

STATUS AND REPRODUCTIVE SUCCESS OF THE COMMON TERN IN MINNESOTA

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## INTRODUCTION

The Common Tern (*Sterna hirundo*) breeds at four primary sites in Minnesota (Mille Lacs Lake, Leech Lake, Duluth Harbor, Lake of the Woods) (Cuthbert et al. 1984). Despite knowledge of the location of these colonies and growing regional and federal interest, recent accurate information on colony size and reproductive success is unavailable for the Minnesota population of Common Terns. Recognizing the need for these data, the Minnesota Nongame Wildlife Program contracted with F. Cuthbert to examine the status and reproductive success of this species. The objectives of the study were to: (1) determine the number of breeding pairs of terns at each colony site, (2) determine chick survival at each colony site, (3) identify colonies with low reproductive success, (4) identify actual or potential causes of egg, chick, or adult mortality, and (5) make recommendations on strategies to improve reproductive success at sites with low chick survival. This report summarizes the results of our study.

## METHODS

To determine the number of breeding pairs, each colony site was visited in late incubation, prior to first hatching, and all nests containing eggs were counted.

To determine chick survival all nests in the smaller colonies and samples of nests (13-24) in the larger colonies were monitored once/week from late incubation through fledging of juveniles. To obtain more accurate survival estimates, nests monitored in the larger colonies were enclosed within chicken wire "pens" (25 cm high, 2.5 cm mesh) (Erwin and Custer 1982). Nests were individually numbered and chicks were banded with USFWS bands shortly after hatching. During each visit, McKearnan

and an assistant (Donna Laing) recorded the number of chicks still alive at each site.

To identify colonies with low reproductive success we calculated breeding success as percent of chicks fledged from number of eggs laid (fledging success) and also as number of chicks fledged/adult pair (reproductive success). We classified colonies as having "low" breeding success if fewer than 30% of the eggs that were laid survived to fledging. A fledging rate of at least 30% is necessary for maintaining the population at its current size (Shugart and Scharf 1983).

To identify causes of egg, chick, or adult mortality, we recorded factors that reduced reproductive success (e.g. predators, human disturbance, storm damage, inviable eggs).

#### DESCRIPTION OF COLONY SITES

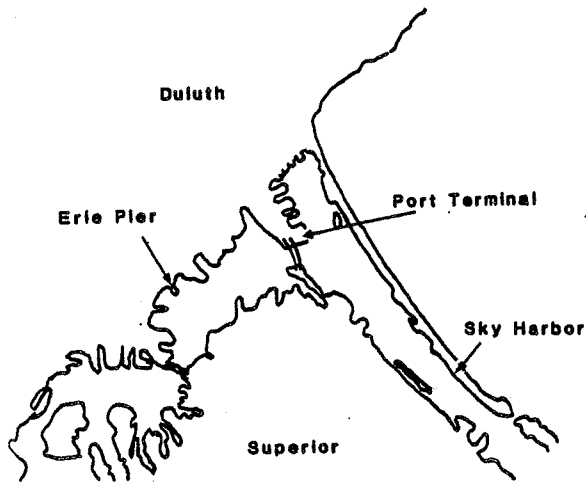
Figure 1 shows the location of the 7 colony sites visited during this study.

##### Duluth Harbor

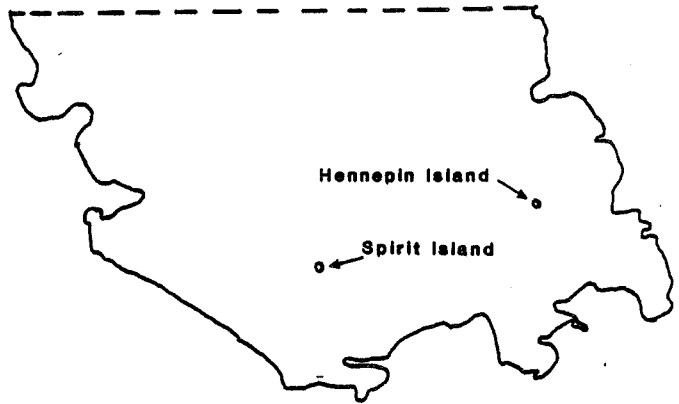
In 1984, Common Terns nested at 3 different localities in the Duluth Harbor.

Port Terminal: This industrialized site is located near the Blatnik ("High") Bridge on property owned by the Duluth Port Authority. The terns nested in several subcolonies at locations that varied in amount of vegetation and substrate type. The vegetation ranged from sparse to thick clumps of sandbar willow (Salix interior). Substrates included sand, loose gravel, and mixed snow and dirt (removed from the Duluth

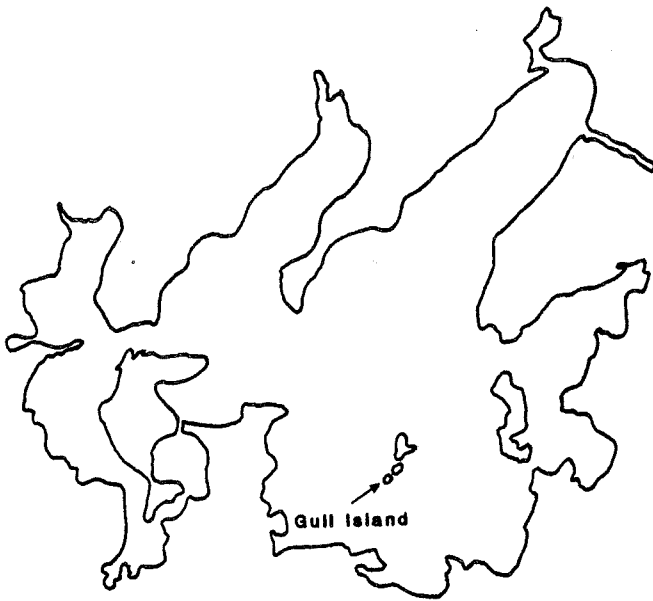
FIGURE 1 PRIMARY BREEDING SITES OF COMMON TERNS IN MINNESOTA



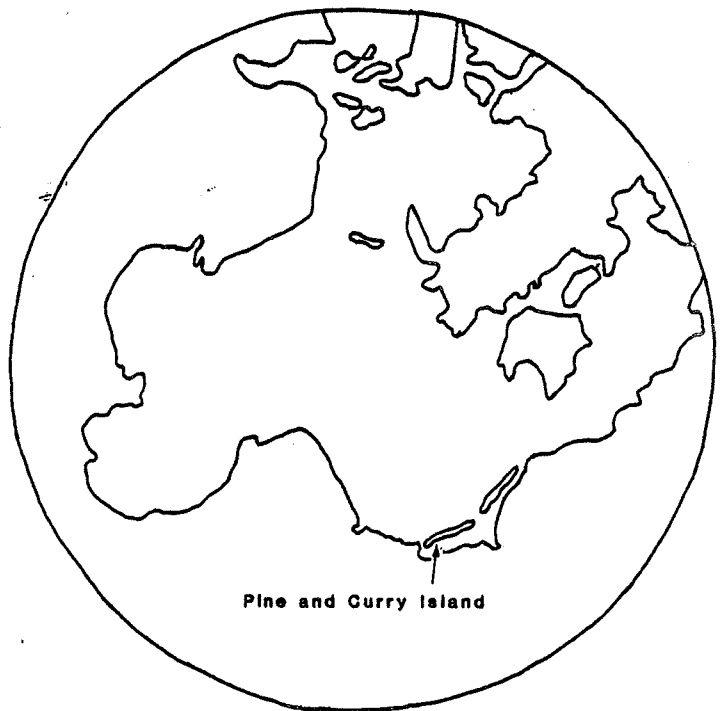
DULUTH HARBOR



MILLE LACS LAKE



LEECH LAKE



LAKE OF THE WOODS

city streets). Over 5000 pairs of Ring-billed Gulls (Larus delawarensis) and a few Herring Gulls (L. argentatus) nested in the thicker vegetation adjacent to the tern colony.

Sky Harbor: This colony was located adjacent to the runway at Sky Harbor Airport on Minnesota Point; the site is a sandspit on the bayside of the point. The low vegetation was predominantly poison ivy (Rhus radicans) and tansy (Tanacetum vulgare). The nest substrate was raised enough above water level so that nests were not destroyed by storm driven waves in 1984.

Erie Pier: This location is a dredge disposal site located at 40th Avenue West. It is under the jurisdiction of the U.S. Army Corps of Engineers. Reproductive success data were not systematically collected at this colony because nesting was late and terns were assumed to be re-nesters from another colony in the harbor. Nest substrate ranged from sand to coarse gravel and vegetation was patchy in distribution.

#### Mille Lacs Lake

The colonies in this lake are located on Hennepin and Spirit islands. These two islands comprise the Mille Lacs National Wildlife Refuge.

Hennepin Island: This small site consists of gravel and large rocks. The terns nested on the gravel and approximately 180 pairs of Ring-billed Gulls nested on the large rocks. There was no vegetation in the tern colony and the portion of the island they utilized was less than 0.5 m above the water level.

Spirit Island: This site is composed of large boulders. In 1984 nests were located well above water level and there was no vegetation present on the island. Small groups of tern nests were interspersed among the 170 Ring-bill and 3 Herring Gull pairs.

#### Leech Lake

The Leech Lake colony is located on Gull Island. Gull Island is the smallest island of a three island archipelago which also includes Big and Little Pelican islands; it is part of the Leech Lake Indian Reservation.

Gull Island: This island is small, consisting of large rocks that outline a horseshoe-shape which is filled in by sandy beach. Although there was some vegetation in the area used by the terns, most nests were located in areas devoid of vegetation. Gulls (280 pairs of Ring-bills, 1 pair of Herring) nested on the large rocks; the terns nested on the beach. The large rocks protected the tern nesting site from most high waves.

#### Lake of the Woods

Lake of the Woods is the site of a major colony (Pine and Curry Island); small numbers of terns (less than 10 pairs) have been reported at several other localities in Lake of the Woods. We focused our efforts at Pine and Curry Island. This island is owned by the State of Minnesota and the portion used by the terns is a Wildlife Sanctuary.

Pine and Curry Island: Most of the terns (98%) nested on the southwestern point of the island. Vegetation density in the colony site was highly variable. Although many gulls "loaf" on adjacent Morris Point, none nest nearby. The island is posted against human trespass and human disturbance is minimal.

## RESULTS AND DISCUSSION

### Number of Breeding Pairs

We estimated that the total number of breeding pairs in Minnesota in 1984 was 861. Table 1 summarizes the pairs censused at each site. Incidental nesting occurred at other locations (e.g. Rocky Point, Lake of the Woods), but to our knowledge no other major colony exists outside of the areas surveyed. More than 50% (489 pairs) of Minnesota's breeding Common Terns nested at the Leech Lake site. The Duluth Harbor and Lake of the Woods colonies were considerably smaller (each had 140 pairs). Only 93 pairs of terns nested in Mille Lacs Lake.

### Chick Survival

Hatching rates and fledging success in individual colonies are summarized in Table 2. Hatching success ranged from 9-75%; the highest rate was recorded at Sky Harbor, and the lowest in the Mille Lacs colonies. The mean hatching rate for all four Minnesota sites was 29% in 1984.

Chick survival was low at most colonies but ranged from 0-57%. Gull Island had the best survival; 57% of the chicks that hatched survived to fledging. At the Port Terminal, no chicks survived in the

enclosures but at least 13 fledglings were observed in other parts of the colony. Chick survival was 10-21% at the other sites. The average survival rate for chicks in all Minnesota colonies in 1984 was 19%.

#### Reproductive Success

Reproductive success for Common Terns in Minnesota is summarized in Table 3. Mean fledging success was 6% and reproductive success was 0.15 chicks produced per nesting pair. This estimate is below the 30% fledging success, suggested by Shugart and Scharf (1983) as the criteria for "good" Common Tern breeding success. Other investigators studying Common Terns in North America also have found variable fledging success (e.g. 0-70% [Nisbet and Drury 1972]; 0-36% [Morris et al. 1976]; 7% [Shugart and Scharf 1983]). If our 1984 estimate is characteristic of the Minnesota population then not enough young are surviving to maintain the population at the current size. Reproductive success also was variable in the North American studies discussed previously. For example Nisbet and Drury (1972) found 0 to 2.07 chicks fledged/pair at 6 colonies in Massachusetts, Morris et al. (1976) estimated 0 to 0.945 chicks fledged/pair at 5 colonies in lakes Erie and Ontario, and Shugart and Scharf (1983) found 0.2 chicks fledged/pair at colonies in northern Lake Michigan.

#### Factors Contributing to Reproductive Failure

Table 4 summarizes the factors that affected hatching and fledging success. Most of the eggs (89%) that did not hatch disappeared; the rest were broken, deserted, or inviable. Because deserted eggs may have been eaten before they were counted at the weekly visit, the proportion



of eggs that were deserted was probably underestimated.

Most of the chicks (56%) that did not fledge disappeared, but many (44%) were found dead. Missing chicks usually indicate predation, but it is possible that some unfledged chicks were washed away or were lost in vegetation or rocks. This could account for the high proportion of missing chicks at the Mille Lacs colonies as chicks on Hennepin Island easily could have drowned during storms and chicks on Spirit Island may have fallen into the crevices between the large boulders on that island.

To evaluate actual or potential causes of egg and chick mortality, we will summarize the factors we believe reduced success at the individual colonies.

Port Terminal - Because this highly industrialized site is not an island, the potential for mammalian predation and human disturbance is great. In previous years (but not in 1984), evidence of predation by skunks, dogs, rats and owls was discovered in this colony (Cuthbert et al. 1984). Human activities were a constant source of disturbance to the terns; they included: sport fishing, egg collecting by foreign sailors, the annual visit of a Navy destroyer, the 4th of July celebration in the harbor, construction work at the Port Terminal, and train and work crews on the railroad tracks. These activities may influence success by causing nest desertion and subsequent egg predation by opportunistic gulls. Gulls also may affect reproductive success by competing for nest habitat. Over 5000 gull pairs nest adjacent to the colony and this rapidly expanding gull population continues to occupy more of the usable habitat each year. The earlier-nesting gulls utilize areas less vulnerable to human disturbance. Finally, nesting

habitat utilized by the terns is of poor quality. During most years, some terns nested on deposits of mixed snow and dirt. In 1984, the snowpiles melted before the terns began to nest and the vegetation (mostly willow) grew too thick for the adult terns to land by their nests. This led to desertion of all nests in one of the enclosures at the Port Terminal.

Sky Harbor - Although this site is not as vulnerable as the Port Terminal to mammalian predation and human disturbance, it is not an island so access to the nesting area is possible. However, no direct evidence of disturbance by these factors was observed. Aircraft traffic on the runway was moderate and its effect on the terns is unknown. Because human activity is forbidden on or adjacent to the runway, direct disturbance by humans was limited. An unknown factor (or factors) was responsible for unusually high mortality of juveniles (32 individuals over 1 week of age) at this site, and this situation needs to be monitored in the future.

Erie Pier - In the past 2 years, terns attempted to nest at this site, but no chicks were known to survive. Continued dredging activity and eventual industrial development will probably preclude this site from long term use by terns.

Spirit Island - Because of the presence of breeding gulls we believe that gull predation may influence reproductive success. Another important factor reducing success at this site is poor quality nesting habitat. The terns nest on large boulders where eggs roll out of nests and chicks disappear into crevices.

Gull Island - Gulls also may be an important factor reducing success at this colony, but the evidence is circumstantial. L. Oring reported (pers. comm.) that in past years, mink predation reduced success; no evidence of mink activity was noted in 1984.

Pine and Curry Island - Because of higher than normal water levels this year, many nests were washed out during storms. All of the nests in two of three enclosures were destroyed. The predominant cause of chick death appeared to be from Red Fox (Vulpes vulpes) predation. Few chicks survived past 5 days of age and fox tracks were discovered during each visit after hatching was in full progress.

Both these factors were unusual for Lake of the Woods this year and in past years success has appeared better. In 1982 Terry Wiens and Tom Martin counted 123 nests in the tern colony and approximately the same number of pairs nested in 1983. These numbers indicate that Lake of the Woods is a stable colony and that 1984 may have been a year of unusually low reproductive success for the terns.

#### Preliminary Management Recommendations

This study indicates that Minnesota Common Tern reproductive success in 1984 was below that required to maintain the population at its current size. Based on these results, we recommend that the MDNR monitor the major colonies for at least 2 additional breeding seasons to determine how much variability occurs in reproductive success between years and among colonies. This information is required before a long term management strategy can be proposed.

The following recommendations are short term measures that we recommend be pursued until reproductive success data are collected for additional seasons:

1. Visit major colonies during late incubation to census number of breeding pairs at each site. Recommended visitation dates are: Duluth (6/13-6/20), Mille Lacs Lake (6/20-6/27), Leech Lake (6/12-6/19), and Lake of the Woods (6/18-6/25).
2. Make a second visit to the major colonies late in the season to estimate reproductive success. Recommended dates are: Duluth (7/15-7/31), Mille Lacs Lake (8/1-8/11), Leech Lake (7/17-8/11) and Lake of the Woods (7/21-7/27).
3. Check for evidence of fox on Pine and Curry Island (examine shoreline for tracks) and remove them as soon as their presence is detected.
4. Post the Mille Lacs Lake colonies with "National Wildlife Refuge" and "Do Not Land or Anchor" signs.
5. Periodically check the sky Harbor colony to determine if unusually high mortality occurs again among older chicks.

Table 1. Number of Breeding Pairs of Common Terns in Minnesota in 1984

Colony Site	Date Censused	No. of Pairs
Duluth		
Port Terminal	19 June <sup>1</sup>	113
Sky Harbor	13 June	27
Mille Lacs Lake		
Hennepin Island	19 June	47
Spirit Island	19 June	46
Leech Lake		
Gull Island	19 June <sup>2</sup>	489
Lake of the Woods		
Pine and Curry Island	22 June	139
Morris Point	22 June	0
TOTAL MINNESOTA		861

<sup>1</sup>census conducted by Tom Davis

<sup>2</sup>census conducted by Jake Miller

Table 2. Hatching Rates and Chick Survival of Common Terns in Minnesota - 1984

Colony Site	No. Eggs Sampled	Percent Hatched	No. Chicks Hatched	Percent Fledged
Port Terminal	34	29	10	0
Sky Harbor	77	75	58	10
Hennepin Island	124	11	14	21
Spirit Island	115	9	10	20
Gull Island	68	31	21	57
Pine and Curry Island	66	39	26	15
TOTAL MINNESOTA	484	29	139	19

Table 3. Breeding Success of Common Terns in Minnesota - 1984

Colony Site	Percent Fledging Success (Fledgling/Total Egg)	Reproductive Success (Fledglings/Breeding Pair)
Port Terminal	0	0
Sky Harbor	8	.22
Hennepin Island	3	.06
Spirit Island	2	.04
Gull Island	18	.43
Pine and Curry Island	6	.17
TOTAL MINNESOTA	6	.15

Table 4. Fates of Unhatched Eggs and Unfledged Chicks

COLONY SITE	UNHATCHED EGGS				UNFLEDGED CHICKS	
	Disappeared	Broken	Deserted	Inviabile	Disappeared	Died
Port Terminal	83%	17%	0%	0%	54%	46%
Sky Harbor	90	5	0	5	38	62
Hennepin Island	100	0	0	0	80	20
Spirit Island	80	6	9	5	100	0
Gull Island	90	4	4	2	50	50
Pine and Curry Island	88	7	0	5	75	25
TOTAL MINNESOTA	89	5	3	3	56	44



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