

COMMITTEE ON THE STATUS OF ENDANGERED WILDLIFE IN CANADA

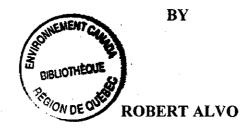
OTTAWA, ONT. K1A 0H3 (819) 997-4991

COMITÉ SUR LE STATUT DES ESPÈCES MENACÉES DE DISPARITION AU CANADA

OTTAWA (ONT.) K1A 0H3 (819) 997-4991

STATUS REPORT ON THE FORSTER'S TERN STERNA FORSTERI

IN CANADA



AND

MARTIN K. MCNICHOLL

REASON:

REPORT LACKS RECENT POPULATION NUMBERS TO

INDICATE ANY TREND.

OCCURRENCE:

ALBERTA, BRITISH COLUMBIA, MANITOBA, ONTARIO,

AND SASKATCHEWAN

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OTTAWA, ONT. KIA 0H3 (819) 997-4991

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JUNE 1994

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DEFINITIONS

SPECIES:

"Species" means an indigenous species, subspecies, variety or geographically defined

population of wild fauna and flora.

VULNERABLE: (V)

A species of special concern because of characteristics that make it

particularly sensitive to human activities or natural events.

THREATENED: (T)

A species likely to become endangered if limiting factors are not reversed.

ENDANGERED: (E)

A species facing imminent extirpation or extinction.

EXTIRPATED: (XT)

A species no longer existing in the wild in Canada, but occurring elsewhere.

EXTINCT:

(X)

A species that no longer exists.

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A species that has been evaluated and found to be not at risk.

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A species for which there is insufficient scientific information to support status

designation.

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STATUS REPORT ON THE FORSTER'S TERN STERNA FORSTERI

IN CANADA

 \mathbf{BY}

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STATUS ASSIGNED IN 1996 INDETERMINATE

ABSTRACT

The Forster's Tern (Sterna forsteri) symbolizes the deep marsh habitat, including this habitat's naturally cyclical nature, in which this species nests in single species or multi-species colonies.

Threats to this species include increases in competitors for nesting areas such as Ring-billed Gulls, Herring Gulls and Franklin's Gulls, the manipulation of water levels for hydro-electric power, the draining and dyking of marshes, increased human activity near nesting colonies, and habitat pollution.

Of the 111 Canadian breeding localities identified to date, 33 have observations only from before 1970. The total Canadian population may consist of between 2133 and 4216 pairs. It seems unlikely that many unknown breeding locations exist. Given the small number of breeding pairs in Canada, and some good evidence of a population decrease, we recommend that the species be listed "vulnerable".

INTRODUCTION

The Forster's Tern (Sterna forsteri) is slightly larger than the Common Tern (Sterna hirundo), with a longer bill, legs and tail, but 5% shorter wings. It differs from the Common Tern by its characteristic pale silvery primaries and the grey inside border of the tail fork. Its flight action is faster, with shallower wing beats than the Common Tern. The adult's bill is more orange than red. The sexes are similar (Cramp et al. 1985). The flight call is distinctly nasal and lower pitched than the Common Tern's, and a good way of separating the two species.

DISTRIBUTION

The Forster's Tern has two discreet breeding populations: 1) inland in the prairies of Canada and the U.S., migrating overland mainly toward the Pacific and the Gulf of Mexico; 2) along the east and south U.S. seaboard, from Maryland to Texas, with migratory elements following the coasts (Cramp et al. 1985). It winters on the coasts of the Gulf of Mexico (Salt and Salt 1976) (Figure 1).

PROTECTION

The Forster's Tern is protected under the Migratory Birds Convention Act (Government of Canada 1989; Canadian Wildlife Service 1991).

POPULATION SIZE AND TREND

There is no estimate of the total number of Forster' Terns breeding in North America (Cuthbert and Louis 1993). The species has been expanding its range eastward rapidly in recent decades (Brunton 1986). However, despite some recent population increases in tern species breeding in the northeastern U.S. and adjacent Canada, most species remain far below numbers of 40 years ago. Continued management and protection will be necessary to maintain suitable sites for current populations (Kress et al. 1983).

The Nature Conservancy, a U.S. based conservation organization, lists the Forster's Tern as "G5" on a scale of G1 to G5, with G1 being assigned to species for which there is the most conservation concern at the global level, and G5 to those with the least.

A reasonably thorough search of all known breeding locations (confirmed, probable or possible breeding), has yielded 111 for Canada (Table 1 and Appendix 1). Thirty-three of these are "historical locations", herein defined as breeding locations known only from before 1970 -- they may or may not still be used, but breeding has not been documented since 1970, either because breeding has not occurred or because no-one has checked the site since then. Because it is sometimes difficult to decide whether a set of data pertaining to one "location" should be considered to represent one or more breeding locations, the numbers presented are given only as a rough guideline.

Yukon

There have been no reports of the Forster's Tern in the Yukon (David Mossop, pers. comm.).

Northwest Territories

There have been no reports of the Forster's Tern in the Northwest Territories (Jacques Sirois and Bob Bromley, pers. comm.).

British Columbia

The Forster's Tern was previously considered an accidental visitor to British Columbia, (Goossen et al. 1982). However, there is now one breeding location in the southeast corner of the province at Duck Lake, Creston Valley Wildlife Management Area (Table 1; Appendix 1). The species was first reported there in 1974, with breeding suspected in 1976, but breeding was not confirmed until 1980. Dyking and water control, providing stable and suitable nesting habitat in the Creston valley, probably contributed to the successful establishment of the small breeding colony there (Campbell et al. 1990).

From 1980 to 1984 there were an estimated 4-9 nests per year. The nearest breeding locations are at Stobart Lake, Alberta (310 km northeast), Ninepipe National Wildlife Refuge, Montana (270 km southeast), and Brook Lake, Washington (280 km southwest) (Campbell et al. 1990).

Prairie Provinces -- general

The Forster's Tern breeds most commonly in Manitoba, and less frequently in Saskatchewan and Alberta. It finds suitable breeding habitat in the grasslands, aspen parkland, and boreal forest regions. Its observed breeding range appears to lie well to the south of the Precambrian Shield and is perhaps related to the availability of marsh habitat. Knowledge of the ecological factor or factors that delimit the range await further investigation (Taverner 1926; Gerrard and Whitfield 1971; Austen and Cadman

1994). Early this century, Taverner (1926) noted that "though common throughout the eastern prairie sections they are more local and less generally distributed than the Common Tern."

Alberta

The Forster's Tern breeds locally in southern and central Alberta (Salt and Salt 1976). It has been assigned "Status Undetermined" in Alberta, which means that it is not considered at risk, but also that insufficient information is currently available to determine an accurate status (Alberta Forestry, Lands and Wildlife 1991). Nevertheless, it is considered a scarce summer resident by Weseloh (1973) and uncommon by Semenchuk (1992). It was reported in only 66 (3%) of 2206 squares surveyed in the province. Breeding was confirmed in 18 of the 66 squares (27%), was considered probable in 17 (26%), and was considered possible in 31 (47%). Thirty breeding locations are known in the province, of which 4 are historical (Table 1; Appendix 1).

Saskatchewan

Forster's Terns breed locally in southern and central Saskatchewan (Salt and Salt 1976). They are "fairly common" in Saskatchewan, where they occur in the Parklands Region and in adjacent portions of the Grassland and South Boreal Regions (Smith 1996).

Evidence of breeding was obtained for only 6% of the province by the Saskatchewan atlas (47 atlas squares). Breeding was confirmed in 13 atlas squares, was considered probable in 4, and possible in 30 (Smith, in prep.). There are 36 known breeding locations in the province, of which 21 are historical (Table 1; Appendix 1).

Manitoba

Thompson's (1891) designation of the Forster's Tern as a summer resident of larger lakes, breeding on the borders of Lakes Manitoba, Winnipeg and Winnipegosis, still describes its Manitoba range fairly well (McNicholl in prep.). Studies by Hatch (1972) indicated that the southern and southwest shores of Lake Winnipeg harbour Manitoba's main breeding population (Koonz and Rakowski 1985). On the other hand, no evidence of nesting was obtained on any of the interior marshes or lakes between Lakes Winnipeg and Manitoba, including East, West and North Shoal Lakes (Hatch 1972).

Aerial surveys for colonial waterbirds conducted in 1979 over all major Manitoba lakes south of 54°10′N, yielded 14 colonies of Forster's Terns totalling 1,092 nests (Koonz and Rakowski 1985). This figure did not include roughly 650 other nests estimated for two of the sites (Bill Koonz, pers. comm.); thus an estimated total from that study would be 1742 nests. Most colonies were in the southern portion of the study area, usually associated with large

marshes (Koonz and Rakowski 1985). This study did not include marshes that were not associated with the major lakes, and therefore did not include all potential breeding habitat for the Forster's Tern (Bill Koonz, pers. comm.). Thirty-three breeding locations are known for the province, of which 7 are historical (Table 1; Appendix 1).

On the other hand, Bill Koonz believes that in Manitoba, both the number of colonies and the number of pairs per colony have declined during recent years. This is based not only on his own observations of colonies and on discussions with other observers, but also on the habitat changes that have been occurring. He "would be surprised if 1000 pairs could be found breeding in Manitoba" (Bill Koonz, pers. comm.).

Ontario

It is not clear whether the Forster's Tern bred in Ontario historically. It may have been largely overlooked due to the inaccessibility of its nest sites and its similarity in appearance to the more familiar Common Tern (Austen et al. 1994). Nevertheless, available information suggests an actual range expansion and population increase in recent years in Ontario, both being attributable to high water levels (Scharf and Shugart 1984; McNicholl 1987).

In Ontario, the species is largely limited to Lake St. Clair and the western end of lake Erie, but a few birds have been observed in northwestern Ontario. For the period from 1981 to 1991, Forster's Terns were given "probable" or "confirmed" breeding status in 17 Atlas squares, and "possible" breeding status in 17 squares. Based mainly on 1991 field data, "it is unlikely that there are more than 1,000 pairs of breeding Forster's Terns in Ontario (Austen and Cadman 1994). Eleven breeding locations are known for the province, of which one is historical (Table 1; Appendix 1).

<u>Ouébec</u>

The species is considered a "visitor" to Quebec (Gauthier and Aubry 1996). There are no documented breeding records, but there were 34 reports for Quebec from 19 August 1972 to the end of 1993 (Yves Aubry, pers. comm.).

Nova Scotia

The Forster's Tern is a rare vagrant and transient in Nova Scotia (Tufts 1986), for which there are no breeding records (Sherman Boates, pers. comm.).

New Brunswick

There were no confirmed observations of Forster's Terns up until 1976 (Squires 1976), and even though there may have been some observations since then, there have definitely not been any breeding records since then (A.J. Erskine, pers. comm.). The species is considered accidental in New Brunswick, with 19 observations (A.J. Erskine, pers. comm.).

Prince Edward Island

The Forster's Tern is listed as "hypothetical" in PEI, meaning that there have been no confirmed observations (Curley et al. 1991).

Newfoundland

A vagrant in Newfoundland, the Forster's Tern occurs there only erratically (Montevecchi and Tuck 1987).

HABITAT

The Forster's Tern's habitat consists largely of freshwater and saltwater marshes, but in migration and winter the species also frequents seacoasts, bays, estuaries, rivers and lakes (American Ornithologists' Union 1983). It is often associated with wetlands affected by agriculture (Ehrlich et al. 1988). It sometimes nests on cobblestone islands (Hall 1989).

This species tends to nest in large marshes (Bergman et al. 1970), often those bordering lakes and reservoirs (Cramp et al. 1985). It changes breeding sites quickly within and between breeding seasons if environmental conditions are not suitable for nesting (Cuthbert and Louis 1986). In Ontario, it is generally associated with deep water portions of large freshwater marshes containing cattails and bulrushes (Austen et al. 1994).

In Minnesota, the Forster's Tern used a range of wetland types, but was most often found in Type 4 wetlands, which are characterized by large stable stands of dense emergent vegetation and extensive Type 5 wetlands are selected when large water for foraging. floating vegetation mats or other suitable nesting substrates are available, with the deeper water and more open expanses of these wetlands possibly providing a predictable food resource and greater Type 4 sites appear very protection from mammalian predators. vulnerable to several species of predators and to nest destruction by major summer storms. Although small wetlands characterized by shallow water and emergent vegetation (Type 3) periodically, these sites seem to be less ideal because of easy access by mammalian predators and greater sensitivity to drought (Cuthbert and Louis 1993).

Nests may be on muskrat lodges, muskrat feeding platforms, drift, matted vegetation, hummocks, mud bars, old grebe's nests, appropriated Western Grebe (<u>Aechmophorus occidentalis</u>) nests, or, in salt marshes, on wrack (Van Rossem 1933; Bergman et al. 1970; Buckley 1979; Techlow 1983; Cramp et al. 1985; Semenchuk 1992). When the Forster's Tern (<u>Aechmophorus occidentalis</u>) and the Black Tern (<u>Chlidonia niger</u>) inhabit the same marsh, the Forster's Tern uses higher and drier nest sites (Bergman et al. 1970). Forster's Terns will readily nest on man-made platforms (Techlow 1983).

GENERAL BIOLOGY

Reproduction

The Forster's Tern nests in single species colonies or multispecies colonies. In Manitoba, typically, several colonies were
clustered in a single large marsh with the nest numbers ranging
from 2 to 325 per colony (Koonz and Rakowski 1985). In South
Dakota, where the species is listed as "S4" by The Nature
Conservancy, meaning that the species is considered to be
"apparently secure statewide, though it may be quite rare in parts
of the state, especially at the periphery" (Grossman et al. 1994),
a site with a minimum of 135 nests was considered to be the major
breeding area in the state (Russell and Harris 1990).

Forster's Terns usually nest in loose colonies. They may be with Yellow-headed Blackbirds (Xanthocephalus associated xanthocephalus), American Coots (Fulica americana), Eared Grebes (Podiceps nigricollis), Pied-billed Grebes (Podilymbus podiceps), (Oxyura jamaicensis), Franklin's Gulls (Larus Ducks Ruddy pipixcan), Laughing Gulls (Larus atricilla), Common Terns, Gullbilled Terns (Sterna nilotica), Little Terns (Sterna autillarum), American Oystercatchers Skimmers (Rynchops niger), (Haematopus palliatus), and muskrats (Chamberlain 1959; McNicholl 1975b, 1975c, 1979; Nuechterlein 1981; Wilkerson and Marsh 1988; Russell and Harris 1990; McNicholl, in prep.).

Forster's Terns are remarkably tolerant to Yellow-headed Blackbirds, the two species often nesting in close proximity. The blackbirds may spend considerable time foraging on and near tern nests, from which they take insects possibly attracted to the nest by the warmth of the incubating terns — the blackbirds do this without harming the eggs or young of the terns. The terns react to the predator warning calls of the blackbirds, and join them in mobbing avian predators, such as raptors, large larids, herons and night-herons. Exclusion of Red-winged Blackbirds (Agelaius phoeniceus) from the colony area by Yellow-headed Blackbirds may

prevent predation of tern eggs by the former (McNicholl 1981).

Pairs are monogamous (Semenchuk 1992). Distances between individual nests in a colony ranged from 1.8 to 27 m in Ontario (Peck and James 1983). Nests are built by both sexes (Semenchuk 1992). Two to four (usually 3) eggs are laid (Godfrey 1986). Incubation lasts 23-25 days, and both sexes incubate (Semenchuk 1992). After hatching, the young remain in the nest for a few days. They are fed by both parents until they are fully grown and able to fly (Bent 1921; Semenchuk 1992). The fledging period remains unreported (Semenchuk 1992). In a Washington state study, most chicks made their first observed excursion from the nest by 2 days of age and left the nesting territory permanently by 4 days (Hall 1988). The young are fed minnows (Common 1926). Only one brood is raised. Shortly after the young are fledged, adults and young begin to disperse over a wide area (Techlow 1983).

Chick and egg mortality are often caused by storm damage (McNicholl Egg predators include rice rats (Oryzonys palustris) (Brunjes and Webster 1992). Predators on the young include: Great Horned Owls (Bubo virginianus), Mink (Mustela vison), Black-crowned (Nycticorax nycticorax), and Snapping Night-Herons (Chelydra serpentina) (Cuthbert and Louis 1993; Fraser 1994). Aerial predators are generally not a problem, because Forster's Terns are very successful in routing them away (McNicholl 1975c). After periods of prolonged heavy rain, muskrats usually rebuild their houses, resulting in the loss of tern eggs in nests on the Spawning carp (Cyprinus carpio) may houses (McNicholl 1975c). inadvertantly break eggs or knock them into the water (McNicholl Nests are occasionally parasitized by American Coots or Red-necked Grebes (Podiceps grisegena).

Movement

The Forster's Tern is migratory in the northern part of its breeding range, but no more than dispersive in the south (e.g. the Gulf of Mexico) (Cramp et al. 1985).

The only non-breeding concentration site listed specifically as such that we found in the Canadian literature is Bruce Lake, Alberta, which is considered of local importance (as opposed to national or regional importance) (Poston et al. 1990).

Behaviour/Adaptability

Bent (1921) mentions Forster's Terns catching flying insects and floating insects, and King (1980) found them catching insects from a smooth beach. However, the species is mainly ichthyophagous. Methods of searching for food include watching from perches, flying over water until prey is spotted followed by plunge-diving, and hovering at a series of spots followed by plunge-diving. The

method used and the degree of territoriality vs. flocking probably depends on water turbidity, dispersion of prey and the availability of perches. Scavenging, insect-hawking and egg predation have also been described (McNicholl 1984; Reed 1985). Forster's Terns also take eggs of Western Grebes and possibly those of American Coots (Van Rossem 1933).

Forster's Terns can live to at least 12 years (Klimkiewicz and Futcher 1989).

Nest site tenacity appears to be strongly developed in larids in highly stable habitats (e.g. cliffs). In highly unstable habitats, such as marshes, site tenacity is necessarily greatly reduced, and group adherence assists rapid pioneering of newly suitable habitat. In fluctuating marshes and prairie lakes, group adherence and reduced site tenacity allow Forster's Terns to rapidly colonize newly suitable habitat, while the maintenance of at least a weak form of site tenacity allows rapid recolonization of previously used sites (McNicholl 1975a).

LIMITING FACTORS

There are several factors limiting the breeding distribution of Forster's Tern in Manitoba's Interlake region, of which food supply may well be the most important. Many of the water bodies in that region are infertile, and, as a result, animal life in the form of minnows, aquatic insects, dragonflies, etc. is limited. As these are staple foods of the Forster's Tern, the number of breeding terns is small. There is a lack of marshes with moderately dense stands of bulrush, cattail, or bur-reed (Sparganium) for nesting cover. Marshes with both good nesting habitat and an abundant food source are scarce in the Interlake, although some of the marshes bordering Lakes Winnipeg and Manitoba are exceptions (Hatch 1972).

Lake Winnipeg is the eastern border of the breeding range of this species in the Prairie provinces. East of this lake the habitat is boreal, and marshes are replaced by bogs surrounded by forest (Hatch 1972).

In Manitoba, increases in Ring-billed Gulls (<u>Larus delawarensis</u>), Herring Gulls (<u>L. argentatus</u>, and Franklin's Gulls (assisted by human development) have likely had an adverse impact on Forster's Terns through competition for nesting habitat (Koonz and Rakowski 1985).

The manipulation of water levels for hydro-electric power, the draining and dyking of marshes, and increased human activity near nesting colonies are and will continue to be threats to their survival (Koonz and Rakowski 1985). Since 1971, Lake Manitoba has

been regulated so that its water remains fairly stable at high levels. This has stagnated marshes, reducing their value for nesting Forster's Terns (Koonz and Rakowski 1985). The loss and degradation of habitat due to these factors and the general increase in pollution, may have led to lower numbers of nesting pairs since the Koonz and Rakowski (1985) study (Bill Koonz, pers. comm.).

A problem in Manitoba and maybe in Saskatchewan is that fishermen see Double-crested Cormorants (<u>Phalacrocorax auritus</u>) as competitors for fish, and when they kill the cormorants, they often end up killing other species that nest in association, like Forster's Terns. The Manitoba government has been conducting colonial waterbird censuses throughout the province's three major lakes over the past five years (Cathy Johnson, pers. comm.).

One of the major factors restricting the Forster's Tern distribution in the Cordilleran region of British Columbia may be suitable breeding habitat (Goossen et al. 1982).

In Texas, human disturbance may have been an important factor in nest and egg losses, where the island colonies were popular areas for wade fishermen. Flooding accounted for the loss of almost 20% of the nests at San Antonio Bay. Fire ants (Solenopsis spp.) were observed swarming on recently pipped tern eggs and on living young. In some cases tern nests were lost to fire ants (King et al. 1991).

SPECIAL SIGNIFICANCE OF THE SPECIES

The Forster's Tern symbolizes the deep marsh habitat, including this habitat's naturally cyclical nature. When the marsh becomes too deep or too shallow, or if it ceases to be flooded regularly, the terns disappear. The species' renowned habit of abandoning sites and appearing elsewhere makes its population size difficult to assess, and also makes its management difficult. Its status may be deceptive in that while it seems to be fairly common in Canada, even recently having colonized British Columbia and possibly Ontario, it is numerous in only a handful of Canadian breeding locations. This probably reflects a general degradation of its habitat.

EVALUATION AND PROPOSED STATUS

A crude estimate of the total number of nesting pairs in Canada is given here. The species breeds in British Columbia, Alberta, Saskatchewan, Manitoba and Ontario. We calculated the estimated total number of nesting pairs by summing the most recent figures

for each breeding location for which a figure was available (Appendix 1). For the other breeding locations, the median number of nests per breeding location for the province was used (Table 1). Note that only non-historic sites are included -- historic ones are assumed not to have any breeding pairs. The results of these estimates are shown in Table 2 along with any available estimates made by experts for a given province.

The results suggest that the total Canadian population may consist of between 2166 and 4216 pairs. It seems unlikely that many unknown In Manitoba, which harbours a large breeding locations exist. proportion of the Canadian population, there are probably not very many unknown breeding sites (Bob Jones, pers. comm.). The species is largely restricted to the southern part of the province, below the latitude of Dauphin Lake and Hecla, the only exception being the nutrient rich area around The Pas. The latter area has always had deep water marshes, but has probably become even more attractive to the Forster's Tern since the 1950s with the construction of a major dam at Grand Rapids. The Saskatchewan River's water is warm at The Pas, having come northward from the Also the water contains sediments, which enter the river in the agricultural areas, and which absorb sunlight and are rich in nutrients (Bill Koonz, pers. comm.).

The Interlake Region of Manitoba is mostly nutrient poor and probably harbours very few Forster's Terns, except in a few exceptional locations such as East Shoal Lake, Lake St. Martin and Waterhen River (Bob Jones, pers. comm.). No breeding reports are known for the area east of Lake Winnipeg.

This species is known to breed in a relatively small number of marshes in Saskatchewan, and "no doubt there are a few more sites yet to be found" (Stuart Houston, pers. comm.).

There are some good indications that the species has decreased in the Canadian Prairies. John Macoun made a trip from the south end of Lake Manitoba to Swan Lake House in 1881. He found the Forster's Tern "breeding abundantly" at Lake Winnipegosis, on Lake Manitoba, on the Waterhen River (Gerrard and Whitfield 1971). Today it would seem that the same could be said only for Lake Manitoba (i.e. at Delta Marsh). In 1937, the Forster's Tern was said to be "quite plentiful and apparently breeds in the marshes" (Gerrard and Whitfield 1971).

The species seems to have decreased considerably at Waterhen Marsh, where at the turn of the century it was "very abundant, especially in the neighbourhood of the larger lakes of the region" and where "two separate colonies were observed", whereas in 1955 only one individual was seen on June 14, and seven on June 15 (Gerrard and Whitfield 1971).

The Jackfish Lake colony observed in 1970 with 50-100 pairs was considered one of the largest Forster's Tern colonies in Saskatchewan (Renaud and Renaud 1971). This would support other available information that suggest that in Canada the species is most abundant in Manitoba and decreasingly so westward.

Given the small number of breeding pairs in Canada, and some good evidence of a population decrease, we recommend that the species be listed "vulnerable".

RECOMMENDATIONS FOR CHANGING STATUS

Protect traditional colony sites against wetland development so that the Forster's Tern will have alternative nesting habitat available in years of water level extremes. Also, encourage a coordinated census effort by states and provinces in the Northern Great Plains region to evaluate the current status of this species throughout its primary breeding range (Cuthbert and Louis 1993).

ACKNOWLEDGEMENTS

Newfoundland: Joe Brazil, Troy Wellicome.

PEI: Rosemary Curley.

Nova Scotia: Sherman Boates, David Nettleship.

New Brunswick: Rod Cumberland, Pat Kehoe, Bruce Johnson.

Quebec: Yves Aubry, Michel Huot, Guy Jolicoeur, Pierre

Laporte, Jacques Larivée.

Ontario: Madeline Austen, Hans Blokpoel, Irene Bowman, Mike

Cadman, Ross James, Richard Pratt, Paul Prevett,

George van Drunen.

Manitoba: Herb Copland, George Holland, Bob Nero, Peter

Taylor.

Saskatchewan: Dale Hjertaas, Stuart and Mary Houston, Jeff Keith,

Al Smith.

Alberta: Roger Edwards, Bill Hall, Glen Semenchuk, Trevor

Wiens.

BC: Syd Cannings, Bill Harper, Gary Kaiser, Brian

Stushnoff.

NWT:

Bob Bromley, Chris Shank.

Yukon:

David Mossop.

United States: Mary Miller (Minnesota), Phil Wilkinson (South

Carolina).

Others:

Theresa Aniskowicz, Sarah Climenhaga, Tony Erskine, Barry Hughson, Colleen Hyslop, Joe Jehl, Melissa

Morrison.

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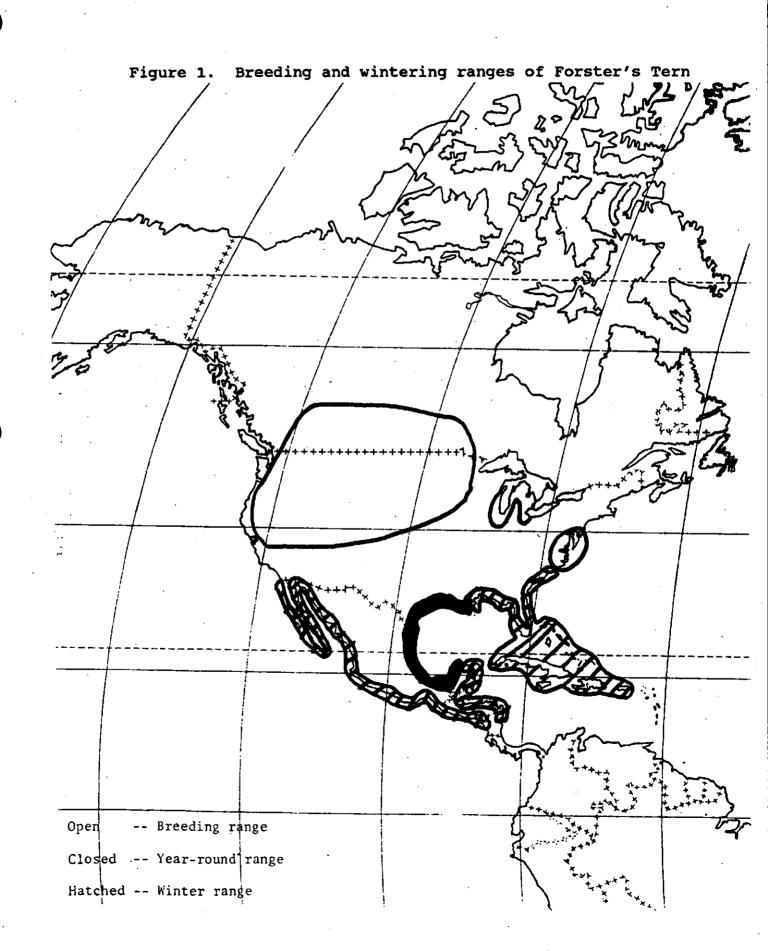


Table 1. Number of known breeding locations (confirmed, probable or possible) of Forster's Terns in each province. See Appendix 1 for details.

PROVINCE	# BREEDING LOCATIONS	# OF THE BREEDING LOCATIONS THAT ARE HISTORICAL	MEDIAN # NESTS (N = sample size)	
•				
ВС	1	0	6 (N = 1)	
Alberta	30	4	3 (N = 3)	
Sask.	36	21	30 (N = 7)	
Manitoba	33	7	33 (N = 18)	
Ontario	11	1	5 (N = 5)	
CANADA	111	33	26 (N = 34)	

Table 2. Estimated number of breeding pairs per province, as given by experts and as calculated using available data.

PROV	ESTIMATE MADE BY AN EXPERT	ESTIMATE MADE USING DATA IN APPENDIX 1	MIN	MAX
вс		6	6	6
AB		78	78	78
sĸ	-	. 481	481	481
МВ	• 1742 + sites not in 3 major lakes (Koonz and Rakowski 1985).	2651	1000	2651
	• 1000 max. (Koonz, pers. comm.).			
ON	• 1000 max. (Austen and Cadman 1994).	568	568	1000
TOTAL			2133	4216

Appendix 1. The 111 breeding locations of the Forster's Tern in Canada. Data include 33 "historical occurrences".

British Columbia records (1 location)

Duck Lake, Creston Valley. 1984: 6 nests (Campbell et al. 1990). (6)

Provincial median number of nests per location in B.C. (N=1): 6; median = 6.

Alberta records (30 locations, including 4 "historical" ones)

- Birch River Delta, near Ft. Chipewyan (spelling?) (PNRS, 1978). North of map in Lake Clair, Wood Buffalo National Park.
- 3*. Buffalo Lake, near Erskine. 9 nests (PNRS, 1966). (0)
- 4. Cold Lake (PNRS, 1976). Less than 100 nests (Poston et al. 1990). During Atlas (Semenchuk 1992).
- 5*. Dillberry Lake, historical (Semenchuk 1992). (0)
- Driedmeat Lake, small colony (ies) (Salt and Salt 1976). Alo. Driedmeat Lake area. 1987: fledged (FAN 1992).
- 7. Eagle Lake, historical (Semenchuk 1992), and Namaka Lake, small colony (ies) (Salt and Salt 1976). Eagle and Namaka Lakes, 12 indiv. on May 8, 1969 (Weseloh 1973). A4. 1988: "pair" (FAN 1992).
- 8. Fairview, during Atlas (Semenchuk 1992). Fairview area. A40, A42. 1991: "pair" (FAN 1992).
- 9. Fawcett Lake (nr. Smith). 3 pairs (PNRS, 1973). (3)
- 10. Lac La Biche, during Atlas (Semenchuk 1992). A27, A29, A33. Lac La Biche area. 1987: fledged; 1988: fledged (FAN 1992).
- 11*. Lac La Nonne. Sight records (no date) (Gerrard and Whitfield 1971). [Assumed to be from before 1970.] (0)
- 12*. Lake Isle (west end). 1951: 1 pair with partially built nest (Gerrard and Whitfield 1971). Small colony (ies) (Salt and Salt 1976). [Assumed to be from before 1970.] (0)
- 13. Lesser Slave Lake, extralimital breeding (Semenchuk 1992).

- 14*. Many Island Lake. 1906: a few birds seen on June 18; 2 specimens taken on July 9; breeding possible (Gerrard and Whitfield 1971). (0)
- 15. Moose Lake, in and around, during Atlas (Semenchuk 1992).
 Muriel Lake, during Atlas (Semenchuk 1992). A28, A30, A31,
 A32, A34, A35, A36, A37. This is a large area, which includes
 the areas of Moose Lake, Muriel Lake, Kehiwin Lake and Elk
 Point. 1987: "carrying food"; 1988: "nest with eggs" (FAN
 1992).
- 16. Pakowki Lake, small colony (ies) (Salt and Salt 1976). Al. 1987: "occupied nest" (FAN 1992).
- 17. Stobart Lake, 12 mi. se of Strathmore; same area as #6 (Eagle Lake and Namaka Lake). 1964: breeding (Gerrard and Whitfield 1971). 11 indiv on May 17, 1970; 5 indiv. and two nests on June 20, 1972 (Weseloh 1973; PNRS). (3)
- 18. Tofield, historical (Semenchuk 1992). A9, A11, A12, A16, A18, A19, A23, A26; includes area of Beaverhill Lake, Miquelon Lake Provincial Park, and Ministik Lake. 1987: "fledged"; 1988: "fledged"; 1991: "distraction display" (FAN 1992).
- 19. Utikuma Lake, <100 nests (Poston et al. 1990).
- 20. Wabamun Lake, small colony (ies) (Salt and Salt 1976). Wabamun Lake area. A13, A14, A20, A21, A24. 1988: "occupied nest" (FAN 1992).
- 21. Whitford/Rush Lakes; two possible locations for Rush Lake, neither near Whitford Lake (Whitford Lake found in gazeteer). <100 nests (Poston et al. 1990). Al5. 1988: "pair" (FAN 1992).</p>
- 22. Winagami Lake, <100 nests (Poston et al. 1990). During Atlas (Semenchuk 1992). A41, A43. 1991: "pair" (FAN 1992).
- 23. San Francisco Lake area. 1989: "distraction display" (FAN 1992).
- 24. Verdigris Lake area. 1987-1991: "visiting" (FAN 1992).
- 25. Calgary, ne edge. 1989: "pair", once in each of two Atlas squares (FAN 1992).
- 26. Sylvan Lake area. 1991: "pair" (FAN 1992).
- 27. Kenilworth Lake area. 1991: "fledged" (FAN 1992).
- 28. Vimy area. 1988: "territory" (FAN 1992).

- 29. Elk Island National Park area. 1990: "territory" (FAN 1992).
- 30. Blackfoot area. 1991: "occupied nest" (FAN 1992).
- 31. Sputinow area. 1991: "pair" (FAN 1992).

Provincial median number of nests per location in Alberta (N=3): 9.3.3; median = 3.

Saskatchewan records (36 locations, including 21 historical ones)

- 32. Candle Lake. 1995. (Al Smith, oral. comm.).
- 33*. Carlton. 1939: 3 individuals (Houston and Street 1959). (0)
- 34*. Christopher Lake. 1958: confirmed breeding (Gerrard and Whitfield 1971). (0)
- 35*. Cypress Lake. 1933: 5 individuals; possible breeding (Gerrard and Whitfield 1971). 1942: 1 pair (Stuart Houston, pers. comm.). (0)
- 36. Doré Lake (South Bay), 20+ nests (PNRS, 1989; Stuart Houston, pers. comm.). (25)
- 37*. Emma Lake, formerly "Josie Lake" or situated near it. 1939: Two or three individuals occasionally observed (Gerrard and Whitfield 1971). (0)
- 38. Jackfish Lake, about 3/4 mi ssw of Aquadeo Beach. 1970: 50100 pairs, making it one of the largest colonies in
 Saskatchewan (Renaud and Renaud 1971). 1990s: at least 20
 pairs (Stuart Houston, pers. comm.). (75)
- 39. Last Mountain Lake (locally known as Long Lake). 1969: 3 nests (PNRS) (Poston et al. 1990, present). This includes 2 confirmed sites checked out by S. Houston [since 1970] (1. north end marshes; 2. Sarnia Beach, e and 3 mi n of village of Dilke), and 1 probable site (in the Valeport marshes at the extreme south end) (Stuart Houston, pers. comm.).
- 40*. Manito Lake. 1906: present (Gerrard and Whitfield 1971). Not sure which Manito Lake it was (Stuart Houston, pers. comm.).
 (0)
- 41*. Maple Creek dam. 1948: 2 individuals; possible breeding (Gerrard and Whitfield 1971). (0)
- 42*. Meota (10 mi. N), 3 nests (PNRS, 1959). (0)

- 43*. Murray Lake, marsh south of. 1935: breeding, smaller colony than the 50-100 pair colony at Jackfish Lake (Gerrard and Whitfield 1971; Renauld and Renauld 1971). (0)
- 44*. Pasqua Lake, marsh at west end; Pasqua Lake goes west from Fort Qu'Appelle. (Stuart Houston, pers. comm.). 1966: a nest with 3 eggs (Gerrard and Whitfield 1971). (0)
- 45*. Pelican Lake (2 mi E of Domremy). 1969: ca 90 ad. (G + W 1971). (0)
- 46*. Regina, Wascana Marsh. 1960: breeding (G + W 1971). (0)
- 47*. Saskatchewan River, 10-50 mi. upstream from Cumberland House.
 1827: type specimen collected (G + W 1971). 1964: common,
 2 nests in a Franklin's Gull colony; many more present, but no
 estimate made (Stuart Houston, pers. comm.). (0)
- 48*. Sled Lake (Otapanask Bay), 7 mi S of Doré L. 1968: at least adults and three nests (G + W 1971). (0)
- 49. Turtle Lake, 20-30 nests (PNRS, 1991). 1983-1995: about 50 pairs each year (Stuart Houston, pers. comm.). (50)
- 50*. Waterhen Marsh, near Kinistino. 1902: Very abundant, especially in the neighbourhood of the larger lakes of the region... two separate colonies were observed. 1955: One indiv. seen June 14, and seven on June 15 (Gerrard and Whitfield 1971; Houston and Street 1959). (0)
- 51. Indi Lake, at the railroad siding of Indi, ca. 6 mi s of Dundurn. 1977: 6 adults feeding 7 young; 1985: colony of 25+ nests (Stuart Houston, pers. comm.). (30)
- 52. Horseshoe Lake, just s of Good Spirit Lake (n of Yorkton).
 1975: 1 pair sitting on a muskrat house in June; possible breeding (Stuart Houston, pers. comm.). (1)
- 53. Cutarm Creek Valley, 1 mi e and 2 mi n of Yarbo. 1990: Group of birds in marsh in bottom of valley; probable breeding (Stuart Houston, pers. comm.).
- 54. Chaplin Lake. About 1990: breeding (Stuart Houston, pers. comm.).
- 55. Buffalo Pound Lake, north end, in marsh nw of Hwy 2. 1975 and 1976: colony (Stuart Houston, pers. comm.).
- 56*. Ekapo Lake, Qu'Appelle Valley. 1937: several individuals seen (Stuart Houston, pers. comm.). (0)

- 57*. Indian Head. 1892: only 1 pair seen during 3 months (Stuart Houston, pers. comm.). 1937: several individuals noted at Strawberry Lake (Stuart Houston, pers. comm.). (0)
- 58. St. Brieux, small lake west of. 1972: terns, thought to be of this species, hovering over marsh (Stuart Houston, pers. comm.).
- 59*. Christopher Lake. 1958: colony (Stuart Houston, pers. comm.). (0)
- 60. Paysen Lake, between Riverhurst and Chaplin. 1985: 50 pairs (Stuart Houston, pers. comm.). (50)
- 61. Eyebrow Lake. 10 pairs (Stuart Houston, pers. comm.). [Assumed to be after 1970]. (10)
- 62. Paradise Hill, small marsh just north of village. 1995: 5 individuals seen (Stuart Houston, pers. comm.).
- 63. Buffalo Pound Lake, at Nicolle Flats, se end of BPL. 1975 and 1976: possible colony (Stuart Houston, pers. comm.).
- 64*. Frobisher, slough west of. 1938: 8 individuals observed (Stuart Houston, pers. comm.). (0)
- 65*. Middle Creek Reservoir. 1941: one pair (Stuart Houston, pers. comm.). (0)
- 66*. Eastend Reservoir. 1942: 4 individuals (Stuart Houston, pers. comm.). (0)
- 67*. Stalwart, small lake near. 1943: a few individuals (Stuart Houston, pers. comm.). (0)

Median number of nests per location in Saskatchewan (N=7): 25, 75, 50, 30, 1, 50, 10; median = 30.

Manitoba records (33 locations, including 7 historical ones).

- 68. Anderson Point (Lake Manitoba). 1990: 200 nests, (BJ, pers. comm.). (200)
- 69. Delta Marsh and Clandeboye Bay. 1979: 315 nests and 500 nests (Koonz and Rakowski 1985). (815)
- 70. South Lake, on south border of Clear Lake, near Wasagaming, Riding Mountain National Park. 1971: 2 nests; as this narrow bulrush stand is becoming thin, the species may soon be lost from the park as a breeding bird -- the species had not been

- reported in the park in surveys made between 1938 and 1946 (Hatch 1972). Assumed to be same site as 35 nests found in 1979 by Koonz and Rakowski (1985). (35)
- 71*. East Shoal Lake (PNRS, 1966) (Also Shoal Lake. 1917: Forster's Tern found in company with the Common Tern, but generally scarce (Taverner 1919)). (0)
- 72. Egg Islands, Lake Winnipeg (51°54'N 97°05'W). 1990: # nests? (Bob Jones, pers. comm.).
- 73. Erickson/Rossburn area (Cuthbert et al. 1990). [Assumed to be after 1979].
- 74. Gainesborough/Lyleton area in southwestern Manitoba, small colonies, (Bob Jones, pers. comm.). 1978: 2 individuals; possible nesting (Knapton 1979).
- 75. Gimli, 2 mi south, in marsh bordering Lake Winnipeg. 1971: ca. 100 pairs (Hatch 1972; McNicholl, in prep.). (100)
- 76*. Glenboro Marshes. 1969: probable breeding (Gerrard and Whitfield 1971). (0)
- 77. Grand Beach (McNicholl, in prep.). Assumed to be the same site as 300 nests found in 1979 by Koonz and Rakowski (1985) who flew over all major Manitoba lakes south of 54°10'N. Also assumed to be same site as South Balsam Bay, 100-350 nests (Poston et al. 1990). (300)
- 78*. Halcrow Lake, near The Pas. 1951: three individuals June 15 and 16; possible breeding (Gerrard and Whitfield 1971). (0)
- 79. Hecla Marsh. 1971: one colony with about 40 nests, but also several other colonies (Hatch 1972). 1979: 25 nests (Koonz and Rakowski 1985). (25)
- 80*. Fairford River, its mouth in Lake Manitoba. 1921: it was found to be common; probable breeding (Gerrard and Whitfield 1971). Lake St. Martin. 1937: Quite plentiful and apparently breeds in the marshes (Gerrard and Whitfield 1971). Pineimuta Marsh, bordering Lake St. Martin. 1969: 6 nests. This was the only evidence of nesting in the Fairford River Lake St. Martin complex (Hatch 1972). (0)
- 81*. Overflowing River, its mouth in Lake Winnipegosis. 1951: breeding (Gerrard and Whitfield 1971). (0)
- 82*. Lockport (McNicholl, in prep.). Assumed to be before 1970.
 (0)

- 83. Louis Island, Lake Winnipeg (51°46'N 97°12W). 1990: 18 nests (Bob Jones, pers. comm.). (18)
- 84. Marshy Point, southwest of Lundar, east side of Lake Manitoba. 1970: eight nests in one colony and about 20 in another (Hatch 1972). (28)
- 85. Matheson Island. 1971: 17 nests (Hatch 1972). (17)
- 86*. Moose and Cedar Lakes area. 1929: locally common (Gerrard and Whitfield 1971). (0)
- 87. Netley Marshes (Selkirk Settlement). 1891: possible breeding (Gerrard and Whitfield 1971). 1971: 38 nests (Hatch 1972). (38)
- 88. Oak Hammock Marsh, large colony(ies), (Bob Jones, pers. comm.; Cleveland et al. 1980). Colonized in 1974, and has since become an important breeding site (McNicholl, in prep.). Less than 100 nests (Poston et al. 1990). 1979: 15 nests (Koonz and Rakowski 1985).
- 89. Oak Lake Marshes (Gerrard and Whitfield 1971; McNicholl, in prep.). Oak Plum Lake, w of Brandon, fair size colony, don't know #s (Bob Jones, pers. comm.). OL/PM (Cuthbert et al. 1990) (All part of the same complex (Bob Jones, pers. comm.)).
- 90. Parisian Lake, > 350 nests (Poston et al. 1990). Assumed to be same site as 375 nests found by Koonz and Rakowski (1985) in 1979. (375)
- 91. Pelican Island, 100-350 nests (Poston et al. 1990). Lake Winnipeg or Lake Winnepegosis? (225)
- 92. Riverton Marsh. 1970: 27 nesting platforms with some young already on the wing and others only 3-4 days old (Hatch 1972).
 (27)
- 93. Root Lake (The Pas) (PNRS, 1984).
- 94. Lake Manitoba (51°24'N 99°07'W). 1979: 25 nests (Bob Jones, pers. comm.; Koonz and Rakowski 1985). (25)
- 95. St. Ambroise. 1970: species present, but no evidence of nesting (Hatch 1972).
- 96. Tom Lamb WMA, Lake #20, 35 km se of The Pas. 1985: approx. 10 nests, PNRS. (10)

- 97. Turtle Marshes, s side of Dauphin Lake, 2 mi upstream from mouth of Turtle River. 1971: about 60 adults with more than 15 young (Hatch 1971). (30)
- 98. Turtle Mtn Prov. Pk., Breadon Lake. 1979: 2 nests (PNRS, 1981; Koonz and Rakowski 1985). (2)
- 99*. Waterhen River (Gerrard and Whitfield 1971). (0)
- 100. Berens Island, (or Commissioner Island). 1979: 150 nests (Koonz and Rakowski 1985). (150)

Provincial median number of nests per location in Manitoba (N=18): 200, 815, 35, 100, 300, 25, 18, 28, 17, 38, 375, 225, 27, 25, 10, 30, 2, 150; median = 33.

Ontario Records (11 locations, including 1 historical)

- 101. Mitchell's Bay, Kent Co., Lake St. Clair. 1977: 8 nests. (8)
- 102. Walpole Island Marshes, Lake St. Clair. 1991: estimated 550 breeding pairs (Austen and Cadman 1994). (550)
- 103. St. Clair National Wildlife Area. 1991: estimated 5 nests (Austen and Cadman 1994). (5)
- 104. Rondeau. 1990: 200 nests (ONRS); 1992: 2-3 pairs (Austen et al. 1994). (2)
- 105. Long Point. 1981: 154 nests. 1991: only 10 pairs probably breeding. 1992: probably no breeding at Long Point (Austen and Cadman 1994). (0)
- 106*. Point Pelee. Former nester, but no recent nesting (Austen and Cadman 1994). (0)
- 107. Kettle Point Marsh, Lake Huron. 1991: 3 pairs thought to be breeding (Austen et al. 1994). (3)
- 108. Lake Simcoe. Possible breeding records during the Atlas (Austen and Cadman 1994). (0)
- 109. Larus Lake in Woodland Caribou Prov. Park, western Ontario. Individuals seen in suitable habitat, but no confirmed nesting (Austen et al. 1994). (0)
- 110. Red Lake, western Ontario. Individuals seen in suitable habitat, but no confirmed nesting (Austen et al. 1994). (0)

111. Lake of the Woods, western Ontario. Individuals seen in suitable habitat, but no confirmed nesting (Austen et al. 1994). (0)

Provincial median number of nests per location in Ontario (N=5): 8, 550, 5, 2, 3; median = 5.

FAN 1992 Federation of Alberta Naturalists database, used for the preparation of the atlas.

PNRS Prairie Nest Record Scheme.

N.B. Estimated number of pairs (or nests) shown in bold in parentheses at the end of each record, or if no data available then provincial median number of nests used. Colonies assumed to exist only if known from 1970 or more recently. If only pre-1970 data available, then colony considered "historical", and the estimated number of pairs given as "0". Historical occurrences are assigned an "*" after the colony number. The A## codes are working codes that we used to map records from Semenchuk (1992).