NEW WORLD SECTION

EDITORS

P.W. Hicklin, Canadian Wildlife Service, PO Box 1590, Sackville, New Brunswick, E0A 3C0, CANADA

G. Ruiz, Smithsonian Environmental Research Center, PO Box 28, Edgewater, Maryland 21037-0028, USA

SURVEYS AND CONSERVATION OF PIPING PLOVERS IN CANADA

J. Paul Goosen

Goosen,J.P. 1990. Surveys and Conservation of Piping Plovers in Canada. *Wader Study Group Bull.* 57: 53-57.

J. Paul Goosen, Canadian Wildlife Service, Room 210, 4999 - 98 Avenue, Edmonton, Alberta, Canada, T6B 2X3.

INTRODUCTION

The Piping Plover, Charadrius melodus, is a small North American shorebird which received little attention from researchers until the 1980s when concern was expressed that this species had suffered a serious population decline (Haig 1985). In 1985, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) declared the Piping Plover to be an endangered species in Canada, while the United States Fish and Wildlife Service declared the plover to be endangered in the Great Lakes region and threatened elsewhere as of 1986 (Sidle 1985). In 1988, the North American Piping Plover population was about 4 090 individuals (data from Anon 1989, Flemming *et al.* 1988, S. Haig pers. comm., W. Koonz pers. comm.). Piping Plovers winter in the southern United States, Mexico and on Caribbean islands (Haig & Oring 1985). Wintering ground surveys have, however, only accounted for less than 45% of the population (J. Nicholls, unpubl. abstract). Hunting contributed to the plover's decline in the late nineteenth century (Bent 1929) but more recently water level regulation, habitat modification, predation and human disturbance have been implicated (see Haig *et al.* 1988 and references therein).

Information on Canadian surveys and conservation for this species has been discussed by Haig (1985) and McNicholl (1985) while research activities are being summarized by Goossen (*in prep.*) in a more extensive version of this current article. The present paper provides an update on surveys and conservation activities by various agencies in their efforts to study and conserve the Piping Plover in Canada. Many of the results are documented in unpublished reports which are narrowly distributed. For these reports, I have not provided the complete citation. Interested readers may contact me directly and indicate which reports are of interest to them and I will forward the request to the appropriate agency.

SURVEYS - DISTRIBUTION AND ABUNDANCE

National Perspective

The Piping Plover is found in nine of the ten Canadian provinces (Figure 1) and breeds now in only 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 (Haig & Oring 1985, Lambert 1987). As recently as 1977, plovers also nested in a third region - Great Lakes Canada (Lambert 1987).

About 36% of the North American Piping Plover population occurs in Canada during the breeding season (based on data from Anon 1989, Flemming *et al.* 1988, S. Haig pers. comm., W. Koonz pers. comm.). Haig & Oring (1985) estimated that there were about 715-1 000 pairs in Canada, but this estimate was later narrowed to about 800-865 pairs (Haig *et al.* 1988) and more recently would appear to be less than 800 pairs (Goossen *in prep.*). These estimates are provisional since no coordinated national or international survey has taken place and not all suitable breeding habitat has been surveyed. The need to clarify the Piping Plover populaton estimate has led to plans to conduct an international survey of its breeding and wintering grounds in 1991. Population estimates are summarized below for each of the two Canadian regions where plovers now breed.

Prairie Canada

Over 65% of the Canadian population is found in Prairie Canada (S. Haig unpubl. data). In Alberta, the first major survey of Piping Plovers was carried out in 1986 with a total of 288 adults reported (C. Wershler & C. Wallis, unpubl. report). This population estimate was 31-44% greater than Weseloh and Weseloh's (1983) estimate of 100-110 pairs for this province. Significant population declines have not been noted in Alberta (Wershler 1987).

Some of the most extensive surveys in Prairie Canada have been carried out in Saskatchewan. These have resulted in controversy over the population status of the plover in this province. Changing habitat conditions (Harris 1987), possible reduction in the population (S. Haig, unpubl. report), and data evaluatoin (A. Smith, unpubl. report; Harris 1987) are factors which have influenced the interpretation of Saskatchewan's Piping Plover population estimates. W. Harris *et al.* (unpubl. report) estimated there were 2 000-2 500 plovers in the provincial population based on lake surveys and estimates made in 1984; however in 1986, the

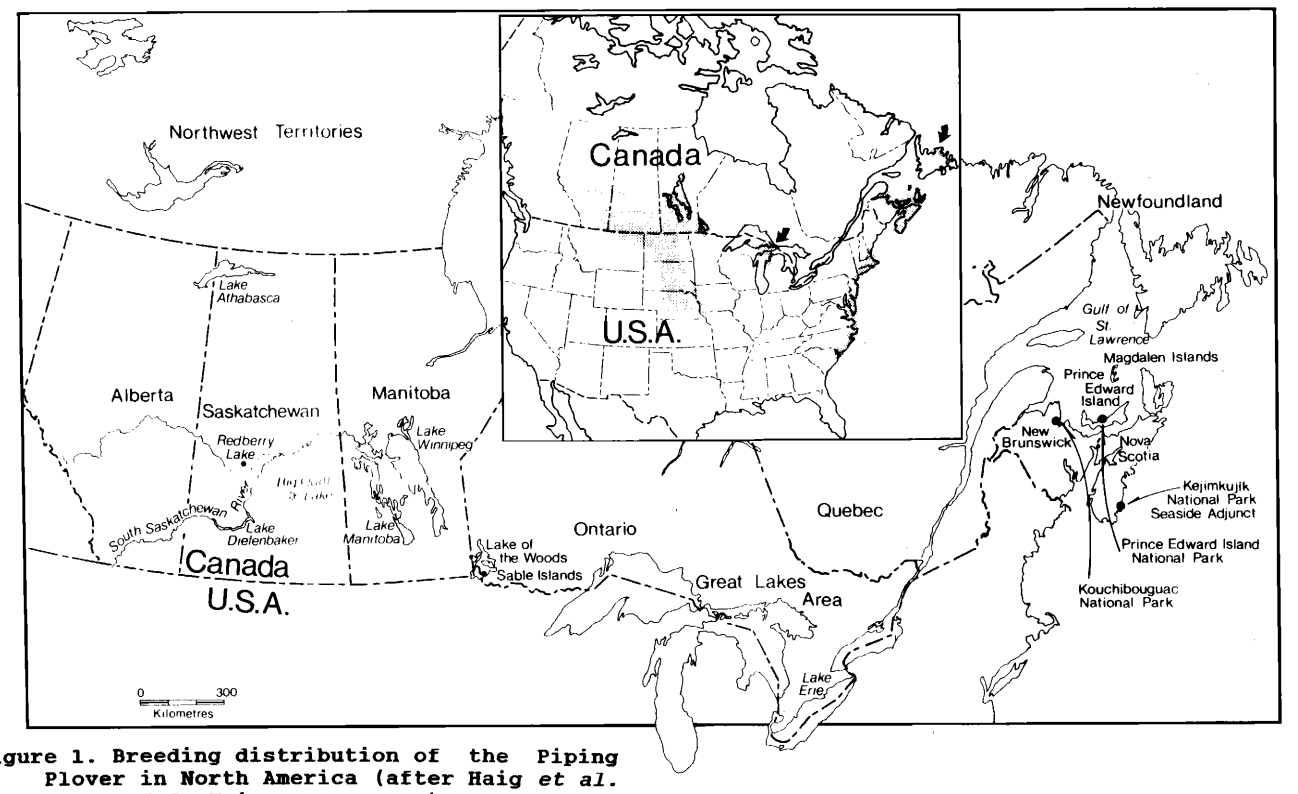

Figure 1. Breeding distribution of the Piping Plover in North America (after Haig *et al.* 1988 and S. Haig pers. comm.).

provincial estimate totalled only about 355-400 breeding pairs (Haig *et al.* 1988). In 1988, populations were estimated to be drastically lower at less than 500 individuals (W. Harris, unpubl. abstract). One of North America's most important breeding sites (Harris, unpubl. report), Big Quill Lake, was estimated to have 300+ adults in 1985 (W. Harris & S. Lamont, unpubl. report) but a survey conducted the following year showed that the population had decreased by over 50%, possibly because of drought conditions influencing adults to move to different sites (W. Harris, unpubl. report). The number of breeding pairs in 1987 increased slightly by about 1% over the 1986 count but production of young was down by 46% (W. Harris, unpubl. report). In 1988, only 107 adults and 17 young were reported. Drought conditions probably contributed to decreased numbers of plovers at Big Quill Lake and other Saskatchewan sites (W. Harris, unpubl. abstract).

Water levels at Lake Diefenbaker, an artificial lake created by damming the South Saskatchewan River, significantly influence habitat availability for Piping Plovers. In 1986, plovers did not nest because of high water levels (W. Harris, unpubl. abstract). However in 1984, when water levels were lower and habitat was available to plovers, over 220 individuals were seen. Habitat was again available in 1988; however only 97 adults were found, down 57% from the 1984 survey. The discovery in 1988 of 44 plovers along the South Saskatchewan River, downstream from Lake Diefenbaker (M. Purdy & B. Weichel, unpubl. report), also has increased the awareness of the plover's use of river habitat in Prairie Canada. Haig (1987) estimated the Manitoba population to be about 120 individuals. A possible population increase to an estimated 200 plovers in 1988 may have been a result of plovers dispersing from drought-stricken areas into other portions of Prairie Canada to Manitoba (W. Koonz, unpubl. report). In the adjacent province of Ontario, the small Lake-of-the-Woods population which has previously been recommended to be included in the plains region (Russell 1983), is currently the only known breeding location in Ontario with up to 10 adults recorded during 1981-1988 (Lambert 1987, L. Heyens, unpubl. reports).

Great Lakes Canada

The Great Lakes area has suffered the most serious decrease in Piping Plover numbers (Lambert 1987). Here the Canadian population, once fewer than 162 pairs, is believed to be extirpated (Russell 1983). Most pairs were thought to have occurred in the Lake Erie area. However, mammalian predation and gulls are suspected as having contributed to the demise of this population (Lambert 1987). Plovers are still occasionally reported for this region.

Atlantic Canada

The 1988 population estimate for Atlantic Canada is about 465 adults (Goossen *in prep.*) and may represent less than 5% increase over 1986/87 pair estimates (Haig *et al.* 1988). Over 80% of all Piping Plovers in Atlantic Canada occur in New Brunswick, Nova Scotia and Prince Edward Island. Most surveys in Atlantic Canada have been carried out in these latter three provinces, particularly in three National Parks, where breeding pair populations during 1984 to 1988 have ranged from 45 to 52 pairs. In 1988, the lowest breeding population at Kouchibouguac National Park in New Brunswick was recorded with only nine breeding pairs reported. The highest number of breeding pairs recorded for this park was 21 in 1983. In contrast, Prince Edward Island National Park had its highest count since 1983 with 28 breeding pairs seen in 1988 (G. Corbett, unpubl. report). The breeding population at Kejimkujik National Park's Seaside Adjunct in Nova Scotia has varied from a high of 27-29 pairs in 1976 (Cairns 1982) to nine breeding

pairs in 1987. In 1988, the population was relatively low with 12 breeding pairs reported. 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. Production and population data from these coastal shorelines will be useful for future comparisons (D. Reive & G. Kenney, unpubl. report). In Quebec, regular surveys are not carried out and the population is estimated at about 40 pairs. In Newfoundland, where monitoring has been carried out since 1983, the plover population has remained at less than 10 adults (Haig 1985, Goossen, *in prep.*).

There is evidence for a decrease in plover numbers in this region. One study suggests that in the Nova Scotia plover population has decreased in the order of 3.3 to 5.8 pairs/year (Flemming *et al.* 1988). In Quebec, the species appears to no longer breed along the north shore of the Gulf of St Lawrence (Cairns & McLaren 1980). The population on the Magdalen Islands has been estimated to be about 30 pairs in 1979 (Cairns & McLaren 1980), 20 pairs in 1983 (David 1983) and 37 pairs plus four unpaired birds in 1987. The 1987 survey was the most comprehensive effort to date and from the results the surveyers concluded that the population on the Magdalen Islands was fairly stable and occupying all suitable habitats (F. Shaffer & C. Pineau, unpubl. report).

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. To date, Canada has no federal endangered species act, but Ontario and New Brunswick have some provisional endangered species legislation (Versteeg 1984). At the national level in Canada, species status designations are assigned by COSEWIC but do not carry legislative powers.

After the Piping Plover's status had been upgraded from threatened to endangered in Canada by COSEWIC steps were taken to develop a national approach to conserving the species by laying the groundwork for a national recovery plan (McKeating 1987). The recovery plan, yet to be finalized, will be complementary to the two American recovery plans already in place (Haig *et al.* 1988, Dyer *et al.* 1988). Research and conservation actions, outlined in the proposed Canadian Piping Plover Recovery Plan, are aimed at retaining the plover's Canadian population and its distribution. Overall Canadian recovery efforts are administrated 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 in each other's recovery team meetings.

Canadian federal, provincial and non-government agencies have initiated a variety of research and conservation measures (Table 1). Non-government 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 and through its publication, *Nature Canada*, has made Canadians aware of the plover (Anon 1986, McSweeny 1985, Speer 1987). World Wildlife Fund (Canada), the Elsa Wild Animal Appeal of Canada and the Saskatchewan Natural History Society and the Natural History Society of Prince Edward Island have supported survey work thereby broadening our knowledge of the plover's numbers and distribution. Wildlife Habitat Canada and Ducks Unlimited have supported habitat enhancement efforts.

Prairie Canada

In addition to the impending National Recovery Plan, provincial management or recovery plans have been initiated in Ontario (H. Gerson, unpubl. draft), Manitoba (Haig 1987, R. Berger, unpubl. draft) and Alberta (C. Wershler, *in prep.*). In Alberta, management suggestions for protecting plover habitat at two lakes from cattle disturbance and/or recreational activities have been made (C. Wershler, unpubl. reports). Habitat enhancement projects have been initiated in both Saskatchewan and

Table 1. Piping Plover research and conservation activity in Canada by various agencies.

	Official Provincial Status	Surveys	Banding	Habitat Development	Signage	Patrols	Management Plan[1]	Public information/ Education
Atlantic Canada								
Newfoundland	None	*				*		*
Prince Edward Island	None	*			*	*	**[2]	*
Nova Scotia	None	*	**[3]	*	*	*	**[2]	*
New Brunswick	None	*	**[4]		*	*	**[2]	*
Quebec	None	*					*	*
Great Lakes Canada								
Ontario	Endangered	*					*	*
Prairie Canada								
Ontario	Endangered	*			*	*	*	*
Manitoba	None	*	*	*	*		*	*
Saskatchewan	None	*	*	*				
Alberta	Endangered[5]	*	*				*	

[1] Approved, in preparation or draft.
[2] Refers to a Canadian Parks Service management plan. No provincial plan prepared.
[3] Cairns (1982).
[4] Haig and Oring (1988).
[5] Listed as endangered under the Alberta Wildlife Act but in policy the status is considered as vulnerable.

Manitoba. Nesting substrate has been increased at two saline lakes in Saskatchewan through the addition of gravel to lake bed habitat. In Manitoba, habitat modification has been attempted at Lake Manitoba (Haig 1987) and Lake Winnipeg. In 1982, protection of breeding habitat on the south-eastern shore of Lake Manitoba was afforded through the Manitoba government by declaring the site as a Special Conservation Area (Haig 1987).

Great Lakes Canada

Although Piping Plovers do not currently breed in this part of Canada, both the proposed National and Ontario recovery plans have set as one of their goals to re-establish, 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 (G. Corbett, unpubl. report). 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. Predation is considered to be a greater problem than human disturbance in Atlantic Canada and may be related indirectly to human activity. Efforts to control predators have been attempted and nest enclosures have been used to increase nest success (G. Corbett, unpubl. report). Since there is evidence that points to plovers having a higher hatching success when nesting near breeding terns than in their absence, consideration should be given to the suggestion to manage tern colonies in order to benefit plover conservation (A. Crowe, unpubl. draft). Researchers and managers who are interested in finding out what is known about the Piping Plover will be happy to learn that CPS has compiled an extensive bibliography on literature pertaining to this species with over 200 references cited (H. Lewis, unpubl.).

For more than 10 years, the Natural History Society of Prince Edward Island has been actively promoting Piping Plover conservation. The society has conducted surveys for plovers, helped in planning workshops, initiated a program to contact landowners, supported public relation efforts including a Piping Plover video and poster. A landowner contact program, which the Society initiated revealed over 75% support by landowners for plover conservation. Disturbances identified by landowners included the use of All Terrain Vehicles, habitat alteration and recreation activities (P. McEachern & S. Barret, unpubl. report).

On Quebec's Magdelan Islands, beach traffic during the plover's breeding season is at its height in July during the chick-rearing period. The primary conservation recommendation for these islands is to reduce traffic so to decrease nest loss and secondarily to consider habitat enhancement (F. Shaffer & C. Pineau, unpubl. report). A recovery plan for plovers occurring in Quebec is in preparation (P. Laporte, unpubl. draft).

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 flooding (Hengeveld 1987) 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 presence of the Piping Plover on the east coast of Canada.

CONCLUSION AND RECOMMENDATIONS

Most provinces, with the exception of Saskatchewan, have been surveyed enough to account for the majority of Piping Plovers within their jurisdictions, Since, population estimates in Saskatchewan have varied considerably between researchers, the importance of clarifying the abundance of plovers in this province is of international significance, since the estimated population may account in some years for 12% or more (based on data from Anon 1989, Flemming *et al.* 1988, S. Haig, pers. comm., W. Harris, pers. comm., W. Koonz, pers. comm.) of the total Piping Plover population (W. Harris *et al.*, unpubl. report). In Prairie Canada there are several concerns which need to be addressed. A conservation strategy must be of the highest priority. This requires clarifying the plover's distribution and protecting habitats important to Piping Plovers. In 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 viable population.

In Atlantic Canada, information is needed on wintering locations of the breeding population 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 Newfoundland (Deichmann & Burrows 1983) should be evaluated and appropriate action taken to provide public education on the matter. In both Prairie and Atlantic regions there is a need to evaluate the long-term effects of climatic change on breeding habitats and reproductive success.

In order to effectively conserve the continental breeding population of Piping Plovers, cooperation between American and Canadian officials must continue (Sidle 1987) 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.

ACKNOWLEDGEMENTS

I thank P.J. Austin-Smith (Nova Scotia Department of Lands and Forests), I. Bowman (Ontario Ministry of Natural Resources), J. Brazil (Department of Culture, Recreation and Youth, Newfoundland), J. Carreiro (Canadian Wildlife Service (CWS), Ontario), D. Cartwright (Department of Natural Resources, New Brunswick), G. Corbett (CPS, Atlantic Region), B. Darby (Ontario Ministry of Natural Resources), R. Dibblee (Department of Community and Cultural Affairs, Prince Edward Island), R. Dyer (United States Fish and Wildlife Service), G. Erickson (Department of Forestry, Lands and Wildlife, Alberta), D. Hjertaas (Department of Parks and Renewable Resources, Saskatchewan), B. Johnson (CWS, Atlantic Region), W. Koonz (Department of Natural Resources, Manitoba), P. Laporte (CWS, Quebec Region), M. Lepage

(Ministere du Loisir de la Chasse et de la peche, Quebec), D. McAskill (Natural History Society of Prince Edward Island) and D. Moore (Department of Forestry, Lands and Wildlife, Alberta) for providing me with information on research and/or conservation in their various jurisdictions. The Potash Corporation of Saskatchewan kindly provided me with survey reports for Big Quill Lake. S. Popowich (CWS drafted the figure. R. Edwards (CWS, P. Hicklin (CWS), G. Morrison (CWS) and S. Haig (Clemson University) provided helpful suggestions which improved the manuscript.

REFERENCES

Anon. 1986. Plover target of conservationists. *Nature Canada* 15(1):49.

Anon. 1989. Birdnotes. *The Living Bird* 8(3):5.

Bent,A.C. 1929. Life histories of North American shore birds. *Smithsonian Institution United States National Museum Bulletin* 146.

Cairns,W.E. 1982. Biology and behavior of breeding Piping Plovers. Wilson Bulletin 94: 531-545.

Cairns,W.E. & McLaren,I.A. 1980. Status of the Piping Plover on the east coast of North America. *American Birds* 34: 206-208.

David,N. 1983. The nesting season June 1 - July 31, 1983. Quebec region. *American Birds* 37: 970-971.

Deichmann,H. & Burrows,R. 1983. Importance of the northeast coast of Newfoundland from Deadmans Bay to Cape Freels to migrant and nesting shorebirds and the threat these birds face from illegal shooting. *Osprey* 14: 9-14.

Dyer,R.W., Hecht,A., Melvin,S., Raithel,C. & Terwilliger,K. 1988. Atlantic Coast Piping Plover recovery plan. United States Fish and Wildlife Service, Newton Corner, Massachusetts. 74 pp.

Flemming,S.P., Chiasson,R.D., Smith,P.C., Austin-Smith,P.J. & Bancroft,R.P. 1988. Piping Plover status in Nova Scotia related to its reproductive and behavioral responses to human disturbance. *J. Field Ornithol.* 59: 321-330.

Goossen,J.P. *in prep.* Piping Plover research and conservation in Canada.

Haig,S. 1985. The status of the Piping Plover in Canada. Report to COSEWIC. National Museum of Natural Sciences, Ottawa. 34 pp.

Haig,S.M. 1987. Piping Plovers in Manitoba - a status report on the species and initial recovery plan for the province. *In:* Proceedings of the Workshop on Endangered Species in the Prairie Provinces (eds. G.L. Holroyd, W.B. McGillivray, P.H.R. Stepney, D.M. Ealey, G.C. Trottier and K.E. Eberhart), pp. 243-247. *Provincial Museum of Alberta Occasional Paper* No. 9.

Haig,S.M. & Oring,L.W. 1985. Distribution and status of the Piping Plover throughout the annual cycle. *J. Field Ornithol.* 56: 334-345.

Haig,S.M. & Oring,L.M. 1988. Genetic differentiation of Piping Plovers across North America. *Auk* 105: 260-267.

Haig,S., Harrison,W., Lock,R., Pfannmuller,L., Pike,E., Ryan,M. & Sidle,J. 1988. Great Lakes and Northern Great Plains Piping Plover recovery plan. United States Fish and Wildlife Service, Twin Cities, Minnesota. 160 pp.

Harris,W.C. 1987. Saskatchewan Piping Plovers. *In:* Proceedings of the Workshop on Endangered Species in the Prairie Provinces (eds. G.L. Holroyd, W.B. McGillivray, P.H.R. Stepney, D.M. Ealey, G.C. Trottier and K.E. Eberhart), pp. 239-242. *Provincial Museum of Alberta Occasional Paper* No. 9.

Hengeveld,H.G. 1987. Understanding CO_2 and climate. Annual report 1986. Atmospheric Environment Service, Environment Canada. 23 pp.

Lambert,A.B. 1987. Piping Plover. *In: Atlas of the Breeding Birds of Ontario* (eds. M.D. Cadman, P.F.J. Eagles and F.M. Helleiner), p. 162. University of Waterloo Press, Waterloo.

McKeating,G. 1987. A national perspective and management strategy on the Piping Plover. *In:* Proceedings of the Workshop on Endangered Species in the Prairie Provinces (eds. G.L. Holroyd, W.B. McGillivray, P.H.R. Stepney, D.M. Ealey, G.C. Trottier and K.E. Eberhart), pp. 233-234. *Provincial Museum of Alberta Occasional Paper* No. 9.

McNicholl,M.K. 1985. Profiles on risk status of Canadian birds: 2. Piping Plover. *Alta. Nat.* 15: 135-138.

McSweeney,B.T. 1985. CNF Launches plover action plan. *Nature Canada.* 14(4):53.

Russell,R.P. 1983. The Piping Plover in the Great Lakes region. *Am. Birds* 37: 951-955.

Sidle,J.G. 1985. Endangered and threatened wildlife and plants; determination of endangered and threatened status for the Piping Plover. *Federal Register* 50(238): 50726-50734.

Sidle,J. 1987. Piping Plover on the American great plains. *In:* Proceedings of the Workshop on Endangered Species in the Prairie Provinces (eds. G.L. Holroyd, W.B. McGillivray, P.H.R. Stepney, D.M. Ealey, G.C. Trottier and K.E. Eberhart), p. 249. *Provincial Museum of Alberta Occasional Paper* No. 9.

Speer,C. 1987. Resort on plover territory. *Nature Canada* 16(1):49.

Versteeg,H. 1984. The protection of endangered species: a Canadian perspective. *Ecology Law Quart.* 11: 267-304.

Wershler,C.R. 1987. The Piping Plover in Alberta. *In:* Proceedings of the Workshop on Endangered Species in the Prairie Provinces (eds. G.L. Holroyd, W.B. McGillivray, P.H.R. Stepney, D.M. Ealey, G.C. Trottier and K.E. Eberhart), pp. 235-237. *Provincial Museum of Alberta Occasional Paper* No. 9.

Weseloh,D.V.C. & Weseloh,L.M. 1983. Numbers and nest site characteristics of the Piping Plover in central Alberta, 1974-1977. *Blue Jay* 41: 155-161.