Atlantic Region Management Plan for Marine Terns

CANADA'S GREEN PLAN

Canadian Wildlife Service, Atlantic Region. August 1992

CONTENTS

Contents i

Preface ii

Executive Summary iii

1 Scope and participation 1
- 1.1 Species considered 1
- 1.2 Participation 1
  - 1.2.1 Provinces 1
  - 1.2.2 Canadian Parks Service 1
  - 1.2.3 Canadian Coast Guard 1
  - 1.2.4 Non-government Wildlife interest groups 1

2 Objective and Goals 2
- 2.1 Population management 2
- 2.2 Habitat management 2
- 2.3 Population monitoring and research 2
- 2.4 Enforcement 2
- 2.5 Public communications and NGO co-ordination 2

3 Status of Atlantic Region Tern Populations 3
- 3.1 Terns breeding in the Atlantic Region 3
- 3.2 Historic population changes 3
  - 3.2.1 Labrador 4
  - 3.2.2 Insular Newfoundland 4
  - 3.2.3 Nova Scotia 4
  - 3.2.4 New Brunswick 4
  - 3.2.5 Prince Edward Island 5
- 3.3 Present status of tern populations 5
  - 3.3.1 Labrador 5
  - 3.3.2 Insular Newfoundland 5
  - 3.3.3 Nova Scotia 5
  - 3.3.4 New Brunswick 5
  - 3.3.5 Prince Edward Island 6
  - 3.3.6 Atlantic Provinces population 6

4 Tern Management Methods and Opportunities 7
- 4.1 Population monitoring. 7
- 4.2 Development of a tern enhancement strategy 7

5 Issues and Actions 12
- 5.1 Population management 12
  - 5.1.1 Issues 12
  - 5.1.2 Actions 12
- 5.2 Habitat management 13
  - 5.2.1 Issues 13
  - 5.2.2 Actions 13
- 5.3 Population monitoring and research 14
  - 5.3.1 Issues 14
  - 5.3.2 Actions 14
- 5.4 Enforcement 14
  - 5.4.1 Issues 14
  - 5.4.2 Actions 15
- 5.5 Public communications and NGO co-ordination 15
  - 5.5.1 Issues 15
  - 5.5.2 Actions 15

6 Implementation 17
- 6.1 First priority initiatives 17
  - 6.1.1 Implementation of the regional gull management plan 17
  - 6.1.2 Management at core colonies 17
  - 6.1.3 Roseate Tern Management 17
  - 6.1.4 Initiation of the program of tern population monitoring 16
  - 6.1.5 Coordination of tern conservation efforts 17
- 6.2 Second priority initiatives 17
  - 6.2.1 Completion of core colony selection and assessment 18
  - 6.2.2 Cooperation in management with citizen groups 18
- 6.3 Third priority initiatives 18
  - 6.3.1 Reproductive success monitoring .. 18
  - 6.3.2 Monitoring of toxic chemical levels in terns 18
  - 6.3.3 Support and promotion of university research. 18
  - 6.3.4 Development and maintenance of consultative links with tern managers in adjacent regions. 18
  - 6.3.5 Investigations of problems on the winter range 18

PREFACE

The early history of human impact on birds in North America was one of unrestrained exploitation which, by the end of the nineteenth century, had resulted in the extinction of several species and the drastic reduction of many more. A growing public alarm at this situation led to many local initiatives to preserve remnant populations. It resulted in the signing of the Migratory Birds Convention between the United States and Great Britain on behalf of Canada in 1916. This treaty had the aim of "saving from indiscriminate slaughter and of insuring the preservation of such migratory birds as are either useful to man or are harmless."

The Migratory Birds Convention Act of 1917 gave legal force to the international treaty in Canada, and parallel enabling legislation was passed in the United States. This Act brought uncontrolled utilisation of birds to an end. Controlled hunting of game species was allowed, but protection was given to other, named, species groups. An organisation, that later grew into the Canadian Wildlife Service, was formed to administer the Act.

All species of terns breeding in North America were given protected status. They, like many other species of seabird which had previously been over-exploited, soon increased in numbers. In the last several decades, however, tern numbers have been declining in eastern North America and it has been deemed necessary to take action to halt this decline in the Atlantic Region and elsewhere. The Canadian Wildlife Service is responsible for the management of migratory birds and this management plan describes how this responsibility will be discharged with regard to terns.

Because all readers of this management plan will not be fully conversant with terns and the "tern problem", this plan contains a comprehensive but brief description of the tern species under consideration and their population history in the Atlantic Region.

Although this plan is concerned with conservation of tern populations in the Atlantic Region, it is hoped that it will find use as a prototype for tern management plans that may be required in other regions.

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EXECUTIVE SUMMARY

In the decades following the signing of the Migratory Birds Convention with the United States in 1916, numbers of terns on the east coast of North America increased. However, it is apparent that substantial declines in tern numbers have occurred in this same region in the past two decades. These decreases have been linked to a contemporaneous increase in numbers of large gulls which are predators on terns.

Arctic, Common, Roseate and Caspian Terns are the species of concern in this management plan. It is estimated that the present Atlantic Region breeding population of terns consists of some 17,000 pairs of Arctic Terns, 29,000 pairs of Common Terns, fewer than 100 pairs of Roseate Terns and fewer than 50 pairs of Caspian Terns.

A strategy for conservation of breeding terns in the Atlantic Provinces is advanced which is founded on the fact that the majority of recruits to tern populations come from a relatively few colonies. It proposes a concentration of much of our conservation effort on those colonies which have been historically large, and have promise of being most productive if given protection.These colonies are 'core' colonies;

Discussions will be initiated with provincial governments to increase the number of tern breeding sites with protected status.

Tern colonies in the region will be censused as human and fiscal resources, including partnerships, permit. It is desirable that all colonies in the region be censused every ten years at a minimum, and that' core' colonies be censused every year.

More detailed research on reproductive success and feeding of terns will be undertaken in core colonies. Research on terns at universities in the Atlantic Region will be encouraged and facilitated by the Canadian Wildlife Service.

Human disturbance and predation are not thought to have a major impact on tern populations in this region, but where such problems are identified public information and enforcement efforts will be increased.

Gull predation is a major factor limiting tern reproductive success. Where it is necessary to control gull numbers for the protection of a tern colony, a program of public information and consultation will be undertaken.

The Canadian Wildlife Service will support the Atlantic Canada Tern Working Group and attempt to interest regional wildlife interest groups in management of individual tern colonies.

To ensure that Atlantic Region tern populations are adequately managed it is necessary to safeguard the birds in all aspects of their life cycle. To facilitate this, the Canadian Wildlife Service is prepared to influence their conservation in other countries with which populations are shared.

1
SCOPE AND PARTICIPATION

1.1 SPECIES CONSIDERED

Five species of terns breed in the Atlantic Provinces of Canada. The Black Tern (*Chlidonias niger*) breeds only on fresh water bodies while the others, of the genus *Sterna*, are principally marine in their breeding distribution. Arctic Terns (*Sterna paradisaea*) and Common Terns (*Sterna hirundo*) are the most numerous. Roseate Terns (*Sterna dougallii*) are at the northern limit of their breeding distribution in this region and they breed in small numbers at only a few sites. Caspian Terns (*Sterna caspia*) are the least abundant with fewer than 50 pairs known to breed in the region. However, they breed more abundantly in other parts of Canada and the world. Common and Arctic Terns have circumpolar breeding ranges while Roseate and Caspian Terns have a more cosmopolitan breeding distribution in temperate and semi-tropical regions.

This plan addresses management of populations of marine terns of the genus *Sterna* which breed on the coasts and at some inland sites in this region. It does not cover Black Terns (*Chlidonias niger*).

1.2 PARTICIPATION

Responsibility for the conservation of migratory birds in Canada was assumed by the federal government after the negotiation of the Migratory Birds Convention with the United States in 1916 and the passage of the Migratory Birds Convention Act in Canada in 1917. The administration of this act is assigned to the Canadian Wildlife Service. The Canadian Wildlife Service, however, controls only a few of the environmental components necessary for effective management of migratory birds. For instance, the continuing existence of all species of birds is dependent upon the integrity of their natural habitat. The control of the majority of lands used by birds is with agencies other than the Canadian Wildlife Service, so in the management of tern populations the activities of many agencies must be co-ordinated. Furthermore, terns, as migratory birds, are present in the Atlantic Region only during their breeding season. This plan includes proposals to influence tern management in other countries with which populations are shared.

1.2.1 Provinces.

The majority of the coastal islands on which terns breed are Provincial Crown Lands. If special protection or status is required for breeding colonies on provincial Crown Lands, provincial protective mechanisms may be used. In this region all provinces have legislation which enables tern breeding sites to be protected.

1.2.2 Canadian Parks Service

Several important Atlantic Region tern colonies are in National Parks, and their breeding habitat is thus controlled by the Canadian Parks Service. The presence of the park may give some degree of protection from human disturbance but, equally, the park may attract people to areas which would otherwise be undisturbed. Active management for tern conservation may be included in a Park Conservation Plan but it will not occur automatically in the routine administration of a National Park.

1.2.3 Canadian Coast Guard

The Coast Guard is an organisation within Transport Canada concerned, primarily, with marine traffic regulation and safety. This agency owns and maintains navigation aids on many of the islands on which terns breed. The ownership of an island by this federal government agency allows control of access and use of the island. Furthermore, federal crown ownership expedites the granting of Migratory Bird Sanctuary status. Of the core colonies identified in this management plan, the Coast Guard owns Sable Island, Machias Seal Island and Guyon Island.

1.2.4 Non-government wildlife interest groups.

The Atlantic Canada Tern Working Group (ACTWoG) is chaired by the Canadian Wildlife Service and brings together government agencies and conservation organisations with the aim of co-ordinating tern conservation efforts in the Atlantic Region. In this region both naturalist groups and private citizens have interests in preserving seabirds and are, or can be, involved in the management of tern colonies.

2
OBJECTIVE AND GOALS

The objective of this management plan is to provide a strategy whereby tern population decreases in the Atlantic Provinces can be arrested, and management implemented to produce long term increases. Specific population targets are difficult to set because Atlantic Region tern populations are not well defined at present. However, sufficient data exist to allow the setting of broadly quantitative goals. Apart from numerical goals, accomplishment of the conservation initiatives embodied in the plan must be one of the criteria by which its effectiveness is judged. The specific goals are listed below.

2.1 Population Management

It is hoped that the management scheme outlined in this plan will allow Arctic and Common Tern populations to increase by approximately 20% over the next two decades. The colony census regime prescribed should be capable of detecting population changes of ±15%.

- By the year 2000 the number of Common Terns breeding in the Atlantic Provinces will be at least 29,000 pairs, equivalent to the present estimated breeding population of the region.
- By the year 2010 the Common Tern breeding population will be at least 35,000 pairs.
- By the year 2000 the number of Arctic Terns breeding in the Atlantic Provinces will be at least 17,000 pairs, equivalent to the present estimated breeding population of the region.
- By 2010 Arctic Tern breeding population will be at least 21,000 pairs.
- By the year 2000 the number of Roseate Terns breeding in the Atlantic Provinces will be at least 75 pairs, equivalent to the present estimated breeding population of the region.
- By the year 2010 there will be at least 200 breeding pairs.
- By the year 2010 there will be at least 50 pairs of Caspian Terns breeding in the Atlantic Region

2.2 Habitat Management

- By the year 2000 the ten most important colonies in the Maritime Provinces will have some form of protected status and will be managed to control disturbance and predation.
- By the year 2000 the four most important tern colonies in Newfoundland will have some protected status and will be managed to control disturbance and predation.

2.3 Population Monitoring and Research

- A population monitoring program will be established to define accurately the present breeding tern population of the Atlantic Provinces and to allow the effectiveness of the conservation initiatives in this management plan to be assessed.
- Research to develop effective population management techniques and to assess the effectiveness of those presently in use will be undertaken.

2.4 Enforcement

- Enforcement needs will be evaluated and remedial strategies will be advanced. If serious problems are identified, enforcement efforts will be increased.

2.5 Public Communications and NGO Co-ordination

- Public communication requirements will be assessed and appropriate initiatives to support the Atlantic Region Tern Management Plan will be implemented.
- The activities of government and non-government groups with interests in tern conservation will be encouraged and coordinated.

3
STATUS OF ATLANTIC REGION TERN POPULATIONS

3.1 TERNS BREEDING IN THE ATLANTIC REGION

Terns, with gulls shorebirds and auks, are members of the avian order Charadriiformes; gulls, terns, skuas and skimmers forming the family Laridae. Terns are typically slender, short-legged birds with long pointed wings. The sexes are alike and adult coloration tends to be white with grey or black wings and mantle. The beak and legs are very often red, orange or yellow. They feed by plunge-diving to capture fish and aquatic invertebrates. Terns lay one to three eggs in rudimentary nests on the ground. Sexual maturity is typically achieved two or three years after hatching, though terns do not often breed successfully until they are five or more years old. Adult mortality is low, giving terns a long reproductive life. The incubation period of the small marine terns breeding in this region is between three and four weeks and chicks fledge about one month after hatching.

Arctic Terns, like Common and Roseate Terns, are slight birds weighing 100-140g. They breed, in eastern North America, as far north as 80 degrees latitude and as far south as the state of Massachusetts. They are the most pelagic of our breeding terns, migrating far out to sea and wintering in the Antarctic Ocean. They return to this region in mid-May, usually nesting in mixed colonies with other terns on rocky or shingle islands or on coastal sandbars. In the more northerly part of the Arctic Tern's breeding range colonies are smaller; in Labrador an unknown but probably significant number breeds solitarily, or in very small colonies, at inland lakes and ponds.

Common Terns breed throughout the Maritimes and insular Newfoundland and as far north as Hamilton Inlet in Labrador. They are less tied to the sea than Arctic Terns, breeding on fresh water lakes in the interior of North America as far north and west as Great Slave Lake. Common Terns may breed in very small colonies or even solitarily at inland lakes in central Canada but their marine colonies are often very large. Eggs are laid in late May and early June and the southward migration normally begins in early September. The migration path of Common Terns is usually close to shore and the winter range of birds breeding in this region is from Florida and the Caribbean south to Brazil.

Roseate Terns have a widespread breeding distribution in the temperate and tropical regions of the world, but they are nowhere very abundant. In Nova Scotia they are near the northern limit of their breeding range and they breed in small numbers at only a few sites. The northernmost breeding of this species in North America is on the Iles de la Madeleine (P.Q.) In this region they nest in colonies with larger numbers of Common or Arctic Terns, migrating to winter on the Atlantic coasts from the Caribbean to Brazil. Roseate Tern numbers have decreased so greatly in recent years that in 1987 the U.S. Fish and Wildlife Service designated the population breeding in the northeastern United States as endangered and the Caribbean population as threatened. In 1989 COSEWIC (Committee On the Status of Endangered Wildlife In Canada) listed the Roseate Tern as a threatened species.

Caspian Terns are larger, averaging 250g in weight. They have a disjunct, cosmopolitan breeding distribution. In this region fewer than fifty pairs are known to breed at four sites, three in Insular Newfoundland and one in southern Labrador. Within Canada they are most abundant in Manitoba and Ontario. In the Great Lakes 3600 pairs are estimated to breed. Comparable numbers breed in Manitoba. In 1978 COSEWIC listed the Caspian Tern as 'Vulnerable'.

3.2 HISTORIC POPULATION CHANGES

Over the past century the numbers of many species of seabirds have changed greatly, and the causes of these changes can usually be ascribed to the influence of man. Radical fluctuations have been observed in populations of gulls and terns. Both were exploited commercially in the nineteenth century in eastern North America and by the end of the century their numbers were greatly reduced.

Terns bred on accessible inshore islands, many of which were, in historic times, settled by fishermen who exploited both adult birds and their eggs for food. However, numbers were apparently not greatly reduced until the last quarter of the century when, in the United States at least, the demands of the millinery trade led to the shooting and trapping of great numbers of adult birds. It is likely that some Canadian tern populations were also reduced by egging and plumage hunting, but probably not as drastically as those breeding in the United States.

Terns responded quickly to the protection which came with the implementation of the Migratory Birds Convention, and populations increased rapidly. In New England breeding terns are estimated to have increased

by 2.5 times, from less than 20,000 pairs at the end of the nineteenth century, to over 50,000 pairs towards the middle of the twentieth century. In the same period, gulls breeding in New England are estimated to have increased tenfold, from 10,000 to 100,000 breeding pairs. Few quantitative historical data exist which can be used to trace population changes of terns or gulls breeding in Atlantic Canada.

3.2.1 Labrador

Both Arctic and Common Terns breed on the Labrador coast. Colonies of the former are more numerous and widely distributed, while those of the latter are not found north of Groswater Bay. In addition to those breeding on coastal islands, an unknown number of Arctic Terns breed solitarily or in small groups in the interior of Labrador. For the purposes of this management plan and in the absence of hard data, a population of 5,000 pairs will be assumed. Previous knowledge of terns in Labrador is so fragmentary that no comparison is possible between past and present numbers.

3.2.2 Insular Newfoundland

Arctic and Common Terns breed on the island of Newfoundland in substantial, though reduced numbers. Caspian terns breed at only three sites.

No historical estimates of the Newfoundland population are possible but it is likely that the presence of subsistence fishing families on the coasts and islands of Newfoundland for several centuries reduced tern populations. Censuses or estimates of the sizes of individual tern colonies have been made by many field workers over the last three decades, and these records have been assembled and published. Close to 4700 pairs were estimated at 82 colony sites. In 1973 a Canadian Wildlife Service aerial survey estimated 16,200 individuals at 131 breeding sites. Because aerial estimates of tern numbers are usually conservative it is likely that this count represented 20,000 to 30,000 breeding birds.

Anecdotal evidence exists of the decline and disappearance of a few large tern colonies in the last two decades and these are contemporaneous with the increase of local gull populations.

3.2.3 Nova Scotia

In Nova Scotia terns are known to have disappeared from many islands on which they once nested. The rate of colony disappearance is documented by the series of low-level aerial surveys made by the Canadian Wildlife Service along the Atlantic Coast of mainland Nova Scotia between 1971 and 1987.

In 1971 the Canadian Wildlife Service undertook an aerial survey of gull colonies in Nova Scotia. Tern colonies encountered during the course of that project were noted and estimates of the numbers of breeding birds were made. At the same time recent records by other observers were tabulated. A total of 51 breeding places were identified, 40 on the mainland Atlantic Coast, 7 on Cape Breton Island, 3 in the Bay of Fundy and one in Northumberland Strait. Estimates of the breeding population at that time were not possible.

In 1982 the Canadian Wildlife Service carried out an aerial search for tern colonies on the Atlantic coast of mainland Nova Scotia and followed this up with ground censuses. Twenty-two colonies were found and a total of 2530 adults counted. Ground censuses of these colonies enumerated 1700 nests. The Bay of Fundy, Cape Breton Island and Northumberland Strait were not censused at that time.

In 1987 the Canadian Wildlife Service carried out an aerial inventory of tern colonies in Nova Scotia. Fifteen colonies, with a total of 1668 adults, were found on the Atlantic coast of the province. The decline in number of colonies on the Atlantic coast of Nova Scotia from 40 in 1971 to 15 in 1987 is one of the best indicators of the recent decline in terns in this region. It is not possible to estimate breeding population changes accurately over this entire period, but between 1982 and 1987 the number of adults counted on aerial surveys declined from 2500 to 1700.

At the beginning of the twentieth century William Saunders, Director of the Dominion Experimental Farms, reported Sable Island to have "...not...far short of a million" terns breeding. This was a reasoned estimate, not a guess. By 1971 only around 2600 terns remained, and the population has declined since then to fewer than a thousand breeding pairs. Even if the turn of the century estimate was high it is evident that tern numbers at this important colony have decreased alarmingly since that time.

3.2.4 New Brunswick

Machias Seal Island is one of the few colonies in the Atlantic Region for which long-term records exist. In 1947 it was estimated that 3400 pairs of Arctic Terns bred there. By 1984 the population had decreased to 1350 nests. In 1988 the Canadian Wildlife Service again censused the island and estimated a breeding population of 1802 pairs of Arctic Terns, 104 of Common Terns and a single pair of Roseate Terns. By 1992 the tern population had increased to 2275 pairs. The increases of terns in recent years may reflect movements of birds from smaller colonies throughout the Gulf of Maine to safer breeding sites in colonies which were managed to limit human disturbance and gull presence. Until recent decades, terns bred on many islands in the Grand Manan archipelago but now Machias Seal Island is their only known breeding place in southwestern New Brunswick.

In contrast, only Common Terns breed on the north and eastern shores of New Brunswick. In 1983 the Canadian Wildlife Service censused tern colonies on this shore and it was estimated that around 15,000 pairs bred there on sandbars and islands in the coastal lagoons. This is the most notable concentration of breeding terns in the Atlantic Provinces.

Unfortunately, there had been no previous systematic census of the colonies on this shore, although some good census records of individual colonies exist. Comparison of these records does not show any consistent trend. Some colonies have decreased. For example in 1970, 702 nests were counted on a single island in Bathurst Harbour. In 1983 only 351 nests were found on all the islands in the harbour. The Egg Island count declined from 216 nests to 74 nests in the same period.

But one colony in Kouchibouguac National Park has grown substantially. In 1971, at the time of the creation of the park, 1,419 nests were counted in this colony; by 1983, it contained 7,000 nests, making it the largest tern colony in eastern North America at that time. This is the only major tern colony in this region which is known to have increased greatly in size.

Other colonies on the north and eastern shores of New Brunswick are subjected to a great deal of human disturbance and in some places on the coast tern eggs are taken. The Kouchibouguac National Park colony is protected from human disturbance, and fewer than 300 pairs of gulls have bred within foraging range. The protection given this colony by the Canadian Parks Service has demonstrated that tern colonies can flourish if protected from disturbance and gull and small mammal predation. The rate of growth of this colony (increasing from 1524 to 6890 nests between 1976 and 1981) has been more rapid than can be explained by successful breeding. Extensive immigration of terns from more disturbed colonies in the Gulf of St. Lawrence is the most likely explanation. But because no systematic censuses of terns on this coast were carried out before 1983, it is not possible to detect declines in neighbouring colonies which may have contributed to the growth of the Kouchibouguac colony.

3.2.5 Prince Edward Island

The breeding seabirds of this province have been fairly well, if not systematically, documented. In 1985 many of Prince Edward Island's seabird colonies were surveyed by the province's Wildlife Federation under the supervision of the Provincial Fish and Wildlife Division, and in 1987 the Prince Edward Island Natural History Society surveyed colonies missed in the earlier census. No previous comparable systematic surveys had been made. Between 1975 and 1978, 18 tern colonies were identified on P.E.I. Surveys in 1985 and 1987 identified only 13 breeding places with a total of 3,654 breeding pairs. The reduced number of breeding places suggests a declining population on Prince Edward Island.

3.3 Present Status of Tern Populations

3.3.1 Labrador

In the course of a Canadian Wildlife Service low-level aerial survey of the Labrador coast in 1978 tern colonies were noted and visual estimates of the numbers of terns flying off them were made. A total of 38 colonies was found and about half were between 55° and 56° north latitude, between Makkovik and Davis Inlet. Of the 3,230 terns counted during the 1978 survey, 2,052 were in these colonies. Because the flight path did not penetrate to the backs of all inlets and estuaries it is likely that some tern colonies were missed. Aerial counts of breeding terns usually underestimate numbers present unless very low passes are made over colonies; so it is probable that the 3,230 terns counted represent at least 5,000 breeding pairs, about 1,000 of them Common Terns.

3.3.2 Insular Newfoundland

No recent assessment of terns breeding in insular Newfoundland has been carried out. In 1973 the Canadian Wildlife Service estimated tern numbers during an aerial inventory of seabird colonies. The 1973 survey identified 131 tern breeding sites on which some 16,200 individuals were estimated to breed. It is certain that the number of colonies and breeding terns has declined since that time and it seems unlikely that the number presently breeding in Newfoundland greatly exceeds 10,000 pairs. Recent survey data suggest that Common and Arctic Terns occur in approximately equal numbers.

3.3.3 Nova Scotia

No single comprehensive survey of all tern colonies in Nova Scotia has been made but data available suggest that around 4,700 pairs presently breed there, with Common Terns the more numerous.

3.3.4 New Brunswick

At present Machias Seal Island is the only known tern colony in southwestern New Brunswick. In 1992 an estimated 2500 pairs of terns bred there. In northeastern New Brunswick 15,000 to 16,000 pairs of Common Terns breed on coastal sandbars.

3.3.5 Prince Edward Island

Between 1985 and 1987 censuses carried out in this province indicated that terns bred at only 13 sites. Only Common Terns are known to breed here and the present population probably does not exceed 3,700 pairs.

3.3.6 Atlantic Provinces population estimate

Sufficient data exist to allow us to make realistic estimates of populations of terns currently breeding in the Atlantic Provinces. These estimates, detailed in Table 1, suggest a total breeding population of around 46,000 pairs.

TABLE 1. Estimated numbers of pairs of terns breeding in the Atlantic Provinces in 1992

		Arctic	*Common*	*Roseate*	*Caspian*
NOVA SCOTIA	Cape Breton Island	400	800	?	
	Atlantic coast	400	2,000	50	
	Sable Island	300	700	13	
NEW BRUNSWICK	Bay of Fundy	2,100	400		
	Gulf coast		15,500		
PRINCE EDWARD ISLAND			3,700		
NEWFOUNDLAND	Insular Newfoundland	5,000	5,000		35
AND LABRADOR	Labrador coast	4,000	1,000		5
	Labrador inland	5,000			
	TOTALS	**17,200**	**29,100**	**60+**	**40**

4
TERN MANAGEMENT METHODS AND OPPORTUNITIES

4.1 Population monitoring.

The numbers of colonial-nesting bird species are usually most easily determined when they are concentrated at breeding colonies. This task is easiest for species such as the auks which breed in a few large colonies at traditional sites. Species, such as terns, which breed in a larger number of, usually small, colonies are not so easily censused. Tern colonies of substantial size are most readily found and counted, but many are small and an unknown proportion breed as isolated pairs.

Terns are, in terms of colony site selection and fidelity, labile species. Small colonies, particularly, may remain in existence for only a few years, disturbance early in the breeding season very often causing a movement to another breeding site. Larger colonies appear to be more tolerant of disturbance and are more persistent. There is also an undefined movement of birds from one colony to another in a single year or from year to year. The sizes of smaller colonies may vary greatly between years, and such changes may be independent of overall population changes.

Censuses of sample colonies over a period of time may not adequately reflect population changes. If censuses were to be carried out at a few large colonies, population declines might remain undetected if the first effect were a reduction in size of, or an abandonment of, small colonies. If numbers were increasing and colonies proliferated rather than increasing in size, censuses of a small sample of colonies would, again, give an inaccurate determination of population status.

Tern populations can only be monitored with confidence if all colonies within the area of concern are censused in the same year. These constraints must be kept in mind in the design of a population monitoring scheme. An effective population monitoring program requires careful ground counts of nests made shortly after the peak of laying and corrected with an estimate of uncounted nests. Aerial or ground censuses which count only adult birds are useful indicators but they are not adequate for population monitoring.

4.2 Development of a tern enhancement strategy

It is impossible to pursue a strategy for enhancing tern populations in the absence of a comprehensive plan to address the proliferation of large gulls. For this, and other, reasons the Canadian Wildlife Service has produced an *Atlantic Region Gull Management Plan*. This plan addresses gull related issues at two levels. As an interim measure it details actions that will be taken to rectify problems such as predation on terns. It also specifies actions that will be taken in the long term to reverse increases in gull populations.

Terns breed in many, often relatively small, colonies and, with the resources available to the Canadian Wildlife Service, not all of them can be given adequate protection from predation and damaging human intrusion. It has been noted that a relatively few colonies of terns and gulls exhibit unusually high breeding success and produce most of the recruits to a given population. These facts are at the root of the strategy advanced in this management plan.

The selection of the most productive colonies is difficult because sufficient data on reproductive success are not available. Furthermore, many colonies may not be achieving their potential at present because of high disturbance or predation. Therefore, the selection of a 'core' colony, a colony selected for management, will be made on the basis of its potential productivity and suitability for management using the following criteria:

- It is in an area of abundant food for terns during the breeding season. Such a food sufficiency may be indicated by the fact that a site supports a large tern colony at present, or has supported such a colony in the recent past.
- It provides suitable nesting habitat for terns.
- It has few avian or mammalian predators or can easily be made and kept free of predators.
- Human intrusion at the site in breeding season is minimal or can be controlled.
- It already has protected status.

The chief criterion for success in the management of core colonies is a high rate of reproductive success. It is unlikely that all the colonies first chosen as core colonies will be uniformly productive and it is important for the success of this strategy that the productivity of core colonies be regularly assessed. New core colonies will be selected to replace those which do not show a high reproductive success.

Securing effective management of core colonies is a minimum first step in effective tern conservation. In

order to secure tern colonies from disturbance and predation the Canadian Wildlife Service will need the assistance of other organisations, both government and non-government.

The predation control aspect of this plan will be limited to addressing "unnatural" predation. Gull populations have increased to levels far higher than would exist without anthropogenic enhancement of their food supply. Introduced species, such as mink in Newfoundland, also constitute an "unnatural" hazard for tern populations. While these situations must be addressed, no attempt will be made to control normal predator-prey relationships which have contributed to the evolution and functioning of natural ecosystems.

Many of the colonies initially chosen as core colonies have already been given some measure of protection, and this protected status was an important factor in their selection. Three are in National Parks, and receive adequate protection from human intrusion. However, gulls have become a problem at all three, and their influence must be controlled if these colonies are to survive.

The colonies selected for consideration as core colonies are described below and listed in Table 2. Their locations are shown in Fig. 1.

Tabusintac Bar. The fact that so many birds have migrated into Kouchibouguac National Park suggests that undisturbed breeding sites are lacking in the southwestern part of the Gulf of St. Lawrence. It is possible that a colony the size of the Kouchibouguac National Park colony may strain local food resources, therefore at least one other safe breeding site should be established on the gulf coast of New Brunswick. This requirement can best be met by obtaining protection for breeding birds on the barrier beaches fronting the Neguac, Tabusintac, and Tracadie lagoons, some 60 km north of the Kouchibouguac colony. These sandbars and their enclosed lagoons are, at present, highly disturbed by clam diggers, picnickers, fishermen and all-terrain vehicles. They are breeding places of Common Terns, Piping Plovers (*Charadrius melodus*) and gulls, while the wetlands and lagoons are valuable migrant waterfowl habitat.

In 1983, some 3,700 pairs of terns were estimated to breed at five sites on the Tabusintac bar system. On the adjacent Neguac and Tracadie Bars a further 3,800 pairs were attempting to breed. Herring Gulls and Great Black-backed Gulls also nest on these sandbars and it is expected that, in addition to human disturbance, terns are subject to gull predation. Management of this area for the benefit of terns would also secure breeding habitat for Piping Plovers and would preserve important habitat for migrating waterfowl.

Kouchibouguac National Park. The colony on barrier beach islands in this park showed rapid growth from 1,500 pairs in 1971 to some 7,000 pairs by 1983 as a result of immigration from more disturbed colonies elsewhere in the Gulf. Gulls have recently become an occasional problem but the park administration is discouraging their nesting in or close to the colony.

Machias Seal Island has been a Migratory Bird Sanctuary since 1944. Sanctuary status provides protection to the breeding Atlantic Puffins (*Fratercula arctica*) and Arctic and Common Terns. In 1992 some 2503 pairs of Arctic and Common terns bred there, an increase from 1903 nests estimated in the previous survey in 1988. It is possible that terns which abandoned Peters Island in 1992 may have moved to this colony. Gulls are excluded from the island and human disturbance is carefully controlled.

Cascumpec and Conway Sandhills. There is evidence of a significant decrease in the number of breeding terns and tern colonies on Prince Edward Island. Of the remaining colonies four are of substantial size: Indian Point Sandhills, 350 pairs; Alberton Harbour, 480 pairs; Cascumpec Sandhills, 1,000 pairs; and Conway Sandhills, 1,200 pairs. It is desirable that at least two of these colonies be accorded formal protection. The Conway and Cascumpec Sandhill colonies should be given first consideration because they are the largest. However, colonies on these coastal bars are vulnerable to terrestrial predators and in the long term it may be best to direct conservation efforts to management of colonies in Alberton Harbour.

Peters Island lies in the narrow passage between Brier Island and Long Island on the southern side of the mouth of the Bay of Fundy. It is owned by the Nova Scotia Bird Society and in 1992 that society began a program of gull management to reduce predation on terns. Some 500 pairs of terns, the majority Common Terns, have bred at this site since about 1970. In 1992 the terns abandoned this colony when the number of gulls breeding there increased to about 400 pairs. The Nova Scotia Bird Society and a committee of local citizens are undertaking to control gulls at this colony to allow terns to return and breed successfully.

The Brothers are two small islands near Pubnico in Southwestern Nova Scotia. In 1992, 413 nests were counted on these islands, about two-thirds of them Common terns and most of the remainder Arctics. Twenty three nests of Roseate Terns were identified but as many as 30 pairs may be attempting to breed there. The Province of Nova Scotia is in the process of purchasing these islands, intending to designate them a provincial Wildlife Management Area.

Grassy Island is situated at the mouth of Mahone Bay. It has not been censused but visitors in 1992 have estimated that between 500 and 1000 pairs of Common and Arctic Terns breed there. This island has no protected status.

Sable Island is a Migratory Bird Sanctuary which is, in its entirety, owned by the Department of Transport.

That department restricts access to the island, and the terns breeding there are undisturbed except for the impacts of the feral horses and breeding gulls. Food for terns is abundant as juvenile gadoid fish and sand lance (*Ammodytes americanus*) are plentiful. This abundance of fish also maintains the large seal population on the island.

Studies of the reproductive success of terns on Sable Island have shown that they suffer huge losses to gulls and do not rear enough chicks to fledging to sustain the population. Censuses in the mid 1980s suggest that about a thousand pairs of terns now breed there. Studies of the Sable Island gulls have shown that they are stressed by a shortage of food in the breeding season and, consequently, prey heavily on breeding terns. Gulls first began to breed on Sable sometime after 1920 and the decline of the terns there has been contemporaneous with the increase of gulls.

In New England several tern colonies have been rehabilitated by removal of the breeding gull populations. A major problem with such removals is that gulls soon re-populate managed islands, requiring continuing control efforts. On Sable Island, re-population is expected to be very much slower than in colonies near the mainland and it is thus an excellent candidate for management by elimination of the breeding gulls. The previous large size of the tern colony on Sable Island and the abundance of food organisms during the breeding season is indicative of its potential to support a large tern population.

Sable Island was estimated to have close to a million breeding terns at the turn of the century, a time when terns were reduced greatly in the eastern United States. The rapid expansion of the New England tern population following the implementation of the Migratory Birds Convention may have been due to immigration of birds from Sable Island.

Guyon Island is owned by Transport Canada and that agency maintains the automated light on the island. Approximately one thousand birds have been estimated on the island in the course of aerial surveys. The species composition of this colony is not known but it is assumed that approximately equal numbers of Arctic and Common Terns breed there. Gulls also breed on this island but their effects on the terns are not known.

Cape Breton Highlands National Park. The tern colony at Middle Head is on a small island separated from a promontory by a 5 metre wide channel. Up to 1980 about 200 terns bred on this island, a quarter of them Arctic Terns. In 1980 gulls began to breed on the island and this has prevented terns fledging chicks. However, terns still return to the island and its rehabilitation would be straightforward.

This colony is of particular interest to the park because of its interpretive possibilities. At present no other tern colonies in the Atlantic Provinces can be viewed by visitors with minimal supervision. This colony requires management to enhance its interpretive value to the park.

Gros Morne National Park was established in 1973 and the first census of terns in 1976 showed about 190 pairs breeding within the park and a further 200 pairs in areas immediately adjacent to the park. By 1984 the population had increased to 254 pairs within the park and 383 outside the park in St. Paul's inlet, a total of 637 pairs. This increase in tern numbers has occurred in spite of a large increase in gulls in the park and the consequent displacement of terns from their traditional breeding site on Stearing Island.

This park has framed a tern management plan which includes re-instatement of terns on Stearing Island and it is negotiating with the provincial government to obtain protection for the terns breeding in St. Paul's inlet.

North Penguin Island has recently been identified as the breeding site of 28 pairs of Caspian Terns. Only four other breeding sites are known in this region and at each of these only one or two pairs have nested. At present this colony has no protected status.

Terra Nova National Park. Approximately 350 terns breed within the park at present. A decade ago 17 sites were occupied by terns but gulls have displaced terns from 8 of these small colonies. At present a vigorous tern conservation program is underway in this park.

Other Newfoundland and Labrador colonies. It is desirable that in addition to the three colonies listed below at least one other core colony be selected in insular Newfoundland. However, known tern colonies in Newfoundland and Labrador at present are small, and few historical census data exist, so that it is difficult to select sites on which there were once large colonies and which have the potential of becoming a core colony. The Provincial Department of Environment and Lands has expressed willingness to consider Ecological Reserve status for any important site which is identified.

TABLE 2. Estimated numbers of pairs of Arctic, Common, Roseate and Caspian Terns presently breeding in core colonies .

Colony	*Arctic*	*Common*	*Roseate*	*Caspian*
Tabusintac Bar, N.B.		3,700		
Kouchibouguac National Park, N.B.		6,400		
Machias Seal Island, N.B.	2300	200	1	
Cascumpec Sandhills, P.E.I.		1,000		
Conway Sandhills, P.E.I.		1,200		
Peters Island, N.S.	200	300		
The Brothers, N.S.	90	300	23	
Grassy Island		500+		
Sable Island, N.S.	400	600	10	
Guyon Island, N.S.	500	500		
Cape Breton Highlands National Park	75	25		
Gros Morne National Park, Nfld.	+	1,000		
North Pelican Island, Nfld.	100	50		28
Terra Nova Natl. Park, Nfld.	100	75		
TOTALS	**3,765+**	**15,950+**	**34**	**28**

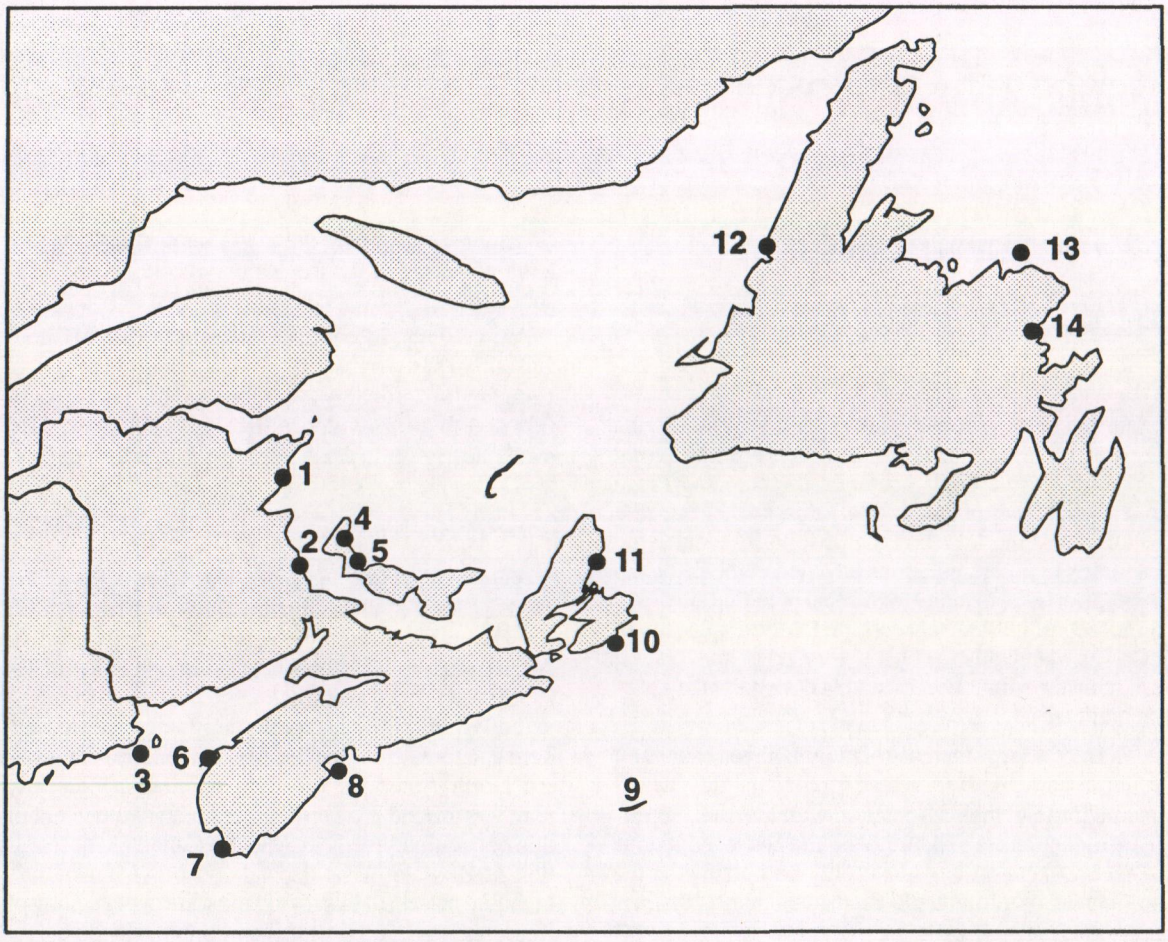

Figure 1. Locations of important tern colonies in Atlantic Canada

1 Tabusintac
2 Kouchibouguac National Park
3 Machias Seal Island
4 Cascumpeec Sandhills
5 Conway Sandhills
6 Peters Island
7 The Brothers
8 Grassy Island
9 Sable Island
10 Guyon Island
11 C. B. Highlands National Park
12 Gros Morne National Park
13 North Penguin Island
14 Terra Nova National Park

5
ISSUES AND ACTIONS

5.1 POPULATION MANAGEMENT

5.1.1 Issues

a. Problems on the breeding range

Disturbance, displacement and predation by large gulls are the most important negative effects on terns during breeding season. Gulls arrive on the breeding range and begin breeding earlier than terns, so they are able to take over the best breeding habitat. Recent large increases in gull populations have led to the displacement of terns from many traditional breeding sites. But the effects of gulls are not confined to the displacement of terns. They also prey on tern eggs and chicks, reducing breeding success, and occasionally they prey on adult terns.

The recent large increase of gulls has been caused by benefits, particularly increased food availability, which accrue through their association with humans. Significant reductions in gull numbers, and hence reductions in their effects on terns, can only be obtained if the amount of anthropogenic food available to them is decreased.

In some places human disturbance may be a problem. In summer many of the sandbars and islets on which terns breed are subjected to increasing recreational use. The disturbance caused by these summer visitors may displace terns to less desirable breeding sites, or may simply lower breeding success by facilitating gull predation.

The accumulation of toxic chemical residues and heavy metals in the tissues of terns is a matter of some concern in the Great Lakes Common Tern population. Analysis of the tissues of terns breeding in New Brunswick and Prince Edward Island have shown that levels of furans and dioxins are at the detection limit of the analytical technique. No other evidence of toxic accumulations, such as high frequencies of chick deformities or reduced fertility, has been noted.

b. Problems on the winter range.

Common Terns and Roseate Terns breeding on the Atlantic Coast of North America undertake near-shore migrations to winter in the Caribbean and in Central and South America. In these regions they are subject to a variety of anthropogenic mortality factors such as hunting and oiling. Human predation on the winter range has been thought to be of major importance in the decline of Roseate Terns and it is probably important to Common Terns. There are also some indications that terns wintering in the tropics may be subject to food shortages.

Arctic Terns, in contrast, migrate farther offshore and winter at sea on the edge of the Antarctic pack-ice. Here they are probably less subject to human persecution and there is evidence that, with abundant food available to terns in the Antarctic summer, mortality is low.

c. Threatened species

In the Atlantic Provinces Roseate Terns are at the northern limit of their breeding range in North America. They breed in this region in small numbers and, like Arctic and Common Terns, the population is declining. COSEWIC (the Committee On the Status of Endangered Wildlife In Canada) has designated the Roseate Tern as a threatened species in Canada. The northeastern North American breeding population presently numbers around 3,000 pairs. Less than two percent of this population breeds in Atlantic Canada. Conservation of Roseate Terns depends on provision of safe breeding places. In this region most known breeding of Roseates is on The Brothers and Sable Island.

Caspian Terns breed over most of North America, but nowhere in large numbers. Approximaty 90% of the Canadian population breeds in Manitoba and Ontario. Less than 1% breeds in the Atlantic Provinces. The greater part of the Canadian population breeds at a single site, facilitating management of this species.

5.1.2 Actions

a. Problems on the breeding range

The Canadian Wildlife Service will implement the Atlantic Region Gull Management Plan which specifies a strategy by which the numbers of gulls in this region will be reduced over the long term.

Accumulations of toxic substances in terns breeding in the Atlantic Region will be monitored by sampling of tissues at a variety of sites and by monitoring for increases in deformities in tern chicks. Where problems are detected programs of investigation and amelioration will be designed and instituted.

b. Problems on the winter range.

The Canadian Wilflife Service will contribute to the international conservation of marine terns by:

- *Monitoring populations*
- *recommending research and conservation programs to the C.W.S. Latin American Program and to other agencies and organisations*
- *providing expertise and advice as appropriate.*

c. Threatened species

A recovery plan for Roseate Terns which recommends management of the important colonies on Sable Island and The Brothers will be completed in 1992. Implementation will begin immediately thereafter.

A recovery plan for Caspian Terns has not been written. The Canadian Wildlife Service will work with the provincial Department of Tourism and Culture to provide protected status for North Penquin Island and provide management to minimise disturbance and predation.

5.2 HABITAT MANAGEMENT

5.2.1 Issues

a. Core colonies

The effective conservation of terns depends very much on the conservation of their breeding habitat. In this region a variety of factors contribute to their exclusion from the most suitable breeding habitat. The proliferation of gulls has resulted in terns' exclusion from many traditional breeding places. Human use of coastal islands may also be a problem, as is the case in northern New Brunswick where human occupation, clam digging and recreational use have reduced breeding habitat available to terns on the barrier beaches.

Although not all tern colonies can be protected, it will be possible to ensure a secure core breeding population by protecting a limited number of the larger and most productive colonies. The core population thus protected will be able to breed successfully, generating a large number of recruits to the population and contributing to the re-population of other colonies in the region.

Control of the majority of tern breeding habitat lies with agencies other than the Canadian Wildlife Service, consequently the co-operation of other organisations is essential to guarantee habitat conservation.

b. Provincial agencies

The majority of tern breeding habitat is controlled by the provinces. Their co-operation and participation is essential to meeting the objectives of this plan.

c. National Parks

Important tern breeding habitat is included within the boundaries of National Parks in this region. The commitment to wildlife conservation by the Canadian Parks Service is high. However, some parks with significant tern populations do not have ready access to the expertise which would allow them to manage tern colonies effectively.

d. Wildlife interest groups

One naturalist organisation in this region owns property on which terns breed but it does not have the expertise for effective management. Other naturalist organisations also have the desire to be involved in seabird protection and sanctuary management.

5.2.2 Actions

a. Core colonies

The Canadian Wildlife Service will propose a program for management of the Sable Island Migratory Bird Sanctuary to enhance the breeding of terns by reducing the impact of gulls. Public review of the program will be undertaken in 1993.

The Canadian Wildlife Service will advise and assist the managers of Kouchibouguac National Park in their management of tern breeding habitat in the Park.

The Canadian Wildlife Service will, in concert with the province of New Brunswick, at-tempt to obtain legislated protection for the Neguac-Tabusintac-Tracadie lagoon complex.

The Canadian Wildlife Service will continue its program of management and protection of the Machias Seal Island Migratory Bird Sanctuary to ensure continued secure and undisturbed nesting of terns.

The Canadian Wildlife Service will work with the Nova Scotia Bird Society and with local residents to ensure secure and undisturbed nesting of terns on Peters Island.

The Canadian Wildlife Service will work with the province of Nova Scotia and with local residents to ensure secure and undisturbed nesting of terns on The Brothers.

The Canadian Wildlife Service will encourage, advise and assist the staff of Gros Morne National Park in their management of habitat within the park for the advantage of breeding terns.

The Canadian Wildlife Service will co-operate with the Parks Division of the Newfoundland Department of Tourism and Culture to locate and secure protection for major tern colonies in Newfoundland and Labrador.

The Canadian Wildlife Service will work with provincial government and naturalist organisations to secure

undisturbed nesting of terns in Prince Edward Island by seeking protection and management for at least two of the four major tern colonies in that province.

The Canadian Wildlife Service will, with the co-operation of Transport Canada, make and execute plans to maintain or enhance tern populations on Guyon Island.

b. Provincial agencies

The Canadian Wildlife Service will encourage provincial wildlife and habitat conservation agencies to protect and manage important tern breeding sites.

c. National Parks

The Canadian Wildlife Service will co-operate with the Canadian Parks Service in making and executing plans to maintain or enhance tern populations in National Parks in the Atlantic Region.

d. Wildlife interest groups

The Canadian Wildlife Service will work with wildlife interest groups to undertake management of tern colonies and will assist them in their efforts.

5.3 Population Monitoring and Research

5.3.1 Issues

a. Population monitoring

In the past, tern colonies in Atlantic Canada have been censused only sporadically, and the population data available are insufficient for accurate monitoring of population changes or for planning a coherent tern management program. The effectiveness of conservation measures proposed in this management plan can only be assessed if tern population levels and trends are known accurately. Adequate monitoring of results is an integral requirement of any management scheme, and at present the data base of censuses is not sufficient for the task.

b. Promotion and encouragement of tern research.

Effective management of tern populations requires, at the very least, periodic reliable estimates of population size, but census data alone are not sufficient to allow confident management of a population. Also required is a knowledge of reproductive success and mortality rates, factors which determine the rates of increase or decrease of the population, and of food availability, which can limit colony growth.

At present tern reproductive success data are available only for the heavily stressed colonies on Sable Island and Machias Seal Island. We do not have representative reproductive success or adult survivorship data which will allow us to model Atlantic Region tern populations accurately. Furthermore, it is desirable that the effectiveness of management of the core colonies be assessed. Mere increases in size of colonies may reflect only immigration from less protected colonies, as has happened in Kouchibouguac National Park. For these reasons there is a need to begin monitoring reproductive success in several colonies in the region.

5.3.2 Actions

a. Population monitoring

The Canadian Wildlife Service will promote and help undertake a tern population monitoring program:

- *all tern colonies in the region will be censused as human and fiscal resources, including partnerships, permit. Ideally these censuses should be carried out at intervals of ten years or less.*
- *core colonies will be censused as human and fiscal resources, including partnerships, permit. Ideally these censuses should be carried out at intervals of 3 years or less.*
- *colonies in northern New Brunswick will be re-censused as human and fiscal resources, including partnerships, permit. An interval of five years or less is ideal, with the next full census to be carried out in 1992.*
- *the Seabird Colony Registry will be used forc ensus data storage, manipulation and retrieval.*

b. Promotion and Encouragement of Tern Research.

Research on the feeding and reproductive biology of terns in the Atlantic Region, particularly at the core colonies identified by this management plan, will be encouraged or undertaken by the Canadian Wildlife Service.

The Canadian Wildlife Service will also encourage and facilitate research on terns at universities and within other federal and provincial government agencies in the Atlantic Provinces.

5.4 Enforcement

5.4.1 Issues

a. Disturbance

Disturbance of seabird breeding colonies was reduced in the early years of this century when many fishermen abandoned inshore islands and moved into mainland villages. More recently, the real income and leisure time of Canadians has increased, and with the ready availability of outboard motorboats and all-terrain

vehicles, many of the breeding sites of terns are subject to damaging human disturbance. The most serious effect of disturbance may be that disturbed colonies are subject to increased gull predation.

b. Egging

Tern eggs were once widely consumed by humans, but human populations are now far removed from a subsistence existence and egging is only a local problem. In the Atlantic Region egging has been reported in recent years only in northern New Brunswick and in Newfoundland. In the absence of other problems egging, at its present level, might not be of great consequence. However, terns are now subject to such heavy predation by gulls that egging may be an important factor reducing overall breeding success locally.

c. Gull management at colonies.

The control of gulls at tern colonies, whether it involves killing of gulls or just scaring them, has the potential to attract unfavourable public comment. Gull control requires the possession of a Canadian Wildlife Service permit.

5.4.2 Actions

a. Disturbance

The Canadian Wildlife Service will, on learning of any serious disturbance problems, co-ordinate response by federal and provincial wildlife enforcement officers to solve the problem quickly.

b. Egging.

Where incidents of egging are reported or suspected, the Canadian Wildlife Service will combine enforcement with a program of public information in the area to attempt to solve the problem and will make every effort to prosecute eggers if the problem continues.

c. Gull management at colonies.

Gull management at colonies will be undertaken only where necessary and following guidelines set out in the Atlantic Region Gull Management Plan. All gull control initiatives will be carefully examined and regulated by the Canadian Wildlife Service.

5.5 Public Communications and NGO Co-ordination

5.5.1 Issues

a. Gull control for tern colony management.

Gull control projects have the potential of arousing strong opposition among some of the general public.

b. Local action for colony preservation.

Public awareness of the plight of terns is limited, but naturalist societies have been made aware of tern problems. The Canadian Wildlife Service does not have the resources to manage many tern colonies and it is desirable that local initiatives to preserve breeding terns be encouraged.

c. Ecotourism and colony management.

The long-term continuance of seabird preservation initiatives is best guaranteed by relating them to the financial interests of area residents. Well regulated ecotourism has been shown to have very few negative effects on seabirds and it has the great advantage of sensitising large numbers of citizens to the desirability of preserving diminishing seabird populations.

d. Co-ordination of tern conservation and management efforts.

An effective tern conservation strategy requires the co-ordination of the efforts of many different groups. The Canadian Wildlife Service, in law, has responsibility for the management of migratory birds, including terns. But breeding habitat, protection of which is central to the conservation of terns, is controlled by many other organisations. Many of the most important tern colonies are on provincial crown land. Others are controlled by conservation groups and a few are within National Parks. The efforts of each agency are more effective if they are co-ordinated with those of others, and if information is freely disseminated. To this end the Atlantic Canada Tern Working Group was founded by the Canadian Wildlife Service in 1988. It is not clear to what extent there is interchange of birds between colonies in the Atlantic Provinces and the Gulf of Maine on one hand and the more northerly parts of the Gulf of St. Lawrence on the other. Plans for management of Atlantic Canada's tern population can only be effective if consultation with agencies managing terns in adjacent regions is maintained.

5.5.2 Actions

a. Gull control for tern colony management

The Canadian Wildlife Service will make strong efforts to inform the public of its reasons for, and the necessity of, undertaking any gull scaring or killing program to aid terns.

Where gull control is necessary for the preservation of a tern colony, a program of public consultation and information is a mandatory prerequisite.

b. Local action for colony preservation.

The Canadian Wildlife Service will attempt to interest local naturalist groups and local citizens in undertak-

ing projects designed to preserve or rehabilitate tern colonies

c. Ecotourism and colony management

Where any tern colony rehabilitation project can be tied to the economic interests of local people by the sustainable development of eco-tourism projects, the Canadian Wildlife Service will encourage such an initiative.

d. Co-ordination of tern conservation and management efforts

In order to co-ordinate, and make more effective the efforts of the several agencies and individuals working for tern conservation in this region, the Canadian Wildlife Service will support and maintain the Atlantic Canada Tern Working Group.

The Atlantic Region of the Canadian Wildlife Service will maintain close co-operative and consultative links with agencies managing terns in the Gulf of St. Lawrence, the Gulf of Maine and the Great Lakes.

6
IMPLEMENTATION

This management plan defines actions necessary for the conservation of tern populations which breed in Atlantic Canada. However, its implementation will be a complex process involving the co-ordination of the activities of many provincial and federal government agencies and non-government conservation organisations.

The mandate of the Canadian Wildlife Service in regard to preservation of declining species is clear, but even so the immediate implementation of all the actions defined as needed for the protection of terns in the Atlantic Region is constrained by limited resources. Action by other government and non-government agencies, which we hope to have as partners in efforts to conserve terns, requires first that they are convinced of the necessity for action and secondly, that they can mobilise resources to participate in the program.

A further complexity derives from the fact that terns breeding in the Atlantic Region spend the non-breeding phase of their lives outside Canada. It is likely that many conservation initiatives which are crucial for population management must be made in other countries. Effecting conservation actions abroad will require co-ordination of the efforts of Canada and the United states, which share the North American breeding populations of terns, in negotiation with Latin American and other southern Hemisphere countries in which terns winter.

The decreases of terns in recent decades are of such magnitude that we should begin implementation of this management plan on several fronts at once. However, the constraints discussed above necessitate the assignment of implementation priorities. These reflect both biological urgency and resource constraints.

6.1 First priority initiatives

6.1.1 Implementation of the regional gull management plan.

Central to the plight of terns breeding in eastern North America are the recent great increases in gull populations which have been fuelled by the wastes of human society. The Atlantic Region of the Canadian Wildlife Service has in place a regional gull management plan which specifies a long term strategy for the reduction of gull populations by reversing those environmental changes which have led to their increase. The implementation of this aspect of the Gull Management Plan has already begun. The Gull Management Plan also considers the need for local gull control initiatives to protect important seabird colonies.

6.1.2 Management at core colonies.

The continuing decline of terns lends an urgency to the need to begin active conservation efforts. Assessment of the core colonies will begin immediately. Because management may necessitate gull controls, and because there is not complete public acceptance of the necessity for such controls, it is necessary that the program of public information on tern conservation and the need for gull controls begin at the same time. Core colonies given priority for assessment and management are North Penguin Island, Sable Island, Brothers Islands, Peters Island and those colonies in the Tabusintac area of New Brunswick.

6.1.3 Roseate Tern management.

A Roseate Tern Recovery Plan has been accepted by RENEW (Recovery of Nationally Endangered Wildlife). This will be finalised in 1992. Implementation has already begun and will continue to receive high priority.

6.1.4 Initiation of the program of tern population monitoring

The program will be implemented as fiscal and human resources, including partnerships, permit. An attempt will be made to begin with censuses of Gulf of St Lawrence colonies in 1993, of insular Newfoundland in 1994, and of colonies on the Maritimes Atlantic coast in 1995.

6.1.5 Co-ordination of tern conservation efforts.

The Atlantic Canada Tern Working Group, which encourages and coordinates tern conservation initiatives in other organisations, will be actively supported by the Canadian Wildlife Service.

6.2 Second priority initiatives

After the above described initiatives have been undertaken the Canadian Wildlife Service will be able to begin tasks which are less urgent.

6.2.1 Completion of core colony selection and assessment.

Guyon Island (45°46'N, 60°07'W) and Grassy Island (44°27'N, 64°08'W) in Nova Scotia and the larger colonies in the provinces of Prince Edward Island and Newfoundland will be assessed and management strategies will be developed and initiated. Advice will be offered to the Canadian Parks Service concerning management of core colonies which are in National Parks.

6.2.2 Co-operation in management with citizens groups.

Where possible, naturalist or local citizens organisations will be involved in colony management regimes. Where a potential for ecotourism exists, the Canadian Wildlife Service will encourage initiatives which are compatible with conservation of tern colonies.

6.3 THIRD PRIORITY INITIATIVES

With the most important management initiatives in place and population monitoring systematised, it will be possible to undertake other tasks which will refine our abilities to manage tern populations effectively. These tasks will include:

6.3.1 Reproductive success monitoring at core colonies

The success of core colony management will be assessed by reproductive success monitoring.

6.3.2 Monitoring of toxic chemical levels in terns

If existing monitoring programs suggest problems, more intense investigations will be undertaken.

6.3.3 Support and promotion of university research.

The Canadian Wildlife Service will give priority to research at Atlantic Region universities which has direct application to tern conservation.

6.3.4 Development and maintenance of consultative links with tern managers in adjacent regions.

These relationships exist informally. They will be strengthened and formalised.

6.3.5 Investigations of problems on the winter range

If it is indicated that problems on the winter range of terns are at the root of population declines, such situations will be investigated and documented. Governments of countries in which terns winter will be urged to rectify any untoward situations revealed.