Credit Jim Williams

Common Tern
Minnesota Conservation Plan

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TABLE OF CONTENTS

Executive Summary 4
Introduction 5
Background 5
Status 5
Legal Status 5
Other Status Classifications 5
Range 6
Historical Breeding Range 6
Current Breeding Range 6
Summary of Presence on Minnesota's Important Bird Areas (IBA) 6
Common Tern Distribution Maps 7
Population Numbers 8
National 8
Regional 8
Minnesota 9
Population Trends 9
National Breeding Bird Survey (BBS) Data 9
Minnesota BBS Data 9
Life History Characteristics Relevant to Recovery 9
Migration 9
Climate Change Vulnerability 9
Home Range and Territoriality 9
Age at First Reproduction 9
Nesting Dates 9
Colony Sites 9
Clutch Size 9
Longevity of Adults 9
Food 9
Habitat Requirements and Limiting Factors Related to Habitat in Minnesota 10
Habitat Categorization 10
Limiting Factors during the Breeding Season 10
General Habitat Descriptions 10

Threats 11
Best Management Practices 11
Gaps in Knowledge 12
MINNESOTA CONSERVATION PLAN 14
Conservation Goal 14
Background 14
Conservation Objectives 17
Background 17
Actions Needed for Conservation 18
Inventory and Assessment Needs 18
Monitoring Needs 18
Habitat Protection Needs 20
Habitat Management and Restoration Needs 20
Specific Actions for Audubon Minnesota 24
Selected Resources for Common Tern Minnesota Conservation Plan 27

Tables

Table 1. Estimates of Common Tern Breeding Pairs in Minnesota……..15
Table 2. Reproductive Success at Minnesota's Common Tern Colonies…….18
Table 3. Summary of Common Tern Habitat Management Actions Implemented in Minnesota……24
Table 4. Common Tern Minnesota Conservation Implementation Plan ….. ……..25

Common Tern Minnesota Conservation Plan

Sterna hirundo

Priority for Minnesota's *Implementation Blueprint for Bird Conservation*

- Boreal Hardwood Transition Forest (Laurentian Mixed Forest Ecological Province): Highest Level Priority

Executive Summary

Audubon Minnesota has selected the Common Tern as one of 24 Target Conservation Species in the state and one of ten to represent Minnesota's northern Boreal Hardwood Forest region (also known as the Laurentian Mixed Forest Province and Bird Conservation Region 12). All the Target Conservation Species for region and their level of priority are shown in the table below. Conservation Plans were only prepared for the highest priority Target Conservation Species in the region.

Highest Level	High Level	Moderate Level
Common Tern	Belted Kingfisher	Common Goldeneye
	Boreal Owl	Red-breasted Merganser
	Olive-sided Flycatcher	Spruce Grouse
	Connecticut Warbler	Common Loon
		Northern Goshawk

A colonial nester, the Common Tern is dependent on unvegetated islands and shoreline habitats in large bodies of water, one of the rarest habitats in northern Minnesota. Long-time active nesting colonies are located in Lake of the Woods, Mille Lacs Lake, Leech Lake and the St. Louis River Estuary; all four sites are designated as Important Bird Areas by Audubon Minnesota. Recently a small colony (10-20 nests) was also located on Pelican Lake in Crow Wing County (2010).

Minnesota currently supports a population of approximately 960 nesting pairs, which is just below the target of 1,000 breeding pairs established by the North American Waterbird Conservation Plan (*Kushlan et at. 2002*). This is less than half of the estimated population of 2,000 nesting pairs in the early 1900s. Three of the long-term nesting sites (St. Louis River Estuary, Mille Lacs Lake and Leech Lake) have been intensively managed for years in order to maintain viable colonies, with a significant investment of resources. The Common Tern is the most intensively managed nongame species in Minnesota.

The Conservation Plan that follows is divided into two parts. The first provides background on the Common Tern, including its status, distribution, habitat requirements and management needs. The second is a detailed conservation plan that outlines specific management recommendations. The highest priorities are to continue to monitor all known colonies and to assess their reproductive success.

Introduction

The Common Tern was selected as a **Target Conservation Species** for the *Blueprint for Minnesota Bird Conservation* (http://mn.audubon.org/). It is one of ten Target Conservation Species selected for the Boreal Hardwood Transition Forest (also known as the Laurentian Mixed Forest Province by Minnesota's Ecological Classification System and Partners In Flight's Bird Conservation Region 12), one of Minnesota's four ecological regions, as part of a statewide process initiated by Audubon Minnesota, with input solicited from resource professionals through a series of nine workshops held in the fall of 2011.

The process for selecting target conservation species is described in the *Blueprint's* conservation recommendations for the Boreal Hardwood Transition Region and is available on the Audubon Minnesota website. Briefly, target species are defined as birds 'whose status and trends are likely to be responsive to changes in ecological conditions, permit inference to the integrity of the overall ecosystem and provide meaningful information regarding the effectiveness of the plan.' This has been broadly adapted from the U.S. Forest Service's definition of Focal Species in the 2012 revisions to the National Forest System Land and Management Planning Rule (*U.S. Forest Service 2012*).

In the Boreal Hardwood Transition Forest target species were selected to represent:

1. Late-successional/old-growth forest habitat (including lowland conifer habitats);
2. Riparian forest habitat; and
3. Shoreline habitat.

The Common Tern was selected to represent shoreline habitats, perhaps the most endangered habitat in the region. A complete list of the other priority birds and conservation targets in the Boreal Hardwood Transition Forest can be found in the *Implementation Blueprint.* Because the *Blueprint's* primary emphasis is to focus attention and resources on a small, select number of conservation targets, a comprehensive conservation plan was prepared for only the highest priority Conservation Targets in each region.

Background

Status

Legal Status

- Officially listed as State Threatened in Minnesota (*Minnesota Rules, Chapter. 6134.0200, Subpart 2(B)*).

Other Status Classifications

1. National
   - Identified by National Audubon as a Common Bird in Decline (*National Audubon Society 2007*).
   - North American Waterbird Conservation Plan: Low Concern; apparent population increase (Population Trend = 2) (*Kushlan 2002*).
   - U.S. Fish and Wildlife Service 2005 Focal Species (*USFWS 2005*).

2. Regional
   - U.S. Fish and Wildlife Service (USFWS) Bird of Management Concern in Region 3 (*USFWS 1995*).

- U.S. Fish and Wildlife Service FY2012-2016 Focal Species (Great Lakes population only) (*USFWS 2011*)
- U.S. Fish and Wildlife Service Bird of Conservation Concern in Bird Conservation Regions (BCR) 12, 22, 23and Region 3 (*USFWS 2008*).
- Focal Species for the Upper Mississippi Valley/Great Lakes (UMVGL) Joint Venture (*Soulliere et al. 2007*).
- Northern Prairie and Parkland Waterbird Region: Moderate Concern (*Beyersbergen et al. 2004*).
- Upper Mississippi River and Great Lakes Waterbird Region: High Priority in BCR12, BCR22 and BCR23; designated a focal species for Region-wide monitoring because it is a Conservation Priority species in the UMVGL Region (Minnesota's population only occurs in BCR12) (*Wires et al. 2010*).
- State listed as Threatened in Michigan and Endangered in Wisconsin.

3. Minnesota
    - Minnesota Species of Greatest Conservation Need (*Minnesota Department of Natural Resources 2006*).
    - Minnesota Audubon Action List (*Audubon Minnesota 2008*).

Range

Historical Breeding Range: The Common Tern breeds across northern North America, from the central Northwest Territories east to southern Labrador and the coastal regions of Newfoundland, Quebec, Nova Scotia and Prince Edward Island south to northern Montana and northwestern North Dakota and then throughout the coastal areas of the Great Lakes states. Along the Atlantic Coast the species nested from the Canadian Provinces south to northern South Carolina. Birds also nested along the Gulf Coast including Texas, Mississippi, Alabama, Louisiana and northwestern Florida.

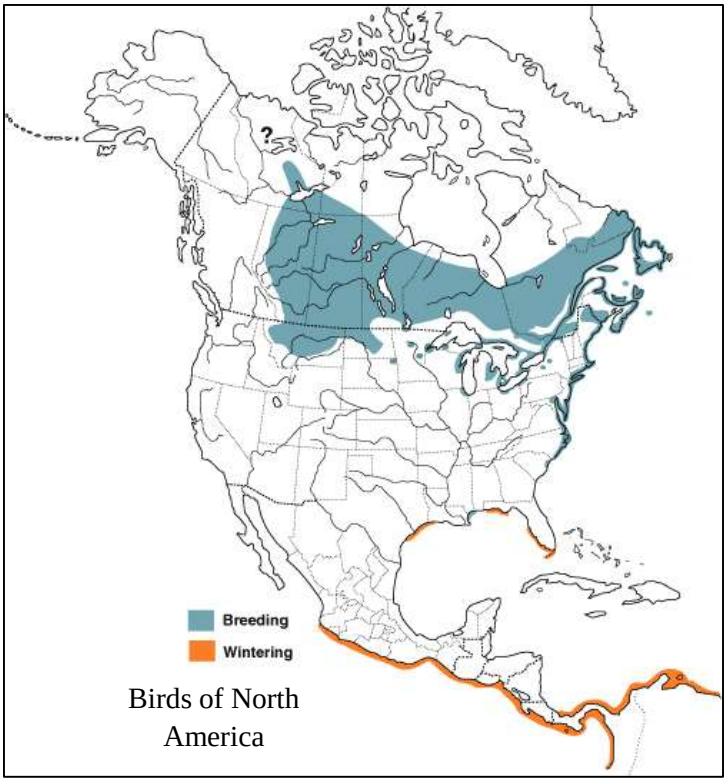
In Minnesota, T. S. Roberts (1932) reported the species occurred as a summer resident from Gull Lake in Crow Wing County and Lake Mille Lacs, northward through the forested region of the state.

Current Breeding Range: Nisbet (2002) noted that there have not been any significant changes in the species' North American distribution since about 1870 (i.e. the beginning of historical documentation of the species occurrence) despite dramatic fluctuations in numbers. Along the Gulf coast, however, the species range has contracted significantly and now only breeds in Louisiana.

In Minnesota, the species can still be found breeding from Lake Mille Lacs northward. Population numbers have declined significantly. Compared to an estimate of 2,000 breeding pairs in the 1900s, in 1984 the statewide population estimate was approximately 880 pairs. The latter, however, did not include islands in the northwest angle of Lake of the Woods, which currently supports relatively large numbers of breeding birds. Although individual sites have been monitored, a statewide population estimate has not been completed since 1984.

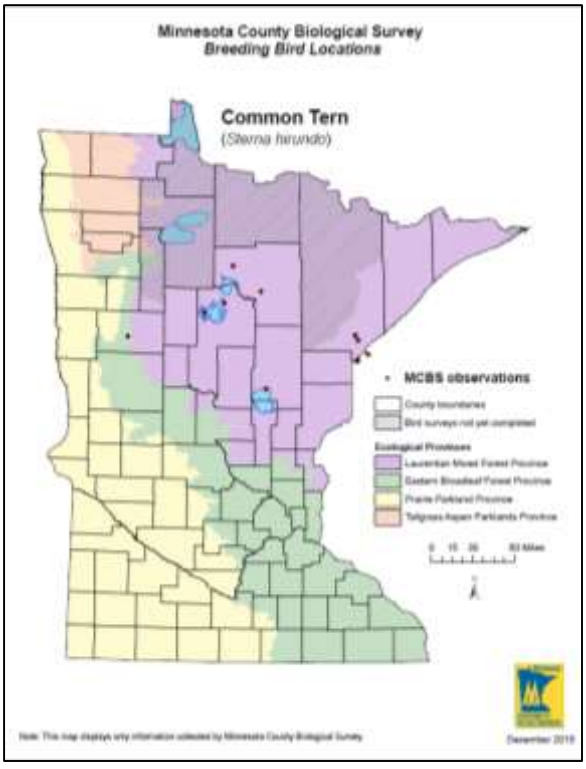
Summary of Presence on Minnesota's Important Bird Areas (IBA): Common Tern breeding colonies are restricted to four major sites and each is designated an Important Bird Areas by Audubon Minnesota: Lake of the Woods (Lake of the Woods IBA); Mille Lacs Lake (Mille Lacs Lake IBA), Leech Lake (Chippewa Pains IBA) and the St. Louis River Estuary (St. Louis River Estuary and Minnesota Point IBA). A small breeding colony recently found (2010) on Pelican Lake in Crow Wing County is not within an IBA and one historic breeding site, Lake Kabetogema, is within Voyageurs Kabetogama IBA. Common Terns have been reported as migrants and/or summer visitants at 28 other Minnesota IBAs.

Common Tern Distribution Maps

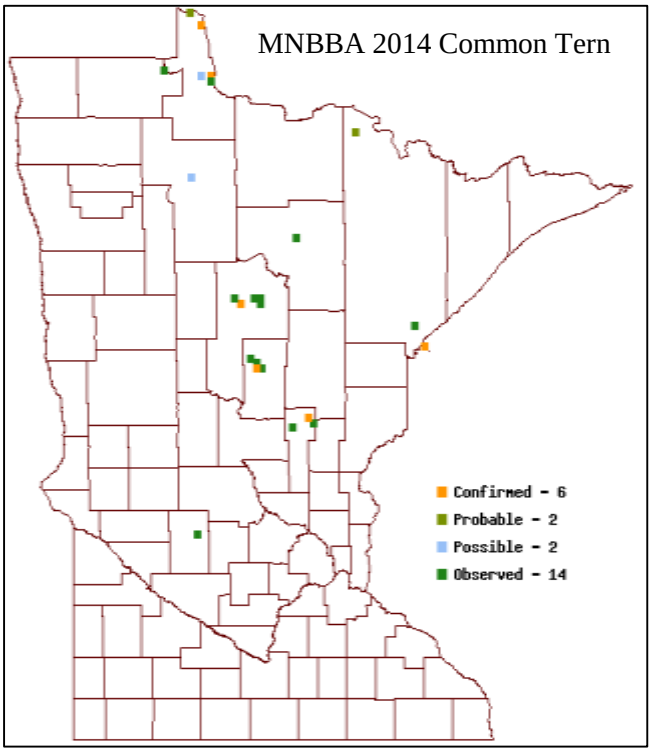


Birds of North America

Birds of North America - http://bna.birds.cornell.edu/bna/



MN DNR http://www.dnr.state.mn.us/eco/mcbs/bird_map_list.html



MN Breeding Bird Atlas, http://www.mnbba.org/

Common Tern Nesting Colonies in Lake of the Woods (courtesy of *Haws 2011*)

Note: Common Terns have historically nested at Pine and Curry Island (south end of Lake of the Woods), Red Lake Rock Island (NW Angle), Odell Island (NW Angle; not shown on map but immediately south of Red Lake Rock Island and north of Crowduck Island), Techout Island (NW Angle), and Crowduck Island.

Population Numbers

National

- Estimated North American population: 300,000 breeders (*Kushlan et al. 2002*).

Regional

- Approximately 10-24% of the Common Tern's global breeding population occurs in the Prairie Pothole Joint Venture Region (*Neimuth 2005*).
- There have been large declines in the Great Lakes population since the1960s (almost no natural habitat available for nesting).
- Estimated population in UMVGL Waterbird Conservation Region: ≤11,000 pairs; approximately 90% of which are in the Great Lakes (1990s number) (*Soulliere 2007*).
- Great Lakes population has experienced steady declines between the first Great Lakes colonial waterbird survey (conducted in the late-1970s) and the third (conducted in1997-99)(*Wires 2010*).
- Population goal in the UMVGL Joint Venture region is 7,600; the current estimate is 5,100; the projected deficit is 2,500 (numbers are individual birds) (*Soulliere 2007*).

Minnesota

- Minnesota's adult population of common terns numbered over 2,000 breeding pairs in 1900 but declined to 880 pairs by 1984 (excluding the NW Angle population).
- There are four primary breeding areas in Minnesota: 1) Lake of the Woods (Pine/Curry Island and Northwest Angle); 2) Mille Lacs Lake; 3) the St. Louis Estuary; and 4) Leech Lake. All four breeding sites are included within designated Audubon Important Bird Areas.
- Minnesota supports about 0. 6% of the species North American breeding range.

Population Trends

National Breeding Bird Survey (BBS) Data *(U.S. and Canada, Sauer et al. 2014)*

- Yellow level of credibility (i.e. the U.S. Geological Survey has classified the BBS data for the Common Tern as data with a deficiency because of the species low abundance, small sample size or the results cannot detect a 3% per year change in the population over the long-term).
- 1966-2012: decreasing trend (not statistically significant) of -1.1% per year; 2002-2012 increasing trend of +3.0% per year (not statistically significant).
- Hundreds of thousands of birds were killed for the millinery trade in the 1870s and 1880s and the population declined dramatically, only to recover in the 1930s and decline again in the 1970s. During the past ten years the population size, as documented by the BBS, seems to be on the increase again.

Minnesota BBS Data

- The existing colonies in Minnesota are not and cannot be adequately monitored by the BBS.

Life History Characteristics Relevant to Recovery

Migration: Neotropical

Climate Change Vulnerability: Low (1) (*Butcher 2010*)

Home Range and Territoriality: Breeding birds usually range within 10 km of their nesting colony; less commonly $\geq$ 30 km. On the coast, birds may maintain a feeding territory of 150-250 m along the shoreline. Territory maintained and vigorously defended around the nest; mean distance between nests is variable but may range from 300 cm in small colonies to 100 cm in larger colonies (*Nisbet 2002*).

Age at First Reproduction: The data are scanty but indicate that a few birds will breed at age 2 but most breed at age 3; less than 20% delay breeding until age 4 (*Nisbet 2002*).

Nesting Dates: Most egg-laying is in mid-late May through early July (later dates are the result of failed first attempts) (*Nisbet 2002*).

Colony Sites: Usually occupies small islands or shorelines with less than 40% vegetative cover. Most nests are 0-5 meters above high-water mark; highest sites are occupied first and late birds tend to settle at or below high-water mark. Breeding site fidelity is high (*Nisbet 2002*).

Clutch Size: Usually 2-3 eggs, occasionally 1 or 4; rarely > 4 (*Nisbet 2002*).

Longevity of Adults: In Massachusetts researchers found median age of breeders to be 9-10 years old (*Nisbet 2002*).

Food: Primarily small fish less than 150mm long; occasionally crustaceans or insects (*Nisbet 2002*).

Habitat Requirements and Limiting Factors Related to Habitat in Minnesota

Habitat Categorization: Shoreline/Sandy Island

Limiting Factors during the Breeding Season
From UMVGL JV Waterbird Conservation Plan (Soulliere 2007):
- Adequate suitable colony sites in proximity (<20 km) to abundant feeding sites.
- Nesting areas must be free of predators with low human disturbance and limited competition from Ring-billed Gulls and Herring Gulls.
- Gulls and Double-crested Cormorants can displace Common Terns, forcing them to move to less suitable sites that are subject to greater adverse conditions.

General Habitat Descriptions
From Birds of North America (Nisbet 2002):
- Unvegetated islands w/associated open water; in Great Lakes, formerly nested on rocky or gravelly islands or shoals but now frequently nests on artificial sites.

From UMVGL Waterbird Conservation Plan (Wires 2010):
- Breeds on rocky/gravelly natural islands/shoals, barrier beaches, and marshes. In the Great Lakes, uses many artificial sites (e.g. piers, artificial islands, navigational aids) with sparse vegetation; nest <5 m above water and <100 m from water's edge. Occasionally found on open prairies and forested habitats. Forages ≤ 20 km offshore in open water; shallow bays, inlets, lakes ponds and rivers.

From UMVGL JV Species Account for Habitat Planning (Soulliere 2007):
- Areas of the Great Lakes and large inland lakes (>1,000 ha) often with marsh and abundant small (3-10 cm) forage fish available < 50 cm from the surface. Nests are located on natural or artificial islands and peninsulas, sometimes on barrier beaches, rarely on floating mats in marshes. Prefers nest sites with sand, gravel, shell, or cobble substrates and scattered vegetation (typically 10-40% coverage) or other protection where chicks can shelter. Sites are often managed or at locations where environmental factors prevent development of woody vegetation; other management has included gull and cormorant removal or exclusion.
- Nests colonially
- Most nests are placed <100 m inland from water edge and < 4 m elevation above water surface but outside wave-wash zone.
- Pairs often return to same site each nesting season.
- Breeding birds feed within 20 km of colony sites, much closer if the colony is small and/or prey is locally abundant. They will also feed on small wetlands and ponds.
- Limiting factors: Adequate suitable colony sites in proximity (< 20 km) to abundant forage. Nesting areas must be free of predators with low human disturbance and limited competition from Ring-billed Gulls and Herring Gulls; gulls and cormorants can displace Common Terns to less suitable sites subject to greater adverse conditions.

From MNDNR Species Account (Minnesota Department of Natural Resources 2008):
- Common Terns select isolated, sparsely vegetated islands in large lakes for nesting. Open edges of sandy or gravelly beaches or dredge spoil areas also are used. Optimal breeding sites are isolated from predators by natural barriers, have a constant, nearby source of food, have stable or falling water levels during the nesting season and have topography that allows nesting common terns to see and hear their neighbors.

Threats

From UMVGL Waterbird Conservation Plan (Wires 2010):

- Destruction and modification of habitat.
- Usurpation of traditional breeding habitat by Ring-billed Gulls.
- Predation.
- Human disturbance.
- Contaminants (Common Terns are one of the most sensitive bird species to embryotoxic effects of DDE; also is the most sensitive wild species yet tested to dioxin-like toxic effects of PCBs (BNA)).
- Limited nest sites during periods of high water.

From Mille Lacs National Wildlife Refuge 2011 Report (McDowell 2011):

- Weather (storm events that result in nest sites being overwashed by waves).

From MN DNR Species Account (*Minnesota Department of Natural Resources 2008*):

- The Great Lakes population has been experiencing problems with predation, human disturbance, and competition for breeding sites with exploding ring-billed gull populations.

Best Management Practices

From UMVGL Waterbird Conservation Plan (Wires 2010):

- Focus on improving management techniques at existing colony sites rather than creating new sites; create new island sites in same geographic area, however, when formerly used sites are no longer suitable for management.
- Management activities should include site enrichment, protective structures, predator control, interspecific competitor removal, and restrictions on human access at sites with high potential for long-term use and high productivity. In BCR12, coordinated efforts with the Army Corps of Engineers should be pursued to maintain or create habitat where there is high potential for use.

From UMVGL JV Waterbird Plan: Common Tern Species Account for Habitat Planning (Soulliere 2007):

- Providing habitat recommendations for island-nesting colonial waterbirds like the Common Tern is especially challenging. These birds depend heavily on Great Lakes near-shore sites, where habitat suitability is dynamic. Conditions such as island substrate, wave action, forage abundance, predation, competition, and human disturbance change from year to year, often in relation to water levels of the Great Lakes.
- Maintain and protect habitat quality associated with existing colonies.
- Establish 13 new nesting colonies in the UMVGL JV Region through restoration/enhancement of previously used sites or establishment of suitable cover on created islands within potential breeding habitat ($\geq$ 100 pairs/site).
- Protection of existing colonies should focus on limiting human disturbance and gull colonization, plus substrate maintenance.
- For potential new or enhanced colony sites, managers should:
    1. Assist in designing dredge-spoil or other island projects to assure sites are suitable for a new colony.
    2. Provide preferred substrate on islands potentially attractive for nesting while minimizing maintenance requirements (e.g., vegetation control).
    3. Evaluate deterrence and control of Ring-billed Gulls and Herring Gulls where they may displace terns.

4. Consider feeding territories of existing tern colonies when locating new projects; required distances between sites may be > 10 km depending on colony size and forage availability.

From Birds of North America (Nisbet 2002):

- Many colony sites in the Great Lakes are actively managed.
- Protection of existing Colony Sites:
    1. Post sites to exclude visitors.
- Habitat Management:
    1. Manage vegetation to prevent overgrowth and maintain desirable mix of open substrate with scattered cover. Methods used include: mechanical clearance, hand thinning, burning, tilling (plowing or harrowing), herbicides, rock salt, or periodic deposition of gravel or dredge spoil.
    2. If vegetation is too sparse, grass may be planted or wooden or rock shelters set out to provide cover.
    3. Erosion control may be necessary using walls or breakwaters constructed from rip-rap.
    4. May need to place fences or barriers around some elevated artificial sites such as piers, barges, and navigation cells to prevent chicks from falling in water.
- Site Restoration, Gull Control:
    1. Remove or displace gulls at sites previously occupied by terns (done in many different ways).
    2. Attempts to control gulls by non-lethal methods (harassment and nest destruction) were usually unsuccessful while gull populations were increasing in the 1960s and 1970s but have had some success in 1990s, especially with use of dogs.
- Predator Control:
    1. Active predator control is often necessary.
- Creation of Artificial Sites:
    1. Many artificial sites such as dredge spoil islands, confined disposal facilities or derelict piers, were created for other purposes but became important sites for nesting terns and other birds in areas where natural sites are scare or absent. By 2000, about 60% of the Common Terns nesting on the Atlantic Coast were on managed sites and about 25% on recently restored sites. In the Great Lakes and St. Lawrence River about 25% of the birds nesting were on managed sites; about 80% on artificial sites. The main limitation of the programs is that managed and restored sites often are subject to predation, hence are not favorable places for terns without efficient predator control. Management programs at many sites must be continued indefinitely if present numbers are even to be maintained.

From MNDNR Rare Species Account (Minnesota Department of Natural Resources 2008):

- Intensive management efforts, including enhancing nesting habitat, controlling predation and reducing competition from gulls, have occurred at all known colonies. Researchers have learned that brightly colored nylon string works well for scaring Ring-billed Gulls away from areas where Common Terns are nesting without affecting the terns and providing common tern chicks with shelters decreases predation by gulls. These efforts are very labor-intensive and have been most successful when done in collaboration with other agencies. Cost-effective strategies to maintain suitable nesting habitat for this species and to reduce predation are likely necessary to ensure the common tern's survival in Minnesota.

Gaps in Knowledge

From UMVGL JV Common Tern Species Account for Habitat Planning (Soulliere 2007):

- Most mortality is believed to occur in winter; population dynamics will not be understood until more is learned about foraging ecology, energetics, molt, causes of death and other limiting factors during winter.

From Birds of North America (*Nisbet 2002*):

- The most important gap in our knowledge of common terns is its ecology on the wintering grounds (the Pacific and Atlantic coasts of Central and South America) where most of the mortality is thought to occur.

MINNESOTA CONSERVATION PLAN

Conservation Goal

Maintain a Minnesota population of Common Terns ≥ 1,000 pairs.

Background: The North American Waterbird Conservation Plan's population objective for the Common Tern is to increase the breeding population to approximately 5,800 pairs throughout the Boreal Hardwood Bird Conservation Region (BCR12). Minnesota's contribution to this regional goal is to maintain a population at or above 1,000 pairs. The last state-wide count of Common Terns was in 1984 when a total of 880 nesting pairs was reported (*McKearnan 1986*). It is likely that the number of nesting pairs was actually higher as the islets in the Northwest Angle of Lake of the Woods were not included in the count. The Mille Lacs National Wildlife Refuge also has a specific objective to maintain a minimum of 150 nesting pairs on Hennepin Island (*Rice Lake and Mille Lacs National Wildlife Refuges Comprehensive Conservation Plan (2007), Objective 1.1, p. 56).*

Current Status of Minnesota Population: As part of Audubon Minnesota's *Implementation Blueprint for Bird Conservation*, the most recent data available for Minnesota's nesting colonies was solicited (Table 1). Based on this information the number of nesting pairs currently present in Minnesota is estimated to be 960. Nearly 39% of the population is on Lake of the Woods; 33% from the NW Angle alone. Because the 1984 statewide count did not include the NW Angle, it may have underestimated the population by anywhere from 150 nests (recent low count in the NW Angle in 2007) to 600 nests (recent high count in the NW Angle in 2009). Even counts made in the NW Angle from 2005-2011 did not survey all potential nesting sites each year so this range in the number of nesting pairs may be low. If we assume that at least 33% of the 1984 population may have been breeding in the NW Angle then the more accurate statewide estimate may have been closer to 1,300 breeding pairs. The current estimate of 960 pairs then would represent a 26% decline in the past 27 years. These assumptions point out the need for an accurate statewide assessment, particularly of the major nesting colonies.

Overall, Minnesota's Common Tern population appears most stable on the islets of the Northwest Angle of Lake of the Woods. The high rocky islands appear to provide better protection against waves and high water (Haws, personal communication). On the lake's south shore, the colony on Pine and Curry Island has not fared well in the past decade. Common Terns have only successfully nested in two of the past seven years. High water continues to be a major concern along the island's eroding shoreline.

The population in the St. Louis River Estuary (Interstate Island) is relatively stable at just below 200 nesting pairs and has slowly increased on Lake Mille Lacs (Hennepin Island) to a little over 200 nesting pairs. Both sites have been intensively managed to maintain these colonies. The Little Pelican Island colony on Leech Lake also has been intensively managed but the population has slowly declined due to competition with co-nesters (both Ring-billed Gulls and Double-crested Cormorants). In 2010 a new, small colony was reported on Bird Island in Pelican Lake (Crow Wing County). Small colonies have also been reported in the past at other sites including Lake Kabetogema (Voyageur's National Park) and Cotton Lake (Becker County). The Lake Kabetogema colony has not been active since the late 1980s; the status of the Cotton Lake colony is unknown.

In summary, it appears that Minnesota is maintaining a population of approximately 960 pairs, which is just below the target of 1,000 breeding pairs. The four major colonies (Lake of the Woods, Mille Lacs Lake, Leech Lake and the St. Louis River Estuary) are designated as Important Bird Areas by Audubon Minnesota. Intensive management efforts have been underway at all Minnesota colony locations, other than the NW Angle, for many years in order to sustain this population level.

Table 1. Estimates of Common Tern Breeding Pairs in Minnesota

Site	Current Data		1984	1930s	Additional Information	Comments
	# Breeding Pairs*	Date	# Breeding Pairs*	# Breeding Pairs *		
Little Pelican Island, Leech Lake **IMPORTANT BIRD AREA**	**149**	2011	489	Gull Island: 1,500 (1933)	1,000 nests reported on Gull Island in the early 1970s; Island abandoned in 1989	Nesting on nearby Little Pelican Island was first attempted in 1989; intensive management is now underway in order to sustain the colony. Competition with other co-nesters (mainly Ring-billed Gulls) is now the major problem; information provided by Steve Mortenson, Leech Lake Tribe Natural Resources Director
Bird Island, Pelican Lake	**20**	2010			2010 was the first year nesting was reported	Minnesota Breeding Bird Atlas report submitted by Kent Montgomery and Brett Arne, MNDNR
Lake of the Woods **IMPORTANT BIRD AREA**						
• Pine and Curry Island	**58**	2010	139	1000 (1932)	Only successful 2 of last 7 years (2005-2011); most recently 2010	The terns did not nest on the island in 2011; the shoreline is eroding and high water continues to be a significant problem for the nesting colony; data provided by Katie Haws, MNDNR
• Red Lake Rock, NW Angle	50	2009			97 nests (2001) 122 nests (2006)	NW angle islands are on rocky islets that seem to fare better in high waves and high water; data provided by Katie Haws, MNDNR
• Odell Island, NW Angle	250	2004			None reported in recent years	See above; data provided by Katie Haws, MNDNR
• Techout Island, NW Angle	87	2010			35 (2006) 400 nests (2009)	See above; data provided by Katie Haws, MNDNR
• Crowduck Island, NW Angle	195	2010			33 nests (2006) 150 nests (2007) 430 nests (2008) 150 nests (2009)	See above; data provided by Katie Haws, MNDNR
Average # nests/yr in the NW Angle (2001-2010)	**317**	2001-2010			Average # nests/yr on all NW Angle Islands	Data provided by Katie Haws (MNDNR)
Hennepin Island, Lake Mille Lacs **IMPORTANT BIRD AREA**	**224**	2011	93	580 (1930)	47 pairs on Hennepin Island; 46 on Spirit Island in 1984	On Mille Lacs National Wildlife Refuge; productivity in 2011 was 0.13 fledglings/pair (major storm event in 2011); since 1993 productivity has averaged 0.46 fledglings/pair (McDowell 2011)
Interstate Island, St. Louis River Estuary **IMPORTANT BIRD AREA**	**194**	Average for recent years	140	First nest at Sky Harbor in 1937	1984 count was 113 at the Port Terminal and 27 at Sky Harbor (McKearnan 1986)	Colonies have actually moved from the Port Terminal and Sky Harbor to Interstate Island; data provided by Fred Strand, WDNR (memo to J. Green).
Average Total	**962**		**861**	**2,580** in early 1930s		Sum of 2011 Gull Island, 15 pair avg on Pelican Lake, 2010 Pine and Curry Island, ten year average on NW Angle, 2011 Lake Mille Lacs and recent average in Duluth Harbor.

* **Note**: One reviewer correctly pointed out that what surveyors are often counting is the number of clutches at a colony, not the number of breeding pairs which would result in an underestimation of the number of birds in a colony. When surveyors visit a colony the adults are disturbed and fly away, often flying above the colony. The surveyor's job is further complicated by not knowing what percent of the clutches observed are second or third nesting attempts. This challenge in reporting prompted the addition of a conservation action to standardize Common Tern monitoring methods and reporting.

Conservation Objectives

- Protect and maintain three island nesting colonies in Minnesota and work to restore or enhance one nesting colony site.
- Minnesota colonies must produce at least 1.1 young per breeding pair for the state to maintain its current population.

Background

Protect and Maintain Three Nesting Colonies: This objective was established by the Upper Mississippi Valley/Great Lakes Joint Venture Waterbird Conservation Plan (*Soulliere 2007*).

Current Status of Colonies in Minnesota: At present, there are five major tern colonies in Minnesota (all the islands in the NW Angle are considered one site in this plan) as well as a small, recently discovered colony on Pelican Lake in Crow Wing County. Four of the major tern colonies (Interstate Island, Hennepin Island, Little Pelican Island and Pine and Curry Island) are actively managed in an effort to address such threats as human disturbance, competition with co-nesters, predation, and eroding shorelines. These efforts have been essential to maintaining Minnesota's current population level; in their absence, the state population of Common Terns surely would be considerably smaller. Therefore, with a considerable investment of staff time and resources, Minnesota is currently meeting the first conservation criteria. Table 1 summarizes the current status of each colony.

Maintain a reproductive success rate ≥ 1.1 to establish a stable population: This conservation objective is an outcome of two Master's Theses on Minnesota's Common Tern population: 1) the first by Joan McKearnan published in 1986; and 2) the second by Bill Penning published in 1993.

McKearnan visted four major colonies (St. Louis Estuary, Mille Lacs Lake, Leech Lake and Pine and Curry Island) and found that overall breeding success was approximately 0.15 fledging/pair; only 6% of the eggs laid survived to fledging. She concluded that if fledging success were to continue at this level, the state population would continue on a precipitous downward decline. Her population simulation model predicted that a breeding success of 1.1 fledgings/pair was necessary just to maintain the 1984 population level of 880 nesting pairs.

Several years later, following an intensive study and management effort focused on the Common Terns nesting in the St. Louis River Estuary, Penning also conducted a modeling effort. He concluded that maintaining a stable population of Common Terns in Minnesota requires: 1) a breeding success rate of 1.10 fledglings/pair; 2) adult survival at 92%; 3) sub-adult survival of 15%; and 4) 12.5% of the sub-adults breeding as successfully as the adults in the colony. Penning noted that in the past decade Minnesota Common Tern colonies had a fledgling success rate that ranged from 0.00 to 1.35; most colonies, however, were well below 1.0. At the time of Penning's thesis, Interstate Island in the St. Louis River Estuary, was the exception, maintaining a reproductive success rate greater than 1.0. More recent data collected by Wisconsin Wildlife Manager Fred Strand has demonstrated a slightly lower average annual reproductive success of 0.91 (1989-2009). Penning concluded that other colonies in the state had to be managed as intensively as Interstate Island to prevent Minnesota's tern population from further decline. As documented above, all four of Minnesota's major nesting tern colonies are the focus of some intensive management (other than the NW Angle). Had they not been, there is little doubt that the state population would be considerably lower today than it is.

Although both of these models included, of necessity, a number of assumptions, they provide resource managers a practical guideline to assess the success of Minnesota's nesting colonies. In addition annual reproductive success can vary widely from year to year in any given colony because of the vagaries of

weather events and predation. As a result, looking at a single year's reproduction will not be indicative of long-term success. Success averaged over a 5 -10 year period will provide a clearer picture of the population's status in Minnesota.

Note: The Rice Lake and Mille Lacs National Wildlife Refuges Comprehensive Conservation Plan (2007) establishes a reproductive goal of producing 100 fledglings annually while supporting a minimum of 150 nesting pairs, following completion of their island enhancement plans (including enlarging the island with gravel and constructing rock jetties offshore to lessen erosion from wave action). This would result in a reproductive success rate of only 0.67 fledglings/pair, which would not achieve the conservation criteria stated above.

Current Status of Common Tern Reproductive Success in Minnesota: Although the dates of monitoring reported in the table below are variable for each site, it is clear that Minnesota is not achieving the reproductive rate necessary to maintain a stable population, despite intensive management efforts. Of the colonies that are managed, only Interstate Island, comes close to achieving the 1.1 fledglings/pair success rate necessary.

Table 2. Reproductive Success at Minnesota's Common Tern Colonies

Colony	**Years**	**Average Reproductive Success**	**Comments**
Interstate Island	1989-2010	0.91	Wisconsin DNR
Little Pelican Island	1988-2004	0.50	Leech Lake Tribe DNR
Pine and Curry Island	2007-2011	0.01	Only successful one of these years
Hennepin Island	1993-2011	0.49	McDowell 2011
NW Angle, LOW	Not available	Not Available	Sites not surveyed every year and only one trip made to count nests; not fledglings

Actions Needed for Conservation

Inventory and Assessment Needs

- Identify the location of any new colonies in the state in order to provide for an accurate statewide account of nesting locations.

  Action: Following completion of the Minnesota Breeding Bird Atlas, conduct an inventory of any new nesting reports that are collected, outside of the traditional nesting locations on Lake of the Woods, St. Louis River Estuary, Lake Mille Lacs and Leech Lake.

  Action: Ensure that new colony locations are promptly reported to the Minnesota Department of Natural Resources, Nongame Wildlife Program.

Monitoring Needs

- Regularly collect sufficient up-to-date data to assess whether Minnesota is achieving its population target of 1,000 nesting pairs.

  Action: Support and encourage the continuation of the excellent monitoring efforts that each of the principal land management agencies are currently conducting.

Background: DNR Nongame Wildlife field staff within the Minnesota Department of Natural Resources (Division of Ecological Resources) have done an excellent job monitoring colonies on Lake of the Woods, as have the Leech Lake Natural Resources staff for the Little Pelican Island colony, the Wisconsin DNR staff for Interstate Island, and the Rice Lake National Wildlife Refuge staff for Hennepin Island. At present, the colonies on Pine and Curry Island, Little Pelican Island, Hennepin Island and Interstate Island are all monitored annually. At a minimum one visit is made to count nesting pairs and/or nests. In nearly all cases, weather and time permitting, additional visits are also made for management purposes and to assess nest success At present, the Northwest Angle colonies are visited once every other year.

- Collect sufficient data on the reproductive success of each colony to assess whether Minnesota is achieving its goal of attaining a reproductive success rate of 1.1 fledglings/nest.

  Action: Support and encourage efforts to monitor the reproductive success at each active colony.

  Background: Again, the principal land management agencies are doing an excellent job, despite the increasing demands being placed on them, to collect this important data from all but the colonies in the NW Angle of Lake of the Woods.

- Improve our assessment of the contribution that the Common Tern colonies in the NW Angle of Lake of the Woods are making to the overall state conservation objectives.

  Action: Encourage the Minnesota Department of Natural Resources, in cooperation with its major partners, to collect data on the reproductive success of the colonies in the NW Angle during the same years that it conducts surveillance monitoring.

  Background: At present it appears that the Common Tern colonies in the NW Angle of Lake of the Woods may be the only non-managed colonies that continually support large populations of nesting birds. As discussed on page 13, the NW Angle may support over 30% of the statewide population. As a result, it is important to improve our understanding of how successful these colonies are from year to year. The challenge of visiting these colonies frequently must be acknowledged. But if the contribution of Pine and Curry Island to both Piping Plovers and Common Terns continues to decline, it will be increasingly important to assess the contribution of the NW Angle population.

- Ensure that the data collected from each colony is comparable.

  Action: Standardize methods for conducting and reporting the results of monitoring surveys conducted at each of the colonies.

- Establish a clear coordinative role for one of the principal land management agencies.

  Action: Encourage the Minnesota Department of Natural Resources, with its state-wide management responsibilities, to assume a leadership role in communicating with all the land managers. They should be periodically convened to discuss coordination and implementation of management actions and to collectively discuss necessary research efforts and/or efforts to collect additional demographic data.

  Background: Considering the staff time and resources invested each year at the four managed colonies, the Common Tern may be the most intensively managed bird in Minnesota. The land

management agencies are doing an excellent job implementing creative management efforts to sustain and enhance the nesting colonies on their respective ownerships. Given the attention that the species receives, there is further benefit to providing additional coordination. At a minimum, the monitoring data collected at each colony each year should be summarized and distributed to resource managers, biologists and researchers. Regular communication could further our understanding of the role that each colony serves in achieving the state wide objectives.

- Improve our understanding of how Minnesota's Common Tern population contributes to the regional population in the Great Lakes.

  Action: Coordinate with other states and provinces in the Great Lakes to track regional population trends.

  Action: Periodically report on the status of Minnesota's Common Tern population in relation to state and region population goals.

Habitat Protection Needs

- There are no habitat protection needs at present. If new colonies are located that remain persistent from year to year, the protection needs of those sites should be assessed.

Habitat Management and Restoration Needs

- Continue the creative approaches to managing Minnesota's Common Tern colonies in order to sustain and potentially enhance the current population (**Note**: a summary of best management practices currently utilized for Common Terns throughout their range can be found on pages 12-13).

  Action: Support and encourage an informed investment in the continued management of the four Common Tern colonies that are currently managed to sustain and enhance the local breeding populations, the degree of investment made, and the management actions taken, should be decided by soliciting as much technical and scientific input as possible to make informed decisions about the future management of the Common Tern in Minnesota. Below is a summary of the management actions underway at each site.

- In an age of continual budget challenges and resource priorities, tracking the time and financial costs of monitoring and managing Minnesota Common Tern colonies, along with the resource outcomes from the investments, would help resource managers and supervisors make informed decisions regarding future management actions.

  Action: Encourage resource agencies to annually track their time and cost for monitoring and managing Common Terns in Minnesota.

Summary of Management Actions at Minnesota Common Tern Colonies

1. St. Louis River Estuary

   A Master's Thesis by Bill Penning (1993) provides a detailed history of Common Tern nesting and management in the St. Louis River Estuary up to the early 1990s. Terns have nested at a variety of natural and man-made (dredge spoil islands) sites in both the Wisconsin

and Minnesota portions of the estuary since the late 1930s. Industrial and human disturbance in the area, coupled with the presence of predators and a burgeoning Ring-billed Gull population, have been major deterrents to successful nesting.

Terns were actively discouraged from nesting at heavily disturbed sites such as the Port Terminal and actively encouraged to nest at Hearding Island Wildlife Management Area (a former dredge spoil site) for several years. Techniques used to discourage nesting at the industrial sites included the use of Bird Scaring Reflective Tape, owl decoys and chasing. Then, in 1983, 5.2 acres of trees and shrubs were cleared from Hearding Island and wooden tern decoys and recorded tern vocalizations were used to encourage nesting from 1983 to 1988. Although terns did move to the island, the level of human disturbance was very high. Predators were also a problem as the island is relatively large and has a large woodlot on the northeast side. Mammal trapping was done prior to the 1987 nesting season but continual harassment of the terns, vandalism, and predation led to the decision to terminate management efforts in 1989.

Eventually the birds moved to a more secure location in the harbor at Interstate Island. Vegetation was removed from portions of the island in 1984 and, in 1985, a small colony of 50 nesting pairs of Common Terns moved there. Because vegetation was not removed from the entire island, avian predators were a problem (Great Horned Owls). Then, in 1989, all the vegetation was scraped off to expose bare sand and the north and east sides of the island were rip-rapped. That same year the estuary's entire common tern nesting population moved to the site and has remained there ever since. Because the site was also attractive to nesting Ring-billed Gulls, gull control has been an ongoing effort by the Wisconsin Department of Natural Resources, which actively manages the colony. Initially gull nests were destroyed but more recently, gulls have been allowed to nest in portions of the island but are actively discouraged to nest within the tern colony by using a grid of monofilament line placed over the terns.

2. Pine and Curry Island, Lake of the Woods

   The Common Tern population on Pine and Curry Island in Lake of the Woods has been monitored annually since 1982, prompted primarily by the co-nesting population of Piping Plovers (Federally Endangered) present on the island. During the 1980s the island supported a relatively robust population of plovers (36 pairs in 1984) but since 2000, only one to two pairs have bred on the site and in many years none have been present.

   The Common Tern colony has suffered a similar demise. The colony was estimated to support approximately 1,000 breeding pairs in the 1930s. In the past decade, however, less than 100 breeding pairs have attempted to nest on the island. Frequent inundation by high water and storms causes nesting failure in many years and the amount of shoreline habitat available has declined significantly.

   Management techniques employed at Pine and Curry Island include: 1) destruction of Ring-billed Gull nests (they don't nest on the island every year); 2) trapping mammalian predators; 3) posting signs prohibiting entry into the nesting colony; 4) establishing grids with monofilament line to discourage entry by nesting gulls and loafing summer visitors (such as Franklin's gulls); and 5) working with the Lake of the Woods Management Board to reduce lake levels during the nesting season.

The primary challenge at Pine and Curry Island is the erosion of the sand beaches that provide prime nesting habitat. Since 1985 nearly 1,500 meters of the island have disappeared (*Haws 2011*). High lake levels maintained by the Lake of the Woods Control Board and reduced

sediment deposition on the island appear to be the primary factors responsible for the observed changes in habitat and the reduction in the nesting colony (*Haws 2011*).

3. Gull Island and Little Pelican Island, Leech Lake
   Until 1989, the Common Tern nesting colony on Leech Lake was located on a small island known as Gull Island. Up through the early 1970s this site supported anywhere from 1,000-1,500 nesting pairs. However, by 1992, only 75 nesting pairs were found and, due to high water levels and wave action, the colony often experienced total reproductive failure (*Mortensen and Estes 1993*). Ring-billed Gulls were also a growing problem.

   In 1989 the terns completely abandoned Gull Island and moved to nearby Little Pelican Island. Efforts to establish a monofilament grid on Gull Island to encourage the terns to return and discourage the gulls failed. As a result, the Leech Lake Tribe, owners of the islands, decided to place their management emphasis on Little Pelican Island instead. Vegetation was removed in an effort to improve the nesting habitat. Although Ring-billed Gulls nested on the island they were not infringing on the tern colony. However, as Double-crested Cormorants increased their nesting population on the island, the gulls were pushed closer to the terns, threatening to disperse the colony. A string grid was employed for several years but gradually lost its effectiveness. As a result, managers began to destroy hundreds of gull nests each year. In addition, a major cormorant control effort has been underway on the lake since 2004. The nesting population of Common Terns now numbers approximately 150 breeding pairs.

4. Mille Lacs National Wildlife Refuge, Mille Lacs Lake
   Two islands constitute the refuge: Hennepin Island and Spirit Island. The two sites have been known to support breeding colonial waterbirds for nearly a century as they were preserved as nesting sites for native birds in 1915 (Spirit Island) and 1920 (Hennepin Island).

   Refuge personnel, in cooperation with the Mille Lacs Band of Ojibwe Department of National Resources, have been actively managing Hennepin Island to benefit Common Terns since 1993. A string grid to exclude nesting Ring-billed Gulls has been constructed and all Herring Gull, Ring-billed Gull and Double-crested Cormorant eggs are destroyed (breaking within the grid and oiling outside the grid). Gravel was added to the island in the tern nesting area to enhance the nesting substrate in 2008 and in 2012.

   On neighboring Spirit Island terns have not nested since 1998 but a large, successful cormorant colony has taken hold, numbering nearly 500 breeding pairs. Because the boulder substrate is not as attractive to nesting Common Terns as the gravel substrate on Hennepin Island, refuge staff is no longer employing management efforts here.

   In the spring of 2012, refuge personnel oversaw a three day workshop designed specifically to assess future management of the refuge, including an examination of alternatives to reduce erosion of the southern tip of Hennepin Island where terns are nesting. The current and proposed management strategies that were reviewed and evaluated are outlined in the Rice Lake and Mille Lacs Lake National Wildlife Refuges Comprehensive Conservation Plan (2007):

   - Working with the Army Corps of Engineers to enlarge Hennepin Island with gravel;
   - Working with the Army Corps of Engineers to construct rock jetties offshore of the island to lessen erosion from wave action on Mille Lacs Lake;
   - Continuing to maintain the protective string grid above the island;
   - Continuing gull and Double-crested Cormorant control;

- Continue to monitor Common Tern productivity; and
- Annually estimate the productivity of nesting birds on Hennepin Island.

Table 3. Summary of Common Tern Habitat Management Actions Implemented in Minnesota

Management Challenge	**Discourage nesting at disturbed sites**	**Encourage nesting at new sites**	**High water levels**	**Predation**	**Competition with co-nesters**	**Human disturbance and vandalism**
Actions	Chasing birds away by people	Remove vegetation (cutting and use of herbicides)	Work with local water managers to reduce lake levels during nesting season	Trapping mammalian predators	Destroy eggs of Ring-billed Gulls, Herring Gulls and Cormorants (breaking/oiling)	Posting signs to prohibit entry into nesting colony
	Bird Scaring Reflective Tape	Use of wooden tern decoys	Nesting substrate enhancement	Taking avian predators (owls)	Place a grid of monofilament line over nesting tern colony	Enforcement
	Monofilament grid to prevent nesting of gulls	Play common tern vocalizations			Active removal of cormorants (shooting)	Press releases
	Owl decoys	Plywood shelters to provide cover for tern chicks			Deterring Gulls from loafing or nesting on nearby islands	
	Encourage nesting on dredge spoil islands	Nesting substrate enhancement				

Specific Actions for Audubon Minnesota:

- Work with the Minnesota Department of Natural Resources to ensure that:
  1. The Common Tern remains a high statewide priority;
  2. Current investments in monitoring and management on Lake of the Woods continue and a greater investment is made to monitor the colonies in the NW Angle, particularly should Pine and Curry Island's significance continue to decline.
  3. Department staff coordinates with the Wisconsin Department of Natural Resources regarding management of Interstate Island.
- Keep track of the annual status of Common Tern colonies on each of the Important Bird Areas.
- Advocate for the necessary resources to maintain and manage each of these colonies

Table 4. Common Tern Minnesota Conservation Implementation Plan

Conservation Goal: Maintain a Minnesota population of Common Terns ≥ 1,000 pairs.

Conservation Objectives:
1) Protect and maintain three island nesting colonies and work to restore or enhance one nesting colony site; and
2) Achieve a reproductive success rate of at least 1.1 young per breeding pair for the state to maintain a stable population

Action	Priority	Projected Timeline Delete	Responsible Entity	Others Involved
Inventory and Assessment				
• Following completion of the Minnesota Breeding Bird Atlas, conduct an inventory any new nesting reports that are collected, outside of the traditional nesting locations on Lake of the Woods, St. Louis River Estuary, Lake Mille Lacs and Leech Lake.	**#6**	2015	Minnesota DNR	Audubon re: Any new reports
• Ensure that new colony locations are promptly reported to the Minnesota Department of Natural Resources, Nongame Wildlife Program.	**#7**	Ongoing	Minnesota DNR	
Monitoring				
• Support and encourage the continuation of the excellent monitoring efforts that each of the principal land management agencies are already conducting	**#1**	Ongoing	Minnesota DNR Leech Lake Tribe Wisconsin DNR Rice Lake NWR	Audubon MN Mille Lacs Band of Ojibwe
• Support and encourage monitoring the reproductive success of each active colony.	**#2**	Ongoing	Minnesota DNR Leech Lake Tribe Wisconsin DNR Rice Lake NWR	Audubon MN Mille Lacs Band of Ojibwe
• Encourage the Minnesota Department of Natural Resources, in cooperation with its major partners, to collect data on the reproductive success of the colonies in the NW Angle during the same years that it conducts surveillance monitoring.	**#4**	2014	Minnesota DNR	Audubon MN
• Encourage the Minnesota Department of Natural Resources, with its state-wide management responsibilities, to assume a leadership role in communicating with all the land managers and periodically convening them to discuss coordination and implementation of management actions and to collectively discuss necessary research efforts and/or efforts to collect additional demographic data.	**#5**	2014	Minnesota DNR	Audubon MN
continued on following page				

Action	Priority	Projected Timeline	Responsible Entity	Others Involved
Monitoring, continued				
• Coordinate with other states and provinces in the Great Lakes to track regional population trends.	**#9**	2015	Minnesota DNR	
• Periodically report on the status of Minnesota's Common Tern population in relation to state and region population goals.	**#8**	2015	Minnesota DNR	Leech Lake Tribe Wisconsin DNR Rice Lake NWR
Habitat Management and Restoration				
• Support and encourage an informed investment in the continued management of the four Common Tern colonies that are currently managed to sustain and enhance the local breeding colony. The degree of investment made, and the management actions taken, should be decided by soliciting as much technical and scientific input as possible to make informed decisions about the species future management.	**#3**	Ongoing	Minnesota DNR Leech Lake Tribe Wisconsin DNR Rice Lake NWR	Mille Lacs Band of Ojibwe
• Encourage resource agencies to annually track their time and cost for monitoring and managing Common Terns in Minnesota.	**#10**	2015	Minnesota DNR Leech Lake Tribe Wisconsin DNR Rice Lake NWR	Mille Lacs Band of Ojibwe

Selected Resources for Common Tern Minnesota Conservation Plan

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