BIRD COMMUNITIES AT SEA OFF CALIFORNIA: 1975 TO 1983

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Abstract.—Seabird populations off California were studied during two three-year periods: southern California during 1975 through early 1978, and central and northern California during 1980 through early 1983. Aerial surveys provided almost all data in central and northern California and about half in the south; ship surveys provided the remainder. Periodic coastal surveys assessed proportions of populations ashore.

The seabird fauna is dominated by about thirty species that reached maximal abundance in the coastal upwelling zone. Biomass and density generally were highest off central California. At times of maximal abundance (fall and winter), estimated total numbers reached 4 to 6 million individuals. A drop in biomass occurred off central and northern California late in 1982 during onset of the intense "El Niño" event of 1982–1983; no such decline was observed off southern California during a weak "El Niño" episode in 1976. The decline in 1982 resulted from decreased visitation of birds nesting north of California (particularly alcids, fulmars, and gulls), and low populations of locally nesting diving birds such as the Common Murre (*Uria aalge*).

Consistent interspecific associations were seen between several species of *Larus* gulls, between several shearwaters (*Puffinus* spp.) and Northern Fulmars (*Fulmarus glacialis*), and between several members of an inner-shelf/nearshore fauna including loons, grebes, scoters, cormorants and pelicans. For the most part, gulls and shearwaters were avoided by other species, especially alcids and phalaropes (*Phalaropus* spp.). Leach's Storm-Petrel (*Oceanodroma leucorhoa*) consistently associated with no other species, was distinct in regional occurrence, and occupied a unique set of sites along measured habitat gradients.

Coastal upwellings, the upwelling frontal zone, and warm, clear, thermally stratified waters of the California Current constitute the three major divisions of open water habitat off California and support different species assemblages. Aggregations of gulls, terns, and storm-petrels extended over relatively large distances (40+ km), often in homogeneous patches of California Current habitat, whereas murres, auklets, and phalaropes aggregated over much shorter dimensions, mainly in the coastal upwelling zone. This suggests that different scale-dependent physical processes affected patches of seabirds and their prey in different habitats.

Species attaining estimated "instantaneous" populations in central and northern California exceeding one million individuals were murres and Cassin's Auklets (*Ptychoramphus aleuticus*) among the nesting residents and Sooty Shearwaters (*Puffinus griseus*) and phalaropes among the seasonal visitors.

KEYWORDS: seabird distribution, community analysis, species composition, species diversity, seabird habitats