

Arctic Terns Nesting in Montana: *First Modern Interior Breeding Records for the Lower 48 United States*

Stephen J. Dinsmore
612 1/2 West Magnolia Street
Fort Collins, Colorado 80521
(dinsmore@lamar.colostate.edu)

Joel G. Jorgensen
1218 Jackson Street
Blair, Nebraska 68008

Abstract

The Arctic Tern (*Sterna paradisaea*) is a circumpolar species that breeds throughout Arctic regions of the northern hemisphere and winters at sea in southern hemisphere oceans. During migration, the species is highly pelagic, although a few individuals regularly occur inland on migration. Arctic Terns are rare vagrants in the Great Plains, with apparent migrants accounting for all previous records. Here we report the occurrence of nesting Arctic Terns in 1998, 1999, and 2000 at Bowdoin National Wildlife Refuge in north-central Montana and comment on the status of the species elsewhere in the Great Plains.

Distribution

Arctic Terns are widespread breeders across tundra regions of the Arctic (Cramp 1985). They nest on open tundra, mostly above 50° N latitude and farther north than any other tern species (Cramp 1985). The southern limits of their breeding range in North America lie in northern British Columbia, northeastern Alberta, northwestern Saskatchewan, northern Manitoba, northern Ontario, eastern Quebec, and Nova Scotia (Godfrey 1966, American Ornithologists' Union 1998). A few breed along the Atlantic Coast south to Massachusetts (Veit and Petersen 1993) and along the Pacific Coast south to Washington (American Ornithologists' Union 1998). There are four breeding records for Wisconsin between 1871 and 1891 (Kumlien and Hollister 1903, Robbins 1991), but none of these is mentioned in a more recent reference (American Ornithologists' Union 1998). We are aware of no other interior breeding records of Arctic Tern for the Lower 48 United States. There is also one report of an Arctic Tern hybridizing with a Forster's Tern (*S. forsteri*) along the central California coast (Roberson et al. 1999). Arctic Terns undertake one of the longest migrations of any bird species—approaching 35,000 km annually—as they travel between their Arctic breeding grounds and their wintering grounds, as far south as 74° S latitude in southern oceans (Bent 1963). Most are thought to winter in Antarctic pack ice between 55° E and 155° E longitude (Cramp 1985).

Breeding Biology

Arctic Terns typically breed in coastal areas and on islands, although some nest at a variety of inland sites associated with larger lakes and rivers. They nest in a wide range of open habitats including beaches, dunes, sand spits, low islands, and marshy tundra, always near water (Godfrey 1966). They may nest either colonially or in isolated pairs (Godfrey 1966), sometimes with other species of gulls (*Larus* spp.) and Common Terns (*S. hirundo*) or Aleutian Terns (*S. aleutica*) (Hawksley 1957). The breeding season extends from early May through July; nest initiation is earliest at southern latitudes and progressively later at more northerly latitudes (Bent 1963). Mean clutch size for Arctic Terns is 2 eggs; one- and 3-egg clutches are less frequent (Bent 1963, Baicich and Harrison 1997, Robinson et al. 2001). Eggs are laid at intervals of one-two days, and incubation may begin with either the first or second egg (Bent 1963). Incubation is typically 20–22 days (Godfrey 1966, Baicich and Harrison 1997). Nest success varies temporally and geographically, with an average nest success of about 70% (see Cramp 1986). After hatching, the semi-precocial young remain near the nest, where both parents tend them; they fledge at 19–24 days (Cramp 1985, Baicich and Harrison 1997). Young birds remain dependent upon the adults for up to two months after fledging (Cramp 1985). Most Arctic Terns do not breed until age four, though some begin breeding as early as two years and some as late as five (Cramp 1985).

Evidence of Breeding in Montana

On 14 June 1998 we were conducting a shorebird survey at Bowdoin National Wildlife Refuge in Phillips County, Montana. This 6300-hectare refuge is located 11 km east of Malta and contains a variety of habitats including a large freshwater lake with extensive marshes and surrounding grasslands. At 1108 MDT we saw an adult Arctic Tern (Fig. 1) at the southeast end of Lake Bowdoin. At approximately 1215, we noted a second adult, and we studied and photographed both birds until 1235. Both



Fig. 1. Arctic Tern in flight at Bowdoin National Wildlife Refuge, Montana, 14 June 1998. Photo by Stephen J. Dinsmore.

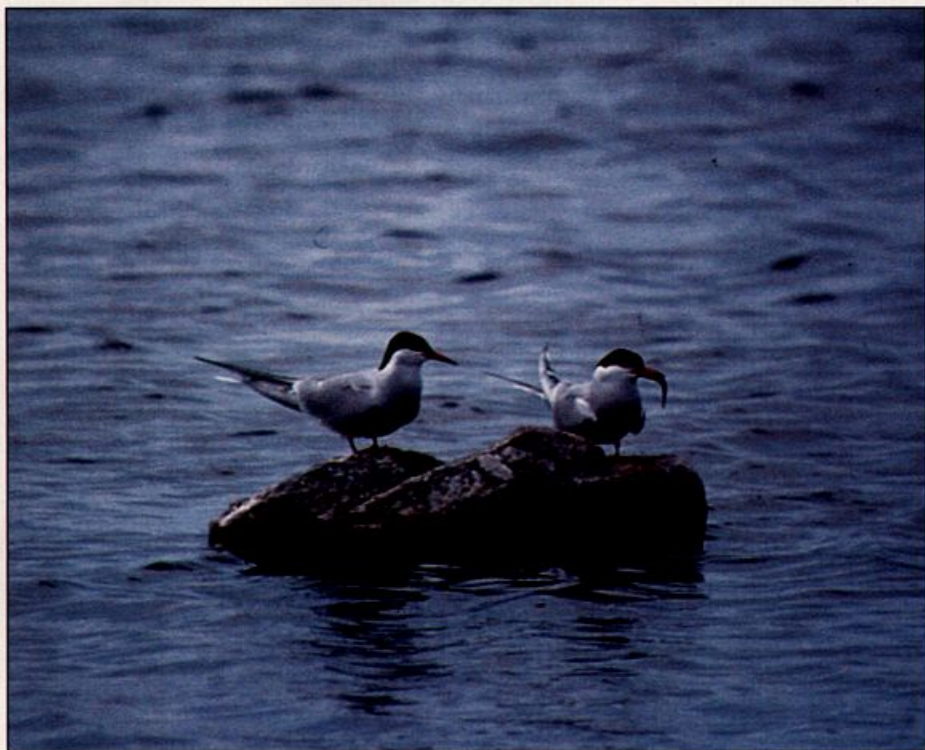


Fig. 2. Arctic Terns in courtship at Bowdoin National Wildlife Refuge, Montana, 17 June 1998. Photo by Stephen J. Dinsmore.

birds were alternately foraging along the lakeshore and resting on a nearby sandbar with several Common Terns. The combination of a shorter, blood-red bill, contrasting white cheek, dark gray belly, short-winged appearance, pale gray upperwing, pattern of narrow black edges to the undersides of the primaries, and higher-pitched call notes separated these birds from the Common Terns. When perched, the birds showed a distinctive short-legged, hunch-backed appearance. We suspected that the Arctic Terns probably arrived on southerly winds just prior to the passage of a cold front on 13 June. Arctic Terns are well known as late spring migrants, and we assumed both birds would resume their northward migration when the weather cleared. The mid-June date seemed normal for a migrant Arctic Tern at this latitude, but we certainly did not anticipate that the terns would remain and nest.

On 16 June, we returned to the location of our original sighting and were unable to relocate the terns. Later that day we found two adult Arctic Terns along the northeast shore of Lake Bowdoin, just east of Long Island. Although this location was approximately six km from our original sighting, we assumed they were the same terns we had seen on 14 June. The birds spent most of their time on a small rock and nearby sand spit. We again confirmed our original identification and took several additional photographs.

On 17 June both adults were still at the same location east of Long Island. On this occasion we noted that the birds were actively courting (Fig. 2). The flight display consisted of a short chase by the male in typical stiff-winged flight, the wings held upward in a deep vee (Cramp 1986). The male brought several small (<5 cm) minnows to the female. Although we cannot be certain, the minnows appeared to be Fathead Minnows (*Pimephales promelas*); Carp (*Cyprinus carpio*) and Brook Stickleback (*Culaea inconstans*) also occur in Lake Bowdoin. The birds also spent considerable time on the small sand spit, although we did not observe nest building. Both adults were very territorial, and we watched them chase away Blue-winged Teal (*Anas discors*), Killdeer (*Charadrius vociferus*), American Avocets (*Recurvirostra americana*), and Ring-billed Gulls (*Larus delawarensis*). Although it seemed highly improbable, we suspected the birds might attempt to nest.

On 18 June, nest scraping and copulation were seen at this location (C. R. Carlson, pers. comm.). On our next visit on 20 June we found an adult Arctic Tern incubating a nest containing one egg. A second adult was nearby, and a third adult was frequenting the southeastern shore of Lake Bowdoin. Both members of the



Fig. 3. Arctic Tern nest at Bowdoin National Wildlife Refuge, Montana, 3 July 1998. Photo by Stephen J. Dinsmore.



Fig. 4. Arctic Tern nest site at Bowdoin National Wildlife Refuge, Montana, 3 July 1999. Photo by Stephen J. Dinsmore.

nesting pair were very vocal when we were near the nest. The nest was on a small sandbar less than one-half m above the waterline and consisted of a shallow scrape lined with pebbles and bits of vegetation. The nest and egg resembled those of a Common Tern (Dinsmore, pers. obs.) and were consistent with those of an Arctic Tern (Baicich and Harrison 1997). The nest contained two eggs when it was checked on 28 June and 3 July (Fig. 3). The nest was still being incubated on 6 July. Between 6 and 10 July, the nest was inundated by rising water levels. During this period, refuge staff elevated the nest in an unsuccessful attempt to save it from being flooded. Had the nest been successful, it should have hatched on approximately 10 July, assuming a normal incubation period. After the nest failed, the terns became much more difficult to locate, and our last sighting was of a single adult near the nest site on 5 August.

On 30 May 1999, Dinsmore and David C. Ely observed a pair of adult Arctic Terns courting at the 1998 nest site. A third adult Arctic Tern was also present but did not engage in courtship activity. By 31 May the pair had constructed a nest within two m of the location of the 1998 nest. The nest contained two eggs on 4 June. On 22 June the nest was empty, and there was no sign of the adults, indicating that the nest had failed. On 3 July, Dinsmore and Ely discovered a second nest containing one egg approximately three km from the first nest (Fig. 4). A pair of Arctic Terns defended the nest and, once again, a third adult was seen nearby. We suspected this was a re-nesting attempt by the original pair. On 24 July the nest contained one egg and was defended by both adults. The egg was still present on 1 August, but we saw no sign of the adults. We concluded that the egg was probably infertile because it should have hatched no later than 25 July, assuming a normal incubation period. We observed both adults engaged in courtship activity on an adjacent island on 1 and 3 August but not thereafter.

On 20 May 2000, Dinsmore and Aaron Brees observed a pair of Arctic Terns courting near the second 1998 nest site. We returned to this site on 24 June and discovered a nest containing two pipping eggs. At least two other adult Arctic Terns were nearby. Assuming a normal incubation period, we calculated that this nest was initiated sometime around 1 June. When we next visited the nest site on 1 July, we saw no evidence of the adults or young and concluded that the young had been depredated, if they had in fact hatched. The terns became much more difficult to locate thereafter, and our last sighting was of a single adult near the nest site on 21 July.

Except for the geographic location, all of these nesting attempts were quite normal. All of

the nests were on small gravel spits along the margin of a large freshwater lake, much like the habitat used by Arctic Terns within their normal breeding range. The nest sites were very exposed and were not in taller vegetation like the nests of Common Terns (Dinsmore, pers. obs.). Our nest initiation dates of 1 June, 4 June, 20 June, and 3 July all fall within the normal range of dates listed by Bent (1963). To the best of our knowledge, none of these nesting attempts was successful. It is possible that eggs from the 2000 nest hatched. It is interesting that these nesting Arctic Terns were not associated with the nesting colonies of Common or Forster's Terns; their nests were a minimum of two km from the nearest Common Tern colony and four km from the nearest Forster's Tern colony. Although they had the opportunity to nest among other species of *Sterna*, these Arctic Terns nested elsewhere.

Status in the Great Plains

Four species of small *Sterna* have occurred in the Great Plains: Common, Arctic, Forster's, and Least (*S. antillarum*) Terns. In this article, we have defined the Great Plains region to include ten states (Montana, North Dakota, South Dakota, Wyoming, Nebraska, Colorado, Kansas, Oklahoma, Texas, and New Mexico), but only the parts of those states lying east of the Continental Divide.

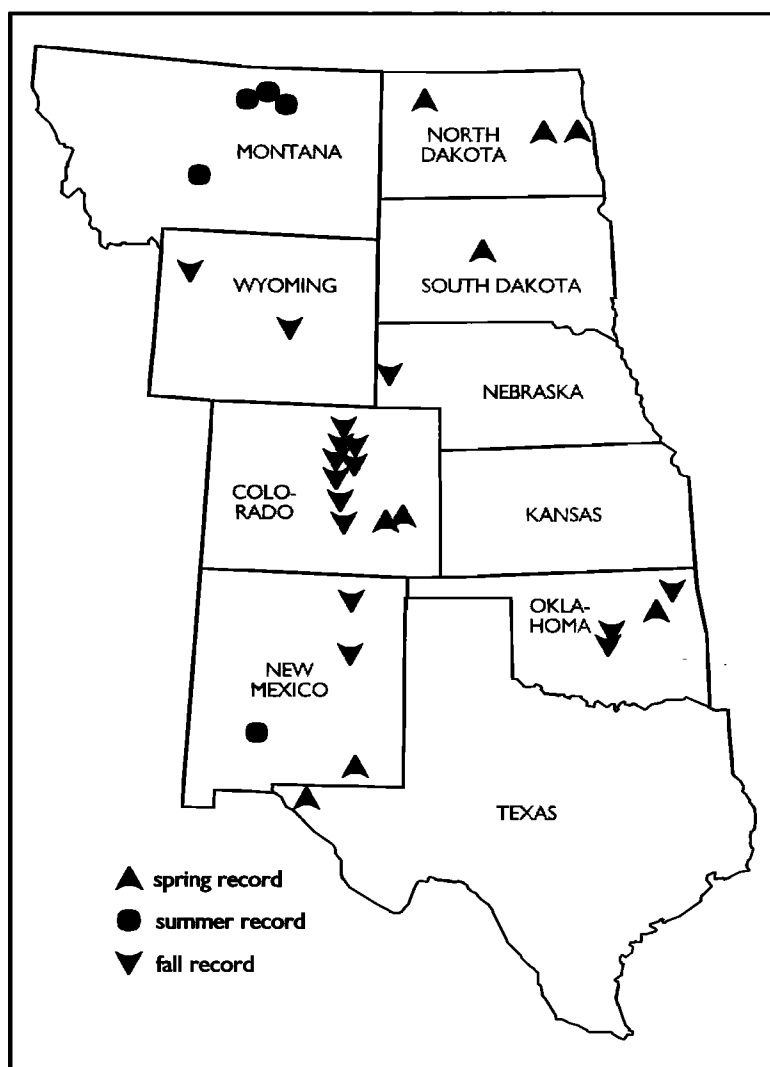


Figure 5. Arctic Tern records in the Great Plains east of the Continental Divide.

Three species of *Sterna* (Common, Forster's, and Least) occur regularly in the Great Plains. Within this region, Common Tern breeds only in Montana and the Dakotas. In Montana, it is a locally common breeding bird, mainly in the northern half of the state (Montana Bird Distribution Committee 1996). In 1997 approximately 110 pairs nested on the Dry Lake unit of Bowdoin N.W.R., but fewer nested there in 1998, 1999, and 2000 (S. J. Dinsmore, pers. obs.). Forster's Terns breeds more widely in the Great Plains, from Montana and North Dakota south to Colorado, New Mexico and Kansas. In Montana, it breeds locally at scattered locations throughout the state (Montana Bird Distribution Committee 1996). Forster's Tern is an uncommon migrant and rare and irregular breeder at Bowdoin N.W.R., with a few pairs nesting there most years. Least Terns breed locally in every state in the Great Plains except Wyoming and New Mexico, mainly along the Missouri, Platte, and Arkansas River drainages and in coastal Texas. In Montana, it breeds very locally along the Missouri and Yellowstone Rivers in extreme eastern Montana (Montana Bird Distribution Committee 1996).

Arctic Terns are rare vagrants in the Great Plains, although records have increased over the past few years. We located 27 records for the Great Plains (Table 1, Figure 5; we excluded a marine record from Texas). These data indicate that Arctic Tern is a rare spring (14 May–20 June; 9 records) and fall (11 July–14 October; 16 records) migrant, with no evidence of breeding. Two records (28 June in Montana and 3 July in New Mexico) defy classification and could represent late spring migrants, non-breeding birds summering south of the regular breeding range, or early fall migrants. The only records of summering birds are from Montana (three records, this paper). It may be noteworthy that records from the eastern part of the Great Plains tend to be in spring, while more westerly records tend to be in autumn.

Based on the available Great Plains data, there was no reason to believe that breeding was even remotely likely in the Great Plains or, more specifically, in Montana. First, the closest known breeding locales to Bowdoin National Wildlife Refuge are in Puget Sound, Washington (approximately 1300 km to the west) and northern Saskatchewan (approximately 1350 km to the north). Second, all records from the summer months appear to be of migrants that remained at a site for no more than a few days, except for old breeding records from Wisconsin.

One may speculate that records of Arctic Terns in the Great Plains will continue to increase as birders make a more concerted effort to find them during migration. In the absence of other breeding data from the Lower 48 and adjacent southern Canada, however, we see no reason to expect a similar increase in breeding records. How long Arctic Terns continue to breed at this site in Montana will be a subject of continued interest.

Acknowledgments

We thank Charles R. Carlson for providing us with information from an 18 June 1998 visit and helping us to identify the possible fish species in Lake Bowdoin. David C. Ely and Tim T Hanks helped monitor the 1999 nesting attempts and Aaron Brees helped monitor the 2000 nesting attempt. James W Arterburn, Peter Grant, Bill Howe, Bill Lisowsky, Ron Martin, W. Ross Silcock, and Sartor O. Williams, III, helped us locate Arctic Tern records in the Great Plains region. W. Ross Silcock and Marshall Iliff carefully read and edited the manuscript of this paper and much improved it.

Literature Cited

- American Ornithologists' Union. 1998. *Check-list of North American Birds*, seventh ed. American Ornithologists' Union, Washington, D. C.
- Andrews, R., and R. Righter. 1992. *Colorado Birds*. Denver Museum of Natural History, Denver, CO.
- Baicich, P. J., and C. J. O. Harrison. 1997. *A Guide to the Nests, Eggs, and Nestlings of North American Birds*, second ed. Academic Press, San Diego, CA.
- Bent, A. C. 1963. *Life Histories of North American Gulls and Terns*. Dover Publications Inc., New York, NY.
- Conry, J. A., and B. E. Webb. 1982. An extant specimen of Arctic Tern from Colorado. *Western Birds* 13: 37-38.
- Cramp, S. 1985. *The Birds of the Western Palearctic*, vol. 4. Oxford University Press, Oxford.
- Godfrey, W. E. 1966. *Birds of Canada*. National Museum of Canada, Ottawa.
- Kumlien, L., and N. Hollister. 1903. The Birds of Wisconsin. Bulletin of the Wisconsin Natural History Society 3: 1-143.
- Montana Bird Distribution Committee. 1996. *P. D. Skaar's Montana Bird Distribution*, fifth ed. Special Publication No. 3., Montana Natural Heritage Program, Helena.
- Olsen, K. M., and H. Larsson. 1995. *Terns of Europe and North America*. Princeton University Press, Princeton, NJ.
- Robbins, S. D., Jr. 1991. *Wisconsin Birdlife*. The University of Wisconsin Press, Madison.
- Roberson, D., S. C. Rottenborn, S. B. Terrill, and D. S. Singer. 1999. Middle Pacific Coast region. *North American Birds* 53: 428-431.
- Robinson, J. A., K. C. Hamer, and L. S. Chivers. 2001. Contrasting brood sizes in Common and Arctic Terns: The roles of food provisioning rates and parental brooding. *Condor* 103: 108-117.
- Veit, R. R., and W. R. Petersen. 1993. *Birds of Massachusetts*. Massachusetts Audubon Society, Lincoln, MA.

Table 1. Records of Arctic Terns in the Great Plains (only locations east of the Continental Divide).

Date(s)	Number	Location	Reference
Montana			
28 June 1994	1 adult	Lebo L., Wheatland Co.	<i>Field Notes</i> 48:957
14 June-5 August 1998	3 adults	Bowdoin N.W.R., Phillips Co.	<i>Field Notes</i> 52:471, 518, this article
30 May-3 August 1999	3 adults	Bowdoin N.W.R., Phillips Co.	<i>North American Birds</i> 53:294, this article
20 May-21 July 2000	4 adults	Bowdoin N.W.R., Phillips Co.	<i>North American Birds</i> 54:297
North Dakota			
20 June 1902	1 adult	Stump L., Nelson Co.	R. Martin pers. comm.
20 June 1993	1 adult	Minot sewage lagoons, Ward Co.	<i>American Birds</i> 47:1121
14 May 1994	2 adults	Grand Forks lagoons, Grand Forks Co.	<i>Field Notes</i> 48:312
South Dakota			
16-17 May 1999	1 adult	Oahe dam, Stanley/Hughes Co.	<i>North American Birds</i> 53:294
Wyoming			
11 July 1992	1 adult	Soda L., Casper, Natrona Co.	<i>American Birds</i> 46:1158
14 October 1997	1 juvenile	Yellowstone National Park, Teton Co.	<i>Field Notes</i> 52:98
Nebraska			
20 September 2000	1 adult	Lake Minatare, Scotts Bluff Co.	S. J. Dinsmore pers. obs.
Colorado			
16 September 1912	1 adult	Windsor, Weld Co.	Conry and Webb (1982)
11-12 September 1979	1 adult	Union Reservoir, Weld Co.	Andrews and Righter (1992)
12 June 1991	1 adult	Adobe Creek Reservoir, Kiowa/Bent Co.	Andrews and Righter (1992)
9 June 1992	1 adult	Nee Noshe Reservoir, Kiowa Co.	B. Lisowsky pers. comm.
20 September 1997	1 juvenile	Lower Latham Reservoir, Weld Co.	<i>Field Notes</i> 52:98
5 October 1999	1 adult	Union Reservoir, Weld Co.	<i>North American Birds</i> 54:81
23 September 2000 ^a	1 adult	Big Johnson Reservoir, El Paso Co.	P. Gent pers. comm.
29 September 2000 ^a	1 adult	Pueblo Reservoir, Pueblo Co.	P. Gent pers. comm.
5-11 October 2000 ^a	1 juvenile	Union Reservoir, Weld Co.	P. Gent pers. comm.
7-10 October 2000 ^a	2 juveniles	Chatfield Reservoir, Jefferson Co.	P. Gent pers. comm.
Kansas			
No records			
Oklahoma			
26 May 2000	1 adult	Lake Yahola, Tulsa Co.	<i>North American Birds</i> 55:193
25 September 2000	1 juvenile	Lake Oologah, Rogers Co.	J. W. Arterburn pers. comm.
10 October 2000	1 juvenile	Lake Hefner, Oklahoma Co.	J. W. Arterburn pers. comm.
14 October 2000 ^a	1 adult	Lake Hefner, Oklahoma Co.	J. W. Arterburn pers. comm.
Texas			
5-7 June 1997	1 adult	McNary Reservoir, Hudspeth Co.	<i>Field Notes</i> 51:1021
New Mexico			
23 September 1991	1 juvenile	Santa Rosa Reservoir, Guadalupe Co.	<i>American Birds</i> 46: 301
28 September 1995	1 adult, 1 juvenile	Maxwell NWR, Colfax Co.	<i>Field Notes</i> 50:94
3 July 1997	1 adult	Elephant Butte L., Sierra Co.	<i>Field Notes</i> 51:1034, 1064
15 May 1998	1 adult	Brantley L., Eddy Co.	<i>Field Notes</i> 52:369, 370

^a Pending acceptance by the state's records committee.



—Received 14 February 2001; Accepted 4 May 2001.