Canadian Wildlife Service
Atlantic Region

1999 Annual Reports

Species at Risk Recovery Programs

Diane L. Amirault
Andrew W. Boyne
Peter Thomas

Annual Report - 1999

Harlequin Duck Research, Conservation, and Recovery Activities in eastern North America and Greenland

Peter W. Thomas
Canadian Wildlife Service
6 Bruce Street
Mount Pearl, NF
A1N 4T3

1999 Annual Report: Status of the Harlequin Duck (*Histrionicus histrionicus*) Recovery Efforts in eastern Canada

Overview

Several major projects were undertaken in 1999 to investigate breeding, moulting, and wintering Harlequin Ducks in eastern North America. Winter surveys were conducted in New Brunswick, Newfoundland, Nova Scotia, and Maine, and regular Christmas Bird Counts were conducted throughout the region. Surveys for new moulting areas continued in Newfoundland and Labrador, as well as Québec. The only breeding Harlequin Duck study was conducted in Labrador where 54 individuals were successfully banded. Additional banding and tissue sampling were conducted on moulting sites in Labrador, and along the western coast of Greenland. Wintering Harlequin Ducks continue to be captured along the coast of Maine, and there are plans to attempt a winter capture in eastern North America.

The complete 1998-99 Christmas Bird Count (CBC) data has yet to be compiled, hence data are not available to determine current trends. An updated distribution and population status generated by Goudie *et al.* (1999) summarizes CBC data from 1960-61 to 1996-97. Goudie *et al.* (1999) indicated declines in the population wintering in eastern Canada up until 1991 or 1992. Since 1992 the overall pattern has been an increase in most known wintering areas along eastern Canada. However, this statement should be qualified by the fact that the majority of the CBC effort that this trend analysis is based upon are from a few specific sites. The number of Harlequin ducks observed in CBCs in the eastern United States has been increasing since the early 1970s, however, part of the increase is due to the addition of new CBC sites.

Newfoundland & Labrador

A breeding Harlequin Duck survey was conducted by Scott Gilliland and Bruce Turner along the Torrent River, Newfoundland (50° 37' N; 56° 50' W) on 11 May, 1999. A total of 21 individuals were discovered, consisting of nine pairs, two lone males, and one lone female. One pair was captured and banded during the same survey.

Surveys were conducted to search for additional moulting areas along the coast by Scott Gilliland and Pierre Ryan of CWS - St. John's. This survey extended from the Northern Peninsula of Newfoundland to Nain, Labrador. Two substantial new moult sites were discovered. The first at the northern end of the Grey Islands (see Figure 1); 144 Harlequin Ducks were observed moulting in this area. The moulting site is located outside the boundaries of the Migratory Bird Sanctuaries at Shepherd Island (50° 44' N; 55° 39' 55" W) and Ile aux Canes (Green Island) (50° 41' N; 55° 37' W) located within that cluster of islands. During the same aerial survey Gilliland and Ryan discovered another new moult site of approximately 30 individuals at St. Peter's Bay in southern Labrador (see Figure 1). These surveys were conducted on 16 August as part of a larger

surveying effort.

An aerial survey was conducted at the Stag Islands (54° 05' 00" N; 57° 12' 00" W) and the Tumbledown Dick Islands (54° 09' 10" N; 57° 08' 56" W) by Gilliland and Ryan on August 16 and found no Harlequins present. Boat and ground surveys were conducted on 12 August, 1999 at the North Stag Islands by Greg Robertson, Peter Thomas, Johanne Dussureault, and Brian Veitch. Forty three Harlequin Ducks were observed: 35 males and 8 females. Two yellow leg bands and one white leg band were observed. No numbers could be recorded.

Boat and ground surveys were conducted at the Gannet Island cluster (53° 56' 00" N; 56° 32' 00" W) by Greg Robertson, Johanne Dussureault, and Mark Button. The maximum count for the cluster was 166 Harlequin Ducks. There were 16 band resightings as listed in Table 1.

A trapping effort was also conducted at the Gannet Island cluster, and the North Stag Islands by Greg Robertson, Peter Thomas, Johanne Dussureault, Mark Button, and Brian Veitch. Trapping conditions were difficult, but 33 birds were captured, banded and tissue sampled. One previously banded bird was recaptured at the North Stag Island. The location, age and sex of captured birds are as follows:

Gannet Islands: 8 ASY males; 4 SY males; and 1 SY female
(ASY = after second year; SY = second year)

North Stag Island: 16 ASY males; 3 SY males; and 1 ASY female

Recapture: 1 ASY male: colour band: yellow - black letters: **V0**; CWS band: **705-71113**
This individual was banded by Ian Goudie on its breeding grounds along the Torrent River, Newfoundland on May 22, 1998.

Ian Goudie, in conjunction with the Institute of Environmental Monitoring and Research (IEMR) conducted the first year of a multi-year study on the Fig River, Labrador (53° 12" 00" N; 63° 11' 45" W) to assess the impacts of low-level flying military aircraft on the activities and reproduction of Harlequins in this region. Goudie & Jones produced a report on their activities entitled: *The Effects of Disturbance on Behaviour and Condition of Harlequin Ducks Breeding on the Fig River, Labrador* (http://www.mun.ca/acwern/figriver.pdf). Goudie & Jones reported that Harlequin Ducks did respond to aircraft overflights. The strongest reactions were elicited from helicopters (mean reaction time = 95 sec.; N = 2), then Transalls (mean reaction time = 60 sec.; N = 2), and followed finally by low-level flying jets (mean reaction time = 8 sec.; N = 2). However, the statement is qualified by the fact that sample sizes were too small to support statistical testing. Goudie captured and banded 38 individuals: 8 adult males, 13 adult females, and 17 juveniles. Blood and feather samples were also collected from some individuals.

As part of an ongoing monitoring program for the Department of National Defence, Jacques-Whitford Environment - Labrador (JWEL) continued their survey effort of breeding areas in Labrador, and their data is available in a binder format. Additionally, JWEL initiated a radio-telemetry study to assess whether individuals discovered on rivers early in the breeding season via aerial surveys, stayed on the rivers where they were first discovered. JWEL placed radio-transmitters on 11 female Harlequin Ducks, but all dropped before the completion of the study. However, with the preliminary data that was collected, all but one were found to stay on the river.

The combined work of Ian Goudie and JWEL succeeded in capturing and banding 54 individuals between 18 May and 26 August, 1999: 21 ATY females; 15 ATY males; 2 '2b' juvenile females; 3 '2c' juvenile females; 10 '2b' juvenile males; and 1 '2c' juvenile male. Blood and feather samples were collected from 28 adults in the region.

Winter surveys (Nov - Apr, 1998-99) were conducted at Cape St. Mary's, Newfoundland (46° 49' 08" N; 54° 09' 14" W). The maximum count for surveys conducted by CWS employees was 75 on 16 January, 1999. However, CBC data indicated a maximum count of 97 individuals at Cape St. Mary's for 2 January, 1999. The maximum number recorded by Tony Power during his regular sea duck survey in that area was 78 on March 10, 1999. Harlequin Ducks were not recorded on any other CBC count in the province.

Fall and winter surveys will be conducted again this year (1999-2000) at Cape St. Mary's. Surveys to date have been conducted on 13 July, 10 September, 1 October, and 13 October, and discovered 6, 10, 19, and 22 individuals, respectively. On November 28, 1999, Bill Montevecchi, Tony Power, Fyzee Shuhood, Dave Fifield, and a Biopsychology class from Memorial University counted 117 Harlequins during a simultaneous count using observers spread out along cliffs and in contact by radio in Golden Bay, Newfoundland. This is the highest count since 1980.

Finally, Joel Heath, a Master's of Science student at Memorial University of Newfoundland is pursuing his Master's work on Harlequin Ducks in Newfoundland and Labrador. The focus of his research is to develop a habitat suitability model for breeding birds in northern Labrador and for wintering birds in Newfoundland.

Québec

Several projects were carried out within the Québec region and elsewhere. Michel Robert worked with JWEL to assist in the catching and marking of 21 Harlequin Ducks between 16 May and 23, 1999. Michel Robert also teamed up with Louise Cloutier of the Université de Montréal to conduct a food habits study of Harlequin Ducks. Marine and freshwater feces samples were collected over the last three summers and analysis is near completion.

A collaborative survey effort was conducted between CWS - Québec and Hydro Québec

between 17 May - 25 May, 1999 to survey rivers of the Gaspé Peninsula, Anticosti Island, and the Québec north shore. There were 10 rivers surveyed on the Gaspé and 18 Harlequins were discovered; no Harlequins were found along four rivers on Anticosti Island; and no Harlequins were found along the 12 rivers flown along the Québec north shore.

Another study is ongoing in collaboration with Hydro Québec to assess sex, age, and moult status of Harlequin Ducks at Bonaventure Island, Forillon National Park, and Port-Daniel. Additionally, time activity budget data were collected to compare to comparable data collected in Newfoundland.

Greenland

A cooperative project was conducted this year in Greenland that included representatives from Canada (CWS - Atlantic and Québec Regions), Greenland and Denmark. The goal was to conduct aerial surveys of the western Greenland coast, followed by a boat survey and trapping effort.

Aerial surveys were conducted on July 21, 24, 30, and 31, by the Danish biologists Boertmann and Mosbech. They estimated ~ 2500 Harlequins along the western coast of Greenland. Subsequent boat survey by CWS representatives Greg Robertson and François Shaffer identified approximately 80 islands/skerries in five distinct regions near Ravneøer (see Appendix 1). A total of 865 Harlequin Ducks were counted. Only 432 individuals were observed in the same area during aerial surveys. Surveyors agreed that the accuracy of the boat count was high (less than ± 10% for each flock), and as a result an approximate 2:1 correction factor can be applied to the aerial survey data. A reevaluation of that correction factor will be completed over the coming winter.

The trapping effort resulted in 52 individuals: 44 ASY males, 5 SY males, 2 ASY females and 1 SY female. A final ASY male was a recaptured bird with the band: yellow-black letters: **3Y**; CWS band : **705-71315**. This individual was banded by Ian Goudie on the Fig River, Labrador on June 9, 1999.

New Brunswick

Data from 1997-98 indicated 25 individuals observed at the Wolves Archipelago in New Brunswick, however the Christmas Bird Counts for the remainder of the province only discovered 5 additional individuals.

A survey conducted on the Wolves Archipelago on 16 February, 1999 reported 42 Harlequin Ducks: 14 adult males, 21 adult females, and 7 immature males. This value is up considerably from the previous year.

During the summer of 1999 there were several reports of Harlequin Ducks on rivers in northern New Brunswick:

1. One female and five young were reported in July on the Cascumpedia River.
2. Al Madden of the New Brunswick DNRE reported three mature and six young Harlequins on the Charlo River.
3. One female was reported on the Benjamin River in mid-July.

Additionally, representatives of the Canadian Wildlife Service assessed the Charlo River, Benjamin River, Nepisiquit River, and Jacquet River for habitat suitability for Harlequin Ducks, and discussed the feasibility of a future trapping effort.

Nova Scotia

Since 1996 Nova Scotia has been excluded from the Harlequin Duck winter monitoring program. Surveys were conducted in the region by Barrow and Hicklin in the 1980's and Milton in the mid-90's, and it was suggested that Nova Scotia did not have a significant wintering population. However, results of recent fixed-winged surveys by Barrow and Hicklin during the winter of 1999, have identified several areas with significant numbers of Harlequins (see Table 2 and Figure 2). They have made consistent counts at these sites from late January to mid-March which suggests Nova Scotia may have a significant winter population. Given the magnitude of the counts, and low visibility rates from fixed-wing aircraft, Nova Scotia may have between 150 to 500 birds (a 2:1 ratio was estimated by Mittelhauser in Maine (*pers. comm.*) and Gilliland and Robertson in Greenland (*pers. comm.*)). If so, it may increase the eastern North American winter population estimate by + 30%. There is a need for ground/boat surveys of some of the key sites to determine use of these areas by Harlequin Ducks and their inclusion on monitoring programs and population estimates.

In addition to the surveys indicated in Table 2, there were opportunistic observations of Harlequin Ducks at two other locations:

1. Observers Andrew MacFarlane and Larry MacDonnell on 12 January: Little Port Hebert Harbour: 45 individuals
2. Observers Andrew MacFarlane and Jason Hudson on 17 February: Trout Cove (near Centreville): 40 individuals

Maine

Glen Mittelhauser continues to analyze capture-mark-recapture data for the coast of Maine. Regular winter surveys are also being conducted within Jericho Bay by Glen Mittelhauser and John Drury. The 1998 data indicated 800-1000 individuals wintering within Jericho Bay. The high count for Jericho Bay in 1999 on March 31 was 952 individuals. Continued winter banding, tissue sampling, and surveys are planned for the winter of 1999/2000.

Remainder of eastern USA Seaboard

No specific projects were undertaken along the remainder of Harlequin Duck wintering areas south of Maine. The 1997-98 CBC data were compiled for Harlequins along the coast. All counts increased in Harlequin numbers with the exception of New York and New Jersey which experienced marginal declines of already minimal numbers. The 1999 data has yet to be completely compiled and published.

Goudie *et al*. Report on Updated Distribution and Population

An updated assessment of the Harlequin Duck population and distribution in eastern North America has been drafted by Goudie *et al* (1999). It assesses the wintering population numbers along the eastern North American seaboard from 1960-61 to 1996-97. This report indicated a decline in wintering Harlequin Ducks in eastern Canada until 1991 or 1992. However, since that time, CBC numbers have increased for most locations in Atlantic Canada. The number of Harlequins observed during CBCs in the eastern United States have increased since the early 1970s. Part of these increases have been due to the addition of new CBC sites and potentially an increased awareness of the species.

Little data is available for the change in breeding numbers in eastern North America. Preliminary analyses by Peter Thomas for 24 rivers in Labrador, based on data collected by Jacques Whitford Environment indicated an annual percentage increase of 1.6%. However, the results are preliminary and the statistical methodology is being refined. Breeding individuals have also been investigated in more northerly regions. However, there is no reason to expect that Harlequin Ducks breeding in northern Québec and Labrador (i.e. moulting and wintering in Greenland) would have any influence on wintering trends displayed along the eastern North American coast. Newfoundland breeders, however, have been linked to the eastern seaboard wintering Harlequins. Surveys of the breeding population along the Torrent River in Newfoundland in 1998, indicated an increase in breeding pairs, from 3 in 1993 to 10 pairs in 1998.

Goudie *et al.* estimate the overall population size at 1600 individuals wintering in North America. Other North American breeders are also known to winter along the coast of Greenland, but only preliminary information is available on their population levels.

Application of IUCN Criteria

An attempt was made to apply the IUCN criteria to the known population numbers and trends of Harlequin Ducks breeding and wintering in eastern North America. The criteria are outlined in Appendix 2.

The IUCN criteria are centered around four common themes:

1. A reduction in the population within the past 10 years
2. Limited area in which the species occupies
3. Limited number of mature individuals
4. The probability of extinction in the future

The data applied to these criteria were taken from the most recent *Updated Distribution and Population of Harlequin Ducks in Eastern North America* by Goudie *et al* (1999). Due to the fact that over the last 10 years the Harlequin Duck population in eastern North America appears to have increased, its area of occupancy is greater than 20 000 km^2, it has more than 250 mature individuals, and is not restricted in its area of occupancy (typically less than 100 km^2) nor in its number of locations (typically less than 5), it cannot qualify for 'Critically Endangered', 'Endangered', or 'Vulnerable' status under the IUCN criteria.

Genetics

Preliminary genetic analyses have indicated a genetic distinction between birds breeding in northern Québec from those wintering in eastern North America. A proposal has been submitted to Environment Canada's Genomics Fund attempting to gather more funds to continue the analysis of tissue samples collected from the various Harlequin Duck breeding regions. The objectives of this continued genetic research are as follows:

1. Determine the genetic structure of the eastern North American metapopulation of Harlequin Ducks.
2. Identify genetic markers that can determine the natal origin of Harlequin Ducks moulting and wintering in eastern North America.
3. Collect samples from wintering and moulting Harlequin Ducks at various sites in eastern North America.

Status Report

Considering the increase of Harlequin Ducks along the North American coast and the determination of a substantial Greenland wintering population, as well as the 10 year deadline for the status report of an endangered species, a revised status report will be written by Peter Thomas (CWS - Atlantic Region) and Michel Robert (CWS - Québec Region).

Table1: Resighted Harlequin Duck bands on the Gannet Islands, Labrador during ground and boat surveys in July, 1999.

Colour	Code	Leg	Metal Band	Sex
W-JX	black	right	left	male
W-F1	black	left	right	male
W-Y1	black	right	left	male
W-HX	black	right	left	male
W-2R	black	right	left	male
W-JR	black	right	left	male
W-F1	black	right	left	male
W-VK	black	right	left	male
W-PV	black	left	right	male
W-Y1	black	right	left	male
W-HX	black	right	left	male
W-FN	black	not recorded	not recorded	male
W-Y1	black	not recorded	not recorded	male
W-ZT	black	not recorded	not recorded	male
W-UN	black	not recorded	not recorded	male
W-4R	black	not recorded	not recorded	male

Table 2: Harlequin Ducks observed during regular seaduck surveys in Nova Scotia by Bill Barrow in 1999.

Location	Date							
	30 Jan	31 Jan	7 Feb	15 Feb	17 Feb	6 Mar	14 Mar	18 Mar
Long Is.	32	--	--	35	--	20	--	--
Gull Ledge	--	35	--	--	38	--	--	20
Harding Point	--	--	25	--	--	--	40	--
Little White Is.	--	--	--	--	35	--	--	25
Big White Is.	--	--	--	--	22	--	--	18
Beaver Is.	--	--	--	--	26	--	--	13
Egg. Island	--	--	--	--	12	--	--	--
Digby Neck	--	--	--	--	--	12	--	--
Bald Tusket Is.	--	--	--	--	--	--	27	--
West Dover	--	--	--	--	--	--	71	--
Topson Is.	--	--	--	--	--	--	21	--
Bird Is.	--	--	--	--	--	--	--	15
Bowen Ledge	--	--	--	--	--	--	--	10
TOTAL	32	35	25	35	133	32	159	101

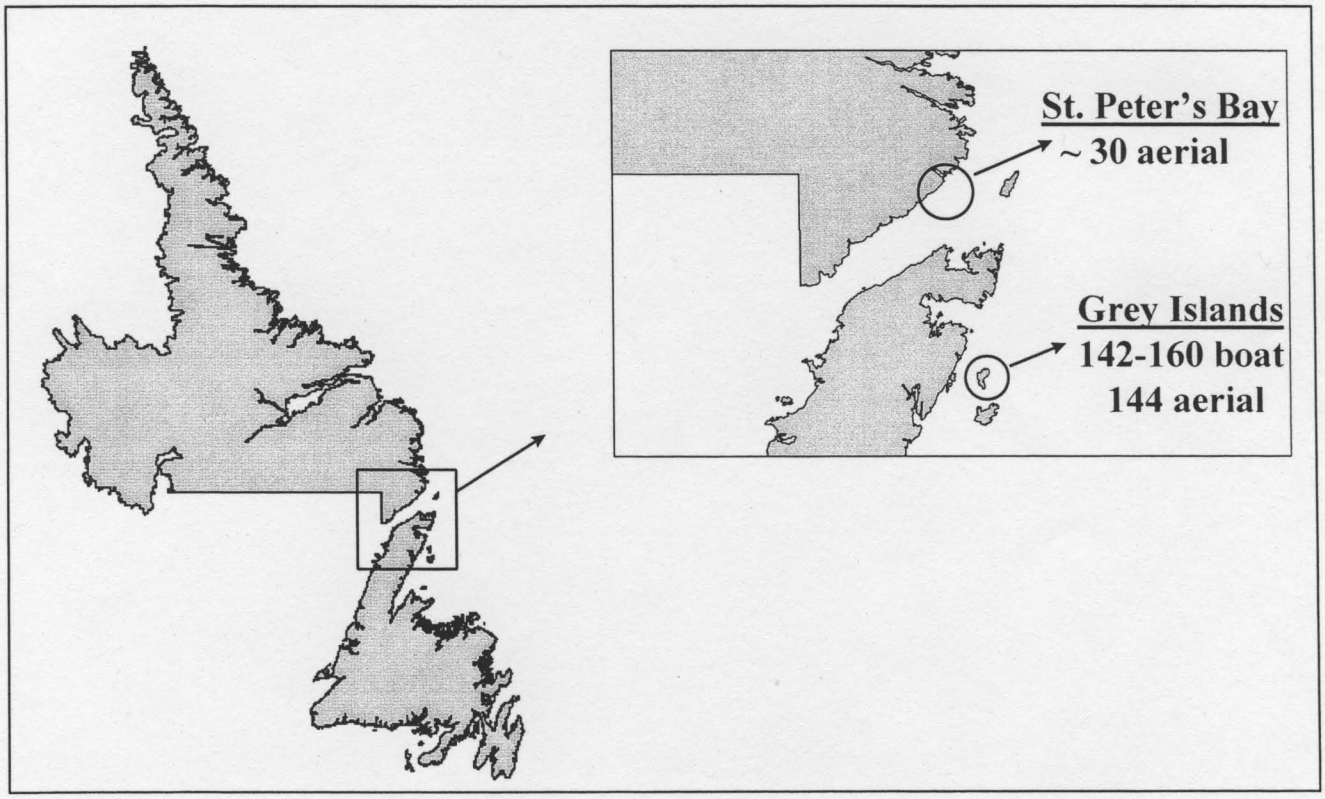


Figure 1: New Harlequin Duck moulting sites discovered in Newfoundland and Labrador during surveys by Scott Gilliland and Pierre Ryan on 16 August 1999.

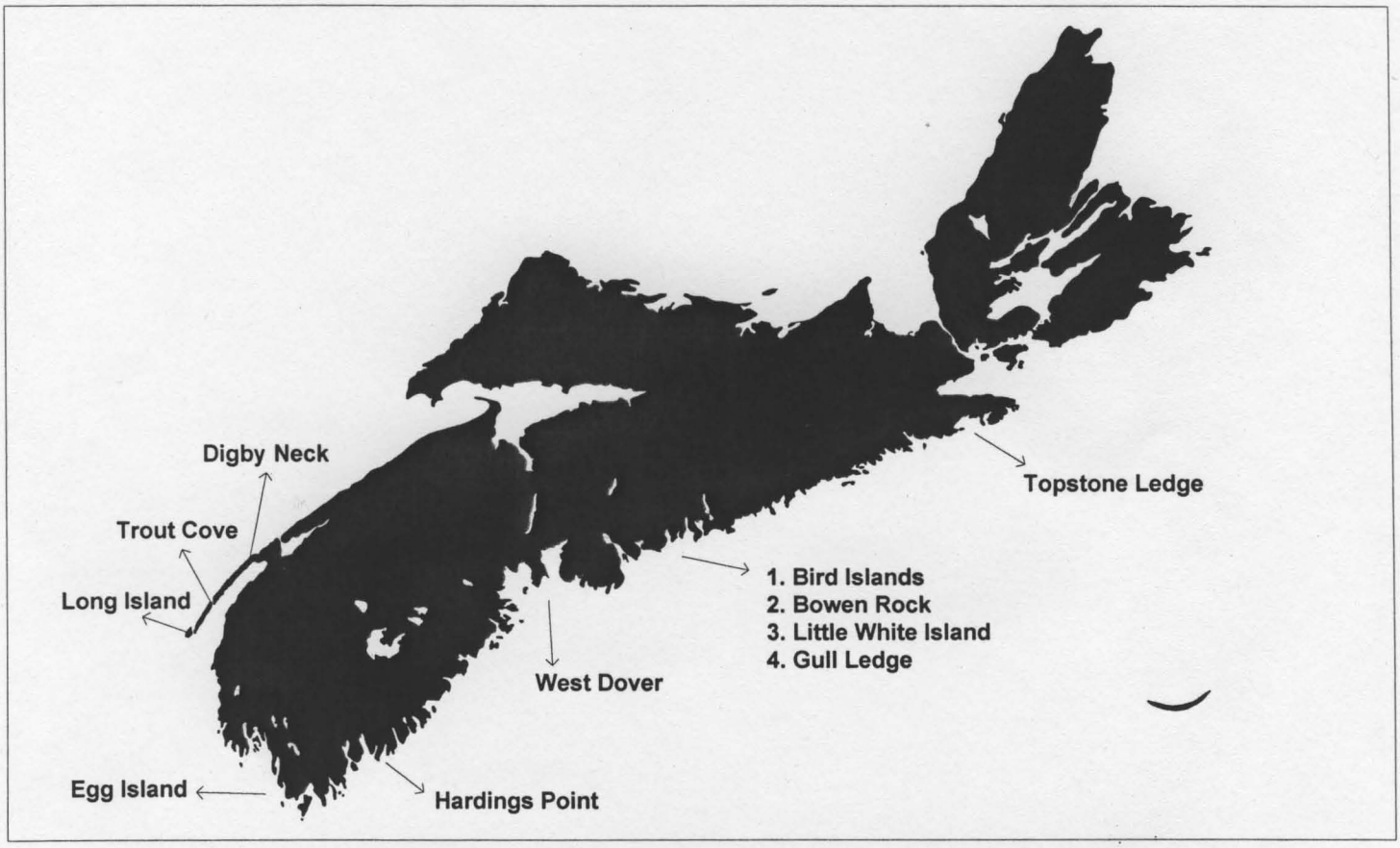
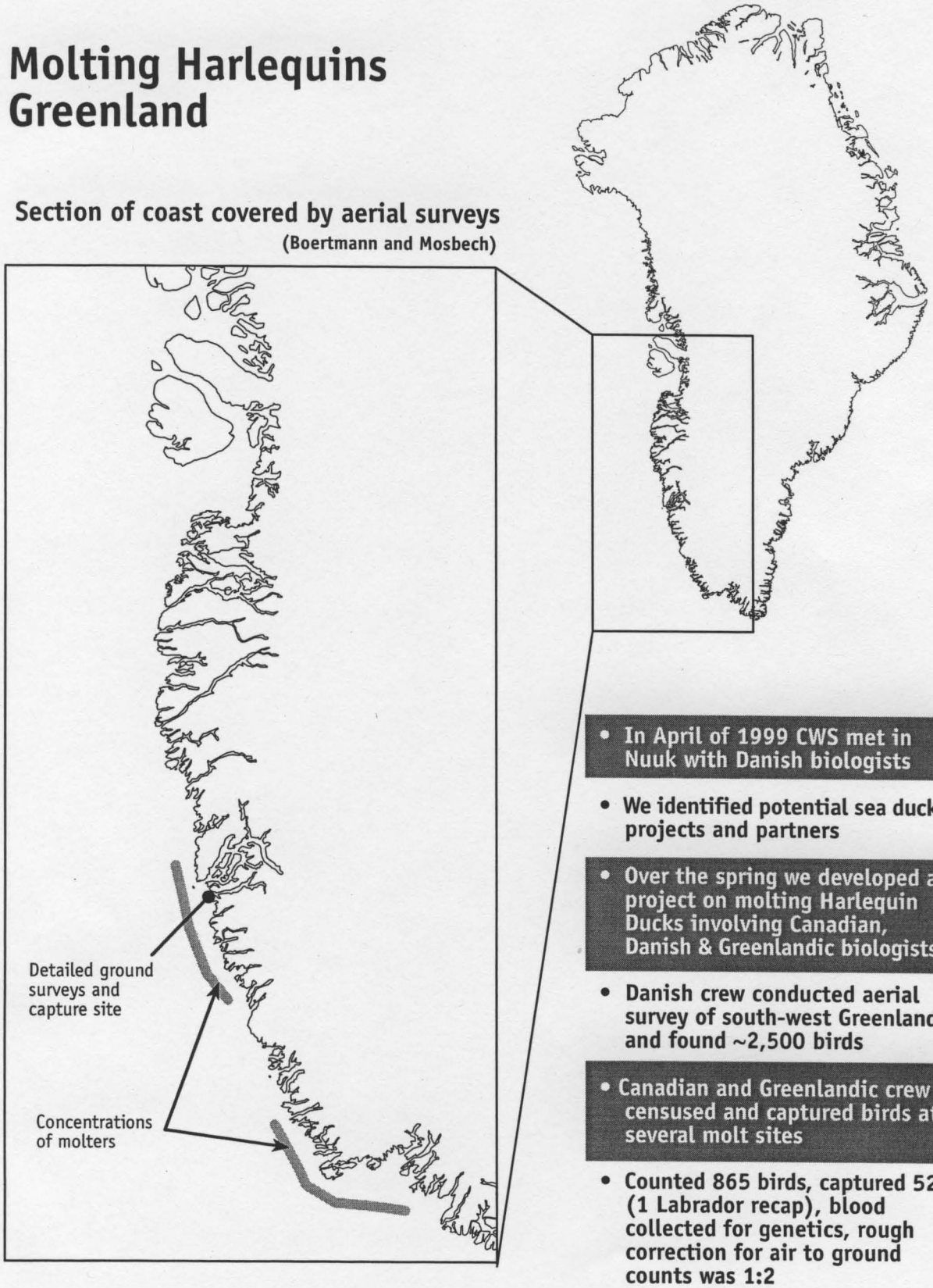


Figure 2: Nova Scotia Harlequin Duck survey locations as indicated by Bill Barrow and Andrew MacFarlane.

Appendix 1: Summary of the surveying, and trapping effort conducted by the Canadian Wildlife Service and the Greenland Institute in southwestern Greenland in August, 1999. (summary *.pdf* file created by Scott Gilliland) (see attached *.pdf* file titled "**Appendix 1**")

Molting Harlequins Greenland



- In April of 1999 CWS met in Nuuk with Danish biologists
- We identified potential sea duck projects and partners
- Over the spring we developed a project on molting Harlequin Ducks involving Canadian, Danish & Greenlandic biologists
- Danish crew conducted aerial survey of south-west Greenland and found ~2,500 birds
- Canadian and Greenlandic crew censused and captured birds at several molt sites
- Counted 865 birds, captured 52 (1 Labrador recap), blood collected for genetics, rough correction for air to ground counts was 1:2

Appendix 2 - Criteria outlined by the IUCN for the designation of critically endangered, endangered, and vulnerable species. Complete criteria are **not** listed.

CRITICALLY ENDANGERED CRITERIA

A. Population reduction in the form of either of the following:
    1. An observed, estimated, inferred or suspected reduction of at least 80% over the last 10 years or three generations, whichever is the longer.
    2. A reduction of at least 80%, projected or suspected to be met within the next ten years or three generations, whichever is longer.

B. Extent of occurrence estimated to be less than 100 km^2 or area of occupancy estimated to be less than 10 km^2.

C. Population estimated to number less than 250 mature individuals and either:
    1. An estimated continuing decline of at least 25% within 3 years or one generation, whichever is longer or
    2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either:
        a. severely fragmented (i.e. no subpopulation estimated to contain more than50 mature individuals)
        b. all individuals are in a single subpopulation.

D. Population estimated to number less than 50 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 50% within 10 years or 3 generations, whichever is the longer

ENDANGERED CRITERIA

A. Population reduction in the form of either of the following:
    1. An observed, estimated, inferred or suspected reduction of at least 50% over the last 10 years or three generations, whichever is the longer.
    2. A reduction of at least 50%, projected or suspected to be met within the next ten years or three generations, whichever is longer.

B. Extent of occurrence estimated to be less than 5000 km^2 or area of occupancy estimated to be less than 500 km^2.

C. Population estimated to number less than 2500 mature individuals and either:
    1. An estimated continuing decline of at least 20% within 5 years or 2 generations, whichever is longer or
    2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either:
        a. severely fragmented (i.e. no subpopulation estimated to contain more than 250 mature individuals)

b. all individuals are in a single subpopulation.

D. Population estimated to number less than 250 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or 5 generations, whichever is the longer.

VULNERABLE CRITERIA

A. Population reduction in the form of either of the following:
   1. An observed, estimated, inferred or suspected reduction of at least 20% over the last 10 years or three generations, whichever is the longer.
   2. A reduction of at least 20%, projected or suspected to be met within the next ten years or three generations, whichever is longer.

B. Extent of occurrence estimated to be less than 20 000 km^2 or area of occupancy estimated to be less than 2000 km^2.

C. Population estimated to number less than 10 000 mature individuals and either:
   1. An estimated continuing decline of at least 10% within 10 years or 3 generations, whichever is longer or
   2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either:
      a. severely fragmented (i.e. no subpopulation estimated to contain more than 1000 mature individuals)
      b. all individuals are in a single subpopulation.

D. Population very small or restricted in the form of either of the following:
   1. Population estimated to number less than 1000 mature individuals.
   2. Population is characterised by an acute restriction in it area of occupancy (typically less than 100 km^2) or in the number of locations (typically less than 5). Such a taxon would thus be prone to the effects of human activities (or stochastic events whose impact is increase by human activities) within a very short period of time in an unforeseeable future, and is thus capable of becoming CRITICALLY ENDANGERED or even EXTINCT in a very short period.

E. Quantitative analysis showing the probability of extinction in the wild is at least 10% within 100 years.

1999 Annual Report: Status of Peregrine Falcon Recovery Efforts in the Bay of Fundy

Overview:

In April 1999, the status of the Peregrine Falcon (anatum) was downgraded to the less serious designation of Threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The species was officially delisted in the United States this past August.

A proposed harvest of migrating Peregrine Falcons in the United States has been a major concern. Opposition to this proposal in Canada has been unanimous from provincial and federal perspectives. These perspectives have been forwarded to USFWS officials. A US-Canada working group has been formed in an attempt to resolve this issue.

Progress continues to be made in terms of recovery of the Bay of Fundy population with an additional two potential nest sites being reported in the province of Nova Scotia. The number of known active territorial pairs has increased to 8 nesting pairs from 1998 estimates of 7 pairs. There were five active nests in New Brunswick. In Nova Scotia, three active nests were confirmed, with two additional potential sites reported late in the breeding season. If the two potential nests reported in late season in Nova Scotia are confirmed, the distribution of Peregrine Falcons would now have expanded beyond the Bay of Fundy to include one site along the Atlantic Coast. The Nova Scotia - New Brunswick population now possibly consists of 10 nesting pairs.

Productivity was high this year. At the eight known confirmed nesting sites, productivity was 2.375 chicks fledged per pair. Including the estimates of productivity at the two additional sites thought to have been occupied in Nova Scotia, the productivity was 2.4 chicks per pair overall. These estimates represent an increase from the 2.14 fledged young per pair estimated in 1998 and exceeds the 1.0 to 1.5 chick per pair estimated to be required to maintain a stable population.

New Brunswick:

The nesting population in New Brunswick is now thought to be 5 pairs. Information was collected during field excursions on June 4 (Fundy National Park- Allain, Sinclair, Sinclair, Sahanatien, Amirault, MacDonnell), and July 21-22 (Grand Manan, Hillsborough surveys- Amirault and MacDonnell). Other information was provided by Fundy National Park Warden George Sinclair, and naturalists Robert Young, Don Baldwin and Dave Christie.

Grand Manan (Seven Days Work) - the nest location was reported to have moved "a couple of hundred yards south" of the 1998 site. Surveys of the area were conducted on July 21-22. No peregrines were observed in the afternoon of July 21, however an early morning survey on July 22 confirmed the information that had been provided by Don

Baldwin. We saw one adult with two very vocal fledged juveniles and observed them during about an hour making attempts to capture gulls.

Saint John Bridge - the bridge pair returned to the usual nesting site this year. A site inspection was conducted in late July. During the visit, two birds were observed - one adult and one juvenile. Discussions early in the spring with the bridge commission staff indicated interest in providing support for falcon conservation efforts. The birds had apparently abandoned nesting attempts last year due to unavoidable bridge repair activities.

Telegraph Brook - the site was checked by Fundy National Park Warden George Sinclair. The site was unoccupied again this year. The site is only known to have been occupied in 1996 and has not been active since then.

Fundy National Park - the Owls Head nest location has moved approximately 50 metres east of the nest used in previous years. Four young falcons fledged from the site. Evaluations will need to be undertaken to determine whether future banding may be possible at the new location.

Edgett's Landing - the nest site used in previous years was eroded and lost over the past winter. The nest is now located approximately 200 metres west of the site used in the past. One young is thought to have fledged from the site. Evaluations will need to be undertaken to determine whether future banding may be possible at the new location.

Reports of potential new nest sites:

No new potential sites were reported for New Brunswick this year.

Nova Scotia:

Cape Sharp - the territorial pair was again active this year. The site was visited by NS DNR biologists Ross Hall and Doug Archibald on June 9 and July 6. The pair is thought to have fledged a minimum of 2 and possibly even 3 young.

Isle Haute - the territorial pair was active again this year. An overnight excursion by NSDNR, CWS and naturalist Kip McCurdy was held on June 2-3. During the trip, the exact location of the nest site was determined. The birds appeared to have nested on the ground under a dense canopy of spruce trees. Presumably, this is possible due to the lack of terrestrial predators. The nest location was confirmed when one of the parents transported the remains of a Black Guillemot to the downy chicks. A second excursion to the Island by NS DNR biologists Ross Hall and Doug Archibald accompanied by Kip and Anne McCurdy was conducted on July 7. At that time, three immature peregrines were seen along with two adults.

St. Croix Cove - naturalist Kip McCurdy has continued to monitor the falcons that he first reported in 1997. Four young were reported to have fledged from the site this year. Photographs were taken of the young birds on the nest ledge.

Reports of potential new nest sites:

Cape Split/Sheffield Vaults area - reports were received from the Scot's Bay area of a pair of falcons in late April-early May. Mark Elderkin saw an adult bird hunting in Port Williams in the first week of June. A NS DNR student reported in mid-July seeing no less than five peregrines, four of which he thought were fledged young with one adult in attendance. All the peregrines were right at the split, on the island and were seen chasing young gulls.

Shut In Island, St. Margaret's Bay - Kip McCurdy observed four Peregrine Falcons in late August on small cliffs on the crown owned island. Although Mr. McCurdy did not have binoculars, he was able to determine that at least one of the four was an adult bird. The presence of the family group in the area strongly suggests that there may have been a nest located on the island. Elaine Kew reported to Mark Elderkin that there were rumours of a peregrine family occupying the site during 1998.

Summary of banding activities and egg collections:

There were no young Peregrine Falcons banded this year and no addled eggs were collected.

Recoveries of injured/dead birds:

Two incidents of injured Peregrine Falcons were reported. Both were immature birds from Nova Scotia. One immature female was found near Shelburne with a wing injury. The bird was brought to a veterinarian where it was determined that a serious, inoperable fracture had occurred. The bird was euthanized and submitted to CWS for toxics and heavy metal examinations which are planned for the near future. The bird will be mounted and retained by CWS for educational purposes. The second bird was recovered October 18, on the Rowan Gorilla II at sea approximately 170 miles northeast of Halifax (1.5 miles off the eastern end of Sable Island) . The bird was in poor body condition (low weight) and slightly oiled during capture attempts. It was rehabilitated at the Kew's raptor centre in St. Margarets Bay. The bird was banded (**1807-15714**) and released November 17.

Two reports of dead Peregrine Falcons were also received from Nova Scotia. One carcass, badly decomposed with only feathers and bones remaining, was submitted to me by the Nova Scotia Department of Natural Resources. It had been collected at Pond Cove, Brier Island, Nova Scotia in early fall 1997 by Dr. Phil Taylor and Andrea Kingsley

(Acadia University). The bird was fluoroscoped to determine whether the bird may have been shot, however no ammunition fragments were detected in the remains. The bird has been sent to the Nova Scotia Museum were the skeleton will be retained for educational purposes. Another badly decomposed immature falcon was found and reported by Peter Richard at the Hawk Beach, Cape Sable Island in late March. The carcass was not retrieved.

Recoveries of banded birds:

There were no sightings of banded Peregrine Falcons reported this year.

Recommendations:

- Survey of Shut In Island and Cape Split during nesting season;
- Banding of Peregrine Falcon nestlings wherever possible;
- Conduct surveys of all known/suspected and potentially suitable habitat in conjunction with the five year Peregrine Falcon survey to be held in 2000;
- Explore interest in banding migrant Peregrine Falcons at Seal Island, N.S.;
- Continued involvement in discussions of the potential for a U.S. Peregrine Falcon harvest;
- Determine interest and need for establishing an Atlantic Peregrine Falcon working group.

Rehabilitated raptor banding -

Requests to band rehabilitated birds prior to release were again received from Maritime Atlantic Wildlife, Cookville, N.B. The following birds were banded and released in New Brunswick.

2 immature Bald Eagles
2 Great Horned Owls
3 Saw Whet Owls *

* one additional Saw Whet Owl was banded, however it died during rehabilitation.

One note of interest, the Red-tailed Hawk rehabilitated, banded and released in 1997 (0877-28662) has been seen periodically since the time of it's release. It was sighted again several times this year, indicating that there is reasonable survival potential for rehabilitated birds.

Table 1. Productivity of individual nest sites, number of young fledged.

Year	Grand Manan	St. John	Fundy Park	Grindstone Island	Edgett's Landing	Telegraph Brook	Ile Haute	Cape Sharp	St. Croix Cove	Shut In Island	Cape Split	Annual Total
1989	❦	2	3	1	❦	❦	❦	❦	❦	❦	❦	6
1990	❦	1	3	2	❦	❦	❦	❦	❦	❦	❦	6
1991	3	2*	3	1*	1*	❦	❦	❦	❦	❦	❦	10
1992	3	2	3	2	nc	❦	❦	❦	❦	❦	❦	10
1993	2	1	4	2	2 (+2 fostered)	❦	❦	❦	❦	❦	❦	11
1994	1	2	3	3	0	❦	❦	❦	❦	❦	❦	9
1995	nc	1	3*	3	2	❦	3	❦	❦	❦	❦	12
1996	3	1	4	3	3	2	nc	❦	❦	❦	❦	16
1997	2*	nc	0	3	1	❦	nc	nc	2	❦	❦	8
1998	2	❦	4	3	3	❦	2	1*	1	nc	❦	16
1999	2	1	4	3	1	❦	3	3	2	2*	3*	24
Total	**18**	**13**	**34**	**26**	**13**	**2**	**8**	**4**	**5**	**2**	**3**	**128**

* - indicates a minimum number estimate
nc - not censused
❦ - no known nesting

1999 Annual Report: Status of the Piping Plover in Eastern Canada

Prepared by Diane L. Amirault
Canadian Wildlife Service - Atlantic Region

Overview:

It appears that for the first time since 1991, there has been a slight increase in the Eastern Canada Piping Plover population. The overall population numbers have increased from 420 adults (204 pairs and 12 singles) counted in 1998 to 475 adults in 1999 (230 pairs and 15 singles), representing an overall 13 % increase. The greatest increase was reported for Quebec at 22%, however substantive increases were reported for Newfoundland (18.5%) and New Brunswick (17%). Prince Edward Island and Nova Scotia populations increased by 7% and 2.6% respectively.

There are some especially promising results from the Acadian peninsula of New Brunswick where populations there have increased substantially during the last two years (10% between 1997-98 and 23% between 1998-99). Provincial numbers in Prince Edward Island have also increased for the second consecutive year (35% between 1997-98 and 7% between 1998-99).

Unfortunately some sites continue to be abandoned by Piping Plovers. In Newfoundland, the Big Barasway Ecological Reserve, a reserve created specifically to protect the species, had no nesting plovers this year. There were no obvious reasons why the site may have been abandoned. (i.e. habitat changes, increase in disturbance, etc.).

There were also some interesting results from the preliminary banding conducted in 1998. Of the 30 birds banded, 8 have been resighted including one bird banded as a juvenile. This year, 134 plovers (30 adults and 104 chicks) were marked in the region. No problems were encountered during this year's banding activities.

Piping Plover conservation continues to be the focus of many federal, provincial and non-government agencies. A strong focus on the Piping Plover Guardian Program continues. This past year, funding was secured to hire a coordinator for southeast New Brunswick which *essentially results in all plover beaches in the province having some level of protection*.

Substantial effort also continues to produce and distribute public education materials. This year, a brochure "The Piping Plover in Eastern Canada" was published for distribution. Articles continue to be published in local newspapers to inform communities of conservation concerns for the species.

Funding secured from Co-op Atlantic was used to fund 3 programs - the Nova Scotia Piping Plover Guardian Program, the Newfoundland Piping Plover Guardian Program operated by the Marine and Mountain Zone Corporation and the Piping Plover Vocalizations Study.

Drafting of an atlas of Newfoundland Piping Plover beaches was initiated. Drafting of the updated Status Report for Piping Plover in Canada was initiated by Andrew Boyne and Thomas Jung with the assistance of François Shaffer.

There were no enforcement programs targeted for the protection of Piping Plover in New Brunswick and Prince Edward Island as in previous years.

Major Research and Conservation Activities:

Piping Plover Banding . . .

After preliminary efforts were initiated in 1998, a more intensive effort was focused on banding plovers this year. A detailed protocol developed last year was modified slightly in order to facilitate the banding effort. The most substantive change was the replacement of band types - incoloy bands were used instead of the stainless steel that was applied in 1998. The bands were also only applied to the lower leg. The replacement bands proved to be extremely effective for use on plovers. They were overall lighter, did not tend to spring back as easily as stainless steel and therefore resulted in a reduced handling time.

A single metal band was placed on the lower right leg of adults and a single colour band was placed on the lower left leg. The opposite banding scheme was applied to chicks - a single metal band was placed on the lower left leg while a single colour band was placed on the lower right leg. The colour bands used were as follows: Nova Scotia - light green/yellow; New Brunswick - light blue/white; Prince Edward Island - red/dark green; Quebec (Magdalen Islands) - grey. The colour assignment for Newfoundland was pink/dark blue, however no birds were banded in Newfoundland this year.

1999 Banding results

Province	Adults	Chicks	Total	Recaptures
Nova Scotia	10	28	38	-
New Brunswick	10	32	42	3
Prince Edward Island	4	21	25	3-4
Quebec	6	23	29	2*
Newfoundland	0	0	0	
Total	30	104	134	8-9

* - one recaptured individual was banded as a juvenile

1998 Banding results

Province	Adults	Chicks	Total	Recaptures
Nova Scotia	-	-	-	-
New Brunswick	7	9	16	-
Prince Edward Island	5	0	5	-
Quebec	3	3	6	-
Newfoundland	3	0	3	-
Total	18	12	30	-

Nova Scotia Nature Trust Landowner Contact Program . . .

A pilot project to contact land owners who have Piping Plovers nesting on or near their properties was initiated in priority nesting areas in Nova Scotia. This approach was felt to be better than using a "heavy-handed" approach as the need for education in this area is still great. A private group, the Nova Scotia Nature Trust (NSNT) led the effort with funding assistance provided by CWS-Atlantic. The NSNT has already been involved in similar land owner contact programs for the protection of coastal plain flora species also found in southern Nova Scotia.

The approach used was non-confrontational. The group was also overall accepted more widely by land owners since they were not a government agency. The focus of the effort was to identify land owners, contact these people, educate them to the presence and predicament of the Piping Plover and determine their interest in becoming a land owner steward. Twenty-six land owners were contacted. Of these, 12 land owners were supportive of the concept of protecting plovers on their properties, six were interested in entering into voluntary stewardship agreements with NSNT and two will be awarded a "Plover Steward" award. Three others were supportive but not comfortable with entering into agreements at this time.

The effort shows much potential for protecting plovers since in Eastern Canada many plover habitats are privately owned. It is hoped that the preliminary effort can be expanded in the future.

Visit to Southwest Newfoundland Piping Plover beaches . . .

CWS biologists Diane Amirault and Peter Thomas organized an excursion to examine Piping Plover habitats in Southwest Newfoundland and gain perspectives on conservation issues in the area. The field trip also served as an orientation session for Peter who has recently been hired to work on endangered species issues from the CWS/St. John's office.

Newfoundland provincial biologist Leah Soper led the survey and described local issues. Beaches surveyed included both beaches currently used and those that have been occupied historically (i.e. Searston Beach, Little Codroy Beach, Cheeseman Provincial Park, Grand Bay West and Stephenville Crossing). An examination of historical sites within Gros Morne National Park was led by Stephen Flemming (Western Brook and Shallow Bay Beach).

Recommendations:

1) Continue Piping Plover banding project. Increase effort to retrap marked individuals.

2) Promote expanded land owner stewardship effort.

3) Enhance CWS effort in Piping Plover conservation efforts in Southwest Newfoundland.

4) Evaluate and reinitiate enforcement programs if considered desirable.

Piping Plover Census Results/Estimates 1989-1999													
Singles													
												1999	1999
Province	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Pairs	Singles
New Brunswick	178	177	203	132	150	145	160	146	139	159	186	89	8
Newfoundland	8	10	7	15	14	17	24	27	35	27	32	15	2
Nova Scotia	120	120	113	54	50	82	71	80	96	76	79	37	5
Prince Edward Is	90	90	110	70	50	60	47	66	60	81	87	43	1
Quebec*	70	78	76	88	92	96	106	104	90	72	88	44	0
Saint P&M			4			2		6	2	5	4	2	0
Total	**466**	**475**	**513**	**359**	**356**	**402**	**408**	**429**	**422**	**420**	**476**	**230**	**16**

Piping Plover Census Results											
Number of Breeding Pairs 1989-1999											
Province	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
New Brunswick	89	87	91	64	73	63	73	65	66	78	89
Newfoundland	4	3	3	7	6	8	12	11	?	12	15
Nova Scotia	60	60	51	22	28	37	35	33	44	37	37
Prince Edward Is	45	45	51	32	21	26	22	29	28	39	43
Quebec	35	35	38	44	46	50	53	51	45	36	44
Saint P&M			2					3	1	2	2
Total	**233**	**230**	**236**	**169**	**174**	**184**	**195**	**192**	**184**	**204**	**230**

Guidelines for banding of eastern Canadian Piping Plovers

1) *Results of 1998 preliminary year*

During the 1998 season, preliminary investigations into banding using a protocol established in conjunction with the recovery team and working group, some problems were observed. These problems were thought to be associated with the use of stainless steel bands. The properties of stainless steel result in some problems in band application:

- the material is not pliable and as a result it is difficult to completely close the band with the pliers prescribed for applying 1A bands.
- the difficulties in closing the bands result in a longer handling time.
- similarly, the band are difficult to re-open if the bander is not satisfied that the band has been applied properly.
- several banders noticed minor abrasions at the time of banding that appeared to heal afterwards (Amirault, unpubl; Shaffer and Laporte, unpubl).
- problems with band application may have been exaggerated by placing the band on the upper leg.

1998 Banding results

Province	Adults	Chicks	Total	Recaptures
Nova Scotia	-	-	-	-
New Brunswick	7	9	16	-
Prince Edward Island	5	0	5	-
Quebec	3	3	6	-
Newfoundland	3	0	3	-
Total	18	12	30	-

Recommendations:

Although unfortunate that one adult was lost during the first year of banding due to complications resulting from an improperly placed band, a less malleable metal is still thought to be preferable for use on Piping Plovers as compared to the softer aluminum which tends to deform under saline conditions. We will continue to explore the possibility of using other metal alloys. For example, incoloy, which is also used on organisms found in a saline environment could be a potential replacement. All bands will be placed on the lower leg.

2) *Results of 1999 Banding Project*

The 1999 banding project was a tremendous success. The preliminary investigations conducted in 1998 enabled a better understanding of modifications to the protocol that were needed to facilitate the banding effort. The most substantive change was the replacement of band types - incoloy bands were used instead of the stainless steel that were applied in 1998. The bands were also only applied to the lower leg. The replacement

bands proved to be extremely effective for use on plovers. They were overall lighter, did not tend to spring back as easily as stainless steel and therefore resulted in a reduced handling time. No problems were encountered in using this new band type.

1999 Banding results

Province	Adults	Chicks	Total	Recaptures
Nova Scotia	10	28	38	-
New Brunswick	10	32	42	3
Prince Edward Island	4	21	25	3-4
Quebec	6	23	29	2*
Newfoundland	0	0	0	
Total	30	104	134	8-9

* - one recaptured individual was banded as a juvenile

Recommendations:

Because of the success in using the incoloy bands on the lower leg, this type of band is recommended for future use on Piping Plovers. As well banding on the lower leg should be continued. Continue banding program for four additional field seasons.

3) Protocol -

Coordination -
Because of the large geographic area of Eastern Canada, the coordination of this study will be conducted in 3 components. The responsibility areas are identified as follows: the Maritimes component will be coordinated by Diane Amirault, Canadian Wildlife Service; the Newfoundland component will be coordinated by Peter Thomas, Canadian Wildlife Service, in cooperation with Dr. Stephen Flemming, Parks Canada, Joe Brazil, Newfoundland Department of Forest Resources and Agrifoods. The Îles-de-la-Madeleine component will be coordinated by Pierre Laporte and François Shaffer, Canadian Wildlife Service. All components of this study will follow the same overall protocol as outlined below.

Study Areas -
The study will focus on areas that traditionally have had a high degree of Piping Plover conservation and monitoring effort. There are many advantages to focusing on these areas. Close monitoring of breeding birds occurs in these areas and will allow for quick access to known nest locations and, therefore, potential banding sites. Assessment of breeding chronology will also be provided by monitors and will permit the banding team to better plan the timing of banding of adult and juvenile birds. Monitors may also be available to assist with trapping and banding. Also, with much emphasis on monitoring, problems associated with banded birds may be quickly detected.

Within the Maritime provinces, the study areas will include the Kouchibouguac, Keijmkujik (Seaside Adjunct) and Prince Edward Island National Parks. Banding will also occur in selected portions of southern Nova Scotia, the Acadian Peninsula of New Brunswick, at Cedar Road Beach, Tabusintac Sandspit and Pointe à Bouleau and in

southeastern New Brunswick at Bouctouche Dune.

In Newfoundland, the study areas will include the Burgeo and Channel-Port-aux-Basques Piping Plover breeding grounds. On the Îles-de-la-Madeleine, banding will occur at the Plage de la Martinique.

Banding protocol -
Only experienced banders, preferably holding Master Permits shall be involved in placing bands on Piping Plovers. Specifically, the banders will be Diane Amirault, Peter Thomas, Pierre Laporte and François Shaffer of the Canadian Wildlife Service and Dr. Stephen Flemming and Gary Corbett of Parks Canada.

Every attempt will be made to minimize disturbance during trapping and banding operations. In order to minimize the possibility of negative impact on Piping Plover productivity, trapping of adults and chicks is recommended only on first nesting attempts. In addition, only one adult bird per pair will normally be trapped. Banding of chicks will ideally occur where neither adult has been banded. However, there will be occasions where trapping in these circumstances will not pose undue stress on nesting plovers. These situations will be identified using the judgment of the bander. Where, in the expert opinion of the bander, little adverse impact will occur from trapping in these circumstances, capture may proceed with appropriate caution.

Trapping technique -
In order to provide the most time-efficient trapping and handling of Piping Plovers, techniques used in trap set-up or handling of birds will be practiced, as much as possible by test runs with inexperienced assistants. The productivity of family groups which have had individuals banded will be followed in order to evaluate whether banding may have an impact on productivity. Specifically, hatching and fledging success will be determined.

Wherever possible, within designated study areas and where substrate characteristics permit, banding will preferably occur where coarse gravel or cobble is present rather than fine sand. Monitors may be able to assist in selecting the best locations for banding.

Trapping of adult and juvenile birds will only occur when weather conditions are good. Optimum weather conditions are defined as days having light to moderate winds, no precipitation and where air temperatures are close to 15° to 25°C. There is a requirement for using personal judgment to assess whether conditions are suitable for trapping. This will be determined by the lead bander.

A maximum of 15 minutes will be allowed for the adult to enter the trap. If after the 15 minutes has elapsed the adult has not returned to the nest, the trap will be removed and no further attempts to trap at that site will be made that day. Attempts to trap difficult to capture adults may be made on subsequent dates, however no more than three attempts will be made to trap individuals to minimize disturbance and the potential for abandonment.

Adults: Trapping of adults will occur approximately 10 to 25 days after incubation is initiated in order to minimize the possibility of nest abandonment. Timing will obviously vary between study areas. The bulk of trapping is anticipated for late May to mid June. Experience gained during 1998-99 shows that trapping is likely more successful in the

later stages of incubation. Therefore, in terms of minimizing disturbance, trapping adults at least two weeks after the onset of incubation is desirable. No attempts should be made at less than seven days after the onset of incubation as the likelihood of success is reduced and may result in unnecessary disturbance.

Adults are easily trapped during incubation using a box trap set over the nest. The box trap consists of a wooden or metal frame covered by a fine plastic mesh. A single door allows the adult to access the nest, and once inside and on the nest, a string holding the door open is pulled, releasing the door and trapping the adult inside. The adult is removed from the trap by hand. Where exclosures are used, the gear will be removed temporarily in order to set the box trap. The exclosure will be replaced immediately after the box trap is removed. Alternatively, exclosures will be constructed with a trap door for ease of entry for trapping purposes. Attempts will be made to remove evidence of human activity near the nests so that the risk of predation due to increased presence will be minimized.

No trapping will be conducted in areas where there is evidence of large numbers of predators on a nesting beach. Trapping and banding will never be conducted where these activities are suspected to increase the likelihood of predation.

Juveniles: Banding of young will be conducted primarily when the young are approximately four to 14 days old. A judgment will be made on capturing birds younger or older than this range if it is felt that this activity will not unduly stress the birds. Banding of juvenile plovers is anticipated for late June to early July. Trapping will primarily be conducted by hand capturing the young. The entire brood will be captured so that the chicks may be released together to maintain the family unit. Ideally, capture is conducted by a group of four persons (for a brood of four chicks). Starting from the top of the dune, each person in the team selects one chick to follow and will walk in the direction of the chick towards the water's edge. That chick is followed until a time when it will eventually "freeze" on the spot and can easily be picked up. This method used when the chicks are very young is thought to be the method to produce the least disturbance. Attempts to capture juvenile birds will be limited to one try.

Handling and information to be collected - A maximum handling time of 10 minutes per bird will be allowed for banding, measurements, and photographs for adult birds. The birds will be released as quickly as possible. The band number, colour of band, age, sex, date and location will be recorded for each bird banded as for routine banding practices.

Adults will be sexed using behaviour and plumage characteristics (Cairns, 1982). Chicks will not be sexed as young shorebirds are not normally sexed (C. Gratto-Trevor, pers. comm.). These will be identified as "Local Unknowns" for banding information reporting purposes.

Depending on time availability, several measurements will be taken while handling the birds. To assist in sexing adults, the maximum and minimum width of the throat stripe will be measured and notes taken on amount of dark area on head. Weight will be measured to the nearest 0.1g with a pesola-type scale, maximum wing chord will be measured to the nearest 0.1 mm using a wing rule, finally tarsus length and culmen length will be measured to nearest 0.1 mm using digital calipers. A maximum time of 10 minutes will be allowed for capture and banding of a group of chicks. To reduce handling time and disturbance, only weights will be taken on captured chicks.

Photographs will be taken of each adult plover banded in order to assess the potential for using plumage characteristics for identifying individual birds after banding and in subsequent years. A series of four photographs will be taken. The first will be a close-up image of the bill from a lateral (side) profile view, in order to help assess the method of using the relative amount of bill colouration (i.e. red, orange vs black) to accurately determine between male and female birds. The second photograph will be taken of the entire head and bill from a lateral (side) profile view for measurement at a later time. A third photo will consist of a lateral (side) profile view of the entire bird. Lastly, a frontal image will be taken of the bird to capture the characteristics of the neck band.

After banding, or removal of the trap if unsuccessful, the birds will be observed from at least 100 m away until it is deemed that the handled birds have returned to their normal behaviour pattern. After broods are released, the chicks will be observed from a distance to confirm that they are reunited with their parents. The amount of time required for birds to return to the nest and for family groups to reunite will be recorded. Wherever possible or feasible, monitoring of banded birds will occur every one to three days to detect possible problems with banded birds.

Bands -
One of the recommendations made for minimizing the risk of injury is to use bands without engraving on the inner edge of the bands. However the recommended band sizes for use on Piping Plovers (1A or 1B) are only available with inscription on the inside. We will determine the potential problems associated with engravings on the inside of the band and explore options to overcome any problems that may be encountered.

Both adult and juvenile birds will be marked with one band on each lower leg. One leg will hold a single incoloy size 1A or 1B band, while the other leg will hold a size XCl u.v.-stable colour band as prescribed for the individual province. The bands will be inspected prior to banding to identify any sharp edges that need to be polished.

Four different colour bands will be used during this study, corresponding to the province of banding. Adults and juveniles will be distinguished according to band placement. Adults will have colour bands placed on the left leg whereas juveniles will have the colour band placed on the right leg. The colour banding scheme has been assigned as follows:

New Brunswick	light blue/white
Newfoundland	pink/dark blue
Prince Edward Island	red/dark green
Îles-de-la-Madeleine	gray
Nova Scotia	light green/yellow

Banding regime -
Because Capture-Mark-Recapture studies rely on observations of banded birds, the confidence intervals of modeling parameters will be increased with a larger number of birds banded. Because of this, no banding targets will be established as banders should be aiming to band as many birds as possible keeping in mind the objective of minimizing potential negative impacts to nesting birds and available resources.

Protocol for mortalities or injuries -

In a twenty year study of Piping Plovers on the United States Atlantic Coast, Wilcox (1959) reported no fatalities due to trapping. Subsequent banding efforts have also resulted in negligible band-related fatalities. Few mortalities are therefore anticipated within the context of this proposed study in eastern Canada. However, in the event that some birds are inadvertently injured or killed, the following protocol is recommended.

Any Piping Plover found dead or injured and when the mortality or injury is suspected of being linked to the banding study will be reported immediately to Diane Amirault, Canadian Wildlife Service at (506) 364-5060 or at cellular number (506) 536-7050. Depending on the circumstances, a decision will be made on whether to suspend the remainder of the study.

An attempt will be made to capture injured birds to determine the extent of the injury and any link to banding. If the band(s) appears to be causing the injury, the band(s) will be removed. Injured birds will be monitored closely. A detailed description of the injury should be made for future reference, including a photograph of the injured limb. All possible attempts will be made to rehabilitate any injured individuals that may be encountered. Severely injured individuals may be euthanised, if appropriate, using cervical dislocation.

Any mortalities associated with banded birds will be examined at the Atlantic Veterinary College (AVC) in Charlottetown, Prince Edward Island in order to determine the cause of death and relationship, if any, to banding. If banding-related or other mortalities occur, these specimens should be retrieved as they may yield valuable information on diet, parasites of the gastero-intestinal tract or lungs, for inclusion in DNA studies and also for potential inclusion of specimens within a tissue storage bank at an appropriate facility.

Ideally, if the specimens are collected in close proximity to the AVC, post-mortem examination of fresh specimens would be preferable. If transport of fresh specimens to the AVC is not possible or feasible, these may be stored in a refrigerator for a maximum of 48 hours prior to transport. Fresh specimens can be shipped on ice directly to AVC. If it is not possible to submit specimens within a short period of time, these should be frozen. Any specimens submitted to AVC should be accompanied by as much information on nesting status and other history as possible. Prior to submitting any samples to AVC, Dr. Scott McBurney (902) 566-0959 should be notified.

4) Monitoring -

Marked birds may not necessarily return to the same areas as they were trapped. Therefore, monitoring outside banding areas will be necessary to obtain accurate indications of return rates. In Eastern Canada, there is a large network of monitors and guardians involved in Piping Plover conservation work. Information will be distributed through all appropriate channels, including naturalist groups to maximise efforts to locate banded birds.

A request for information on banded birds sighted during migration, on the wintering grounds and also on the United States Atlantic Coast will be circulated to all appropriate agencies involved in Piping Plover conservation efforts. We will request that information on the date and exact location of the sightings, as well as the colour and position of the band be provided to Diane Amirault as soon after the observation as possible.

5) Public relations -

There will be requirements for informing the public of the banding study and explain why it is necessary to mark the birds. Information will be developed and circulated through brochures, newspaper announcements and electronic channels, highlighting the need and purpose of this study.

6) Reference list

Cairns, W.E. 1977. Breeding biology and behaviour of the Piping Plover (*Charadrius melodus*) in southern Nova Scotia. M.Sc. thesis, Dalhousie Univ. Halifax, N.S.

Cairns, W.E. 1982. Biology and behavior of breeding Piping Plovers. Wilson Bull., 94(4): 531-545.

Gratto-Trevor, C.L. 1994. Banding and foot loss: an addendum. Journal of Field Ornithology 65(1): 133-134.

Haig, S.M. and L.W. Oring, 1988a. Mate, site and territory fidelity in Piping Plovers. Auk 105: 268-277.

Haig, S.M. and L.W. Oring. 1988b. Distribution and dispersal in the Piping Plover. Auk 105: 630-638.

Loegering, J.P. and J. D. Fraser. 1995. Factors affecting Piping Plover chick survival in different brood-rearing habitats. Journal of Wildlife Management 59(4): 646-655.

Reed, J. M. and L.W. Oring. 1993. Banding is infrequently associated with foot loss in Spotted Sandpipers. Journal of Field Ornithology 64(2): 145-148.

Root, B.G., M.R. Ryan and P.M. Mayer. 1992. Piping Plover survival in the Great Plains. Journal of Field Ornithology 63(1): 10-15.

Shaffer, F. and P. Laporte. 1997. Quelques faits sur la problématique du baguage du Pluvier siffleur. CWS memo. 4 pp.

U. S. Fish and Wildlife Service. 1996. Piping Plover (*Charadrius melodus*), Atlantic Coast Population, Revised Recovery Plan. Hadley, Massachusetts. 258 pp.

Wemmer L.C. and F.J. Cuthbert. in press. Banding Piping Plovers in the Great Lakes: An Evaluation and New Insights. Unpublished manuscript, Dept of Fish and Wildlife, University of Minnesota.14 pp.

Wiens, T.P. and F.J. Cuthbert. 1988. Nest-site tenacity and mate retention of Piping Plover. Wilson Bulletin 100 (4): 545-553.

Wilcox, L.A. 1959. Twenty year banding study of Piping Plover. Auk 76(2): 129-152.

Diane L. Amirault
Canadian Wildlife Service
P.O. Box 6227
Sackville, N.B.

E4L 1G6

(506) 364-5060
fax (506) 364-5062
diane.amirault@ec.gc.ca

. . . updated January, 2000

1999 Annual Report- Status of Roseate Tern Recovery Efforts.

Highlights:

The status of the Roseate Tern in Canada was reevaluated by COSEWIC in April 1999 and as a result the species was reclassified from Threatened to the more imperiled Endangered. During 1999, the Nova Scotia Department of Natural Resources and the Canadian Wildlife Service conducted joint surveys for terns along the coast of Nova Scotia. An estimated 117-141 Roseate Terns were observed at eight sites in Nova Scotia. Naturalists observed Roseates at two other sites in Nova Scotia later in the season but breeding was not confirmed. Roseate Terns were also observed on Machias Seal Island, NB, and the Magdelan Islands, PQ. The second year of the Country Island Tern Restoration Project was implemented and more terns nested on the island than in the previous four seasons, although the number of Roseates was still below the historic high. Preliminary results indicate that Sable Offshore Energy Incorporated's pipe laying activities had no measurable impacts on Roseate Terns or other seabirds on Country Island. CWS provided tern decoys and materials for Roseate Tern nest shelters to the Wedge Island Rehabilitation Committee. Other recovery efforts included the continuing coordination of the Atlantic Canada Tern Working Group (ACTWoG) which provides a forum to discuss tern issues in eastern Canada and the publication of the Roseate Tern Hinterland Who's Who. A video Hinterland Who's Who was also completed using footage from the Brothers taken by CBC's *Land and Sea*.

Summary:

Surveys

The Nova Scotia Department of Natural Resources flew aerial surveys for terns along the entire coast of Nova Scotia. CWS ground surveyed all colonies with over 100 individuals and a subset of smaller colonies. Roseates were not observed at any colony with less than 100 terns. As Roseate Terns tend to nest in larger colonies of Arctic and Common Terns it is likely that we detected most Roseate Terns in the province. Sable Island, where several pair of Roseates typically nest annually, was not surveyed, and due to poor weather neither were islands in Tor Bay where Roseate Terns have nested in the last few years. There were naturalist reports late in the season of Roseate Terns on Westhaver and Peter Islands but breeding was not confirmed. Peter Island was not visited by CWS during ground surveys and Westhaver was visited on 4 June but no Roseate Terns were observed. A single pair of Roseates was observed on Machias Seal Island but were not believed to have bred (K. Devlin, pers. comm.) and 3-5 pair were observed nesting on the Magdelan Islands (F. Shaffer, pers. comm.). This gives an estimated population of Roseate Terns in Canada of 123-149 pairs not including Sable Island or islands in Tor Bay which could increase the estimate by 5-10 pairs (Table 1, Figure 1). This estimate is slightly higher than those in the 1985 status report (103-127 pair), the Canadian Roseate Tern Recovery Plan (50-100 pair), and the updated COSEWIC status report from 1998 (87-137 pair; Table 2).

The Brothers

Ted d'Eon continued his work on the Brothers in 1999. The number of Roseate Tern nests increased to an all time high of 61 despite an overall decrease in the number of all tern nests and the abandonment of South Brother. The previous high was 59 in 1998. The overall decrease in terns was likely due to heavy crow predation in 1998. In 1999 the tern colony on Pinch Gut Island, an island about 15 km from the Brothers, increased in size by roughly the same number of terns that decreased on the Brothers. Early in the year poisoned bait was placed on North Brother to try to eradicate the crow problem. Two crows were killed and there was no evidence of crow predation in 1999. As in 1998, Roseate Tern productivity was low for unknown reasons. Ted said he would have been surprised if 20 young fledged.

Wedge Island

CWS provided tern decoys and nest shelters to the Wedge Island Tern Restoration Committee to facilitate their work on Wedge Island, NS. These were placed on the island early in the season. The number of terns on the island remained stable and may possibly have increased slightly from an estimated 50-60 pairs in 1998 to 120-140 individuals in 1999. These are estimates of birds over the colony because we did not enter the colony so as not to jeopardize the work of the Restoration Committee. The colony on the island adjacent to Wedge Island at the tip of Macdonald Point (local names include Neil's or Green Island) increased from 10-20 pair in 1998 to 101 nests in 1999 with an estimated 3-6 pairs of Roseates. Simon Krasemann, who deserves credit for the work on Wedge Island, feels that the number of gulls nesting on Wedge Island has decreased dramatically in the last two years. This occurred concomitant with the return of terns to Wedge Island which had been abandoned by terns for several years. There is undoubtedly a relationship between the number of gulls in the area and the closure two years ago of the Sackville landfill. The landfill was located 25 km from Wedge Island and received garbage from the Metro Halifax area. There is still a large number of gulls nesting and roosting on the island. Unless the gulls find another food source it is likely that the number of gulls in the area will continue to decrease until the population reaches a naturally sustainable level. The island was put up for sale twice in 1999, the first time unbeknownst to us. The new owner put it back on the market due to a sudden illness, and the Nature Conservancy of Canada (NCC) put a bid in on the island. Their bid was unsuccessful as the island was sold as part of a larger parcel of land on the mainland. NCC is trying to contact the new owner as they believe there may still be an opportunity to acquire the land. If NCC is successful, this will obviously contribute to the long term protection of the island and its tern colony.

Country Island

This was year two of the Country Island Tern Restoration Project. The project was initiated in 1998 in response to Becky Whittam's graduate research which found that the tern colony was threatened by corvid and gull predation. A non-lethal scare program was adopted in an attempt to reduce the number of predators nesting on the island, thus decreasing the predation pressure on terns. More terns nested on the island in 1999 than

in the previous four seasons, however only 16 pair of Roseate Terns nested. That is up from one in 1997 and three in 1998 but far less than the high of 45 observed in 1996. No gulls or corvids have nested on the island in either year of the restoration project. In 1999 the number of gull nesting attempts and the number of gulls roosting on the island decreased again, after decreasing in 1998. Productivity was high for all three tern species and it appears that Common Eider productivity also benefited from predator control. Significant numbers of ducklings were seen for the first time around the island late in the chick rearing period suggesting that this was the first time in four years that any ducklings fledged. In 1998 predator control was intense early in the season when eiders were prospecting for nest sites. As a result only 17 nests were found when it was estimated that 50-60 nested on the island prior to control. In 1999, the section of the island where eiders nest was avoided early in the season and 82 nests were later found. This was an increase in nests over 1998 but not necessarily an increase over 1997 because surveys were incomplete prior to control. Corvid predation on eider eggs was still a problem. Predation is also believed to affect Leach's Storm Petrels as many carcasses were still found in 1999, however the effect of predation on petrels was not quantified.

Recommendations for 2000:

1) The tern restoration project on Country Island should be continued indefinitely. Through partnerships and external funding opportunities, the 1999 field season required considerably less direct funding from CWS than in 1998. We are currently pursuing other funding sources and it is expected that at a minimum the same level of external funding can be secured for 2000 as in 1999. Additional funds will be sought through the *Important Bird Areas* Community Action Fund and there are plans for a graduate student funded through NSERC to conduct research on the island for the next two years. The project should shift its focus from management to research while continuing to maintain predator control as per the previous two years. It is expected that the amount of effort required to control the predator population will decrease annually as the predators' attachment to Country Island as a breeding site weakens.

2) Surveys for Roseate Terns should be undertaken at sites that were not surveyed in 1999 (Sable Island, islands in Tor Bay), at sites where Roseates were seen in 1999 but breeding was not confirmed (Peter Island, Westhaver Island), and at sites where predation may have been an issue in 1999 (Mash Island). In many cases these surveys may be undertaken by CWS partners.

3) Tern surveys should be undertaken in New Brunswick. The health of the Roseate Tern population is linked to the health of Common and Arctic Tern populations in the region. Surveys conducted in PEI found that the number of terns nesting in that province has decreased substantially. Tern colonies identified in PEI in 1999 should be resurveyed in 2000 to take into account the possibility of movement between NB and PEI between years. Re-surveying NS would be a much larger commitment but should also be considered to provide a complete snapshot of the Maritime tern

population. There is also a complete seabird survey scheduled for the Magdelan Islands in 2000.

4) Sable Island should be surveyed for Roseates during the breeding season and again late in the summer for staging birds. Work by Tony Lock suggests that Sable may be an important staging area for Roseate Terns. The origin of these birds is unknown but Lock felt that they were either a good proportion of the Canadian population or birds from the northeast U. S.. Sable Island has always been listed as a significant site for Roseate Terns however its current importance to the population as a breeding and staging area is largely unknown.

5) Continue to support work at Wedge Island and the Brothers and develop partnerships with additional groups such as the Bluenose ACAP (Atlantic Community Action Plan) site who plan to work on seabirds in Mahone Bay.

5) Links should be made with the United States Roseate Tern Recovery Team and their Recovery Plan as they are responsible for the bulk of the northeast Roseate Tern population. The Canadian Recovery Plan expired in 1995 and therefore requires updating.

6) Continue to provide information and contribute to the Northeast Tern Management Plan being developed by the National Audubon Society for the U.S. Fish and Wildlife Service. Maintain links with the Gulf of Maine Seabird Working Group, the American equivalent to ACTWoG.

7) Some resources should be allocated for work on gull populations in the region. We have been managing terns without understanding the dynamics of their main predators and competitors; large gulls. Anecdotal evidence suggests that populations are declining and there have been several mass starvings of juvenile gulls reported in eastern Canada. It is likely that the pressures affecting gull populations differ between locations based on artificial food supplies. The diet and productivity of gulls in areas should be studied and compared between colonies where fish offal is still readily available and colonies where fisheries moratoriums and landfill closures have forced gulls to look for other food sources. Potential colonies include:1) Wedge Island, NS - the Sackville landfill has closed; 2) Indian Point Sandhills, PEI - the fishery has been scaled way back yet there are still large numbers of gulls; 3) southwest NS - fisheries continue to thrive; and 4) Grand Manan archipelago - there is a lot of aquaculture activity.

Andrew Boyne
6 March, 2000

Table 1. Number of Roseate Terns observed at colonies in eastern Canada in 1999.

Colony	Latitude	Longitude	Date	Roseate Tern pairs	Tern nests all species	Source
Nova Scotia						
Mash Island	44.50	-64.28	4 June	10-20	324	CWS/ NSDNR surveys
Wedge Island	44.691	-63.95	4 June	5-10	120-140 *	CWS/ NSDNR surveys
Neil's Island	44.62	-63.93	4 June	3-6	101	CWS/ NSDNR surveys
Hughes Island	43.73	-65.02	5 June	5-10	189	CWS/ NSDNR surveys
Horseshoe, McNutt's Island	43.65	-65.30	6 June	1-2	101	CWS/ NSDNR surveys
North Brother	43.64	-65.82	7 June	61+	399	Ted d'Eon
Salmon Island	43.42	-65.63	7 June	at least 16	279	CWS/ NSDNR surveys
Country Island	45.10	-61.53	9 July	16	549	Julie Paquet - Tern Restoration Project
Westhaver Island	44.44	-64.34		present [1]	57 [2]	[1]James Hirtle [2]CWS/ NSDNR surveys
Peter Island	44.26	-66.34		2 [1]	25 *[2]	[1]Clarence Stevens [2]CWS/ NSDNR surveys
New Brunswick						
Machias Seal Island	44.50	-67.10		1	2985 (1998)	K. Devlin - ACWERN/UNB
Quebec						
Magdelan Islands	48.40	-61.78	20-22 June	3-5	2211	François Shaffer - CWS-Quebec
			Total	123-149		

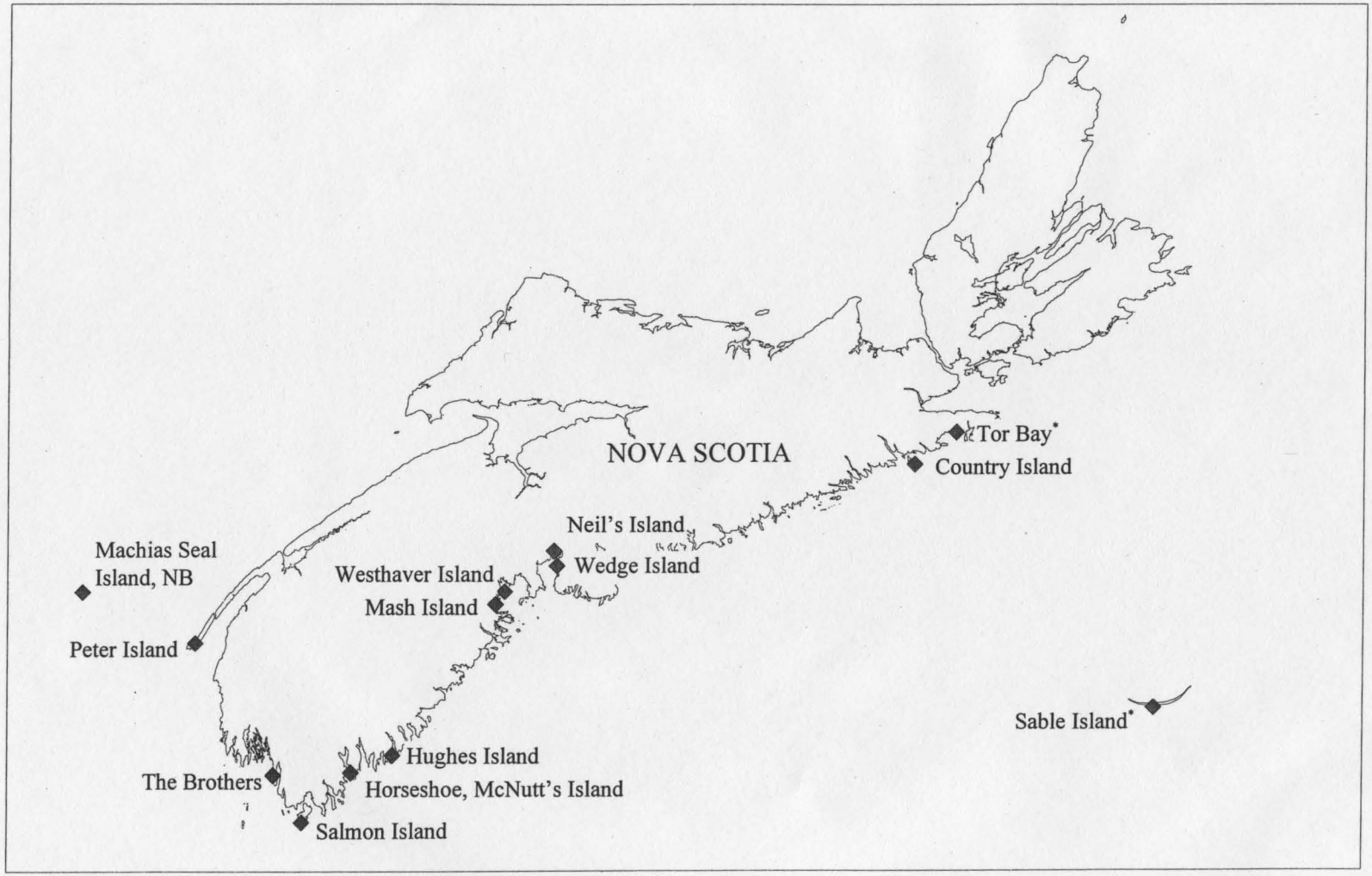
* Individuals
+ 9 July

Table 2. Estimated number of Roseate Tern pairs breeding in Canada in 1982-85 (from Kirkham and Nettleship 1985), 1997 (from Whittam, 1998), and 1999.

Site	1982-85 estimate	1997 estimate	1999
Several colonies on the Magdalen Islands, PQ	1 - 5	1 - 5	3-5
Machias Seal Island, NB	0	1 - 2	1
Peter Island, NS	1	0	2
The Brother's. NS	55 - 60	54	61
Mud Island, NS	2	0	0
Tusket Island, NS	15 - 20	0	0
Westhaver Island, NS	8	0	present
Grassy Island, NS	0	12 - 30	0
Wedge Island, NS	6	0	5-10
Sambros Island, NS	3	0	0
Country Island, NS	0	18 - 45*	16
Sable Island, NS	10 - 20	1	-
Mash Island, NS	-	-	10-20
Neil's Island, NS	-	-	3-6
Hughes Island, NS	-	-	5-10
Horseshoe, McNutt's Island, NS	-	-	1-2
Salmon Island, NS	-	-	16
TOTAL	**101 - 125**	**87 - 137**	**123-149**

* Country Island complex - includes birds breeding on Country Island, Charlos Cove, Fisherman's Harbour and Inner West Bird Island in 1997

Figure 1. Location of Roseate Tern breeding sites in Canada, 1999. In addition to these sites Roseates bred on the Magdelan Islands, Quebec. Islands in Tor Bay and Sable Island were not surveyed in 1999 but Roseates have traditionally nested at these sites (*).



Species at Risk Recovery Program

Species at risk recovery program; annual reports 1999.

Name Date