion of the ILT range.”

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