Semipalmated Sandpiper *Calidris pusilla* - southward migration on the Canadian Prairie

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Southward migrating Semipalmated Sandpiper *Calidris pusilla* were systematically counted at the far eastern (Winnipeg, Manitoba) and far western (Calgary, Alberta) section of the Canadian prairie. Winnipeg counts at two sites numbered 316 over a 10 year period - 1980 to 1990. Calgary counts, at many small sites, numbered 254 over an 11-year period - 1979 to 1989. Migration patterns were established and we suggest that the Alaskan and some western Canadian populations, in addition to retracing the northward route, also use more eastern and western corridors.

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This paper presents the southward migration patterns of Semipalmated Sandpiper *Calidris pusilla* from two prairie staging locations, east prairie at Winnipeg, Manitoba and west prairie at Calgary, Alberta. The data for the summary came from over a decade of systematic shorebird counts at the two locations and suggest that the migration routes are somewhat different from recent literature. Harrington & Morrison (1979) and Morrison (1984) describe migration strategies of three population groups - Alaskan, central and eastern. We believe that the Alaskan and west-central population retrace the northward route and in addition move in a corridor that extends from the west coast to the east prairie and that the northward corridor of the Alaskan group is restricted to a west Canadian prairie corridor.

STUDY AREAS

The great-plain of North America stretches *ca.* 2,500 km north from the Gulf of Mexico to the Arctic Ocean. A southern portion is often called "the prairies". In Canada this area lies in the provinces of Manitoba, Saskatchewan and Alberta. It is an area of limited rainfall and most of its agricultural practices depend on a May-June rainfall. This however varies from area to area and fluctuates from year to year creating a habitat that is considered unstable. The studies were made at almost the extreme east and west section of the area - a distance of *ca.* 1,300 km.

Manitoba counts were made at two sites (*ca.* 50°N, 97°W - elevation *ca.* 250 m). Grassmere Creek (GC), West St. Paul at evaporating sewage sludge ponds (43.7 ha with 16 cells) and Oak Hammock Marsh Area (OHM) - a restored cattail marsh containing *ca.* 1,953 ha of water in four cells and large areas of pasture. Both areas were manipulated for considerations other than shorebirds, but the shorebird habitat, particularly at OHM, remained fairly stable.

Alberta counts were made within a rectangular undulating agricultural high prairie area east of Calgary (50°55' to 51°20' N, 113°10' to 113°55' W - elevation *ca.* 1,000 m) and an occasional foothills/mountain count (elev. *ca.* 1,200 m) west of the city. The birds were found in cultivated land, ephemeral pools, sloughs, lakes, and irrigation reservoirs. Count habitat was extremely unstable due to meteorological and human-manipulation factors.

METHODS

The count period was from 21 June to mid-October.

Manitoba counts were by Holohan who made systematic walking census around St.Paul-Grassmere Creek sewage sludge ponds (GC) from 1981 to 1988 (286 counts - range 5-58) and Oak Hammock Marsh (OHM), 1980 to 1990 (80 counts range 1-8) - mainly at a 150 ha part of north cell. The Alberta data was gathered by Steeves from 1979 to 1989. The principle method was five-hour counts from an automobile along the grid road system (3.2 km north-south, 1.6 km east-west) at fields, sloughs, lakes and reservoirs - a second count at any location took place at least six days later (254 counts - range per year 11-35).

Descriptive statistic figures were calculated, for both areas, after classifying the data to the year's five-day periods.

RESULTS

Migration phenology, a summary of numbers passing and juvenile occurrence are all summarised in Table 1.

Table 1. Summary information on migration phenology of Semipalmated Sandpiper.

	Calgary	Winnipeg
Earliest observations	26 June	25 June
Mean arrival date	8 July	1 July
Mean departure date	13 September	6 October
Latest observations	9 October	19 October
Approx. total numbers passing	11,000	27,000 GC 7,000 OHM
Daily maxima	1,000	700 GC 1,800 OHM
First juveniles	2 August	4 August

At Calgary the latest record for northbound birds was 6 June (JBS unpub. data 1979-89 - 163 counts) so that the start of southward migrants was clear. But at Winnipeg birds were present throughout June (SH unpub. data 1980-90) and therefore the 21 June date was chosen based on the Calgary data. Mean and late departure dates were later at Winnipeg and were probably due to the colder Calgary autumn.

Passage numbers were greater at Winnipeg (Table 1). Just two sites were counted and if the OHM had received the same coverage as the GC site, total numbers would have been much higher. The OHM site probably would be suitable for even larger staging flocks if water level manipulation was carried out with consideration for the shorebird migration schedule. Numbers using the Calgary area were small and of the many factors determining shorebird presence probably the most influential was the continuing drought of the 1980s which left many natural areas without autumn water.

Figure 1 illustrates the pattern of occurrence, using the mean of each five-day period, at Calgary and the GC site. Peaks at Winnipeg appear to be about five days later at Winnipeg than Calgary. Studies at other locations (in Morrison 1984) indicate that the July movement would consist of subadults, failed breeders and postbreeding females. August passage appeared to consist of adults and juveniles with adults prominent to build-up to peak and then during the remaining period juveniles became progressively more abundant.

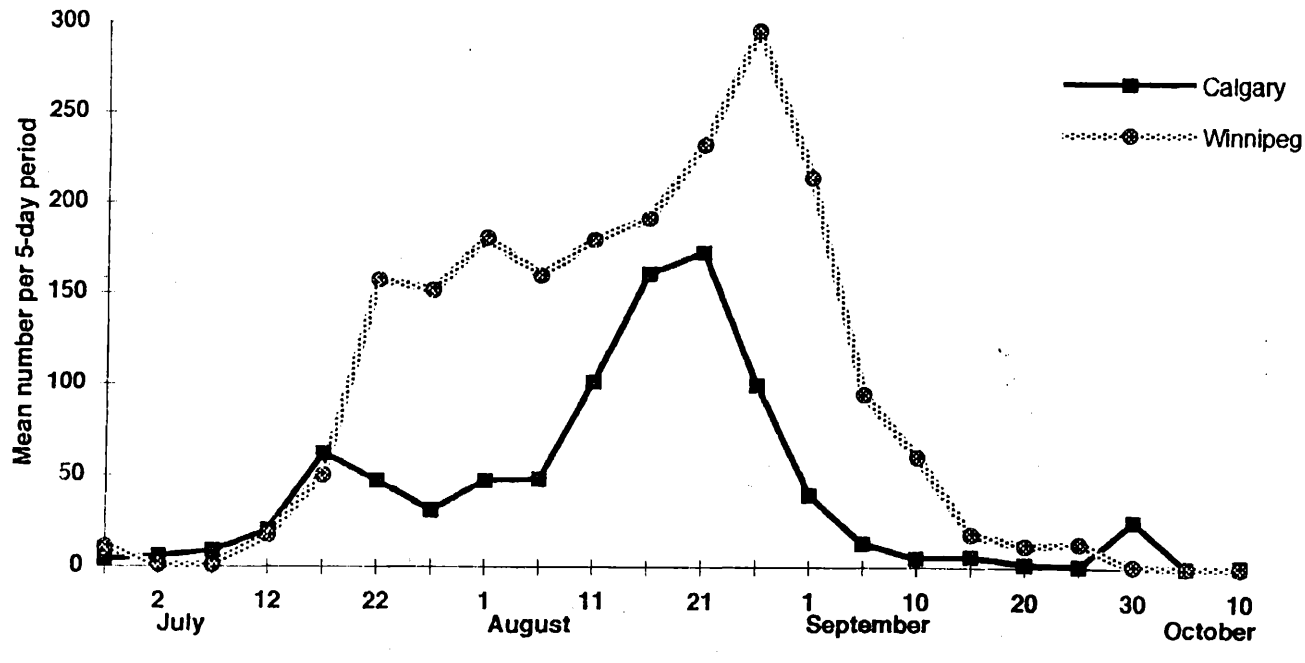

Figure 1. Migratory occurrence of Semipalmated Sandpipers at sites in Calgary and Winnipeg.

DISCUSSION

The breeding range (A.O.U. 1983; Gratto-Trevor 1992) is tundra of the low-arctic from south Labrador Peninsula (S to *ca.* 53°N) to central Baffin Island (N to ca. 70°N) and across mainland Canada, King William island, S. Victoria and S. Banks Islands (N to *ca.* 72°N), south along Alaskan coast to Norton Bay (*ca.* 56°N) and the E. Siberian Chukchi Peninsula.

Manning *et al.* (1956) suggested the existence of three separate populations, whilst Harrington & Morrison (1979) suggested a clinal population with smaller birds to the west. They thought the three populations used the following routes. On the journey from South America the great-plain route is used by Alaskan and central populations and the Atlantic coast is used by the eastern population. On the return journey to South America a 'retrace' route with perhaps a slight eastern veer is used by the Atlantic population, a James Bay to Atlantic coast route is used by the central population - an 'elliptical' migration and a 'retrace' route by the Alaskan population. Lank (1983) suggested that western central populations also use the transcontinental route.

Morrison & Ross (1989) thought that most wintered on the north coast of South America and Gratto-Trevor (1992) indicated some reach to about N. Uruguay (*ca.* 32°) and S. Peru on west coast (*ca.* 18°). Morrison & Ross (1989) suggested that wintering South American populations reflect the breeding cline with Alaskan birds (the smaller), on western parts of the north Atlantic coast/Pacific coast and that larger birds, from central and eastern populations, winter towards the east.

Routes of the Alaskan and west-central population through Canada, as indicated from recent studies, suggest modifications as follows:

Northward - a west great-plain Canadian route and with extension to coastal British Columbia;

Southward - the Canadian west coast, the great-plain with the main passage towards the east, and perhaps eastern Canada.

Northward movement toward the western part of the continent is supported by information from several sources - British Columbia (BC), the three prairie provinces and Alaska. Campbell *et al.* (1990) for BC indicate that at "southern Strait of Georgia... may be very common..." Coastal range dates are from late April into early June and at the BC/great plain the peak is "mid to late May". Alberta at Calgary (JBS unpublished 1979 to 1989 data) has a mean peak of occurrence of 16 May (sd 5.8 days, n = 143). Colwell *et al.* (1988), for Saskatchewan, presents data showing an early May and mid June peaks - suggesting the possibility of use by two populations (the Alaskan and central). But as their study only lasted one year in an unstable habitat, long term systematic counts and banding data are needed. Manitoba at Winnipeg (SH unpublished data 1980 to 1990) has mean peak 4 June (sd 5.7 days, n = 204), a mean peak difference of *ca.* 19 days from Alberta is a strong indication of a much later movement through the eastern part of the plain and is assumed to be that of the central population. Alaska Seward Peninsula arrival dates are usually "during the second week of May... Movement usually peaks... last third of May" (Kessel 1989). The western part of the plain lies on the most direct route to Alaska from the Gulf of Mexico and further supports the idea of a narrow corridor for the Alaskan population.

A Southward 'fan-shaped' movement, rather than just the prairie "retrace" route suggested by Harrington & Morrison (1979), is supported by information from British Columbia, the Great Plain, and eastern Canada.

British Columbia literature (Campbell *et al.* 1990) reveals that the status is locally "*very common* to abundant" that on BC coasts the "third most abundant 'peep' caught in summer banding operations on the Fraser River delta". The change in status from "uncommon" (Butler & Campbell 1987) leads to speculation that further study may prove a considerable BC coastal passage. Their data supports a late June through July movement - peak numbers from mid-July to early August. Juveniles arrive in mid-July and become more common as the movement progresses. The passage ends in September.

Great plain data indicates that main passage is on the great plain and is primarily of Alaskan origin but has elements of the west central group. It extends to the far east-west Canadian prairie: numbers (of the 1980s) appear to be greater on the eastern half of the Canadian plain and thus is Canadian great plain 'elliptical'. Morrison (1984) from evolving studies (Manning *et al.* 1956; Harrington & Morrison 1979) concludes that it is the Alaskan population that uses the Great Plain and that central and eastern populations veer to the east coast. But Lank (1983) and Gratto-Trevor (1992) indicate that some of the central population may also use the route. Martinez (1979) at Cheyenne Bottoms, Kansas over a 13-year period (1966-78) banded *ca.* 29,000 which indicates a strong central continental movement, but no indications of type or schedules are given. Data from the three Canadian provinces (Salt & Salt 1976; Adam *et al.* 1985; Cleveland *et al.* 1988) indicates an early July movement with the main migration in August. Pinel *et al.* (1991) for Alberta, add to the outline by giving some examples of extreme dates. Colwell *et al.* (1988) using a one season systematic count for Saskatchewan, also supports with mid-July and third-week-August peaks.

Data that indicates an Alaskan population movement to the east is scarce as is data that indicates that some of the central cline use the great-plain Gulf of Mexico route.

Morrison & Ross (1989) estimate a total wintering population of 2 million. Hicklin (in Gratto-Trevor 1992) indicates that 40-74% of the total southward stage at the east coast Bay of Fundy region. The percentage using the inland route is not known. Lack of adequate

estimation data is not surprising when consideration is given to the many factors in the equation for the presence of shorebirds. The interaction of these factors will probably prevent accurate populations estimation. Cheyenne Bottoms KS and Quill Lakes SK are identified as having the highest central North America staging populations (Gratto-Trevor 1992) but numbers are not given. These large staging sites and others provide a variable habtiat. Adequate management at Cheyenne Bottoms through drought periods now seems secure with a "landmark ruling ordering cutbacks in irrigation... to allow more water..." (Anonymous 1992) and thus should present as fairly stable for future census. But staging areas without water control go through phases creating habitat that ranges from less-than-adequate to ideal. These phases, mainly due to fluctuating water levels, lead to staging mobility and thus estimation difficulties. We suggest that a considerable number of birds stage in small concentrations throughout the interior. There are millions of ponds, hundreds of lakes and other areas on the great plain which are suitable in varying degree for staging birds and we have observed that small groups tend to use these areas - edges of lakes, drying sloughs, irrigation reservoirs, grassy meadows, rocky breakwaters, muddy areas along rivers, sewage ponds, and managed areas. We believe that a major staging area loss probably would not jeopardise a large group that would normally have used an area - the birds would break up into small flocks and stage at the less-than-ideal but still satisfactory areas. We thus agree with Senner & Howe (1984) who state "Species that regularly use inland habitats during migration will probably show too much geographic instability among years to permit population trend analysis."

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