

PIPING PLOVER RESEARCH AND CONSERVATION IN CANADA

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The Piping Plover is a small North American shorebird which received relatively little attention from researchers until the 1980s when concern was expressed that this species had suffered a serious population decline.³¹ In 1985, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) declared the Piping Plover to be an endangered species based on a status report recommendation,³¹ while the United States Fish and Wildlife Service (USFWS) declared the plover to be endangered in the Great Lakes region and threatened elsewhere as of 1986.⁷¹ In 1988, the population on the North American breeding grounds was estimated to be about 4300 adults (Table 1). Piping Plovers winter in the southern United States, Mexico and on Caribbean islands,³⁶ however wintering ground surveys have only accounted for about 1730

individuals (adults and young in their first year).⁶⁵

About the turn of the last century, hunting contributed to the plover's decline,⁷ but more recently, water level regulation, habitat modification, predation and human disturbance have been implicated.⁴¹

The present overview, an expanded version of an upcoming article,³⁰ provides an update on surveys, research and conservation activities by various Canadian agencies and provides a major focus on the period 1985-1988. Information prior to this period can be found in Haig³¹ and McNicholl⁶¹ while some material, falling in the period discussed in this current paper, has been discussed by McNicholl⁶¹ and Haig and Oring.³⁷

Table 1. NORTH AMERICAN PIPING PLOVER POPULATION ESTIMATES FOR 1988.

Location	Number of adults	Source
<i>Great Plains</i>		
Canada	925	see Table 2
United States	1612	Susan Haig, unpubl. data
<i>Great Lakes</i>		
Canada	0	Susan Haig, unpubl. data
United States	31	Susan Haig, unpubl. data
<i>Atlantic coast</i>		
Canada	465	see Table 2
United States	1288	Anonymous ⁵
<i>Islands</i>		
Canada	1390	
United States	2931	
North America	4321	

Surveys - Distribution and Abundance

National Perspective

The Piping Plover is found in nine of the ten Canadian provinces³⁶ (Figure 1) and breeds in two principal regions defined in this paper as Prairie Canada (Alberta, Saskatchewan, Manitoba, western Ontario) and Atlantic Canada (Quebec, Nova Scotia, New Brunswick, Prince Edward Island, Newfoundland). Until 1977, Piping Plovers also nested in the Canadian Great Lakes region⁵⁵ although breeding may have occurred more recently, in 1981 and 1988.⁹

Based on 1988 data, about 32% (near 1400 adults) of the North American Piping Plover population occurs in Canada (Table 1 and 2). Estimates of the Canadian population, published in 1988, ranged from about 715-1115 pairs;^{36, 71} the estimate for 1986 was about 800-850 pairs⁴¹ and less than 700 pairs for 1985 (Table 2). An international Piping Plover survey in 1991 on both breeding and wintering grounds will provide the best population estimates to date.

Prairie Canada

Sixty-six percent of the Canadian population is found in Prairie Canada



Figure 1. North American breeding distribution of the Piping Plover (after Haig *et al.*⁴¹ and S. Haig, pers. comm.)

ble 2). In Alberta, the Piping Plover breeding population prior to 1978 was estimated to be 100-110 pairs,⁸⁴ but the major survey, carried out in 1986, revealed a total of 288 adults.⁸³ Additional checks in 1987 resulted in one more breeding area being located near Estiskow.⁷⁹ Since 1900, habitat loss in Alberta is thought to have resulted in a decrease in breeders of less than 10%, however drought conditions in 1988 resulted in no productivity at some locations and is thought to have influenced a decline in the provincial population.⁸²

The northern-most Canadian record of breeding Piping Plovers occurred in Saskatchewan at Lake Athabasca and extended the previously known range by 1 km.¹ Recent occurrences of Piping Plovers in Saskatchewan have mostly been documented on lands under federal or provincial jurisdiction.¹⁷

Changing habitat conditions,⁴³ possible reduction in the population³² and data evaluation⁷³ have influenced the interpretation of Saskatchewan Piping Plover

population estimates. In 1984, the Saskatchewan population was estimated to be between 2000-2500 plovers. This estimate was based on known and extrapolated data from lake surveys plus an estimate of the remaining potential habitat for plovers in Saskatchewan.⁴⁸ However, the 1986 provincial estimate was down 67% at about 700-800 adults⁴¹ and down further to 500 individuals in 1988 (Wayne Harris, pers. comm.). Big Quill Lake, one of the largest and most populated breeding sites in North America, was estimated to have 300+ adults in 1985⁴⁷ but a survey done the following year reported less than 50% of that number.⁴² The adult population count was up somewhat in 1987, but the number of observed young was down by 46% from 1986.⁴⁴ In 1988, only 107 adults and 17 young were reported. Drought conditions⁴⁵ probably contributed to decreased numbers of plovers at Big Quill Lake with adults possibly going to different sites.⁴²

Populations at Redberry Lake, a site considered for recreational develop-

Table 2. CANADIAN PIPING PLOVER POPULATION ESTIMATES FOR 1988.^a

Province	Number of adults	Source
<i>Provincial Canada</i>		
Alberta	220+	Wershler ⁸²
Saskatchewan	500	Wayne Harris
Manitoba	200	Bill Koonz
Ontario (Lake of the Woods)	5	Maxson <i>et al.</i> ⁵⁹
<i>Atlantic Canada</i>		
Quebec	74	Pierre Laporte CWS ^b
Newfoundland	8	Bruce Johnson CWS
Prince Edward Island	91	Bruce Johnson CWS
Nova Scotia	102 ^c	Flemming <i>et al.</i> ²⁵
New Brunswick	190	Bruce Johnson CWS
Total	1390	

^a The estimates reflect 1987 or earlier data as complete surveys were not carried out in all provinces in 1988.

^b - Canadian Wildlife Service.

^c Average taken of 1987 range (48-54 pairs).

ment,⁷⁴ remained stable at or about 40 individuals in 1984⁴⁸ and 1985.⁵³ At Lake Diefenbaker, an artificial lake created by damming the South Saskatchewan River, fluctuating water levels significantly influence habitat availability for Piping Plovers. In 1984, when water levels were low and habitat was available to plovers, 223 individuals were seen during a survey of about 63% of the eastern part of Lake Diefenbaker's shoreline.⁴⁸ In 1986, plovers did not nest because of high water levels.⁴⁶ Habitat was available in 1988, however, only 97 adults were found even though more shoreline was covered⁴⁶ than in 1984.⁴⁸

Relatively few plovers have been reported on river habitat in Prairie Canada. This contrasts with considerable use of riverine sandbar habitat by plovers in the American great plains.⁴¹ The discovery, in 1988, of 44 plovers along the South Saskatchewan River downstream from Lake Diefenbaker⁶⁶ has increased an awareness of the plover's use of river habitat in Prairie Canada. It is not known what, if any, importance rivers have as an alternative nesting area for displaced breeding plovers during drought years when lakes such as Chaplin and Old Wives have little or no water and very few plovers (Wayne Harris, unpubl. data).

Manitoba's plover population, based on data from surveys carried out prior to 1987, is estimated to be about 120-130 individuals.^{33 34} Several previously unknown sites with one or more plovers were located in 1987 by the Manitoba Department of Natural Resources.⁶⁴ In 1988 the population was estimated at close to 200 plovers. This increase is thought to have possibly been a result of drought in other areas influencing plovers to move into Manitoba.⁵⁴

The Piping Plovers at Lake of the Woods in western Ontario are included in the plains population.⁶⁹ This is the only known annual breeding population in

Ontario⁵⁵ consisting of up to 10 adults (1981-1988).^{55 50 51 52 59}

Great Lakes Canada

Historically, the Great Lakes population in Ontario has been estimated about 150-160 pairs, with most at Lake Erie, particularly Long Point.⁶⁹ The species' decline in the Great Lakes region has been so great that it can be considered extirpated⁶⁹ although there are two possible breeding records (1981 and 1988) in the last decade.⁹ Human disturbance⁶⁹ and predation⁵⁵ are thought to have contributed to the decline.⁶⁹

Atlantic Canada

The Piping Plover population in Atlantic Canada ranged from about 445-500 adults based on 1982 and 1984 information.³⁶ The 1988 population estimate for Atlantic Canada, 465 adults, is approximately 34% of the Canadian population with 82% of the Atlantic Canada plovers occurring in New Brunswick, Nova Scotia and Prince Edward Island (Table 2). In these latter provinces, the annual breeding population at three National Parks has ranged from 45 to 52 pairs during 1984 to 1988. The lowest breeding population at Kouchibouguac National Park, New Brunswick, was recorded in 1988 with only nine breeding pairs reported, down from the high of 21 in 1983. In contrast, Prince Edward Island National Park had its highest count in 1988, with 28 breeding pairs located.¹³ The breeding population in Kejimikujik National Park's Seaside Adjunct, Nova Scotia has varied from a high of at least 27-29 pairs in 1976 (data only from Cadden Beach¹⁰ currently at Catherines River Beach⁶⁸), to nine breeding pairs in 1987.¹³ In 1988, the Canadian Parks Service (CPS), in addition to surveying plovers in National Parks, also surveyed nine provincial beaches in Nova Scotia and recorded 12-14 breeding pairs and 13 fledged chicks.⁶⁷ In Quebec the population is estimated to be less than 10 pairs (Table 2). Since 1979, population

estimates for the Magdalen Islands have varied from 30 pairs in 1979¹² to 20 pairs in 1983¹⁸ to 37 pairs plus four individuals in 1987.⁷⁰ Surveys prior to 1987 were not considered to be exhaustive as was the 1987 survey, and therefore evaluating the population trend is difficult.⁷⁰ However the latter report concluded the population was fairly stable. In the 1980s, the Newfoundland plover population appears to have remained at less than 12 adults (Joe Azil, pers. comm.).

In Nova Scotia, a decrease of 3.3-5.8 pairs/year was believed to have occurred from 1983 to 1987.²⁵ In Quebec, adults and young were seen along the Gulf of St. Lawrence's north shore as recently as 1986,⁸⁷ however no Piping Plovers were seen during a 1988 survey.²⁰

Research

Evolutional Perspective

Only four major research projects on Piping Plover biology have been completed in Canada - two in Prairie Canada³⁵ and two in Atlantic Canada.^{10 23}

Prairie Canada

Whyte conducted a two-year study at Quill Lake, a large prairie lake in Saskatchewan. His fieldwork concentrated on breeding chronology, territoriality, choice of nest locations and reproductive success. Hatching success was only 28.6% in 1980 and 8.8% in 1981 while fledging success was considerably higher (66.7% in 1980 and 86.0% in 1981). Predation by Ring-billed Gulls was suspected and may have caused the low nest success.⁸⁵

In Manitoba, Haig carried out a major study of the breeding biology of Piping Plovers.³⁵ She found that almost 70% of pairs which survived returned the following year to the area where they had bred and that there was no significant difference in return rates between males and females. Although most pairs

changed mates between years, the majority retained mates after nest loss.³⁹ Like Whyte,⁸⁵ Haig found nest success to be poor with 64% of the nests failing in her study, most likely because of predation, storms and human disturbance. She determined that only about one chick fledged from a nest.³⁹ Haig also did genetic research on various North American populations; no convincing support could be found for taxonomically dividing this plover into two subspecies³⁸ as does the American Ornithologists' Union.² Haig has also provided the most comprehensive overview of Piping Plover distribution in North and Latin America.^{36 40}

A recent analysis of Piping Plover productivity data from the Prairie Canada and American great plains population questions whether the population will sustain itself since not enough young may be being produced. Using a theoretical model to determine productivity required for population stability, researchers determined that between 1.15-1.44 fledged chicks/pair is required to maintain the western population. Known productivity was found to be only 1.12 ± 0.33 (standard error) fledged chicks/pair in the prairie and plains population. Theoretical production values, which serve as a tentative benchmark need to be tested further.²⁷

Atlantic Canada

Cairn's research in Nova Scotia resulted in the first comprehensive description of Piping Plover territorial and courtship behaviour.^{10 11} She found that fledging success was lower on beaches with greater recreational activity compared with her main study area, Cadden Beach, which had more limited recreational use.^{10 12} A one-season study by Tull in and near Kouchibouguac National Park, New Brunswick, found that reproductive success in early nests was greater than those initiated later.⁷⁶ Tull also found that human disturbance or lack thereof, was

not an important factor affecting productivity, however disturbance was relatively limited at his study site and may not have been sufficient to show an impact. Further study in Nova Scotia revealed that disturbance was not an important factor for young chicks (10 days) but was for older chicks (17 days).²⁵ For this latter group, significantly fewer survived per pair (0.5) on beaches with disturbance compared with those surviving (1.8) on beaches with less activity. This study suggests behavioural changes in response to human presence such as decreased chick brooding and feeding, may make chicks more vulnerable to predation and the elements.

Productivity has also been determined by CPS for Piping Plovers breeding in some Atlantic National Parks. The number of chicks fledged per pair has varied from 1.5-2.2 in Kouchibouguac National Park^{76 13} to 0.7-2.8 in Prince Edward Island National Park^{15 63 86} to 0.3-2.1 in Kejimikujik National Park.^{68 11}

In Nova Scotia, during 1979-1983, fledging success was reported to be 1.2 chicks/pair/nest initiated.²⁵ It should be noted that there is variation in the above studies as to the definition of a fledged chick and some give minimum-maximum ranges because of the difficulty in determining the number of fledged chicks.

Conservation

National Perspective

Piping Plovers are protected by the Migratory Birds Convention Act of 1917 and additional conservation measures are afforded through the Canada Wildlife Act of 1973. As of fall 1990, Canada has no federal endangered species act, but Manitoba (Bill Koonz, pers. comm.), Quebec (Pierre Laporte, pers. comm.), Ontario and New Brunswick have endangered species legislation.⁷⁷ At the national level, species status designations in

Canada are assigned by COSEWIC but not carry legislative powers.

After the Piping Plover's status has been upgraded in 1985 from threatened to endangered in Canada by COSEWIC steps were taken to develop a national approach to conserving the species, laying the groundwork for a national recovery plan.⁶⁰ The recovery plan⁶ has been approved (Tim Lash, pers. comm.) and is complementary to the two American recovery plans already in place.^{22 41} Research and conservation actions, outlined in the Canadian Piping Plover Recovery Plan, are aimed at retaining the Canadian plover population and its distribution.⁶ Overall Canadian recovery efforts are administered through a national coordinator while two regional teams are responsible for regional planning. Recently, Canada and the United States have recognized that international cooperation is important to Piping Plover conservation and have participated jointly in recovery team meetings.

Federal, provincial and nongovernment agencies have initiated a variety of research and/or conservation measures (Table 3). Nongovernment agencies have been successful in providing publicity about the plover's plight and have supported plover surveys and conservation. For example, the Canadian Nature Federation has been active in habitat preservation (B. T. Aniskowicz, pers. comm.) and through its publication, *Nature Canada*, has made Canadians aware of this plover.^{3 62 74} Support for survey work has come from World Wildlife Fund (WWF), the Elsa Wild Animal Appeal in Canada, the Saskatchewan Natural History Society (SNHS),²⁹ the Province of Quebec Society for the Protection of Birds⁷⁰ and the Natural History Society of Prince Edward Island (NHSPEI) (Dan Askill, pers. comm.). Ducks Unlimited, SNHS, Wildlife Habitat Canada and WWF have supported habitat enhancement efforts (Dale Hjertaas, pers. comm.)

Official Provincial Status	Surveys	Banding	Habitat Development	Signage	Patrols	Management Plan ^a	Public Information/ Education
<i>Atlantic Canada</i>							
Newfoundland	*			*	*		*
Prince Edward Island	*			*	*	*b	*
Nova Scotia	*	*c	*	*	*	*b	*
New Brunswick	*	*d		*	*	*b	*
Quebec	*			*	*	*	*
<i>Great Lakes Canada</i>							
Ontario	*					*	*
<i>Prairie Canada</i>							
Ontario	*			*	*	*	*
Manitoba	*	*	*	*		*	*
Saskatchewan	*	*	*	*		*	*
Alberta	*	*				*	*

^a Approved or in preparation.

^b Refers to a Canadian Parks Service management plan. No provincial plan prepared.

^c Cairns.¹¹

^d Haig and Oring.³⁸

^e Listed as endangered under the Alberta Wildlife Act but in policy the status is considered as vulnerable. Note that the term endangered in the Act encompasses species considered to be endangered, threatened and vulnerable (Steve Brechtel, pers. comm.).

Prairie Canada

Within the last five years, the participation of agencies in Piping Plover conservation in Prairie Canada has increased and demonstrates a heightened interest in this migratory plover. The Prairie Piping Plover Recovery Team has identified priority action plans.²⁹ These strategies will serve to implement the interests of the national plan at the regional level. In addition to the national recovery plan, provincial management or recovery plans have been initiated in Ontario,²⁸ Manitoba^{34 8} and Alberta.⁸²

General suggestions regarding Piping Plover management in Alberta have been previously outlined⁷⁸ while specific management suggestions have been made for protecting plover habitat from cattle disturbance and/or recreational activities at Little Fish Lake and one of the Reflex Lakes.^{80 81} Habitat enhancement projects have been initiated in both Saskatchewan and Manitoba. Nesting substrate has been increased at two lakes in Saskatchewan, Chaplin^{45a} and Little Quill, through the spreading of gravel on lakeshore habitat (Dale Hjertaas, pers. comm.). Since Piping Plovers successfully use a variety of artificial habitats for nesting,⁴¹ a proposed dyke to enhance waterfowl production, at Old Wives Lake in southern Saskatchewan, if constructed, may provide suitable plover nesting habitat.³² In Manitoba, habitat modification has been attempted at Lake Winnipeg (Bill Koonz, pers. comm.) and Lake Manitoba.³⁴ In 1982, breeding habitat on the southeastern shore of Lake Manitoba was protected by the Manitoba government declaring the site a Special Conservation Area.³⁴ A sign at Sable Islands Provincial Nature Reserve, Lake of the Woods, Ontario was erected in part to contribute to conserving breeding Piping Plovers (Leo Heyens, pers. comm.).

Great Lakes Canada

Although Piping Plovers do not currently breed in this part of Canada, both the

proposed national⁶ and Ontario recovery plans have set as one of the goals, the re-establishment, if feasible, the plover in this region.

Atlantic Canada

Of nine National Parks and one National Park Reserve in Atlantic Canada, only Prince Edward Island National Park, Kouchibouguac National Park and Kejimikujik National Park's Seaside Adjunct harbour Piping Plovers. Each of these three parks has a management plan for Piping Plovers.^{14 26 68} CPS has used signs, fences and warden patrols to afford protection to some nesting areas and interpretive hikes, slide shows and pamphlets assist in educating the general public (Gary Corbett, pers. comm.). Since maritime storms cause nest loss,⁴ CPS has considered removing eggs, incubating them and then replacing them (Gary Corbett, pers. comm.). Piping Plover eggs have been successfully hatched by artificial means and the resulting young released into the wild.⁶³ Predation is considered to be a greater problem than human disturbance in Atlantic Canada but it may be related indirectly to human activity (Gary Corbett, pers. comm.). Efforts to control predators have been attempted⁶⁷ and nest exclosures have been successfully used in decreasing predation.²¹ Since there is evidence to suggest that plovers have a higher hatching success when nesting near breeding terns than in the terns' absence, consideration should be given to the suggestion to manage tern colonies in order to benefit plover conservation.¹⁶ CPS has also compiled an extensive bibliography with over 200 references cited on literature pertaining to this species.⁵⁷

For more than 10 years, the NHSP/ELH has been actively promoting Piping Plover conservation. The society has conducted surveys for plovers, helped in planning workshops, initiated a program to contact landowners, and supported public relations efforts including a Piping Plover

deo and poster (Dan McAskill, pers. comm.). The landowner contact program revealed over 75% support by landowners for plover conservation. Disturbances identified by landowners included use of All Terrain Vehicles, habitat alteration and recreational activities.⁵⁸

On Quebec's Magdalen Islands, beach traffic during the plover's breeding season heightened in July during part of the chick-rearing period. The primary conservation recommendation for these islands is to control traffic so as to decrease nest loss and secondarily to consider habitat creation.⁷⁰ Additional discussion of plover conservation is found in a draft Quebec recovery plan.⁵⁶

A diversity of techniques has been used in attempts to increase populations of different bird species,⁷⁵ however, only limited experimentation has been initiated to encourage plover productivity

and none has yet been used to increase genetic diversity. Reciprocal egg fostering among different plover demes has been suggested as a means to increase genetic diversity.²⁴ However a recent genetic study has shown that inbreeding in Piping Plovers is not a concern.³⁸

The future of the Piping Plover in Atlantic Canada is somewhat clouded by a predicted warming trend in the earth's climate which may result in coastal flooding⁴⁹ thereby reducing available nesting habitat and decreasing plover productivity. However, any future threats to the plovers and their coastal habitat will be challenged by the concern and commitment of dedicated conservationists in Atlantic Canada to attempt to ensure the continuing presence of the Piping Plover on east coast beaches.

Conclusion and Recommendations

Most provinces, with the exception of Saskatchewan, have an adequate



Piping Plover

Geoff Holroyd

account of the Piping Plover populations within their jurisdictions. Furthermore, population estimates in Saskatchewan have varied considerably between researchers, and the importance of clarifying the abundance of plovers in this province is of international significance, as the estimated population may account for 12% (Table 1) to perhaps 50% of the total continental population.⁴⁸

In Prairie Canada there are several concerns which need to be addressed. Further clarification of the plover's distribution and protection of its habitat is needed. As to research, long-term data are needed on population dynamics, dispersal and productivity to determine the nature of population fluctuations and the adequacy of reproductive output in maintaining a self-sustaining population.

In Atlantic Canada, information is needed on wintering locations of the breeding population (Richard Dyer, pers. comm.) while research and management is required to reduce nesting failure caused by predators and storms. The possible impact of illegal shorebird hunting in some locations in Newfoundland¹⁹ should be evaluated and appropriate action taken to provide public education. In both Atlantic and Prairie regions, conservation must take priority if the plover's status is to be downlisted or de-listed. In order to effectively conserve the continental breeding population of Piping Plovers, joint action by Americans and Canadians⁷² must continue in cooperation with those Latin American countries where the plovers winter. Finally, it is of utmost importance that landowners and the general public take responsible conservation actions for habitat preservation during occupational and recreational activities.

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Piping Plover nest

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