NEARSHORE FLIGHTS OF SEABIRDS PAST YAQUINA ESTUARY, OREGON, DURING THE 1982 AND 1983 SUMMERS

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Although there have been several studies of seabird distributions off the Oregon and Washington coasts (e.g., Wahl 1975, Wiens and Scott 1975, Manuwal et al. 1979, Wahl et al. 1981, Matthews 1983, Wahl and Speich 1984), research has not been directed to determining the net movement of seabirds flying nearshore along these coasts. Interpretations of flights can be equivocal, but Marchant (1977) has shown that systematic observations of nearshore flights can provide valuable information about seabird distributions and movements.

I conducted this study to determine if selected seabirds, especially Common Murres (*Uria aalge*), exhibited significant net movements past the mouth of Yaquina Estuary. Dispersion or migration would be suggested by many more birds flying in one direction than another because if there were many watches, the numbers of birds flying to and from colonies or feeding areas should cancel each other out.

STUDY AREA AND METHODS

All observations were from a point about 0.2 km from land on the south jetty of Yaquina Estuary (44° 37'N, 124° 04'W), which is on the mid-Oregon coast in Lincoln County. During 5-min watches, I counted seabirds flying north or south through the field of view of a 20x telescope, which was pointed westward. The horizon of the sky was set near the top of the lower one-third of the field of view, and the telescope was 5-6 m above the water. Flying birds were observable to about 2-3 km offshore. I counted shearwaters (virtually all Sooty Shearwaters, *Puffinus griseus*, with occasional Pink-footed Shearwaters, *P. creatopus*), Fork-tailed Storm-Petrels (*Oceanodroma furcata*), Brown Pelicans (*Pelecanus occidentalis*), Brandt's (*Phalacrocorax penicillatus*) and Pelagic (*P. pelagicus*) cormorants, Common Murres and Pigeon Guillemots (*Cepphus columba*). During the June-September period, I conducted 124 watches in 1982 (mainly of shearwaters and murres) and 58 in 1983. Watches in 1982 were 10-25 min apart on 10 July and were a minimum of 56 min apart on other days; in 1983, there was one watch/day in June-August and 1-3 watches/day, 15-30 min apart, in September.

Watches in 1983 were divided into different intervals for each species based on changes in a bird's abundance. For example, watches for Common Murres were divided into four intervals (June-15 July, 16-31 July, 1-18 August, and September) because the abundance of murres differed greatly among these intervals (see below).

To determine if net movements were significant, the numbers of birds flying north versus the numbers flying south during watches were tested with a two-tailed Wilcoxon paired-sample test (Zar 1974: 124-126).

Table 1. Net number of shearwaters and Common Murres flying north past Yaquina Estuary, Oregon, during 5-min watches in 1982. The Wilcoxon paired-sample test was used to examine significance. P = probability; NS = not significant; a dash indicates no data available.

1982	Observation period (PDT)	Watches N	Net number of Sooty Shearwaters flying north per watch $\bar{x}$	SD	Range	P	Net number of Common Murres flying north per watch $\bar{x}$	SD	Range	P
10 Jul	1400-1830	27	-	-	-	-	90.2	88.0	(-38)-256	<0.01
22 Jul	1020-1920	7	-	-	-	-	137.4	252.4	5-706	<0.05
28 Jul	1150-2020	7	-	-	-	-	169.7	122.0	41-404	<0.05
30 Jul	0740-1945	10	-	-	-	-	56.9	55.4	2-173	<0.01
5 Aug	0650-1915	9	-	-	-	-	15.0	13.0	2-41	<0.01
12 Aug	0640-1900	9	-	-	-	-	2.6	3.2	0-10	<0.05
19 Aug	0650-1930	11	75.1	138.5	(-16)-407	NS	0.1	0.3	0-1	NS
26 Aug	0720-1900	10	32.4	35.0	(-7)-113	<0.02	0	0	0	NS
3 Sep	0740-1930	9	15.4	48.0	(-48)-100	NS	0	0	0-1	NS
16 Sep	0715-1900	10	20.2	33.0	(-1)-109	<0.05	0	0	0-1	NS

RESULTS AND DISCUSSION

In 1982, shearwaters were not common until August, and on the four census days in August and September their net movement was northward (i.e., the number of birds flying north was greater than the number flying south) each day and was significantly so on two of the days (Table 1). In 1983, shearwaters were first observed on 9 May, but there were fewer than 5/watch until 31 July. From then through September they commonly flew by, mainly northward (Table 2). The net number of shearwaters flying north in 1983 in the 30 July-September period was within the daily range of 1982 flights (Tables 1 and 2).

Fork-tailed Storm-Petrels were not detected in 1982, but a net average of 1.1 flying north was observed in 1983 between 15 August and 5 September (Table 2). They did not exhibit a significant northward trend (Table 2). Their unusual nearshore abundance in 1983 was also noted along the southern Oregon coast (Evanich and Fix 1983).

Brown Pelicans and cormorants both exhibited net averages of 0.1-0.5/watch flying north in 1983 (Table 2). The net number of pelicans flying north was barely significant, and the net number of cormorants flying north was insignificant (Table 2).

In 1982, the magnitude of Common Murre flights often changed within a day, but the only watches with net southward movements were on 10 July (Table 1). The net flight directions were significantly northward each day in July and on 5 and 12 August (Table 1). Net northward rates on 28 July

Table 2. Net number of birds flying north past Yaquina Estuary, Oregon, during 5-min watches from June to September 1983. The Wilcoxon paired-sample test was used to test significance. F. Storm-Petrel = Fork-tailed Storm-Petrel; Days = number of days of watches; P = probability; NS = not significant.

		Days	Watches	Net number of birds flying north per watch			
Taxon	1983 Period	N	N	$\bar{x}$	SD	Range	P
Sooty Shearwater	Jun-29 Jul	23	23	0.3	1.0	(-2)-2	NS
Sooty Shearwater	30 Jul-Sep	23	33	19.6	34.1	(-1)-134	<0.01
F. Storm-Petrel	Jun-14 Aug	30	30	0	0	0	NS
F. Storm-Petrel	15 Aug-5 Sep	7	8	1.1	2.5	(-4)-4	NS
F. Storm-Petrel	6-30 Sep	9	18	0	0	0	NS
Brown Pelican	Jun-Sep	46	56	0.5	1.9	(-3)-10	<0.10
Cormorant	Jun-Sep	46	56	0.1	4.6	(-16)-12	NS
Common Murre	Jun-15 Jul	15	15	0.7	44.9	(-75)-92	NS
Common Murre	16-31 Jul	9	9	28.2	29.5	(-1)-89	<0.01
Common Murre	1-18 Aug	10	10	5.7	12.5	(-6)-32	NS
Common Murre	Sep	12	22	0	0	0	NS
Pigeon Guillemot	Jun-Jul	24	24	0.1	0.9	(-1)-3	NS
Pigeon Guillemot	1-18 Aug	10	10	2.1	2.2	(-1)-7	<0.02
Pigeon Guillemot	Sep	12	22	0	0	0	NS

averaged almost 170/watch (Table 1), a rate of about 2000 murres flying north an hour. In 1983, murres most commonly flew by the jetties in June and July, but the only significant northward movements were in late July (Table 2). Even during the peak flight period of 1983, the net rates of flights were never as great as during the same period in 1982 (Tables 1 and 2). The differences between 1982 and 1983 may have been related to the 1983 El Niño as murres left the central Oregon coast much earlier in 1983 than 1982 (Bayer 1986) and both nesting success and adult survival of Common Murres along the Oregon coast was greatly reduced in 1983 (Graybill and Hodder 1985).

The significant northward movements of Common Murres in 1982 and 1983 occurred about the time that non-flying young of Oregon murres left nesting areas with their fathers to swim along the coast (Scott 1973). These flights could be of female and unsuccessfully nesting male murres migrating to the Strait of Juan de Fuca between Vancouver Island and Washington State, where many murres from Oregon and perhaps California arrive by September (Manuwal et al. 1979: 58-59).

Pigeon Guillemots infrequently flew past the jetties and showed a significant net movement (northward) only in the 1-18 August 1983 period (Table 2). There is no information on where Oregon Pigeon Guillemots migrate or disperse to after their nesting season, but perhaps they accompany the Common Murres to the Strait of Juan de Fuca.

CONCLUSIONS

All seabirds in this study showed net northward movements, but the movements were significant for only a few taxa during parts of the summer. Net movements in some areas can be the normal daily pattern (e.g., Sharrock 1973 cited in Marchant 1977), but Marchant (1977) observed that net movements may also be good indicators of bird migrations. In this study, it was not possible to prove conclusively that the significant net movements represented migration.

ACKNOWLEDGMENTS

I thank Dennis Paulson and Harry B. Nehls for constructive comments on an earlier draft of this paper. I am also grateful to Bill McNeil, Vern Jackson, Rob Lawrence, Mike Bauman and Andy Rivinus of Oregon Aqua-Foods for facilitating the logistics and funding of this project.

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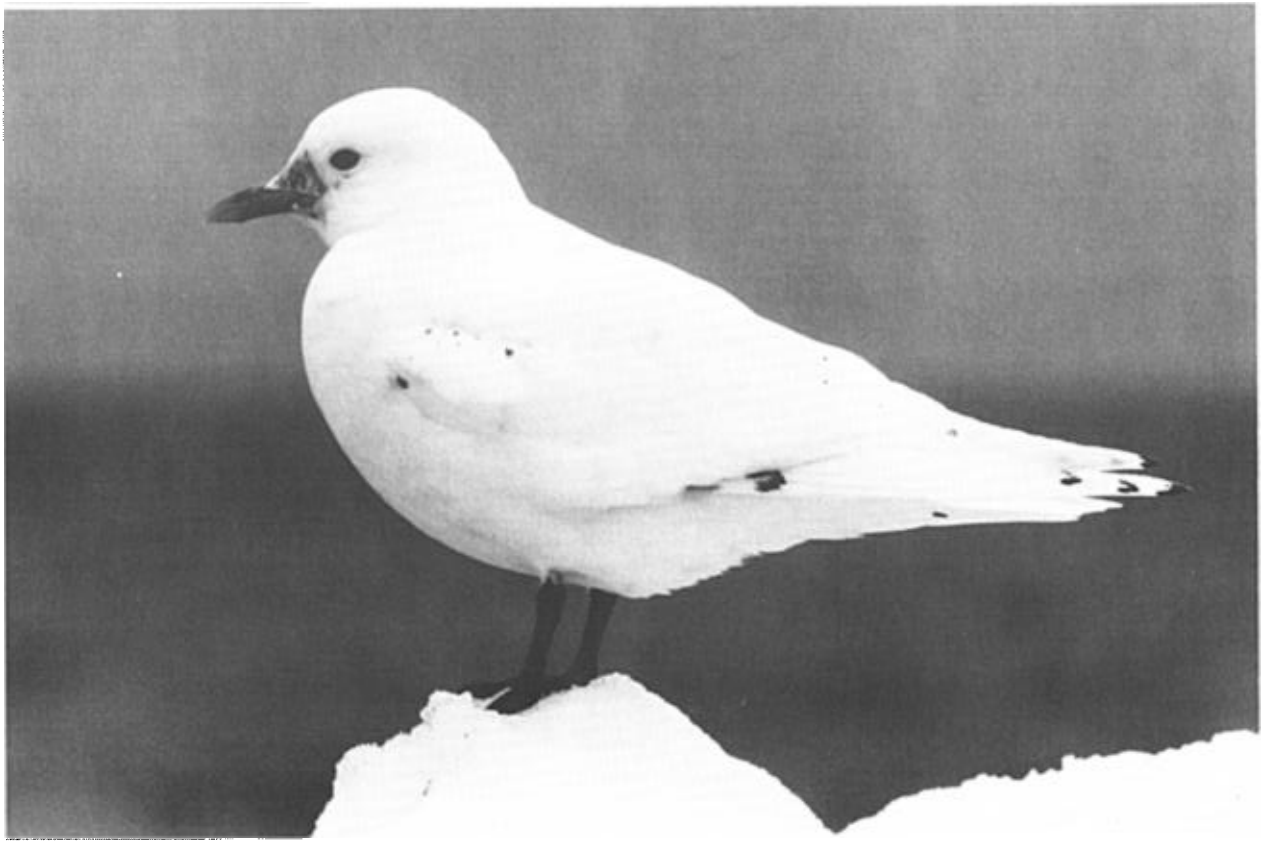
Accepted 12 December 1985



Ivory Gull (*Pagophila eburnea*), St Lawrence Island, Alaska, June 1983

Photo by Bruce Maxwell