

Distribution of the Least Tern in interior North America

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THE INTERIOR POPULATION OF THE Least Tern (*Sterna antillarum*) was recently added to the federal list of endangered and threatened wildlife (United States Fish and Wildlife Service 1985a). Although the American Ornithologists Union (1983) continues to recognize three Least Tern subspecies in North America, debate continues on the validity of these subspecies and the extent of genetic and ecological interactions among the coastal Least Tern (*S. a. antillarum*), California Least Tern (*S. a. browni*) and the interior Least Tern (*S. a. athalassos*) (A.O.U. 1957). Massey (1976) reported no consistent morphological, behavioral, or vocal differences between the coastal Least Tern and the California Least Tern. Electrophoretic analysis indicate little genetic differentiation among Least Terns produced on



Exposed sandbars on the central Platte River. Much open river channel habitat has disappeared along the central Platte. Photos/John Sidle.



Adult tern on nest. Photo/Nebraska Game Commission.

the Texas coast and Texas Panhandle rivers (McCament and Thompson 1987). Coastal Least Terns have been known to populate interior breeding sites. Boyd and Thompson (1985) captured an incubating Least Tern at Quivira National Wildlife Refuge, Kansas, that had originally been banded as a chick on the Texas coast.

Because of the taxonomic uncertainty of Least Tern subspecies in North America, the United States Fish and Wildlife Service did not specify the interior subspecies in the listing. The United States Fish and Wildlife Service designated as endangered the population of Least Terns (hereafter referred to as the Interior Least Tern) occurring in the interior of the United States.

Taxonomic and population questions aside, the status of the Interior Least Tern concerns various federal and state agencies. As a result of the listing of the Interior Least Tern, census and field research continue. The data presented here have been compiled from our surveys and from published and unpublished sources for the period 1985–1987, and record recent data on numbers and distribution.

Methods

Most Interior Least Terns nest on sandbars in rivers, but some nest on sandpits and gravel pits along rivers and on the shores of some lakes



Least Tern chicks and egg. Photo/John Sidle.

(U.S.F.&W.S. 1987; Hill 1985). In the Upper Missouri River Basin they are very often breeding associates of the threatened Piping Plover (*Charadrius melodus*), whose status and conservation are also a major concern (U.S.F.&W.S. 1985b, 1988). Nesting by Interior Least Terns begins in the spring after water levels have receded and sandbars have been exposed. Attempts to census Interior Least Terns occur during surveys of rivers when suitable habitat conditions exist in the spring

and early summer. Boat and aircraft are the principal means of transportation for locating and censusing the birds.

Along 192 kilometers of the Missouri River in North Dakota, Dryer and Dryer (1985) arrived at all suitable nesting sites by motor boat and searched on foot. Interior Least Terns actively defend their nesting colonies, and this aids in locating nest sites and adult terns. Least Terns and their nests are censused first in late June and early July in North Dakota and a return visit is

made from mid-July to late July to record the fate of nests and to locate new nests. The Nebraska Game and Parks Commission (1985a) used an airboat to census the terns along the Niobrara and Platte rivers, Nebraska.

Fixed-wing aircraft, operating at altitudes from six meters to 61 meters above ground, have been used to locate tern colonies and to census adult terns. Along the Platte, Loup, Middle Loup and Niobrara rivers in Nebraska, and the Cimarron River in Kansas and Oklahoma, aerial surveys of tern colonies are followed by ground checks, and in some years colonies are visited every three to seven days to evaluate reproductive success (Boyd 1986, 1987; Nebraska Game and Parks Commission 1985a, 1986a; Schwalbach *et al.* 1986, 1988). Evans (1984) used fixed-wing aircraft to locate suitable nesting habitat on the Ohio River and scanned sandbars from a boat, landing only at sites where terns were observed. To determine habitat use by terns, J.W. Smith (1985, 1986) used fixed-wing aircraft to inventory potential nesting habitat on the Missouri and Mississippi rivers in and adjacent to the State of Missouri, followed by ground checks by boat of suitable nesting habitat during the breeding season. Sweet (1985) and Smith and Shepherd (1985) used helicopters to census Interior Least Terns at two islands in the Mississippi River and along a long stretch of the Arkansas River.

The U.S. Army Corps of Engineers (Rumancik 1986; M. Smith 1986) twice surveyed 1100 kilometers of the Lower Mississippi River by fixed-wing aircraft, once by small boat during which observers landed on sandbars, and once by a larger vessel from which observers censused terns but did not disembark. The small boat survey followed an aerial survey within three to four days. It was conducted when chicks were hatching and recorded 40% more Least Terns than any aerial survey. This survey was believed to be the most efficient and accurate survey for Interior Least Terns on the Lower Mississippi River.

Results and Discussion

Census data indicate that there are currently more adult Interior Least Terns than the 1250 reported by Downing (1980) for the mid-1970s and more than the 1400 to 1800 reported

by the United States Fish and Wildlife Service (1985a; Table 1). Additional and more complete surveys than those that were conducted prior to endangered status are likely explanations for the current estimates of Interior Least Terns. The survey by Downing (1980), for example, did not include North Dakota, South Dakota, or Texas and was based upon a brief flight over just a portion of the Interior Least Tern's range. The differences among the years 1985 to 1987 probably are also due to improved census techniques and coverage. This is particularly true on the Mississippi River.

The breeding range of the Interior Least Tern is restricted to a few locations (Fig. 1) and represents remnants of a wider distribution that existed prior to the impoundment and channeling of the Mississippi River drainage in this century (Hardy 1957). Destruction, modification, and curtailment of the birds' habitat and range continue (U.S.F.&W.S. 1985a).

On the Missouri River, dams and channels have eliminated most sandbars. Lake Sakakawea, behind Garrison Dam, North Dakota, and Lake Oahe, Oahe Dam, South Dakota, have inundated hundreds of miles of the Missouri River Valley. Channelization along Nebraska's Missouri River boundary has virtually eliminated sandbars, with the exception of 890 hectares of exposed sandbars inventoried along the 80 kilometer Missouri River National Recreation River (Schmulbach *et al.* 1981; U.S.F.&W.S. 1986). In Missouri, the Missouri River between Kansas City and St. Louis still contains at least 15 sandbars that have potential as Least Tern nesting habitat, but they do not presently nest anywhere along that stretch of the river (J.W. Smith 1985). Eleven of these sandbars are owned by the Missouri Department of Conservation, providing long-range potential for Least Tern restoration in that part of the state; however, present flooding regimes in the Missouri River may preclude nesting in the region. The habitat dynamics of Missouri River sandbars have not been fully evaluated.

In North Dakota, South Dakota, and Nebraska, free-flowing stretches of the Missouri River containing sandbars occur below most of the mainstem dams (Dryer and Dryer 1985; Schwalbach *et al.* 1986, 1988; Schwalbach 1988). Interior Least Terns occur almost entirely on these short stretches and usually in

association with Piping Plovers. The productivity and distribution of Interior Least Terns on these short stretches of the Missouri River is influenced by the relation of sandbar habitats to water levels (Schwalbach *et al.* 1986, 1988, Schwalbach 1988). The amount of sandbar habitat and often reproductive success depend upon the discharge of water from mainstem dams. For example, Dryer and Dryer (1985) estimated that on June 10, 1983, an average daily discharge of 492 cubic meters per second had exposed approximately 2000 hectares of sandbar habitat along 192 kilometers of the Missouri River below Garrison Dam, North Dakota. On August 11, 1983, an average daily discharge of 742 cubic meters per second had exposed about 970 hectares of sandbars. Untimely discharges from Garrison Dam have inundated Interior Least Tern colonies.

Substantial losses of eggs or young, or even entire colonies, due to flooding have been documented every year on the Missouri River since 1980 (Nebraska Game and Parks Commission 1985b). Recommendations have been made to modify discharges at Garrison Dam (U.S.F.&W.S. unpubl. memo 1983) and Gavins Point Dam in South Dakota (Nebraska Game and Parks Commission 1985b). The United States Army Corps of Engineers is currently consulting, under Section 7 of the Endangered Species Act, with the United States Fish and Wildlife Service on the effects of the operation of mainstem dams on the Interior Least Tern and Piping Plover.

Most of the Missouri River's tributaries do not support Interior Least Terns. The Yellowstone River in North Dakota is one of the northernmost nesting areas, although there is very little suitable habitat on this river. Least Terns occupy a short segment of the Cheyenne River in South Dakota, but are absent on other tributaries in South Dakota because of inadequate nesting habitat (Schwalbach 1988). The Niobrara River in Nebraska is largely free-flowing with little regulation and retains a natural system of sandbars similar to what must have existed in the past (Ducey 1985). Interior Least Terns nest on the lower 190 kilometers of the Niobrara River and reproductive success is high (Nebraska Game and Parks Commission 1985a).

However, the Platte River Valley in Nebraska has undergone signifi-

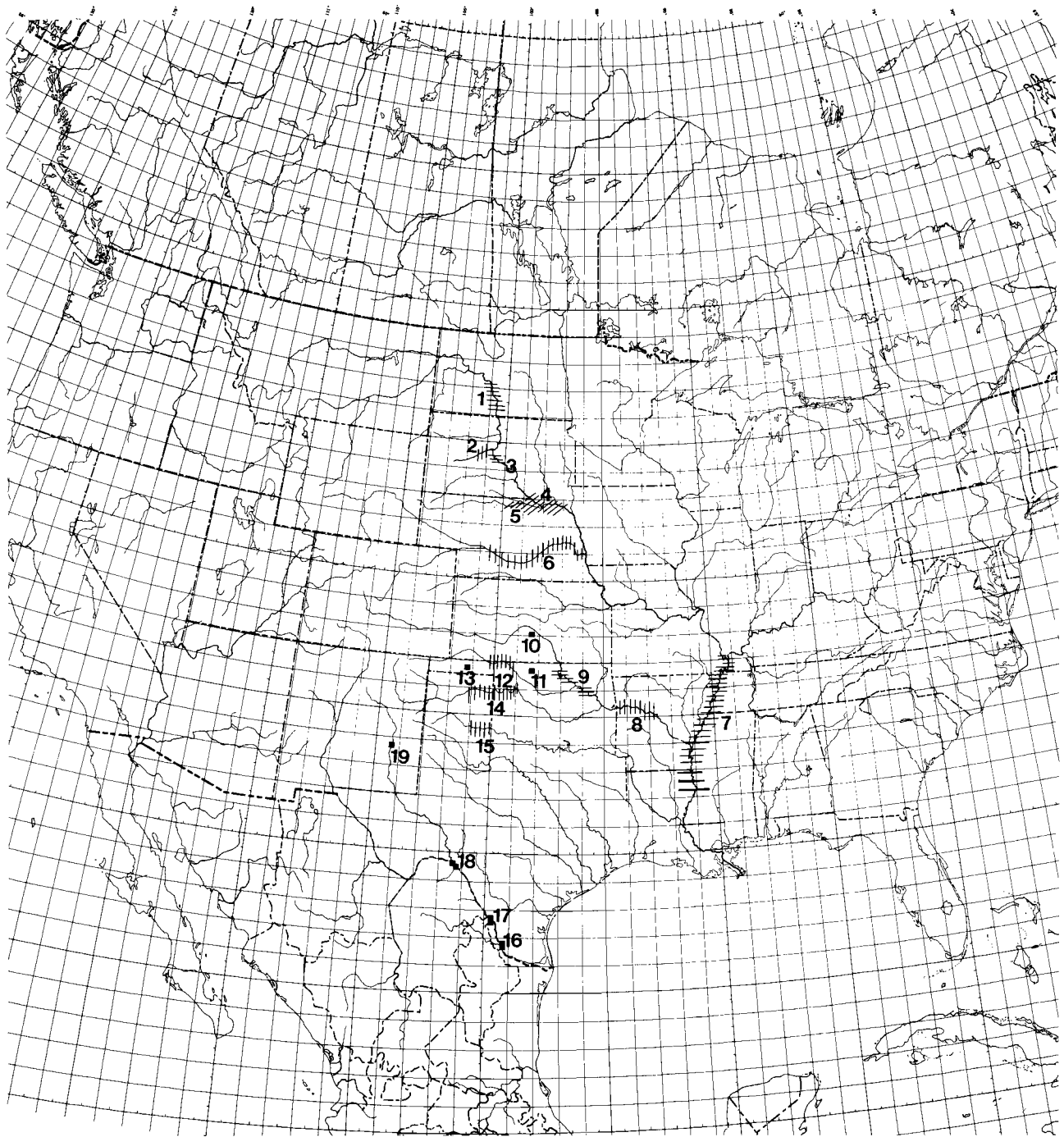


Figure 1. Breeding distribution of Least Terns in interior North America. Numbers refer to the locations listed in Table 1.

Table 1. Census data on the population of the Interior Least Tern, 1985–1987.

Location	Number of adult Least Terns			Approximate length of river stretch (km) where nesting least terns intermittently occur	Source
	1985	1986	1987		
Mississippi River System					
1 Below Garrison Dam, Missouri River, North Dakota	114	169	175	192	(Dryer and Dryer 1985; M. Dryer unpubl. rep 1986, 1987)
2 Cheyenne River, South Dakota	—*	31	54	26	(Schwalbach <i>et al.</i> 1986, 1988; Schwalbach 1988)
3 Lake Oahe, Missouri River, South Dakota	—	16	21	—	(Schwalbach <i>et al.</i> 1986, 1988; Schwalbach 1988)
4 Below Fort Randall and Gavins Point Dam, Missouri River, South Dakota to Ponca, NE	202	206	292	140	(Schwalbach <i>et al.</i> 1986, 1988; Schwalbach 1988; Nebraska Game and Parks Commission (1986b))
5 Niobrara River, Nebraska	174	—	143	190	(Nebraska Game and Parks Commission 1985a)
6 Platte River, Nebraska	256	438	706**	502	(Nebraska Game and Parks Commission 1986a, J. Dinan <i>pers. comm.</i>)
7 Mississippi River, Cape Girardeau, Missouri to Vicksburg, Mississippi	1264	2244	2488	1100	(Rumancik 1985, 1986; J.W. Smith 1985, 1986, 1987; M. Smith 1986; W. King <i>pers. comm.</i>)
8 Arkansas River, Arkansas (above Little Rock)	50	80	130	256	(Smith and Shepherd 1985; K. Smith 1986; Smith <i>et al.</i> 1987)
9 Arkansas River, Oklahoma	—	70	150	119	(Hoffman 1986; L. Hill <i>pers. comm.</i>)
10 Quivira National Wildlife Refuge, Kansas (Rattlesnake Creek of Arkansas River)	48	48	54	—	(Boyd 1986, 1987)
11 Great Salt Plains National Wildlife Refuge, Oklahoma (Salt Fork of the Arkansas River)	—	140	110	—	(Boyd 1986, 1987)
12 Cimarron River, Kansas and Oklahoma	82	150	132	121	(Boyd 1986, 1987)
13 Optima Reservoir, Oklahoma (Beaver River)	45	52	60	—	(Boyd 1986, 1987)
14 Canadian River, Oklahoma and Texas	127	182	—	253	(McCament and Thompson 1985, 1987; U.S.F. & W.S. unpubl. data)
15 Prairie Dog Town Fork of the Red River, Texas	44	50	—	241	(McCament and Thompson 1985, 1987)
Rio Grande River System					
16 Falcon Reservoir, Rio Grande River	—	150	—	—	(McCament and Thompson 1985, 1987)
17 Lake Casa Blanca	—	5	—	—	(McCament and Thompson 1985, 1987)
18 Amistad Reservoir, Rio Grande River	—	9	—	—	(McCament and Thompson 1985, 1987)
19 Bitter Lake National Wildlife Refuge, New Mexico (Pecos River)	—	6	—	—	(S. Hoffman; U.S.F. & W.S. unpubl. data)
Total***	2406	4046	4515	3140	

* (—) signifies no census conducted in that year.

** includes 104 Interior Least Terns censused in 1987 on the Loup River, a tributary of the Platte River (H.B. Graves unpubl. rep.).

*** The total does not include 22 and 20 Interior Least Terns censused in 1986 and 1987, respectively, on the Yellowstone River, North Dakota (Kreil and Dryer 1987; M. Dryer unpubl. data); 28 Interior Least Terns at ash lagoons of a power plant near Council Bluffs, Iowa in 1986 (Wilson 1986); 4 Interior Least Terns on the Fort Peck Reservoir within the Charles M. Russell National Wildlife Refuge, Montana, in 1987 (Montana Piping Plover Committee 1988); and 2, 4 and 4 Interior Least Terns censused in 1985, 1986, and 1987, respectively, at a public service power plant's cooling lake near East Mount Carmel, Indiana, along the Wabash River (Johnson 1987, Mills 1987).

cant vegetational and morphological changes due to water withdrawals since settlement for irrigation and power (U.S.F.&W.S. 1981; Sidle *et al.* [in prep]; Williams 1978). The results have been a significant reduction in the amount of Least Tern nesting habitat along the central Platte River (North Platte to Columbus) through a narrowing of the river channel and a tremendous increase in riparian vegetation (Currier *et al.* 1985; Ducey 1985). The present riverine environment contrasts sharply with the historic treelessness and wide river channel. Current use of central Platte River channels by Least Terns indicates that areas with unobstructed visibility are used proportionately higher than the availability of such areas (David C. Carlson *pers. comm.*). Interior Least Terns often nest at sand and gravel pits adjacent to the Platte River. However, reproductive success is low due to human disturbance and predation (Nebraska Game and Parks Commission 1986a; G.R. Lingle unpubl. data). Most sandbar nesting by Least Terns using the Platte River now occurs on the lower Platte River (east of Columbus) (Nebraska Game and Parks Commission 1986a), where the unobstructed channel is wider and large, barren sandbars are more plentiful than on the central Platte River. The United States Fish and Wildlife Service is currently collaborating with several public agencies and private organizations regarding studies to determine instream flow regimes suitable for Least Terns and other threatened and endangered species.

On the Mississippi River, Interior Least Terns occur almost entirely in the lower valley south of Cairo, Illinois. Nesting occurs on mid-channel islands or on sandbars within dike fields. Surveys by the United States Army Corps of Engineers (Rumancik 1985, 1986, 1987; M. Smith 1986) and Missouri Department of Conservation (J.W. Smith 1986, 1987) indicate that about one-half of all Interior Least Terns occur along 1100 kilometers of the Lower Mississippi River. As on the Missouri River, there are untimely rises in water levels which inundate nests. Human disturbance is infrequent, but casual disturbance during the broodrearing period has been implicated in chick mortality at Mississippi River terneries. J.W. Smith (1986) cited human disturbance as an important factor limiting the breeding success of Least Terns in

and adjacent to the State of Missouri. To provide protection for the Least Tern, the Missouri Department of Conservation has designated certain state-owned Mississippi River islands as inviolate refuges during the breeding season. These islands, considered to be critical tern habitat by the state, are annually posted with large, conspicuous signs describing the reason for posting, the time frame for refuge status (May 15–August 31 unless the signs are removed earlier by state officials), and the penalties that could apply in cases of trespass. Public information programs have ameliorated the human disturbance problem (J.W. Smith 1987). Conservation programs are ongoing for Interior Least Terns in North Dakota (Kreil 1987) and Nebraska.

Currently, United States Army Corps of Engineers dredge permits require the permittee to contact the Corps 30 days prior to dredging to obtain updated information concerning the location of Interior Least Tern colonies which may be affected by the dredging activities (Richard Kaiser *pers. comm.*). If surveys reveal Least Tern breeding activity within one-half mile of the proposed dredging location, dredging must not proceed until the impacts of the dredging have been reviewed by the Corps of Engineers.

Interior Least Terns no longer occur on most tributaries of the Lower Mississippi River, including the Ohio River. Throughout watersheds of the Arkansas and Red rivers, reservoirs and other river management schemes have had a similar impact on the distribution of Interior Least Terns as occurs on the Missouri, Mississippi, and Platte rivers. The upper Arkansas and Red river watersheds support Interior Least Terns. For example, on the Arkansas River, terns nesting in Oklahoma occur only below dams such as the Keystone Dam (Hoffman 1986). In Kansas, Schulenberg and Ptacek (1984) reported that reproductive success is low and much of the breeding habitat is threatened, although the population of terns on the Cimarron River is believed to be stable (Boyd 1986, 1987). The construction of Lake Meredith on the Canadian River in Texas has greatly reduced the magnitude of both high flows and average annual flows and suitable nesting sandbar habitat has been eliminated along stretches of the Canadian River (U.S.F.&W.S. *unpubl. data*).

On the Rio Grande River, Interior

Least Terns nest primarily in the vicinity of reservoirs (McCament and Thompson 1985, 1987). Nesting occurs on shell beaches along the reservoirs (Neck and Riskind 1981). Further surveys on the Rio Grande may reveal additional Least Terns.

Recent surveys confirm that the Interior Least Tern continues to occur intermittently along only a few segments of rivers. Breeding habitats continue to be disrupted, and agreements among numerous agencies will have to be reached to permanently protect the sandbar environment of the terns.

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