

FINAL REPORT
SECTION 6
ENDANGERED SPECIES ACT



FEDERAL AID PROJECT E-31

SURVEY AND MANAGEMENT OF INTERIOR LEAST TERNS AND SNOWY PLOVERS
ON THE CANADIAN RIVER IN CENTRAL AND WESTERN OKLAHOMA

JUNE 13, 1994 - SEPTEMBER 30, 1995

FINAL REPORT

STATE: Oklahoma

GRANT NUMBER: E-31

GRANT TYPE: Research

GRANT TITLE: Least Tern/Snowy Plover Survey

SEGMENT DATES: June 13, 1994 - September 30, 1995

PROJECT TITLE: Survey and Management of Interior Least Terns and Snowy Plovers on the Canadian River in Central and Western Oklahoma.

I. Objectives:

- 1) Survey the Canadian River bed on Packsaddle Wildlife Management Area for evidence of breeding activity by interior least terns and snowy plovers.
- 2) Develop management recommendation for the area, if necessary, to enhance its suitability for nesting terns and plovers.
- 3) Assist with the management efforts of terns on the Canadian River Least Tern Preserve in central Oklahoma.

II. Abstract

During the summers of 1994 and 1995, surveys were conducted on the Canadian River on and near Packsaddle Wildlife Management Area (WMA) to locate and monitor nesting colonies of endangered least terns (*Sterna antillarum*). Three least tern colonies containing 14 nests were monitored in 1994 and two colonies containing five least tern nests were monitored in 1995. Colonies were not monitored frequently enough at the end of each breeding season to determine the number of chicks which survived to fledge. In 1994, eleven chicks from at least six broods survived to at least eight days of age. In 1995, at least one chick survived to fledge and three other chicks survived to at least 16 days of age. No snowy plovers were found, but we did document the fourth and fifth known nestings of the spotted sandpiper in Oklahoma. Primary causes of nest loss are suspected to be flooding of nests, mammalian predators and trampling of nests by cattle.

Assistance was provided to the Cleveland County Audubon Society for locating, monitoring and posting signs around colonies. In 1994, approximately 79 chicks fledged from four colonies and 39 chicks fledged from five colonies in 1995.

III. Procedures

In Oklahoma, most least tern (*Sterna antillarum*) colonies occur on the sand bars and beaches of a few major rivers (Boyd 1990, Downing 1980) and most of this suitable nesting habitat is privately owned. The Packsaddle Wildlife Management Area (WMA), owned by the Oklahoma Department of Wildlife Conservation, is a rare exception. This area is located on the Canadian River in extreme western Oklahoma and appears to contain suitable nesting and foraging habitat (Figure 1). In June of 1991, the U.S. Fish and Wildlife Service conducted a helicopter survey of the Canadian River to estimate its least tern population, and during this survey observed least terns on or near the Packsaddle WMA (L. Hill pers. com.). Least terns had been documented also on the Canadian River in western Oklahoma and Texas by McCament-Locknane and Thompson (1988). This project was conducted in part to determine whether least terns presently breed on the WMA and if the area could be enhanced to make it more suitable for nesting terns.

The project period encompassed both the 1994 and 1995 least tern breeding seasons and data were collected during both years at Packsaddle Wildlife Management Area. Assistance was provided also to the Cleveland County Audubon Society and to U.S. Fish and Wildlife Service law enforcement agents working on the Canadian River Least Tern Preserve in Cleveland and McClain counties in central Oklahoma.

An initial survey was conducted in early June each year to locate least tern nesting colonies on the Canadian River at Packsaddle Wildlife Management Area. During the survey, two biologists walked an approximately 9.5 mile stretch of river on and adjacent to the WMA. During the surveys, we searched for least terns and recorded any evidence of nesting or courtship behaviors in the birds we found. Courtship behaviors included adults "chasing" one another, adults presenting fish to one another and copulation. Nesting behavior included adults giving what appeared to be alarm calls as we approached them, adults sitting for prolonged periods on the sand, adults building scrapes or adults tending to eggs or chicks. In addition to the least terns, we also searched for snowy plovers.

When a suspected nesting colony was located, we plotted its location on a map of the area and observed the behavior and movements of the terns with binoculars or a 22x spotting scope at a distance between 80 and 100 yards from the center of activity. All of the colonies we observed occupied less than one square acre, and the distances at which we observed the colonies, did not appear to disturb them (birds did not give distress calls or mob us). We observed each suspected colony for 20 to 40 minutes to estimate the number and location of potential nests based on the positions of sitting adults. We then approached the colonies to verify the existence of nest and count eggs or young chicks. We avoided walking within twenty feet of nests to prevent drawing attention to

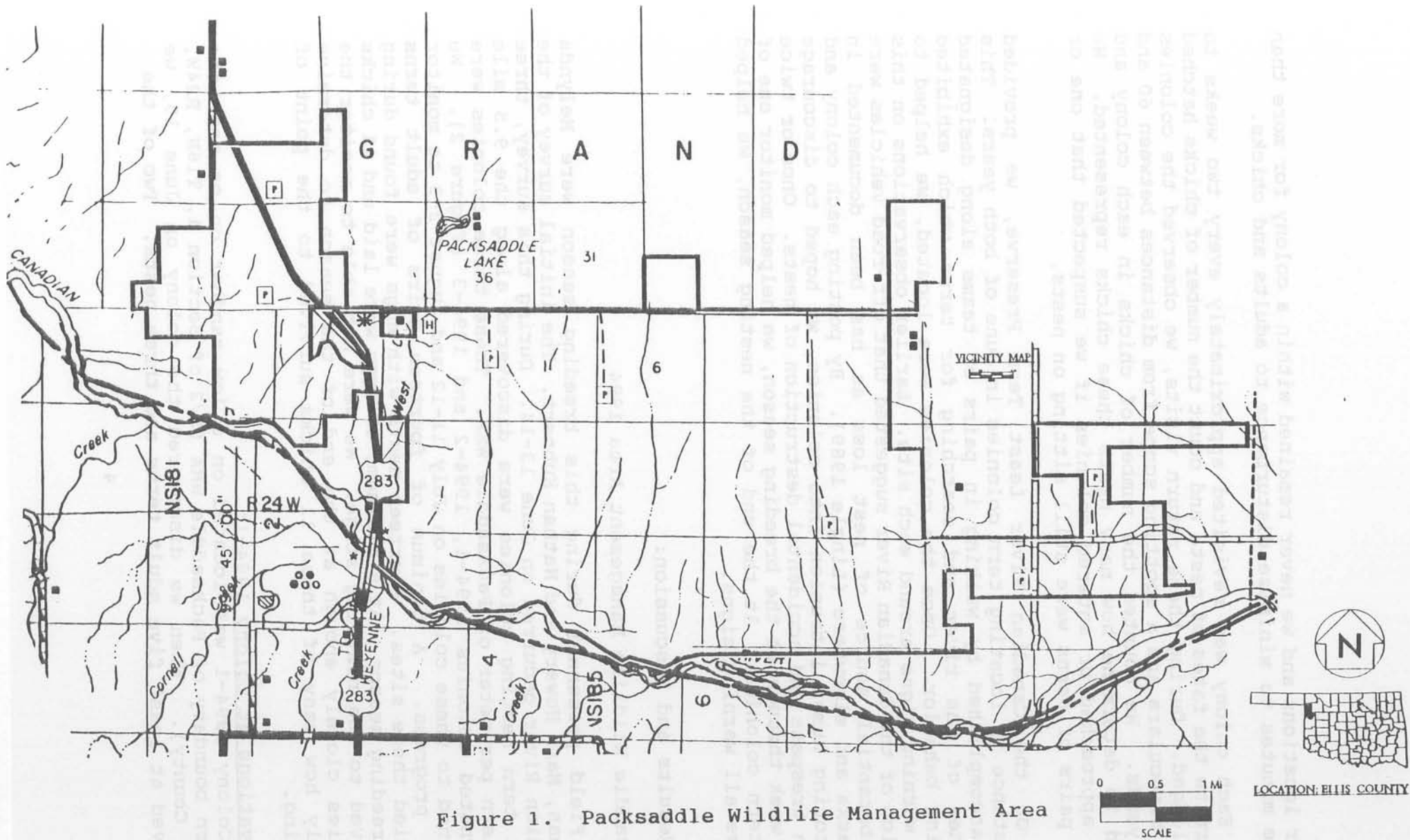


Figure 1. Packsaddle Wildlife Management Area



their locations and we never remained within a colony for more than three minutes to minimize disturbance to adults and chicks.

Each colony was revisited approximately every two weeks to determine the fates of nests and count the number of chicks hatched or fledged. During these return visits, we observed the colonies with binoculars and a spotting scope from distances between 60 and 100 yards. We counted the number of chicks in each colony and tried to determine how many nests these chicks represented. We only approached or entered colonies if we suspected that one or more pairs of terns were still sitting on nests.

On the Canadian River Least Tern Preserve, we provided assistance in locating tern colonies in June of both years. This was accomplished by walking in pairs or teams along designated reaches of the river and searching for terns which exhibited nesting behavior. Once the colonies were located, we helped to post warning signs around each site. Earlier observations on this portion of the Canadian River suggested that off-road vehicles were a substantial source of nest loss as has been documented in Nebraska and elsewhere (Lingle 1989). By posting each colony and monitoring human intrusion into colonies, we hoped to discourage human trespass and accidental destruction of nests. Once or twice each week throughout the breeding season, we helped monitor one of the tern colonies. At the end of the nesting season, we helped remove all warning signs.

IV. Results and Discussion:

Packsaddle Wildlife Management Area 1994

Field personnel during this breeding season were Melynda Hickman, Mark Howery and Nathan Kuhnert. The initial survey of the Canadian River occurred on June 13-14. During this survey, three least tern nesting colonies were discovered along the 9.5 mile southern perimeter of Packsaddle WMA. These three colonies were designated colonies 1994-1, 1994-2 and 1994-3 (Figure 2). We returned to these colonies on July 11-12 and August 2-3 to monitor their progress. A minimum of **fourteen pairs of adult terns** occupied these sites. **Fourteen nests** with eggs were found during the breeding season. At a minimum, **39 eggs** were laid and **11 chicks** survived to the nestling stage. We were not able to monitor the colonies closely enough at the end of the season to determine exactly how many of these 11 chicks survived to the point of fledging.

Observations at Colony 1994-1:

Colony 1994-1 was located on a low sandbar on or near the western boundary of Packsaddle WMA (S/2 of Section 4, T16N, R24W, Ellis County). When we discovered the colony on June 13, we observed at least five adult terns and three nests. Two of the

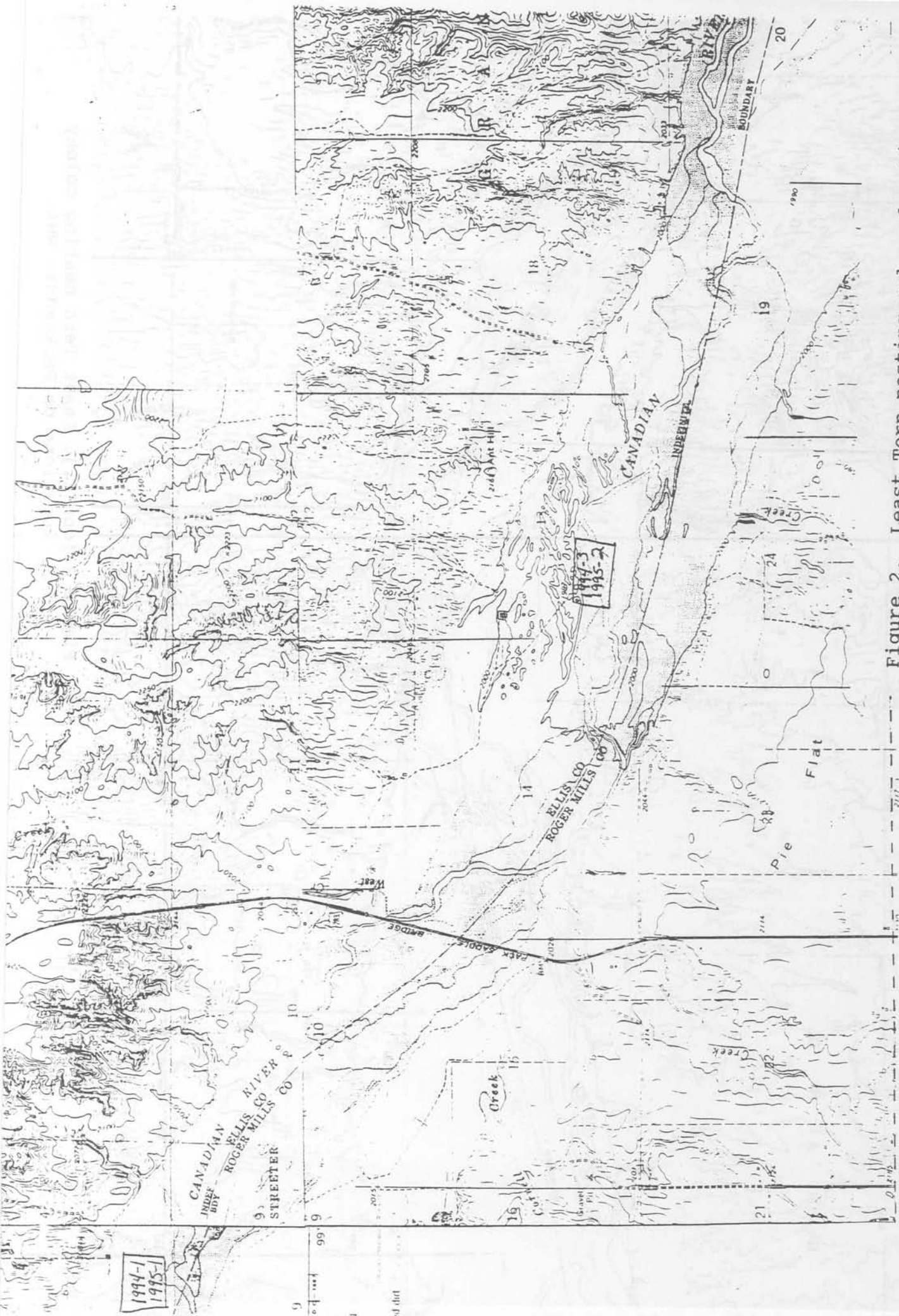


Figure 2. Least Tern nesting colony locations on Packsaddle WMA.

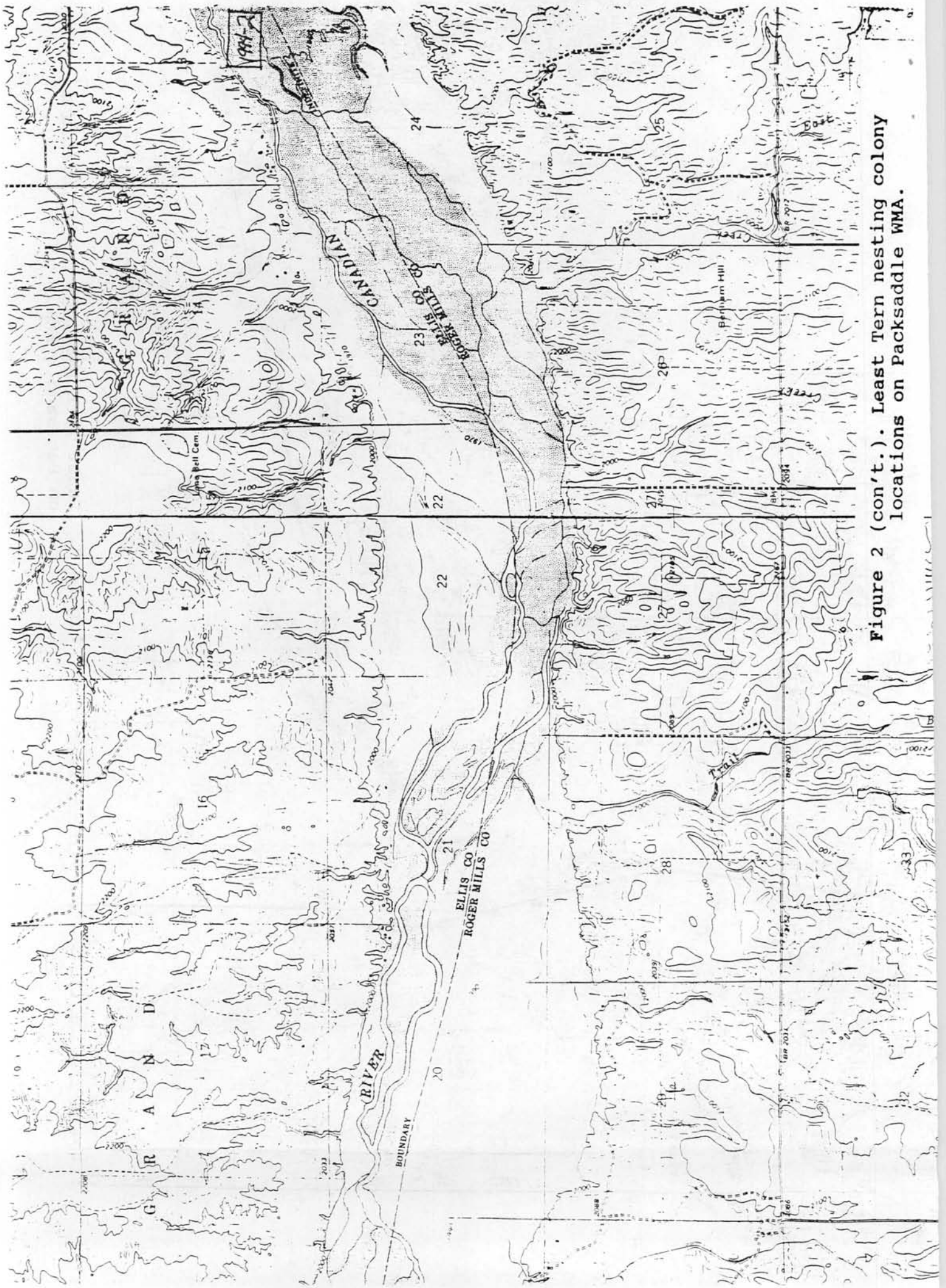


Figure 2 (con't.). Least Tern nesting colony locations on Packsaddle WMA.

nests contained three eggs while the third nest held two, for a total of **eight eggs**. All of the nests were within 100 feet of one another and were constructed in the sand only six to eight inches above the water line.

We returned to the colony on July 11, and observed at least **four adult terns** and **three chicks**. Two of the chicks appeared to be approximately 8-12 days old while the other chick was less than eight days of age. There was no surface flow in the river and the former sandbar the colony occupied resembled a ridge of sand in the dry river bed. We revisited this colony on August 2, but were unable to locate any adult terns, fledglings or chicks.

Observations at Colony 1994-2:

This colony was located on or just east of the eastern boundary of Packsaddle WMA (SW/4 of Section 13, T16N, R23W, Ellis County). We observed **four adult terns** on a low sandbar and found **one nest containing three eggs**. The nest was constructed only four to five inches above the water level, and judging from the wetness of the sand, we estimated that the sandbar had been exposed only seven to ten days. The other two adults were observed copulating and chasing one another. We found two scrapes on the sandbar less than 200 yards east of the nest. We suspected these may have been nesting attempts by the second pair.

On our July 14 monitoring visit, we observed only **two adult terns** caring for **one chick** approximately 8-12 days old. We watched one adult fly onto the sand and feed the chick a three-inch minnow. We did not return to this site on our third monitoring trip August 3, because no adult or young terns had been located at either of the two larger colonies and we assumed this colony would be abandoned as well.

Observations at Colony 1994-3:

Colony 1994-3 was the largest colony found on Packsaddle. We found it on a broad beach on the north bank of a bend in the river (SW/4 of Section 13, T16N, R23W, Ellis County). When we discovered the colony on June 14, we observed a minimum of **eleven adult terns**; eight appeared to be on nests and three were flying in and out of the colony. We located **nine nests** and one empty scrape, all within approximately 100 yards of one another. Eight nests contained three eggs each and the remaining nest held two eggs for a total of **26 eggs**. All of these nests were built only 8-12 inches above the waterline.

When we revisited the site on July 14, we observed at least **seven adults**. One of the adults was sitting on **one new nest** which contained **two eggs**. We observed a total of **seven chicks**: three chicks were between 12-14 days of age, two chicks were approximately eight days old and two chicks were less than eight days. Based upon their ages, we suspect that these chicks

represent three separate broods. We observed numerous cattle tracks around this colony as well as a set of vehicle tracks which passed within three feet of the nest containing eggs.

When we revisited the colony on August 3, we did not observe any adult terns, fledglings or chicks. Cattle tracks remained common around the colony and we also saw coyote tracks nearby.

Packsaddle Wildlife Management Area 1995

Field personnel for the 1995 season were Melynda Hickman, Mark Howery and Stephanie Harrison. An initial Canadian River survey was attempted on June 5-6, but because of repeated rainfall events throughout the last half of May and early June, the river was at or near its flood stage and no bare sand was visible. During the night of June 5, an additional 1-2 inches of rain fell in the Packsaddle area and the water level rose higher the following day. On June 27-28, a second survey was conducted. During this survey, there were only a few significant sandbars exposed, however, breeding activity was documented at two sites, designated as colonies 1995-1 and 1995-2 (Figure 2). Both of these colonies were located at approximately the same sites as two of the 1994 colonies. A minimum of nine pairs of adult terns were present at these two sites and we suspect that two other non-breeding pairs were present in this stretch of river as well. Both colonies were revisited on June and July 26-27 to monitor their progress. Nests with eggs were found only at colony 1995-1, where five nests containing a total of 14 eggs were observed. At least one chick survived to fledging and three additional chicks survived to at least 16 days of age or older.

Unlike 1994, water remained flowing in the river throughout June and July. According to Alva Gregory, the wildlife technician living on the area, surface water flow had not occurred this late into the summer in nearly 30 years. The flow on July 27-28, 1995 was comparable to that observed on June 13, 1994.

Observations of Colony 1995-1:

Colony 1995-1 was located on a sandbar on or near the western boundary of Packsaddle WMA (S/2 Section 4, T16N, R24W, Ellis County). This location was approximately the same location as colony 1994-1. On June 27, we observed a minimum of nine adult terns and located five nests at this colony. Four of the nests contained three eggs each and the remaining nest held two eggs for a total of 14 eggs. We also observed one pair construct a scrape in the ground as if they were initiating a new nest.

We returned to monitor the colony on July 11. On this date, we observed six adult terns and four broods. All of the chicks appeared to be approximately 7-8 days old and each brood stayed close to one of its parents which aided us in determining the

number of broods and the number of chicks per brood. Two broods contained three chicks each and two broods contained one chick each for a total of **eight chicks**.

The final visit to this colony occurred on July 26 and 27. A minimum of five adult terns were present in the colony. We also observed two chicks approximately 18-20 days old, one chick approximately 16 days old and at least one (possibly two) recently fledged young, for a total of **three chicks and one fledgling**. Based on the ages of the chicks, these probably represented three broods.

Observations at Colony 1995-2:

Colony 1995-2 was located on a sandbar at approximately the same location as colony 1994-3 just southwest of a local landmark named Ant Hill (SW/4 of Section 13, T16N, R24W, Ellis County). We observed at least **four adult terns**. One pair was observed copulating for approximately three minutes. The second pair exhibited courtship behavior (one adult offered the other a fish). A possible scrape was also located.

During the return visit to the colony on July 12, we did not observe any adult terns or signs of nesting activity. Vehicle tracks were observed in this stretch of the river and on this site. The tracks were wider than those of typical all-terrain vehicles and suspect that the tracks originated from a commercial minnow seiner's truck.

Canadian River Least Tern Preserve 1994 Nesting Season

Along with a biologist from the Oklahoma Museum of Natural History and USFWS law enforcement agents, we conducted two training meetings for volunteer colony monitors on the Preserve and students from Irving Middle School. The topics covered in the training included the natural history of the least tern, techniques for accurate monitoring of nests at colonies, laws regarding endangered species and how volunteers should report suspected illegal activities to state and federal law enforcement officials.

Four colonies were located and posted within the Preserve's boundaries. We and several Preserve volunteers posted the perimeter of each colony site with warning signs. These signs were mounted on T-posts and flagged with yellow caution tape to increase their visibility.

The colony sites were monitored at least twice a week until all nesting activity was completed. On each visit to a site, the volunteers counted the number of nests, number of terns, number of chicks, and recorded nesting behavior from a nearby observation point outside the colony's posted perimeter. Monitoring at two colony sites was improved by the construction of 2 six-foot high

observation platforms by one of the Preserve volunteers. Monitoring results indicate that approximately 39 pairs of terns nested and at least 79 least terns fledged within the Preserve's boundaries. The warning signs were removed from all colony sites in September after the terns had completed their nesting activities and begun their fall migration.

We assisted a group of students from Norman's Irving Middle School with a project to video the conservation efforts for the least tern. The school was awarded a grant from the Toyota Corporation to produce an interactive CD-ROM to be distributed to schools statewide for classroom use. We also participated in public outreach through two least tern public viewing days hosted by the Cleveland County Audubon Society. The least tern observation days were designed to give the general public the opportunity to observe terns at a safe distance and learn about the species' natural history through a brief verbal presentation and a least tern educational brochure.

Grant funds were used to purchase T-posts and the materials used in the construction of the observation platforms and to reprint 5,000 copies of the least tern brochure.

Canadian River Least Tern Preserve 1995 Nesting Season

The 1995 least tern nesting season began in May with the continued training of adult and student volunteers. Due to elevated water levels, least terns began nesting almost 3 weeks later than previously recorded years (1991-1994). We assisted a group of trained and federally permitted volunteers in locating and posting signs around 5 colonies within the Preserve boundaries.

Each colony was monitored at least twice a week throughout the nesting season by ourselves or a trained volunteer. A minimum of sixty-one pairs of least terns were observed in the Preserve compared to 39 pairs during the 1994 nesting season. However, only 34 least tern chicks fledged compared to 79 in 1994. Increased predation by coyotes was noted in one particular colony. Nest losses due to flooding were also higher in 1995 because of heavy rains in early and mid June and again in mid July.

We participated in two public viewing days, which were attended by more than 100 people. Cleveland County Audubon members, Preserve volunteers and biologists shared spotting scopes, binoculars and information with the public while observing the terns fishing in the Canadian River.

The 1995 nesting season concluded with Preserve volunteers and ourselves removing the warning signs from the colony sites after the terns had migrated from the area. Grant funds were used to purchase additional warning signs, T-posts, and wire to mark the

boundaries of the nesting colonies. In addition, \$1,400 was spent to partially reimburse the expenses of a part-time colony monitor and volunteer coordinator.

General Observations of Snowy Plovers

No snowy plovers were located on Packsaddle WMA during either the 1994 or 1995 breeding seasons. The suspected reason for this is the apparent lack of suitable habitat. The Canadian River in western Oklahoma does not flood to the same extent as it does in the central part of the state, and its channel appears to be more stable from year to year. Because of this attribute, the river on Packsaddle WMA does not scour each spring and large sandbars or other bare areas are not created. We did observe an adult spotted sandpiper with four chicks on Packsaddle in June of 1994 and we located a spotted sandpiper nest in June and an adult with four half-grown chicks in July of 1995 in the same stretch of river. While the spotted sandpiper is a common migrant through Oklahoma, it is a rare breeder in the southern U.S. These observations represent only the fourth and fifth documented nestings of this species in Oklahoma in recorded history.

Snowy plovers were observed both years in the Canadian River Least Tern Preserve. In 1994 adults and chicks were observed within two least tern colonies; in 1995, four pairs of snowy plovers were seen in one tern colony and these hatched at least eleven chicks. It was more difficult to determine the number of plover chicks fledged than least terns because they often move away from the tern colonies after hatching.

General Observations of Least Terns at Packsaddle WMA

We did not observe any attempts by least terns to nest or re-nest after the end of June on Packsaddle, but in 1995, new tern nests were initiated as late as mid July in the Least Tern Preserve in central Oklahoma. Our observations at Packsaddle suggest that once nesting is complete, adult and fledgling terns abandon the Canadian River in western Oklahoma. At most colonies, the number of adults seen at colonies corresponded closely with the number of broods in the colonies. The unsuccessful adults appeared to leave after nest failure. On the Canadian River Least Tern Preserve, additional adult terns appear to join the colonies throughout the nesting season. In August of 1994, over 100 adult and sub-adult terns were observed at a colony that contained fewer than 15 pairs in July. We suspect that terns that are unsuccessful at nesting in western Oklahoma, may move downstream to attempt to re-nest rather than remain at their original colony. One possible explanation is that they abandon these colonies because falling water levels reduce the protection their nests would receive from predators.

Based upon our observations, we suspect that flooding of nests, trampling of nests by cattle and nest depredation by

mammalian predators are the greatest causes of nest losses at Packsaddle WMA. The appearance of the Canadian River on and around Packsaddle WMA is very different from its appearance downstream on the Least Tern Preserve in Cleveland County. Scouring floods appear to be rare in western Oklahoma and the sandbars that do develop are generally small and rarely rise more than one-two feet above the normal June water level. Because of this, most of the available nesting habitat is susceptible to inundation by a sudden rise in water level following a heavy storm in May or June. In 1994, all of the nests we found were initiated after the first week in June. That year, heavy rains in late May apparently caused the river to flood and submerged all the sandbars and any nests that may have been present. Rainfall was unusually high in May and June of 1995, and no suitable nesting habitat was available on June 6, and the condition probably remained the same for at least another week.

The tracks of two potential mammalian nest predators, the raccoon and coyote, were common along the river and we observed coyote tracks in or near several of the tern colonies. Coyotes and other mammalian predators have been demonstrated to be major causes of nest failure in other areas in Oklahoma (Grover 1979). In normal years, the Canadian River is dry after the first of July, therefore none of the sandbars remain as islands throughout the nesting period and the colonies are unprotected. Even in wet years such as 1995, colonies on island sandbars are only protected by shallow water less than four feet deep. No nesting sites offer complete protection against mammalian predators.

The prevalence of cattle grazing along the river was unexpected, but very common. Fences prevent the cattle on Packsaddle WMA from entering the river bed; however, cattle trespass onto the area from private property across the river as well as from upstream and downstream. We observed cattle tracks in or near every tern colony. Given the number of cattle and the length of the tern's incubation period, it is likely that some nests with eggs are accidentally trampled and destroyed by cattle. We did observe vehicle tracks in one colony that indicated a truck drove within three feet of one nest. Vehicular traffic is uncommon, but this part of the river is exploited by commercial minnow seiners and they could potentially enter tern colonies and drive over nests or chicks.

Though the main channel of the Canadian River does run dry most summers, we do not believe that a shortage of food exists for the terns. Numerous sloughs occur along the river that retain water throughout the terns' breeding season. Even during our monitoring visits in July of 1994, we observed sloughs with large minnow populations. In addition to these sloughs, at least four ponds have been constructed on the WMA within two miles of the river, which could also serve as foraging areas for terns. The terns that we observed feeding chicks in July always brought two to

three inch minnows back to the colony. All of the chicks we observed appeared active, healthy and showed no signs of weakness due to a lack of food.

V. Recommendations:

We did not see any activities on Packsaddle WMA that would appear to be harmful to nesting terns. Fencing protects the nesting areas by preventing cattle and vehicles from entering the river from the management area. All of the cattle and vehicles that we observed on the river originated from adjacent properties.

We considered several potential activities that might enhance the success of least terns nesting on this portion of the river; however most of these are probably cost prohibitive in this case and would address only one of the potential sources of nest loss.

1) Constructing fences along both banks and across the Canadian River to prevent access by cattle and vehicles is probably not cost effective. It would be an expensive project initially and require annual funding for maintenance and repair. Placing fencing across the river would be necessary to limit access from upstream and downstream, but this may not be feasible. The shifting sand on the river bed could dislodge fence posts and logs and other floating debris in the river could push over fencing. Also, this technique would not reduce the nest losses due to predators or to flooding.

2) Construction of islands such as the Zink Island on the Arkansas River in Tulsa, would probably not be beneficial in this area. This too would be an expensive project and because the river is dry most of the summer, these sites would not always function as islands during the nesting period. While these islands may reduce the number of nests lost by flooding, they probably would not alter losses from trampling or predation.

3) The grazing rights to adjacent properties along the river could be leased and cattle grazing deferred until after the nesting season. This might reduce the losses caused by cattle, but would not reduce losses to predators nor to floods. This activity would also require an annual budget for lease payments and additional fencing may need to be constructed and maintained.

4) Creating bare areas (sand scars) two to four acres in size and placed several hundred feet off the river channel, could provide alternative nesting sites for terns and might warrant future discussion. Portions of the river's floodplain lie just north of the fencing on the south perimeter of Packsaddle WMA. These areas are away from the river channel, are less susceptible to flooding and they can be made inaccessible to cattle. Blocks of pasture could be plowed and treated with herbicides to create patches of bare sand that are only a few hundred yards away from the river but

still be protected from trespass cattle and flooding. These could be used as an alternative to the low sandbars and beaches now used by nesting terns. Least terns have been documented nesting in abandoned sand pits and sandmining operations off of main river channels (Sidle and Kirsch 1993). If they will use these sites, they may also use artificial sand scars. The negative aspects of this idea include its lack of affect on reducing nest depredation and it is probable that these sand scars would have to be treated annually to maintain them in a barren state. Also, if they are used by terns, predators might learn to recognize these sites as fruitful hunting spots during the summer. This would necessitate abandoning existing sites and creating new ones every few years.

Before any action is taken, more data should be collected on the frequency of least tern nestings on Packsaddle WMA, and more definitive evidence collected with regard to the causes of nest failure. Any potential conservation actions must also be conducted in coordination with the U.S. Fish and Wildlife Service, ODWC, and possibly adjacent landowners or the Army Corps of Engineers.

VI. Significant Departures

We did not prepare a formal management plan for the Packsaddle WMA as planned. No activities on the WMA occur on the river floodplain, the WMA does not provide road access for vehicles to enter the river and fencing prevents livestock on the WMA from having access to the river. All of the potential habitat enhancement projects discussed would need to be further analyzed before we could recommend any of them.

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IX. Date: December 26, 1995

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