

WESTERN SANDPIPER MIGRATION STUDIES ALONG THE WEST COAST OF CANADA

by Robert W. Butler and Gary W. Kaiser

The Western Sandpiper *Calidris mauri* breeds in western Alaska and eastern Siberia and spends the winter in the southern USA and Central America. Hundreds of thousands of this species migrate along the Pacific coast of North America each spring and autumn, stopping at mudflats in the Gulf of Alaska (Senner et al. 1981) and the Fraser River delta at Vancouver, British Columbia (Butler et al. 1987). These two sites are about 1 200 km apart between which lie nearly 27 000 km of mountainous coastline.

Adult Western Sandpipers occur along the British Columbia coast from late June to late July whereas juveniles migrate mostly from the end of July to mid-September. Their migration is rapid with most birds lingering only 2-3 days (Butler et al. 1987) so that waves of migrants flood along the coast. That phenomenon coupled with the fact that few people and fewer birdwatchers live along the rugged British Columbia coast suggested that there might be other important stop-over sites.

As part of Canada's participation in the Western Hemisphere Shorebird Reserve Network (Myers 1987a, 1987b, and Hicklin 1988 this *Bulletin*), we began in 1987 to search for potential hemispheric and/or regional sites of importance to shorebirds along the British Columbia coast. We searched mudflats in July and August to locate flocks of Western Sandpipers. We also studied the wildlife record files of the Royal British Columbia Museum in Victoria, B.C. for reports of Western Sandpipers and solicited assistance from volunteers through naturalists' newsletters. In addition, we attached white leg flags to 650 banded Western Sandpipers at Boundary Bay near Vancouver in July and August 1987 in the hope of increasing the observations of marked birds on the wintering grounds. Consequently, we identified five sites of importance to Western Sandpipers along the British Columbian coast (Figure 1). In order to assess the relative importance of each site, we required some estimate of the flyway population which, to our knowledge, is unknown. Rough estimates can, however, be calculated from existing data.

In 1978, one of us (G.W.K., unpublished data) counted Western Sandpipers every 5.6 days, on average, over a 91-day migration period at Boundary Bay in the Fraser River delta. Since the turnover rate for this species is known to be 3 days (Butler et al. 1987), we plotted counts made 3 or more days apart and calculated the area below the curve to estimate the number of sandpipers that used the bay. The estimated population amounted to 506 479 birds. Unfortunately, we could not apply this same method to other sites since similar series of counts have not been done, even though we had numbers during peak migratory periods at those other sites. Therefore, we recalculated the numbers for Boundary Bay using only average peak counts and compared the estimate with the graphic method described above. Peak numbers of sandpipers at Boundary Bay consist of about 19 000 birds. If we assume that the population turns over every 3 days then there would be 30.3 days in the 91 day migration period where numbers at the site represent new birds for a total population of 575 700 (19 000 x 30.3)

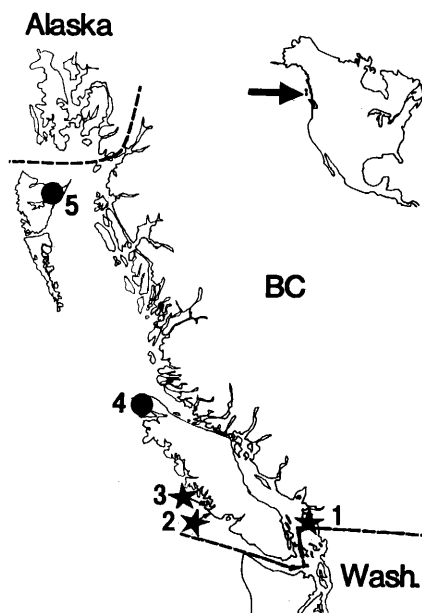


Figure 1. Sites on the British Columbia coast which support regional (closed circle) and hemispheric (star) Western Sandpiper populations. 1 - Fraser River delta, 2 - Chesterman Beach, 3 - Tofino mudflats, 4 - Hansen's Lagoon, 5 - Delkatla Slough.

sandpipers throughout the migratory period. This second estimate is slightly larger than the first by 12.0%. This is expected since the second estimate fails to account for low numbers during the early and late phases of migration. Therefore, for sites outside Boundary Bay we measured populations by the equation:

$$E = (p \times 30.3) - 0.12 (p \times 30.3)$$

where E equals the estimated population that uses a site during migration, p refers to the average peak number, 30.3 represents the number of days when p consists of new migrants and 0.12 is the correction factor to account for low numbers at the beginning and end of a curve characterized by a long plateau (rather than a single peak) set at p.

By these means, we attained a total population estimate for the British Columbian coast of 2 443 756 Western Sandpipers during the southward migration (Table 1). For comparison, Isleib (1979) estimated single-day numbers of Western Sandpipers in spring for the Copper River delta in Alaska of 1.5 to 2 million birds and a total northbound population of 6.5 million between 28 April and 31 May 1973.

Our results indicate that by the criteria established in Myers et al. (1987a, 1987b) the Fraser River delta and Chesterman Beach/Tofino mudflats (see Figure 1) are of hemispheric importance to migrant Western Sandpipers (sites which support 250 000 shorebirds or 30% of the species' flyway population; Table 1). Hansen's Lagoon and Delkatla Slough (Figure 1) support

Table 1. Population estimates of Western Sandpipers during autumn migration on the British Columbia coast.

Location	Average peak counts	Population estimates	Percent of total	Site significance
Fraser River delta	44 000	1 173 216	48.0	Hemispheric
Chesterman Beach	35 000	933 240	38.2	Hemispheric
Tofino Mudflats	8 000	213 312	8.7	Hemispheric
Hansen's Lagoon	1 650	43 996	1.8	Regional
Delkatla Slough	3 000	79 992	3.3	Regional
Total		2 443 756	100.0	

less than 5% of the estimated flyway population but exceed the regional criterion of 20 000 birds (see Myers et al. 1987a, 1987b).

Most of the birds in the Fraser River delta use Boundary Bay and Roberts Bank. Boundary Bay has no formalized protection for its wildlife although recently it was proposed to the British Columbia Provincial Cabinet as a Wetland of International Importance as defined by the Ramsar Convention. Roberts Bank is undergoing slow industrial development and is already the site of a coal port, ferry terminal and small boat harbour. Part of the Tofino mudflats are protected by very weak provincial legislation (Map Reserve of the Ministry of Environment and Parks) and a small area lies within the boundaries of Pacific Rim National Park where there are other small but perhaps regionally significant sites. Chesterman Beach near Tofino mudflats is unprotected. Hansen's Lagoon lies within Cape Scott Provincial Park, and Delkatla Slough is a municipal sanctuary.

This cursory examination needs to be followed by firstly a more accurate assessment of each site from which to estimate total populations, and secondly a continued search for new locations of critical importance to migratory shorebirds along Canada's west coast. Such sites will hopefully be offered protection through the Western Hemispheric Shorebird Reserve Network as their importance to migrant shorebirds is recognized.

REFERENCES

- Butler, R.W., Kaiser, G.W. and Smith, G.E.J. 1987. Migration chronology, length of stay, sex ratio, and weight of Western Sandpipers (*Calidris mauri*) on the south coast of British Columbia. *J. Field Ornithol.* 58: 103-111.
- Isleib, M.E. 1979. Migratory shorebird population on the Copper River delta and eastern Prince William Sound, Alaska. *Studies in Avian Biology* 2: 125-129.
- Myers, J.P., Morrison, R.I.G., Antas, P.Z., Harrington, B.A., Lovejoy, T.E., Sallaberry, M., Senner, S.E. and Tarak, A. 1987a. Conservation strategy for migratory species. *American Scientist* 75: 19-26.
- Myers, J.P., McLain, P.D., Morrison, R.I.G., Antas, P.Z., Canevari, P., Harrington, B.A., Lovejoy, T.E., Pulido, V., Sallaberry, M. and Senner, S.E. 1987b. The western hemisphere shorebird reserve network. *Wader Study Group Bull.* 49. (Suppl.): 122-124.
- Senner, S.E., West, G.C. and Morton, D.W. 1981. The spring migration of Western Sandpipers and Dunlin in southcentral Alaska: numbers, timing and sex ratios. *J. Field Ornithol.* 52: 271-284.

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