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**A preliminary assessment of the status of shorebird populations in Canada**R.I.G. Morrison,<sup>a</sup> A. Bourget,<sup>b</sup> R. Butler,<sup>c</sup> H.L. Dickson,<sup>d</sup> C. Gratto-Trevor,<sup>e</sup> P. Hicklin,<sup>f</sup> C. Hyslop,<sup>g</sup> and R.K. Ross<sup>h</sup>**Abstract**

This paper reviews published and unpublished information on the status and abundance of shorebird populations in Canada and on population trends and sizes. Seventy-four species of shorebirds have occurred or may have occurred in Canada; 40 of these species breed in Canada. Most shorebird populations appear to be stable or declining, with very few increasing. Information on population trends is best developed for the Atlantic seaboard of Canada, where statistical analysis of count data has shown declines in a number of species during the period 1974–1991. For most species and for most other parts of Canada, currently available information is inadequate to provide an authoritative assessment of status or trends.

Qualitative assessments were made for as many species and regions as possible by members of the Canadian Wildlife Service Shorebird Committee, using published and unpublished information and personal observations. Many species were thought to be stable, implying that there had been no obvious detectable change. For those species whose numbers had apparently changed, more populations were thought to be decreasing than increasing. Where it was possible to revise initial qualitative assessments by comparing them with published information derived from quantitative analyses, most revisions involved a change in trend from stable to declining. Preliminary estimates of population sizes for 40 species of shorebirds indicated that about half fell in the range 10 000–100 000, with the largest populations numbering several million and the smallest ones ranging from a few tens or hundreds of individuals to several thousand.

**Introduction**

Canada contains habitats that are of great importance to shorebirds at many stages of their life cycles. Different shorebird species breed in many parts of the country, ranging from the High Arctic to temperate zones in the

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south. Migration areas of major international importance are found on the Atlantic and Pacific coasts, as well as in the interior on the prairies and along the coastlines of areas such as James Bay (Morrison et al. 1991). Most species migrate to wintering areas well south of Canada, although the Atlantic and Pacific coasts provide important wintering areas for a limited number of species (Morrison 1984; Butler and Campbell 1987).

Much concern has been expressed in recent years about the impact of human activities on ecosystems throughout the world. Shorebirds are a group especially vulnerable to environmental change because of their strong dependence on interior and coastal wetlands, ecosystems that face a wide variety of threats on a global scale. Many species of shorebirds depend on such wetlands to provide the feeding and resting areas needed to complete their extensive migrations, which in the New World may take them from one end of the hemisphere to the other (Morrison 1984).

Despite the perceived risks that shorebirds face, little information is available with which to assess the effects of environmental changes on these birds in the Western Hemisphere. For some species, breeding grounds lie in remote Arctic areas and wintering grounds are found along inaccessible parts of the coastline of South America (Morrison and Ross 1989), so that regular collection of census or survey data is impracticable. Recent analyses of counts of shorebirds made during migration on the east coast of the United States and Canada (Howe et al. 1989; Morrison et al. 1994) have shown that declines have taken place in populations of a variety of shorebird species, especially during the latter part of the 1970s. Declines have also been suggested by studies in Quebec and James Bay (Larivée 1989; Morrison et al. 1991), as well as for some species breeding in southern Canada (Erskine et al. 1992). For other parts of the North American continent, however, little long-term information is available with which to assess trends, although widespread survey operations are currently leading to a much improved knowledge of shorebird distribution in the United States, Mexico, and Central America (Page et al. 1992; Morrison et al. 1992, 1993; Page and Palacios 1993; R.I.G. Morrison, R.K. Butler, and F. Delgado, unpubl. data).

Godfrey (1986) and DeSante and Pyle (1986) described the general abundance and breeding status of shorebirds in Canada without attempting to provide specific information on population sizes or trends. Rose and Scott (1993) compiled data on sizes of and trends in sizes of waterfowl populations, including shorebirds, on a worldwide basis. The objective of the present paper is to provide a preliminary assessment of the sizes of and trends in sizes of shorebird populations in different regions of Canada, based on currently available information.

## Methods

Information on the numbers of species occurring in Canada and on their general abundance and breeding status was extracted from Godfrey (1986) and DeSante and Pyle (1986). Population trends for species surveyed during fall migration on the eastern seaboard of the United States and Canada have been described by Howe et al. (1989) and by Morrison et al. (1994), respectively. For other species and areas for which long-term data sets and statistical analyses are not available, trends are based on a qualitative assessment of data from published and unpublished surveys resulting from discussions between, and the completion of questionnaires by, members of the Canadian Wildlife Service (CWS) Shorebird Committee (listed in footnote to Table 1). Information on shorebird population sizes has been drawn from CWS surveys both in Canada and in South America (Morrison and Ross 1989; Morrison et al. 1991, and unpubl. data), as well as from other published sources (see Rose and Scott 1993); for nearly all species, however, information on population sizes in the Western Hemisphere remains incomplete and imprecise.

## Results

### Status and abundance

The status and abundance of the 74 species of shorebirds that have occurred or may have occurred in Canada are summarized in Table 1. Terms and abbreviations used in Table 1 are defined in Appendix 1. Of the 74 species, approximately 43 occur with some regularity (i.e., abundant, common, regular, or uncommon), seven are found much less often (i.e., scarce, casual, or rare), 16 have occurred only as accidentals, and a further six are listed as hypothetical (Table 2). Populations of the uncommon Long-billed Curlew<sup>1</sup> have been designated as vulnerable by the Committee on the Status of Endangered Wildlife in Canada (de Smet 1992), and the rare Mountain Plover is considered an endangered species in Canada (Wershler and Wallace 1987; Knopf 1991). Two other species are categorized as endangered: one, the Piping Plover, is a regular breeder; the status of the second, the Eskimo Curlew, is much less certain, as sight records occur only occasionally and no breeding areas are currently known (Gollop et al. 1986). Forty species of shorebirds have been recorded breeding in Canada, nearly all drawn from commonly occurring species (Table 2). A few species that are found regularly in Canada do not breed within its borders, most being shorebirds that migrate along the west coast and breed in Alaska—for example, the Western Sandpiper (abundant), Black Turnstone (common), and Rock Sandpiper (common).

### Population trends

An assessment of population trends was made for 45 species of shorebirds across Canada: 19 (42.2%) were considered to be decreasing in at least some part of their range (although not necessarily in all regions), whereas

only two (4.4%) were thought to be increasing (Table 3). Both species thought to be increasing are seen only in small numbers in Canada (Ruff and Black-necked Stilt).

A regional breakdown of the perceived population trends of shorebirds in Canada by abundance category is presented in Table 4. In all regions (see Appendix 1 for definitions), most species were categorized as stable (mostly stable?). In Pacific Canada, the numbers of species thought to be increasing or decreasing were not significantly different. In both Central and Eastern regions, the numbers of species considered to be decreasing significantly exceeded those thought to be increasing. Differences between the Pacific region and other regions were significant.

The initial assessments of population trends made by CWS Shorebird Committee members on the basis of circulated questionnaires and round-table discussions were compared with revised assessments made after consultation of available literature and other information (as presented in Table 1). Numbers of species for which assessments were altered are indicated in Table 5. Trends for nine (32.1%) of the 28 species assessed in Eastern Canada were changed, whereas only one (3.1%) of 32 trends and two (6.5%) of 31 trends were altered in the Pacific and Central regions, respectively.

### Population sizes

Population sizes were estimated for 40 species of shorebirds (Table 6). Species whose general abundance was categorized as accidental or rare, or for which the bulk of the population occurred outside North America, were excluded. Estimates represent the likely numbers of birds that would be found in Canada, either breeding or on migration. Estimated population sizes most commonly fell in the 10 000–100 000 range (21, 52.5%); the largest populations were in the order of several million, whereas the smallest populations involved from a few tens or hundreds of individuals to several thousand.

### Discussion

The amount and quality of information available for assessing trends in and abundance of shorebird populations vary considerably between species and regions and in many cases are very limited. Even the longest runs of data available for trend analysis, which come from survey operations in eastern Canada and the United States, involve only 12 or 13 of the 43 species of shorebirds occurring regularly in Canada (Howe et al. 1989; Morrison et al. 1994). Very little information is available for species passing through other parts of the continent or for species that do not gather in large numbers at coastal locations. Many of the trends reported in Table 1 are therefore necessarily based on a qualitative assessment of the available information; although it is useful to provide such a broad review of information on shorebirds, caution must be used when considering trends that are based for the most part on relatively few quantitative data or relatively little statistical analysis.

Most species were categorized as "stable?". In many cases, this indicates that there had not been any dramatic

**Table 1** Status of shorebirds in Canada, based on published information and qualitative assessments by members of the CWS Shorebird Committee.<sup>a</sup> Abbreviations and definitions appear in Appendix 1.

Species	Population status and abundance					Notes
	Breeding status in Canada	Abundance in Canada	Pacific	Central	Eastern	
Northern Lapwing <i>Vanellus vanellus</i>		Acc	-	-	Acc	DP: rV, rW
Black-bellied Plover <i>Pluvialis squatarola</i>	B	Com	Sta?	Sta?	Dec?/Sta?	DP: cS, luW c. 50 000(+?) SA: 27 267 MSS: variable trend, Sta? ISS: Dec, p<0.1 IWRB: 25 000–100 000, Dec
Greater Golden-Plover <i>Pluvialis apricaria</i>		Acc	-	-	?	DP: xV IWRB: Europe > 1 million, Dec
Lesser Golden-Plover <i>Pluvialis dominica</i>	B	Com	Sta?	Sta?	Sta?	DP: cS 10 000s (<50 000) SA: 4055 MSS: Dec, ns
Mongolian Plover <i>Charadrius mongolus</i>		Acc				Little information available on population size, as few migration or wintering surveys cover upland habitat; perhaps some tens of thousands, probably <50 000. Nonsignificant decline noted in MSS surveys 1974–1991.
Snowy Plover <i>Charadrius alexandrinus</i>		Rar	Sta?			DP: xV Limit of range
Wilson's Plover <i>Charadrius wilsonia</i>		Cas				DP: xV
Common Ringed Plover <i>Charadrius hiaticula</i>	B	Reg				DP: IS, xV IWRB: Cda/WEur 240 000, Inc

<sup>1</sup> Scientific names of species mentioned in the text may be found in Table 1.

Table 1 (continued)

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Species	Breeding status	Abundance in Canada	Population status and abundance			Notes
			Pacific	Central	Eastern	
Semipalmated Plover <i>Charadrius semipalmatus</i>	B	Com	Sta?	Sta?	Sta?	DP: cS, xW c. 50 000? MSS: variable trend, Sta? ISS: Dec, ns BBS in IWRB: Sta
Piping Plover <i>Charadrius melodus</i>	B	End	-	Dec 2775, Dec	Dec/Sta? Dec? (Ont) 1890, Dec	DP: uS NA 5400 (Haig and Plissner 1993) Cadman et al. 1987 IUCN 1988
Killdeer <i>Charadrius vociferus</i>	B	Com	Sta	Sta?	Dec/Sta	DP: cS, rW BBS in IWRB: Sta
Mountain Plover <i>Charadrius montanus</i>		Rar	-	Dec?		DP: xS, xV Limit of range BBS in IWRB: USA 5600, Dec COSEWIC in IWRB: Cda 10
American Oystercatcher <i>Haematopus palliatus</i>		Cas				DP: xS*, xV
Black Oystercatcher <i>Haematopus bachmani</i>	B	Reg	Sta 10 000	-	-	DP: fP
Black-necked Stilt <i>Himantopus mexicanus</i>	B	Sca/Rar	Inc?	Inc?		DP: xS, xS*, rV Edge of range Cda 100? BBS in IWRB: nNeotr/NA Sta
American Avocet <i>Recurvirostra americana</i>	B	Reg	Inc	Sta?/Dec? 10 000s (c. 50 000?)	Sta?	DP: fS BBS in IWRB: Neotr/NA Sta
Common Greenshank <i>Tringa nebularia</i>		Acc				DP: xW
Greater Yellowlegs <i>Tringa melanoleuca</i>	B	Com	Sta?	Sta?	Sta?	DP: cS, lrW 10 000s (c. 20 000?) ISS: Dec, ns BBS in IWRB: Sta

Continued

Table 1 (continued)

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Species	Breeding status	Abundance in Canada	Population status and abundance			Notes
			Pacific	Central	Eastern	
Lesser Yellowlegs <i>Tringa flavipes</i>	B	Com	Sta?	Sta?	Sta?	DP: cS, xW 100 000+ SA: yellowlegs sp. 91 047 ISS: Inc, ns BBS in IWRB: Dec
Common Redshank <i>Tringa totanus</i>		Hyp				DP: not listed
Spotted Redshank <i>Tringa erythropus</i>		Cas	+	-	+	DP: xV
Solitary Sandpiper <i>Tringa solitaria</i>	B	Reg	Sta?	Sta?	Dec	DP: fS c. 10 000? Larivée 1989
Green Sandpiper <i>Tringa ochropus</i>		Hyp				DP: -
Willet <i>Catoptrophorus semipalmatus</i>	B	Com	(Rar)Sta	Sta?/Dec?	Sta/Inc?	DP: fS 15 000 SA: 44 370 MSS: Dec, ns ISS: Inc, ns BBS in IWRB: eNA Sta, wNA Sta
Wandering Tattler <i>Heteroscelus incanus</i>	B	Com	Sta? <10 000 (c. 5000?)	-	-	DP: luS, xS*, fT IWRB: 10 000-100 000
Spotted Sandpiper <i>Actitis macularia</i>	B	Com	Sta?	Sta?	Sta?	DP: cS, lrW 50 000+(+)
Terek Sandpiper <i>Xenus cinereus</i>		Acc	+	-	-	Campbell et al. 1990

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Table 1 (continued)

Status of shorebirds in Canada, based on published information and qualitative assessments by members of the CWS Shorebird Committee.<sup>a</sup> Abbreviations and definitions appear in Appendix 1.

Species	Breeding status	Abundance in Canada	Population status and abundance			Notes
			Pacific	Central	Eastern	
Upland Sandpiper <i>Bartramia longicauda</i>	B	Unc	Dec?	Dec?	Dec? (Inc?, Ont)	DP: fS 2000? BBS in IWRB: Inc Robbins et al. 1986  The Upland Sandpiper was placed on the "Blue List" for the period 1975-1986 (Tate 1981, 1986) and was reported to be slowly declining, stable at low levels, or absent over much of its former eastern range (Tate and Tate 1982).
Eskimo Curlew <i>Numenius borealis</i>		End/Ext?				DP: eS, xT Highest recent sighting 23, 1981 Blankinship and King 1984 Gollop et al. 1986 Gollop 1988
Whimbrel <i>Numenius phaeopus</i>	B	Com	Sta?	Sta?/Dec?	Sta? Dec? (Ont)	DP: fS, xW 25 000(?+) Cadman et al. 1987 SA: 24 874 MSS: Inc, ns ISS: Dec, p<0.01 IWRB: 25 000-100 000, Dec
Bristle-thighed Curlew <i>Numenius tahitiensis</i>		Acc	+	-	-	DP: xV 10 000, Dec (IUCN 1988)
Slender-billed Curlew <i>Numenius tenuirostris</i>		Acc				DP: exV IWRB: 20, Dec, threatened
Far Eastern Curlew <i>Numenius madagascariensis</i>		Acc	+	-	-	DP: xV AWSG in IWRB: 21 000
Eurasian Curlew <i>Numenius arquata</i>		Hyp				DP: xV
Long-billed Curlew <i>Numenius americanus</i>	B	Unc?	Dec c. 500	Dec c. 6000	-	DP: uS, xW c. 6500 (de Smet 1992) BBS in IWRB: Sta

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Table 1 (continued)

Status of shorebirds in Canada, based on published information and qualitative assessments by members of the CWS Shorebird Committee.<sup>a</sup> Abbreviations and definitions appear in Appendix 1.

Species	Breeding status	Abundance in Canada	Population status and abundance			Notes
			Pacific	Central	Eastern	
Little Curlew <i>Numenius minutus</i>		Hyp	+	-	-	Campbell et al. 1990
Black-tailed Godwit <i>Limosa limosa</i>		Acc				DP: xV IWRB: wEur Dec/Sta
Hudsonian Godwit <i>Limosa haemastica</i>	B	Reg	Sta	Sta/Dec?	Sta	DP: luS, uT 50 000 SA: 45 529  North American population probably 50 000+ (estimate of 20 000 or less by Scott and Carbonell [1986] outdated).
Bar-tailed Godwit <i>Limosa lapponica</i>		Acc	Sta?			DP: xV Limit of range IWRB: eSAsian & Eur populations Inc
Marbled Godwit <i>Limosa fedoa</i>	B	Reg	Sta? (few)	Dec?	Dec? (Ont) (Rar)	DP: fS, xW 10 000? BBS in IWRB: Sta
Ruddy Turnstone <i>Arenaria interpres</i>	B	Com	Sta (Unc)	Sta	Sta	DP: cS, rW 30 000-50 000 SA: 23 499 MSS: Inc, ns ISS: Dec, ns IWRB: NEur/Cda 67 000, Sta (=A. i. interpres) Neotr/nwNA 25 000-100 000, Sta (=A. i. morinella)
Black Turnstone <i>Arenaria melanocephala</i>		Com	Sta?	-	-	DP: rS*, cW 10 000-15 000? BBS in IWRB: 61 000-99 000
Surfbird <i>Aphriza virgata</i>	B	Reg	Sta	-	-	DP: luS, uW 5000-10 000

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Table 1 (continued)

Status of shorebirds in Canada, based on published information and qualitative assessments by members of the CWS Shorebird Committee.<sup>a</sup> Abbreviations and definitions appear in Appendix 1.

Species	Breeding status	Abundance in Canada	Population status and abundance			Notes
			Pacific	Central	Eastern	
Red Knot <i>Calidris canutus</i>	B	Com	Sta?	Sta?/Inc?	Dec?/Sta?	<p>DP: lcS, fT, xW  <i>C. c. rufa</i> 100 000–150 000            (Harrington et al. 1988; Morrison and Harrington 1992)            Cda: <i>C. c. islandica</i> 50 000–120 000?            SA: 76 392 (<i>C. c. rufa</i>)            MSS: Dec+, ns            ISS: Dec+, ns            IWRB: Eur <i>C. c. islandica</i>            512 000, Sta            BBS in IWRB: <i>C. c. rufa</i> 250 000</p> <p>The northeastern Canadian High Arctic is occupied by <i>C. c. islandica</i>. Canadian breeding population size of <i>islandica</i> is uncertain: Meltofte's (1985) figure of 10 000 pairs on Ellesmere Island and eastern Axel Heiberg Island was considered an underestimate, and the number breeding in the Canadian Arctic could range up to 60 000 pairs (Davidson and Wilson 1992). <i>C. c. rufa</i> occupies the central Canadian Arctic, and most recent estimates of population levels are around 100 000–150 000 (Harrington et al. 1988; Morrison and Harrington 1992) rather than the 250 000 quoted by IWRB. Results from both MSS (1974–1991) and ISS (1972–1983) surveys suggested substantial declines in knot populations migrating through the eastern seaboard of North America (involving <i>C. c. rufa</i>), although the declines were not statistically significant.</p>
Sanderling <i>Calidris alba</i>	B	Com	Sta?	Sta?	Dec/Sta?	<p>DP: lcS, cT, uW            110 000            SA: 111 815            Variable in recent years            MSS: Dec, ns            ISS: Dec, p&lt;0.01            IWRB: 100 000–1 million, Dec</p> <p>MSS and ISS results have both indicated that North American populations of Sanderlings have declined in recent years: population numbers are probably in the 100 000–200 000 range.</p>

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Table 1 (continued)

Status of shorebirds in Canada, based on published information and qualitative assessments by members of the CWS Shorebird Committee.<sup>a</sup> Abbreviations and definitions appear in Appendix 1.

Species	Breeding status	Abundance in Canada	Population status and abundance			Notes
			Pacific	Central	Eastern	
Semipalmated Sandpiper <i>Calidris pusilla</i>	B	Abu	Inc?	Sta?	Dec/Sta?	<p>DP: cS            2–5 million            SA: 2 142 042            MSS: Dec, p&lt;0.01            ISS: Dec, ns            IWRB: 3.2–3.9 million, Sta</p> <p>Estimates from surveys and banding in South America suggest a population size of 2–5 million (Morrison 1991). Some analyses of MSS and ISS data indicate that declines may have taken place in populations migrating through the eastern seaboard of North America. Less is known about the status of populations passing through western and central parts of Canada, although numbers are small on the Pacific coast.</p>
Western Sandpiper <i>Calidris mauri</i>		Abu	Sta?	–	–	<p>DP: fT, lrW            2–3 million            IWRB: 100 000–1 million</p>
Rufous-necked Stint <i>Calidris ruficollis</i>		Acc				<p>DP: xV            AWSG in IWRB: 471 000, Dec</p>
Little Stint <i>Calidris minuta</i>		Acc				<p>DP: xV            IWRB: &gt;500 000, Sta</p>
Temminck's Stint <i>Calidris temminckii</i>		Acc				<p>DP: xV            IWRB: 10 000–100 000s+</p>
Long-toed Stint <i>Calidris subminuta</i>		Hyp				<p>DP: no records for Cda            IWRB: 25 000–100 000</p>
Least Sandpiper <i>Calidris minutilla</i>	B	Com	Sta?	Sta?	Dec/Sta?	<p>DP: cS, lrW            MSS: Dec            50 000–100 000            MSS: Dec, p&lt;0.01            ISS: Inc, ns            IWRB: 100 000–1 million, Sta</p> <p>MSS results indicated that significant declines took place in Least Sandpiper populations during the period 1974–1991, despite perceptions that population sizes were generally stable.</p>

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Table 1 (continued)

Status of shorebirds in Canada, based on published information and qualitative assessments by members of the CWS Shorebird Committee.<sup>a</sup> Abbreviations and definitions appear in Appendix 1.

Species	Breeding status	Abundance in Canada	Population status and abundance			Notes
			Pacific	Central	Eastern	
White-rumped Sandpiper <i>Calidris fuscicollis</i>	B	Com	Sta?	Sta?	Sta?	DP: lcS, fT 50 000+ SA: est. 72 996 MSS: Dec, ns
Baird's Sandpiper <i>Calidris bairdii</i>	B	Com	Sta?	Sta?	(Rar)	DP: cS 50 000++
Pectoral Sandpiper <i>Calidris melanotos</i>	B	Com	Sta?	Sta?	Sta?	DP: lcS, cT, xW 10 000s (c. 25 000?)
Sharp-tailed Sandpiper <i>Calidris acuminata</i>		Unc	Sta?	-	-	DP: rV <1000 AWSG in IWRB: 166 000
Purple Sandpiper <i>Calidris maritima</i>	B	Com	-	-	Sta?	DP: lfS, fW 10 000
Rock Sandpiper <i>Calidris ptilocnemis</i>		Com	Sta?	-	-	DP: fW 10 000
Dunlin <i>Calidris alpina</i>	B	Com	Sta 35 000 winter 100 000+ migration ( <i>C. a. pacifica</i> )	(Unc)	Sta?	DP: cS, fW MSS: Dec, ns IWRB: <i>C. a. pacifica</i> >1 million  Dunlins passing through western Canada on migration belong to the race <i>C. a. pacifica</i> , for which IWRB quotes a population size of >1 million. Populations passing through central areas, James Bay, and the east coast of Canada belong to the race <i>C. a. hudsonia</i> . About 35 000 winter on the Fraser River delta.
Curlew Sandpiper <i>Calidris ferruginea</i>		Rar	+			DP: rV Edge of range IWRB: >1 million
Stilt Sandpiper <i>Calidris himantopus</i>	B	Com	Sta?	Sta?	Sta?	DP: lfS, fT 50 000+
Spoonbill Sandpiper <i>Eurynorhynchus pygmeus</i>		Acc				DP: xV Total: 4000-6000 Howes and Parish 1989

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Table 1 (continued)

Status of shorebirds in Canada, based on published information and qualitative assessments by members of the CWS Shorebird Committee.<sup>a</sup> Abbreviations and definitions appear in Appendix 1.

Species	Breeding status	Abundance in Canada	Population status and abundance			Notes
			Pacific	Central	Eastern	
Buff-breasted Sandpiper <i>Tryngites subruficollis</i>	B	Reg	Dec?/Sta?	Dec?	(Rar)	DP: luS, uT 5000-10 000+
Ruff <i>Philomachus pugnax</i>		Unc	Inc	+	+	DP: rV, xW IWRB: WAfr 100 000, Dec
Short-billed Dowitcher <i>Limnodromus griseus</i>	B	Com	Sta?	Sta?	Dec	DP: fS, cT, xW 100 000+ SA: 48 859 MSS: Dec, p<0.05 ISS: Dec, p<0.05 BBS in IWRB: Dec all regions  MSS and ISS results consistently indicated significant declines in populations passing through the eastern seaboard of North America.
Long-billed Dowitcher <i>Limnodromus scolopaceus</i>	B	Reg	Sta?	Sta?	-	DP: lfS, cT, lrW 50 000+
*Jack Snipe <i>Lymnocyptes minimus</i>		Acc				DP: exV
*Great Snipe <i>Gallinago media</i>		Hyp				DP: not listed
*Common Snipe <i>Gallinago gallinago</i>	B	Com	Sta?	Dec	Dec	DP: cS, uW Erskine et al. 1992 BBS in IWRB: Neotr/NA Sta >1 million
*Eurasian Woodcock <i>Scolopax rusticola</i>		Acc				DP: exV IWRB: Eur 1-2 million, Sta
*American Woodcock <i>Scolopax minor</i>	B	Com			Dec/Sta?	DP: fS, xW BBS in IWRB: NA Dec Sauer and Bortner 1991 100 000s
Wilson's Phalarope <i>Phalaropus tricolor</i>	B	Com	Inc	Sta?	Sta/Inc? Inc (Ont)	DP: cS 100 000+? BBS in IWRB: Sta

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Table 1 (continued)  
Status of shorebirds in Canada, based on published information and qualitative assessments by members of the CWS Shorebird Committee.<sup>a</sup> Abbreviations and definitions appear in Appendix 1.

Species	Population status and abundance												Notes
	Breeding status in Canada	Pacific	Central	Eastern	Abundance in Canada	Pacific	Central	Eastern	Abundance in Canada	Pacific	Central	Eastern	
Red-necked Phalarope <i>Phalaropus lobatus</i>	B	Sta?	Sta?	Dec?	Com	Sta?	Sta?	Sta (Ont)	DP: cS c. 2 million(+) E: population moved (offshore?)				
Red Phalarope <i>Phalaropus fulicaria</i>	B	Sta?	Sta?	Dec?	Com	Sta?	Sta?	Dec?	DP: cS, xW 100 000-1 million IWRB: 100 000-1 million				

<sup>a</sup> Committee members: R.I.G. Morrison, R. Butler, H.L. Dickson, P. Hicklin, C. Hyslop, R.K. Ross, C. Gratto-Trevor, and A. Bourget.

Table 2  
Numbers of shorebird species occurring and breeding in Canada

Category <sup>a</sup>	No. of species occurring	No. of species breeding
Abundant	2	1
Common	28	26
Regular	9	9
Uncommon	4 <sup>b</sup>	2 <sup>b</sup>
Scarce	1	1
Casual	3	
Rare	3 <sup>c</sup>	
Accidental	16	
Hypothetical	6	
Endangered	2	1 <sup>d</sup>
Total	74	40

<sup>a</sup> For category definitions, see Appendix 1.

<sup>b</sup> Long-billed Curlew are also considered vulnerable.

<sup>c</sup> Mountain Plover are also considered endangered.

<sup>d</sup> Eskimo Curlew (End/Ext?) may also breed in Canada.

Table 3  
Summary of population trends assessed for shorebird species in Canada<sup>a</sup>

Category	Trend			Total
	Inc/Inc?	Sta/Sta?	Dec/Dec?	
Abundant	-	1	1	2
Common	-	17	11	28
Regular	-	4	4	8
Uncommon	1	1	2	3
Scarce	1	-	-	2
Rare	-	1	-	1
Endangered	-	-	1	1
Total	2	24	19	45

<sup>a</sup> Species were categorized as Dec (decreasing) if any part of their population was considered to be decreasing in the different regions considered in Table 1. For definitions, see Appendix 1.

Table 4  
Summary of regional population trends assessed for shorebird species in Canada (see Table 1)<sup>a</sup>

Category	Pacific (P)			Central (C)			Eastern (E)			Total			Total
	Inc/Inc?	Sta/Sta?	Dec/Dec?	Inc/Inc?	Sta/Sta?	Dec/Dec?	Inc/Inc?	Sta/Sta?	Dec/Dec?	Inc/Inc?	Sta/Sta?	Dec/Dec?	
Abundant	1	2	-	-	2	-	-	-	2	1	4	2	7
Common	1	23	1	-	18	2	-	14	9	1	55	12	68
Regular	1	6	1	-	2	4	-	2	2	1	10	7	18
Uncommon	1	1	2	-	-	2	-	-	1	1	1	5	7
Scarce	1	-	-	1	-	-	-	-	-	2	-	-	2
Casual	-	-	-	-	-	-	-	-	-	-	-	-	0
Rare	-	2	-	-	-	-	-	-	-	-	2	-	2
Endangered	-	-	-	-	-	1	-	-	1	-	-	-	2
Total	5	34	4	1	22	9	-	16	15	6	72	28	106
(1)		ns			*			**					**

(2)

	P	C	E
P	-	*	**
C		-	ns
E			-

(1) Comparison of numbers of species increasing and decreasing within region, based on chi-square test.

(2) Comparison of numbers increasing and decreasing between regions, based on chi-square test.

Statistical significance: ns = not significant, \* = p<0.05, \*\* = p<0.01.

<sup>a</sup> For definitions, see Table 1 and Appendix 1.

changes in numbers: a designation of "unknown" would generally have been almost as appropriate.

To what extent and in what direction are trends based on questionnaires and discussions likely to be biased? The two cases of increasing trends reported in Table 3 involved species usually seen in Canada in rather small numbers, and it is likely that increased numbers of sightings of such regionally uncommon shorebirds would have come to the

attention of the CWS Shorebird Committee members. Small or even moderate changes in populations that are relatively abundant may, on the other hand, be much less apparent to observers. When initial trend assessments based on questionnaires and discussions were compared with trend information derived from statistical analysis of survey data or other sources for areas in Eastern Canada, revisions nearly always involved alteration of trend estimates from

**Table 5**  
Comparison of number of revisions made to initial assessment of status after consultation of published and other information

Category	Pacific (P)	Central (C)	Eastern (E)	Total
No. of species with revised assessment	1	2	9	12
No. of species for which assessment not revised	31	29	19	79
<b>Total</b>	<b>32</b>	<b>31</b>	<b>28</b>	<b>91</b>

	P	C	E	P+C
P	-	ns	*	-
C		-	ns	-
E			-	**
P+C				-

Comparisons based on chi-square test with Yates correction. Statistical significance: ns = not significant, \* =  $p < 0.05$ , - = not tested.

“stable?” to “decreasing.” This suggests that initial assessments based on opinions were relatively conservative in assigning the designation “stable?” to a species if little information was available and that those assessments were not biased towards decreases; such a situation might have occurred, for instance, if committee members were predisposed to look for decreases, perhaps as a result of current concerns over habitats and future conservation of shorebirds. It also underlines the need for further quantitative analyses and suggests that other decreases may be found if shorebird populations in other regions have been affected in a similar way. However, few long-term survey data are available for trend analysis from other regions, so that there are no immediate prospects for extending trend assessments to a wider range of species or geographical areas.

Some other regional information supports the apparent decreases in numbers of small sandpipers and other shorebirds reported for Atlantic Canada by Morrison et al. (1994). Counts have declined at a number of sites along the St. Lawrence estuary and in the Gulf of St. Lawrence, where habitat alterations and losses have occurred (Morrison et al. 1991). Breeding Bird Survey data collected between 1966 and 1991 revealed widespread declines in Killdeer, Spotted Sandpiper, and Common Snipe, which were significant in several parts of Canada (Erskine et al. 1992). Analysis of data collected by the Étude des populations d'oiseaux du Québec (ÉPOQ) between 1969 and 1988 showed declines in a number of shorebird species; the greatest decline was for the Solitary Sandpiper (Larivée 1989). Recent aerial surveys of the Ontario coastlines of James Bay and Hudson Bay suggest that numbers of shorebirds have declined over the past 15–20 years (R.I.G. Morrison and R.K. Ross, unpubl. data). Numbers of Semipalmated Sandpipers breeding on study plots near Churchill, Manitoba, have also declined substantially over the past 10–15 years (C. Gratto-Trevor, unpubl. data). Some

**Table 6**  
Estimated sizes of shorebird populations in Canada (probable breeding population or numbers found on migration)<sup>a</sup>

Estimated population size	No. of species	%
10s (1–99)	1	2.5
100s (100–999)	1	2.5
1000s (1000–9999)	5	12.5
10 000–50 000	12	30.0
50 001–100 000	9	22.5
100 000s (100 000–999 999)	8	20.0
1 000 000+	4	10.0
<b>Total</b>	<b>40</b>	<b>(100)</b>

<sup>a</sup> Total derived from information in Table 1 (includes Common Snipe and American Woodcock).

potential exists for obtaining information on trends by revisiting areas in the Arctic that have been surveyed over the past 20–25 years (e.g., Gould 1988; Pattie 1990), but as yet no quantitative comparisons have been made.

Causes of declines in shorebird numbers are difficult to identify because they may occur at many points in the extensive migration patterns of the birds. Some species of shorebirds are particularly vulnerable to impact because they pass through “bottlenecks” on migration, where many birds occur in the same place at the same time (Myers et al. 1987); as a result, catastrophic environmental events could affect a large proportion of the population at once. On the other hand, it is possible that smaller environmental changes affecting the birds at a number of different places may affect their ability to complete their annual migrations successfully and hence increase their annual mortality. Such “low-grade” changes might be particularly difficult to identify, although they might be expected to affect different species to different extents, depending on the combination of factors affecting populations passing through different areas. Declines might also be part of a long-term cycle or reflect changes in the environment not related to human activities.

A notable feature of the analysis of shorebird population trends in eastern Canada during the period 1974–1991 (Morrison et al. 1994) was the marked synchrony in trends across species during particular sets of years: most of the 13 species analyzed declined during the latter half of the 1970s, whereas most species increased during the first half of the 1980s. Boyd (1992) showed that decreases in the Red Knot population wintering in the United Kingdom during the 1970s were linked to a series of particularly cold Junes on their main breeding grounds in the northeastern Canadian High Arctic, and it seems likely that the changes in shorebird numbers detected on migration in eastern Canada during the 1970s and 1980s may also have been linked to weather on the Arctic breeding grounds. Although these results suggest that weather on the breeding grounds may have caused at least some of the fluctuations in shorebird populations over the past 15–20 years and that such changes are at least partly reversible, concern remains that populations may be adversely affected by the many

other threats facing shorebirds and their habitats throughout their migration ranges.

The enormous advances in knowledge of shorebird distribution that have occurred in recent years have led to the creation and continued development of conservation initiatives such as the Western Hemisphere Shorebird Reserve Network. Information on shorebird population trends will be needed to determine if such initiatives are contributing to the long-term conservation of the birds and to identify the factors most affecting shorebird populations. The question of where best to monitor shorebird populations in the Western Hemisphere is not easy to answer. Breeding ground surveys may be useful for some species breeding in more southerly parts of Canada or in the United States. They have the advantage of revealing which parts of the population are changing and may help to identify some of the causes of population change, such as reproductive failure or adult mortality. For many species nesting in the Arctic, the remoteness of the breeding grounds, the considerable expense of fieldwork and the need to make a commitment to long-term or at least repeated monitoring, the low densities and dispersed nature of shorebird (and human) populations, and the differences in breeding biology of shorebird species make designing a simple comprehensive survey program difficult. Monitoring schemes for particular species might be feasible.

For many species, the major wintering areas on the coast of South America are very inaccessible and would require aerial surveys for long-term coverage. Although aerial surveys are thought to provide useful data for identifying key areas used by shorebirds, it is less clear whether they can provide data of sufficient accuracy to enable between-year comparisons of numbers. The Neotropical Waterbird Census, organized by Wetlands for the Americas and the International Waterfowl and Wetlands Research Bureau, may enable coverage of some Nearctic shorebird species wintering in South America, and it may also be possible to design effective monitoring operations for species whose wintering areas are located within North America and for which ground coverage might be feasible. In Canada, apart from the potential for monitoring the small numbers of species that occur in winter, developing and expanding the operation of survey networks in areas where birds occur on migration and which are accessible may represent the best way to continue to collect data needed for population trend analysis. Difficulties with surveys at migration stopovers include designing a suitable sampling regime at a time when numbers vary considerably, both within and between years, and uncertainties concerning the origins and destinations of the birds in interpreting the results.

There are very few species of shorebirds in Canada for which detailed population estimates are available, although it was possible to make at least a rough estimate for 40 species (Table 6). The best currently available estimates are thought to be those for the Semipalmated Sandpiper and Red Knot: aerial surveys (Morrison and Ross 1989) and banding (Spaans 1984) on the South American wintering grounds indicated a population of some 2–5 million Semipalmated Sandpipers, a figure compatible with

numbers passing through the Bay of Fundy (Hicklin 1987), and wintering ground surveys and banding suggest a total of 100 000–150 000 Red Knot (Harrington et al. 1988; Morrison and Ross 1989; Morrison and Harrington 1992). Estimates for a species such as the Sanderling (approximately 110 000 in South America; Table 1), which occupies beach habitats that are relatively straightforward to survey, may be reasonably accurate. Population estimates derived from aerial surveys for this and other species are likely to represent minimum figures for a number of reasons: not all birds are likely to be counted on aerial surveys, it is not possible to identify all birds seen when large concentrations are encountered, it may not be possible to arrange flights when weather and tide heights are optimal when covering large areas, and coverage may not be available from all parts of the relevant range. Knowledge of turnover rates is required for interpretation of ground or aerial counts made at migration stopover areas, and it appears that turnover rates are very different in different places (Morrison 1991).

Future compilation of information from current work in Mexico (Morrison et al. 1992, 1993; Page and Palacios 1993) and Panama (R.I.G. Morrison, R.K. Ross, R. Butler, and F. Delgado, unpubl. data), from ongoing studies such as the International Shorebird Survey (B.A. Harrington, Manomet Bird Observatory, Mass.) and the Pacific Flyway Project (Page et al. 1992), and from counts in Alaska (e.g., R. Gill, U.S. Fish and Wildlife Service) may improve estimates for species occupying coastal habitats. Breeding Bird Surveys may continue to provide trend estimates for a limited number of species breeding in southern Canada (Erskine et al. 1992). For species that disperse more widely over upland and inland habitats, population estimates will be much harder to acquire, although schemes such as ÉPOQ may be useful for such species (Larivée 1989).

Estimated population sizes most frequently fell in the range of tens of thousands for a variety of shorebird species. Species with populations exceeding 100 000 involved mostly small and medium-sized sandpipers, snipes or woodcock, and included the three phalaropes. The very large concentrations of Red-necked Phalaropes and Red Phalaropes that were once found near the entrance to the Bay of Fundy during southward migration have largely disappeared in recent years (Morrison et al. 1991), probably owing to a change in the distribution of their food. It is not known, however, whether this change in food distribution has resulted in a greatly decreased population or simply a redistribution of the birds. Numbers of Red-necked Phalaropes breeding at a study area near Churchill, Manitoba, have decreased dramatically over the past 12 years (C. Gratto-Trevor, unpubl. data). Less numerous species included two endangered species—the Eskimo Curlew (possibly less than 100 birds?) and the Piping Plover (current estimates 5000–6000)—as well as species such as the Upland Sandpiper and Buff-breasted Sandpiper, which are not known to be numerous anywhere in their ranges and whose total population sizes may well be less than 10 000 birds. Although the Canadian population of Black-necked Stilts is small, large numbers occur farther south within the main range of the species.

In summary, present information drawn from a combination of quantitative analyses and qualitative assessments indicates that a number of shorebird populations in Canada appear to be declining and that few are increasing. For most species and regions, currently available information is inadequate to provide an authoritative assessment of status or trend. Most shorebird populations breeding in or passing through Canada appear to number in the tens of thousands of individuals.

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#### References

Blankinship, D.R.; King, K.A. 1984. A probable sighting of 23 Eskimo Curlews in Texas. *Am. Birds* 38:1066-1067.

Boyd, H. 1992. Arctic summer conditions and British Knot numbers: an exploratory analysis. *Wader Study Group Bull.* 64 (Suppl.):144-152.

Butler, R.W.; Campbell, R.W. 1987. The birds of the Fraser River delta: populations, ecology and international significance. *Can. Wildl. Serv. Occas. Pap.* No. 65. Ottawa.

Cadman, M.D.; Eagles, P.J.F.; Helleinen, F.M. (eds.). 1987. Atlas of breeding birds of Ontario. University of Waterloo Press, Waterloo. 617 pp.

Campbell, R.W.; Dawe, N.K.; McTaggart-Cowan, I.; Cooper, J.M.; Kaiser, G.W.; McNall, M.C.E. 1990. The birds of British Columbia. Vol. II. Nonpasserines. Diurnal birds of prey through woodpeckers. Royal British Columbia Museum and Canadian Wildlife Service, Victoria. 636 pp.

Davidson, N.C.; Wilson, J.R. 1992. The migration system of European-wintering Knots *Calidris canutus islandica*. *Wader Study Group Bull.* 64 (Suppl.):39-51.

DeSante, D.; Pyle, P. 1986. Distributional checklist of North American birds. Vol. 1. United States and Canada. Artemisia Press, Lee Vining, Calif. 442 pp.

De Smet, K. 1992. Status report on the Long-billed Curlew *Numenius americanus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Canadian Wildlife Service, Ottawa. 28 pp.

Erskine, A.J.; Collins, B.T.; Hayakawa, E.; Downes, C. 1992. The cooperative Breeding Bird Survey in Canada, 1989-91. *Can. Wildl. Serv. Prog. Notes* No. 199. Ottawa. 14 pp.

Godfrey, W.E. 1986. Birds of Canada. Rev. ed. National Museum of Natural Sciences, Ottawa. 525 pp.

Gollop, J.B. 1988. The Eskimo Curlew. Pages 583-595 in Chandler, W.J. (ed.). Audubon wildlife report 1988/89. Academic Press, San Diego, Calif.

Gollop, J.B.; Barry, T.W.; Iversen, E.H. 1986. Eskimo Curlew. A vanishing species? *Sask. Nat. Hist. Soc. Spec. Publ.* No. 17. Regina. 160 pp.

Gould, J. 1988. A comparison of avian and mammal faunas at Lake Hazen, Northwest Territories, in 1961-62 and 1981-82. *Can. Field-Nat.* 102:666-670.

Haig, S.M.; Plissner, J.H. 1993. Distribution and abundance of Piping Plovers: results and implications of the 1991 international census. *Condor* 95:145-156.

Harrington, B.A.; Hagan, J.M.; Leddy, L.E. 1988. Site fidelity and survival differences between two groups of New World Red Knots *Calidris canutus*. *Auk* 105:439-445.

Hicklin, P.W. 1987. The migration of shorebirds in the Bay of Fundy. *Wilson Bull.* 99:540-570.

Howe, M.A.; Geissler, P.H.; Harrington, B.A. 1989. Population trends of North American shorebirds based on the International Shorebird Survey. *Biol. Conserv.* 49:185-199.

Howes, J.; Parish, D. 1989. New information on Asian shorebirds: a preliminary review of the INTERWADER Programme 1983-1989 and priorities for the future. Asian Wetland Bureau Publ. No. 42. Kuala Lumpur, Malaysia.

IUCN. 1988. IUCN red list of threatened animals. International Union for the Conservation of Nature and Natural Resources, Gland, Switzerland.

Knopf, F.L. 1991. Status and conservation of Mountain Plovers: the evolving regional effort. Report of research activities. U.S. Fish and Wildlife Service National Ecology Research Center, Fort Collins, Colo. 9 pp.

Larivée, J. 1989. Variation des observations d'oiseaux du Québec méridional de 1969 à 1988. *Carnets zool.* 49:83-90.

Meltofte, H. 1985. Populations and breeding schedules of waders, Charadrii, in high arctic Greenland. *Medd. Groenl., Biosci.* 16. 43 pp.

Morrison, R.I.G. 1984. Migration systems of some New World shorebirds. *Behav. Mar. Anim.* 6:125-202.

Morrison, R.I.G. 1991. Research requirements for shorebird conservation. *Trans. North Am. Wildl. Nat. Resour. Conf.* 56:473-480.

Morrison, R.I.G.; Harrington, B.A. 1992. The migration system of the Red Knot *Calidris canutus rufa* in the New World. *Wader Study Group Bull.* 64 (Suppl.):71-84.

Morrison, R.I.G.; Ross, R.K. 1989. Atlas of Nearctic shorebirds on the coast of South America. *Can. Wildl. Serv. Spec. Publ.* 2 vols. Ottawa. 325 pp.

Morrison, R.I.G.; Butler, R.W.; Dickson, H.L.; Bourget, A.; Hicklin, P.W.; Goossen, J.P. 1991. Potential Western Hemisphere Reserve Network sites for migrant shorebirds in Canada. *Can. Wildl. Serv. Tech. Rep. Ser.* No. 144. Ottawa. 98 pp.

Morrison, R.I.G.; Ross, R.K.; Torres M., S. 1992. Aerial surveys of Nearctic shorebirds wintering in Mexico: some preliminary results. *Can. Wildl. Serv. Prog. Notes* No. 201. 11 pp.

Morrison, R.I.G.; Ross, R.K.; Guzman P., J.; Estrada, A. 1993. Aerial surveys of Nearctic shorebirds wintering in Mexico: preliminary results of surveys of the Gulf of Mexico/Caribbean coasts. *Can. Wildl. Serv. Prog. Notes* No. 206. 14 pp.

Morrison, R.I.G.; Downes, C.; Collins, B. 1994. Population trends of shorebirds on fall migration in eastern Canada 1974-1991. *Wilson Bull.* (in press).

Myers, J.P.; Morrison, R.I.G.; Antas, P.Z.; Harrington, B.A.; Lovejoy, T.E.; Sallaberry, M.; Senner, S.E.; Tarak, A. 1987. Conservation strategies for migratory species. *Am. Sci.* 75:18-26.

Page, G.W.; Palacios, E. 1993. Winter shorebird numbers in wetlands along the west coast of Baja California. Unpubl. rep., Pacific Flyway Project, Point Reyes Bird Observatory and Centro de Investigacion Cientifica y de Educacion Superior de Ensenada (Mexico). Point Reyes Bird Observatory, Stinson Beach, Calif. 17 pp.

Page, G.W.; Shuford, W.D.; Kjelson, J.E.; Stenzel, L.E. 1992. Shorebird numbers in wetlands of the Pacific flyway: a summary of counts from April 1988 to January 1992. Unpubl. rep., Point Reyes Bird Observatory, Stinson Beach, Calif. 20 pp. + app.

Pattie, D.L. 1990. A 16-year record of summer birds on Truelove Lowland, Devon Island, Northwest Territories, Canada. *Arctic* 43:275-283.

Robbins, C.S.; Bystrak, D.; Geissler, P.H. 1986. The Breeding Bird Survey: its first fifteen years, 1965-1979. U.S. Fish Wildl. Serv. Res. Publ. No. 157.

Rose, P.M.; Scott, D.A. 1993. Waterfowl population estimates. IWRB Spec. Publ. (draft rep.). International Waterfowl and Wetlands Research Bureau, Slimbridge, U.K. 127 pp.

Sauer, J.R.; Bortner, J.B. 1991. Population trends from the American Woodcock singing-ground survey, 1970-1988. *J. Wildl. Manage.* 55:300-312.

Scott, D.A.; Carbonell, M. (compilers). 1986. A directory of Neotropical wetlands. International Union for the Conservation of Nature and Natural Resources (IUCN), Cambridge, and International Waterfowl and Wetlands Research Bureau (IWRB), Slimbridge, U.K.

Spaans, A.L. 1984. Waterbird studies in coastal Suriname: a contribution to wetland conservation in northeastern South America. Pages 63-76 in Annual report 1983. Research Institute for Nature Management, Arnhem, Netherlands.

Tate, J. 1981. The blue list for 1981. *Am. Birds* 35:3-10.

Tate, J. 1986. The blue list for 1986. *Am. Birds* 40:227-236.

Tate, J.; Tate, D.J. 1982. The blue list for 1982. *Am. Birds* 36:126-135.

Wershler, C.R.; Wallace, C.A. 1987. Status report on the Mountain Plover (*Charadrius montanus*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Canadian Wildlife Service, Ottawa.

## Appendix 1

### Abbreviations and definitions of terms used in Table 1

#### Species

\* = Not assessed by CWS Shorebird Committee (information not generally included in analyses)

#### Breeding status

B = Breeds in Canada

#### Terms referring to abundance

(terms used to describe general abundance of shorebirds in Canada, based on Godfrey [1986])

##### 1. *Regular and commonly occurring species*

Abu = Abundant: occurs in large numbers in suitable habitat within species range  
Com = Common: normally found in suitable habitat in species range  
Reg = Regular: likely to be found in suitable habitat within species range  
Unc = Uncommon: of regular although only occasional occurrence within species range

##### 2. *Occasional and irregularly occurring species*

Sca = Scarce: not usually seen, although known to occur within suitable habitat within species range  
Cas = Casual: of irregular occurrence, considered to be outside of normal species range  
Rar = Rare: only very occasionally found

##### 3. *Species not normally occurring in Canada*

Acc = Accidental: occurs only very occasionally and not likely to be seen within suitable habitat; occurrence considered to be outside of normal species range  
Hyp = Hypothetical: sighting reported of species, but evidence not adequate to confirm occurrence within Canada

##### 4. *Other*

End = Endangered: total population size considered small enough that survival of species is endangered  
Ext = Extinct: species no longer exists

#### Terms referring to status

(based on published sources and assessment of CWS Shorebird Committee)

#### Regions

Pacific = Areas west of the Rocky Mountains  
Central = Areas east of the Rocky Mountains to and including Manitoba  
Eastern = Areas east of and including Ontario

#### Status

Sta = Stable  
Inc = Increasing  
Dec = Decreasing  
? = Status or other information uncertain  
c. = Approximately  
+ = Present in region  
- = Absent in region

#### Notes

Numbers refer to estimated Canadian population (pop.); regional population sizes may be mentioned under regional abundance columns; other population figures as referenced

AWSG = Results of Australian Wader Study Group quoted in IWRB  
BBS = Breeding Bird Surveys operated by Canadian Wildlife Service and U.S. Fish and Wildlife Service  
COSEWIC = Committee on the Status of Endangered Wildlife in Canada  
DP = Status in Canada from DeSante and Pyle (1986), abbreviations as follows (see DP for further details):  
P = Permanent resident and confirmed breeder

S = Summer resident and confirmed breeder  
T = Transient (occurring in established range during migration)  
V = Vagrant (occurring outside established range during migration)  
W = Winter resident or visitor  
\* = Nonbreeding  
c = Common or abundant  
f = Fairly common  
u = Uncommon  
r = Rare  
x = Extremely rare  
l = Limited or local in distribution  
e = Extirpated or no regular recent records in former range

ISS = Population trend from International Shorebird Survey data 1972-1983 (Howe et al. 1989)  
IWRB = Population numbers and trends compiled by International Waterfowl and Wetlands Research Bureau by Rose and Scott (1993)  
MSS = Population trend from Maritimes Shorebird Survey data 1974-1991 (Morrison et al. 1994)  
SA = Number censused on aerial surveys of the coast of South America by Morrison and Ross (1989)

#### Regions

Neotr = Neotropical region  
NA = North America  
Cda = Canada  
Ont = Ontario  
Eur = Europe  
Afr = Africa  
NSEW, nsew = North, South, East, West as context

#### Statistical significance

ns = not significant

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