

NOTES ON THE 1983 DISTRIBUTION OF SANDERLINGS ALONG THE UNITED STATES' PACIFIC COAST

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This report summarizes censuses of Sanderling *Calidris alba* obtained in mid-winter, and during spring migration, along the US Pacific Coast between southern California and Northern Washington. The censuses are one component of ongoing research on Sanderlings in central coastal California (Myers 1980).

Coast-wide censuses were made by the authors and collaborators (see Acknowledgements) during two periods: 11 to 21 January 1983 and 4 to 24 May 1983. In addition, from 27 April to 5 May 1983 CTS and CJH censused all beaches and estuaries from Del Norte County, California (41° 40' N) to Jefferson County, Washington (47° 20' N).

We censused beaches by walking or driving on the beach and/or scanning from an adjacent road with 15-60X telescopes, and censused estuaries with the telescopes. On beaches near estuaries, efforts were made to census around high tide periods in order to assure that Sanderlings would be forced off low-tide foraging areas within the estuaries (Connors et al. 1981).

Birds were counted individually when the numbers were small. With large flocks birds were counted in groups of tens and hundreds. Census numbers were later rounded for calculations of densities, as presented below. Beach lengths were determined from automobile odometers or from local maps. Lengths of beaches sampled are provided in Table 1.

During the spring censuses we followed molt in the field by visually estimating the percentage of all birds in full alternate plumage. We also recorded the percentage of full alternate plumage on individually color-banded birds in order to track molt progress on individuals.

RESULTS

1. Mid-winter density

The mid-January census took place 14-17 January 1983, with most censuses made on 15 January. Approximately 260 km of beach were censused, but a fraction of those censused were not usable in this analysis because they were made near estuarine areas during lower tidal periods, improper portions of the tidal cycle (Connors et al. 1981). For this paper we consider a total of 240 km of beach over which approximately 9690 Sanderlings were recorded, for an overall average of 40 Sanderlings/km of beach (Table 1, Figure 1).

No consistent, coast-wide, geographic pattern emerged in Sanderling distribution at this time of year. Density rose and fell in an irregular pattern from north to south, with three peaks in the distribution: at the northern end of the census region around Grays Harbor, Washington, near Tomales Bay on Dillon Beach, California, and on the beaches of Santa Cruz County, California.

Higher densities, however, were clearly linked to the nearby presence of estuaries. Beaches with nearby estuaries (N=9) averaged 53 birds/km while those without (N=12) averaged 21 birds/km. This difference is statistically

significant (Mann-Whitney $U = 134$, $z = 2.49$, $P < 0.01$). The major exception to this pattern involved relatively high densities on beaches away from estuaries in Santa Cruz County, California, perhaps because, being inside Monterey Bay, these beaches were much more protected from waves than outer beaches to the north, and thus prey distributions were not disrupted by winter storms (Myers et al. 1981).

Away from estuaries, extensive beaches (>5 km long, N=6) averaged higher densities than short beaches (N=6), 33 vs. 11 birds/km, respectively ($U = 50$, $z = 1.76$, $P < 0.05$). For this analysis we pooled together lengths of pocket beaches within coastal sectors.

2. Spring density

Results from the two spring censuses are summarized in Table 1. The distribution of counts in time and space was by no means ideal, but it does reveal several basic patterns, and hints at others. By early May, Sanderling density throughout California had dropped markedly compared to winter densities. In contrast, density rose sharply in Oregon and Washington. Two areas of exceptionally high density were discovered: in the Oregon Dunes National Recreation Area, and a lengthy beach/lagoon system centered around the mouth of the Columbia River, including Clatsop Beach to the south and Long Beach, Grayland Beach, and Olympic-North Beaches in front of Willapa Bay and Grays Harbor (Figure 1). In late April/early May, Sanderling density on 156 km of beach sampled in these areas of Oregon and Washington averaged 185 birds/km, with a total of 28 810 Sanderlings recorded. Hereafter, we refer to these areas as staging areas.

Comparing the late April/early May census with counts made in mid-May indicates that the peak of migration occurs before 15 May. A single census made 1 June at Clatsop Beach, Oregon, however, revealed significant numbers (1 670 total, 176/km, compared to 472/km in early May) still in the area. Unfortunately, we cannot determine whether this represents a secondary peak of migration, a lingering population, or some other possibility. Continuous censuses along these beaches are needed.

3. Observations of banded birds

In the Oregon and Washington staging areas we observed 11 banded Sanderlings from Bodega Bay, California, banded there during previous winters (Table 2). No birds were seen carrying leg-flags that would have indicated a South American origin (Myers et al. 1983).

Two of the color-combinations could not be read with certainty, and one bird carried only a single metal band. Of the individuals positively identified by color-combinations, one was less than one year old. Three of the banded birds were seen at least twice (Table 2). One of these, an adult, remained in the Oregon Dunes staging area at least 14 days. During this time it molted from an estimated 25% to 90% full alternate plumage. Another adult remained on the beaches in southern Washington at least 7 days, during which time

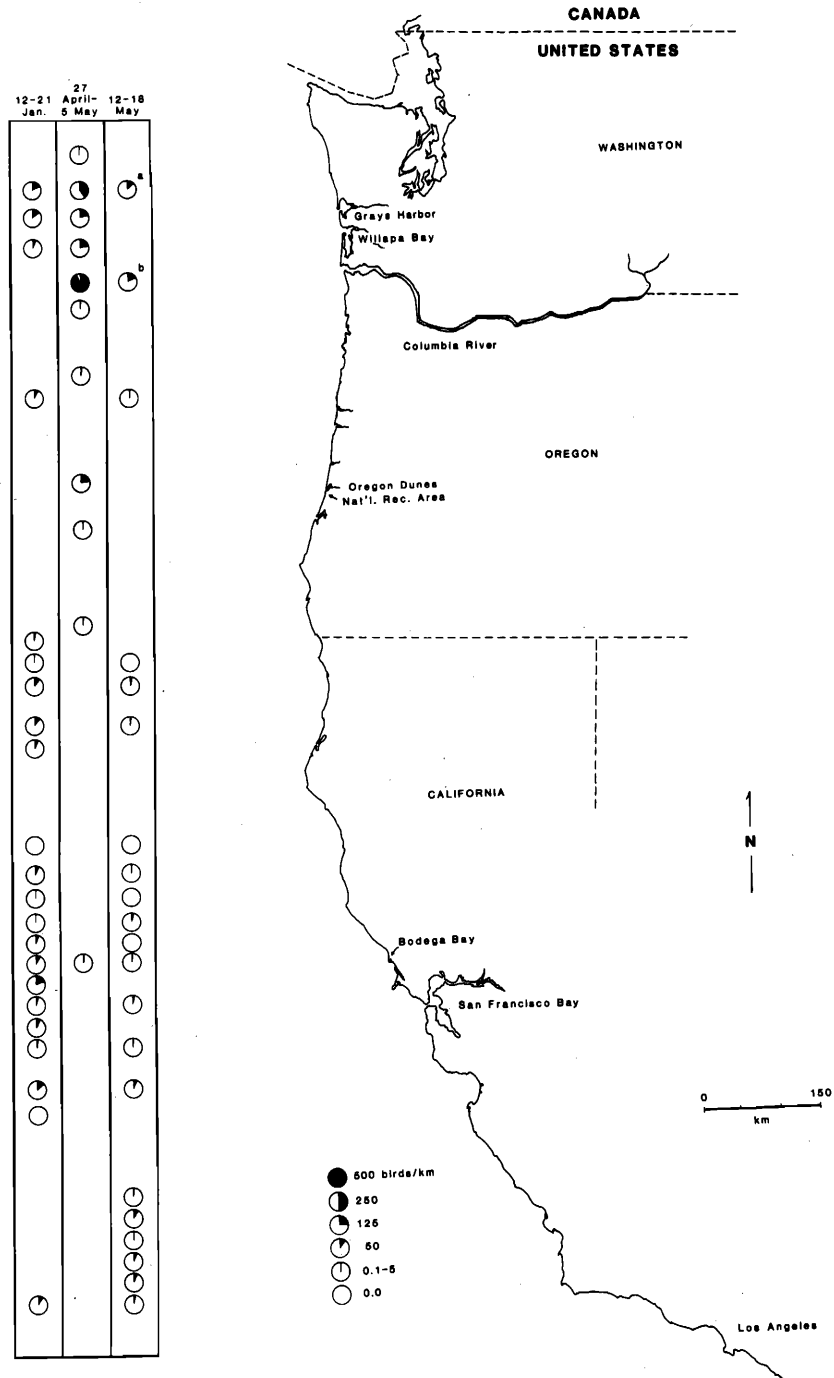


Figure 1. Distribution and densities of Sanderlings censused during winter and spring along the Pacific Coast.

it did not alter its plumage appearance noticeably; during both sightings it was scored 25% full alternate molt. A first-winter Sanderling first sighted in the Oregon Dunes staging area was seen again 12 days later, 240 km to the north at Clatsop Beach. Between sightings its molt state (25% full alternate) did not change noticeably.

Some information on the speed of northward movement along the West Coast was provided by

sightings in migration of 3 adult birds color-banded in Bodega Bay. One was seen at Bodega Bay on 25 April and then again, 3 days later, 780 km to the north in the Oregon Dunes area. Two others at Bodega Bay on 25 April were found 8 days later on Grayland Beach, Washington (1120 km to the north). One of these latter birds then spent at least 7 days in the area (see above).

Table 1. Comparison of Sanderling census results for winter and spring along the US Pacific Coast. Beach lengths given are in kilometers, and densities given are expressed as birds per kilometer.

Beach or Area	Beach Type	Winter Length Sampled	Spring Length Sampled	Density & (Numbers)		
				12-21 Jan	27 April-5 May	12-18 May
Dungeness Spit, Washington	A ^a	-	14.4	-	-	5 (68)
Olympic-North Beach Washington	A	34	36	85 (2900)	199 (7160)	68 ^b (883)
Grayland Beach, Washington	A	22	24	73 (1600)	99 (2390)	-
Long Beach, Washington	A	31	41	33 (1030)	94 (3840)	-
Clatsop Beach, Oregon	B1	-	25	-	472 (11 790)	87 ^c (1940)
Tillamook Bay to Seaside, Oregon	B2	-	30	-	9 (273)	-
Rock Creek Beach to Netarts Bay, Oregon	B2	-	55	-	1 (64)	-
Cape Perpetua to Gleneden Beach, Oregon	B2	40	40	31 (1250)	-	9 (358)
Oregon Dunes Nat'l. Rec. Area, Oregon	B1	-	31	-	117 (3630)	158 ^d (2060)
Bullards Beach to Bastendorff Beach, Oregon	B2	-	12	-	5 (65)	-
Lake Talawa Beach to Ophir Beach, Oregon/California	B1 ^e	-	60	-	2 (94)	-
Crescent City Beach, California	B2	1.6	-	14 (22)	-	-
S. Crescent City Beach, California	B2	5	5	3 (15)	-	0 (0)
Gold Bluff Beach, California	B1	11	11	48 (523)	-	19 (206)
Clam Beach, California	A	2.4	2.4	52 (125)	-	9 (22)
Jetty Beaches, Humboldt Bay, California	A	12.6	-	27 (339)	-	-
Mendocino County Beaches, California	B2	7	7	9 (0)	-	0 (0)
MacKerricher State Beach, California	B1	7	7	39 (271)	-	6 (40)
Manchester State Beach, California	B1	8	8	7 (58)	-	0 (0)
Sea Ranch Beaches, California	B2	1.6	0.8	7 (11)	-	19 (15)
Sonoma County Beaches, California	B2	5	7	30 (148)	-	0 (0)
Bodega Bay, California	A	7	7	45 (316)	13 (93)	8 (53)
Dillon Beach, California	A	2.6	-	105 (273)	-	-
Pt. Reyes National Seashore, California	A	22	10	29 (436)	-	17 (174)
Cliff House Beach, California	A	5.3	-	37 (196)	-	-

Table 1. continued.

Beach or Area	Beach Type	Winter Length Sampled	Spring Length Sampled	Density & (Numbers)		
				12-21 Jan	27 April-5 May	12-18 May
San Mateo County Beaches, California	B1	9	9	10 (90)	-	1 (9)
Santa Cruz County Beaches, California	B1	4.5	4.5	61 (276)	-	33 (147)
Asilomar State Beach, California	B2	1.5	-	0 (0)	-	-
Atascadero State Beach, California	B2	-	2.5	-	-	11 (27)
Morro Bay State Park Beach, California	A	-	6	-	-	48 (290)
Pismo Beach Area, California	B2	-	10.4	-	-	8 (86)
Arroyo Grande Creek to Santa Maria River, California	B1	-	15	-	-	29 (439)
Santa Maria River to Mussel Rock, California	B2	-	3.4	-	-	37 (127)
Santa Ynez River Mouth, California	B1	3.2	2.4	48 (155)	-	18 (43)

A: beach backed by estuary

B1: extensive beach (>5 km) away from estuary

B2: pocket beach(es) (<5 km) away from estuary

a not strictly coastal; the spit is in the Strait of Juan De Fuca

b consists of only 13 km of beach at the southern end where birds were more widely spaced (defending feeding territories)

c census performed at low water (however this may have been unimportant, see text), also census consisted of only 22.4 km of beach

d census consisted of only 13 km of beach

e one beach was 31 km long, the others were pocket beaches

Table 2. Sightings of wintering Sanderlings from Bodega Bay, California on Spring Migration 1983

Initial Capture Date and Age	Last Date Sighted at Bodega Bay	First Sighting on Migration	Second Sighting on Migration
24 November 1982 AHY, male ¹	25 April 1983	28 April 1983 Oregon Dunes, Oregon	-
5 January 1983 HY	Transplanted to Monterey Bay on 6 January 1983 ²	29 April 1983 Oregon Dunes, Oregon	11 May 1983 Clatsop Beach, Oregon
26 October 1982 AHY	14 March 1983	29 April 1983 Oregon Dunes, Oregon	12 May 1983 Oregon Dunes, Oregon
12 October 1978 AHY	29 March 1983	1 May 1983 Clatsop Beach, Oregon	-
12 February 1981 HY	25 April 1983	3 May 1983 Grayland Beach, Washington	-
14 January 1982 AHY	25 April 1983	3 May 1983 Grayland Beach, Washington	10 May 1983 Olympic-North Beach, Washington
19 November 1980 AHY	17 December 1983	11 May 1983 Clatsop Beach, Oregon	-
1981-82 ?	14 April 1983	11 May 1983 Clatsop Beach, Oregon	-

¹ Sexed by laparotomy

² Part of wintering site fidelity experiments

None were seen together with other color-banded individuals. The closest two were separated by at least 3 km. This suggests that Sanderlings migrate northward as individuals rather than in cohesive groups. This pattern is substantiated further by the observation that departure from Bodega Bay is staggered: color-banded birds (both adult and first-winter) still remained at Bodega Bay during the period when we observed these marked birds in Oregon and Washington. However, the sample of color-marked birds seen away from Bodega Bay was small compared to the number alive to migrate (in excess of 150), and that could have resulted from our having missed a few flocks containing a high percentage of banded birds.

4. Habitat, foraging, and behavior

Over 99.99% of 29 540 Sanderlings counted in Oregon and Washington during the 27 April to 5 May census effort were observed on open beaches, irrespective of tidal height. Nearby extensive mud and sandflats were virtually devoid of Sanderlings.

Birds foraged in the staging areas throughout most daylight hours. During 5 censuses, a subset of total birds censused (roughly 75%) were assigned to one of two categories: foraging or roosting. Within this set, at high tide 74% of birds foraged, at mid-tide 70% of birds foraged, and at low tide 47% foraged. Over all tidal regimes and weighting for numbers of birds, this averages to 70% foraging. Relatively small numbers roosted at any tide levels.

Within the staging areas we observed Sanderlings feeding on sandcrabs *Emerita analoga* and marine worms in the wave-washed zone during high and intermediate tide levels, as well as in exposed wet sand at lower tide heights. Many birds foraged in wet sand above the water line following tire tracks.

On the southern portions of Clatsop Beach, Long, and Olympic-North Beaches, Sanderlings aggressively defended feeding territories. Toward the northern terminus of each of these beaches, however, most birds roamed in large flocks within areas of very high Sanderling density: over 440 birds/km for 5 km on Long Beach, and over 440/km for 12 km on Olympic-North Beach.

DISCUSSION AND CONCLUSIONS

The distribution of Sanderlings along the US Pacific Coast shifts radically from winter to spring. In winter, they are spread unevenly from Washington through California, with concentrations centered largely around large beaches with nearby estuaries. By late spring, Sanderlings have concentrated onto a few beaches in central Oregon and around the mouth of the Columbia River. These spring staging areas contain several tens of thousands of Sanderlings. The beaches used are the final sections of outer coast sandy beach south of the next major Sanderling staging area now known to the north, the Copper River Delta in southeast Alaska, some 1550 km away (Isleib 1979).

We offer the following speculative scenario for Sanderling spring migration on the US Pacific Coast. Individuals from dispersed wintering grounds south through California and into

Mexico (but not to the Pacific Coast of South America), drift northward along the coast making relatively short flights and frequent feeding stops, until they reach the staging areas in Oregon and Washington. There they build up fat reserves and complete alternate molt prior to a non-stop flight to the Copper River Delta.

In a study of estuarine migrant shorebirds, Herman and Bulger (1981) identified Grays Harbor, Washington, as a major spring migration staging area for at least 12 species. The Willapa Bay estuary immediately south of Grays Harbor also supports large numbers of spring migrants (S.G.Herman, pers. comm.). Coupled with our observations on the beaches adjacent to these estuaries, it is clear that this coastline must figure prominently in any plans for the conservation of New World shorebirds.

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