

Seabird seasonal patterns in the Olympic Coast National Marine Sanctuary

Introduction

The rugged Olympic Coast was designated as a National Marine Sanctuary in 1994 in part because its boundaries delineate a productive upwelling area that attracts a high abundance and diversity of marine organisms including birds, fish, and mammals. Charged with monitoring key marine resources, the sanctuary has conducted at-sea marine bird and mammal surveys nearly bi-annually since 1995, however, seasonal information on bird use in the offshore waters of the sanctuary is lacking due to limited large-ship availability. In 2006, the sanctuary initiated a pilot streamlined survey protocol to conduct monthly surveys from May through September in sanctuary waters that can be accomplished using the sanctuary's own research vessel.

These surveys are providing insight into how species composition changes through the upwelling season and point to some areas within the sanctuary that may prove consistently important to seabirds.

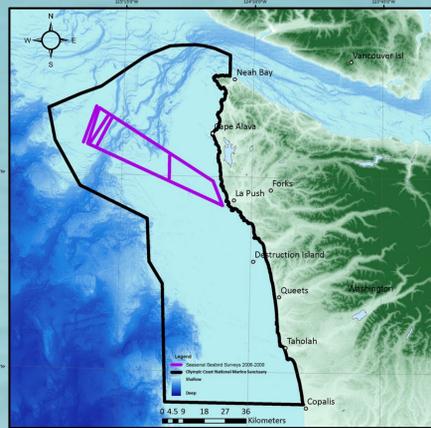


Figure 1. Area map including the trackline for the seasonal seabird surveys.

Methods

Monthly at-sea surveys were conducted from May through September in 2006-2009. Poor weather conditions and other complications precluded some months from being surveyed (11 of 20 possible surveys completed). The survey route is 150 km long, traveled as a large rectangle off the Olympic Coast from LaPush, WA north to Point of Arches (Figure 1). The route extends 65 km offshore and covers a range of depths from 25 to 310 m (where it crosses the Juan de Fuca trough). The nearshore leg of the track travels near several known breeding islands. The 11.7m Olympic Coast National Marine Sanctuary (OCNMS) research vessel RV Tatoosh was the platform. Using one primary observer, a secondary observer and a recorder, we conducted strip transects (one sided) and recorded real-time data using SeeBird software and protocol developed by SWFSC (Ballance 2005). For each individual bird, we recorded species, distance from the ship (binned in 100 m bins), behavior (sitting, directional flight, non-directional flight etc.), direction of flight relative to the ship's movement, and age and sex if appropriate. To determine general distribution, density values were calculated using all birds within a 200 m strip. Only birds feeding or sitting on the water were used to calculate densities of individual species.



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Results

Table 1. Summary of mean relative densities of the most commonly encountered seabird species in 11 surveys made from May through September, 2006 – 2009 in the northern portion of the Olympic Coast National Marine Sanctuary. All densities for 200 m strip transect and include both sitting and flying birds (not adjusted for flight speed and direction).

Taxa	Scientific Name	Density (birds km ²)		Maximum Count
		Mean	SE	
Common Murre	<i>Uria aalge</i>	37.552	7.535	646
Sooty Shearwater	<i>Puffinus griseus</i>	14.372	0.500	412
Fork-tailed Storm-petrel	<i>Oceanodroma furcata</i>	8.676	4.925	36
Pink-footed Shearwater	<i>Puffinus creatopus</i>	7.882	1.141	453
Glaucous-winged/Western Gull complex	<i>Larus glaucescens x occidentalis</i>	5.216	1.410	123
Northern Fulmar	<i>Fulmarus glacialis</i>	5.049	2.331	434
Cassin's Auklet	<i>Ptychoramphus aleuticus</i>	2.453	3.116	76
Red-necked Phalarope	<i>Phalaropus lobatus</i>	1.991	2.076	48
Tufted Puffin	<i>Fratercula cirrhata</i>	1.746	0.703	44
Rhinoceros Auklet	<i>Cerorhinca monocerata</i>	1.370	0.703	29

II. Bird Distribution

Birds were consistently encountered in higher densities on the southern leg of the transect. This coincides with the edge of the mouth of the Juan de Fuca canyon, where birds were relatively abundant in all seasons (Figure 2 a-d).

Some species, such as Fork-tailed Storm-petrels and Black-footed Albatross, are encountered frequently (albatross seen on nearly all surveys but in low numbers) or seasonally in relative, albeit patchy, abundance (Fork-tailed Storm-petrels in September 2009) but only in the offshore areas over the deeper water.

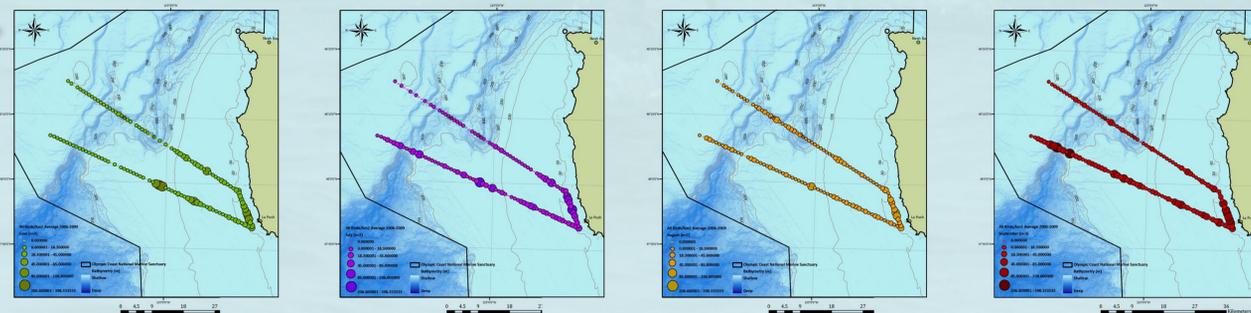


Figure 2 a-d. Average relative abundance for all birds (200 m strip transect, includes both sitting and flying birds) by month for 2006-2009. Relative densities in birds/km² using 1km grid. a=June, b=July, c=Aug, d=Sep.

III. Seasonality

Sooty Shearwaters, one of the most abundant species, showed little seasonal variation in habitat use.

Cassin's Auklets showed a more dramatic seasonal movement from nearshore areas in June and July (presumably when nesting) to predominantly offshore areas by August/September. Figure 3 a-b)

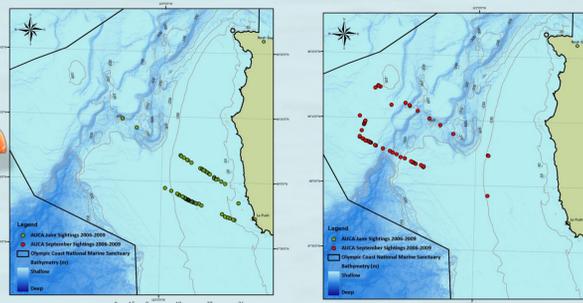


Figure 3 a,b. Cassin's Auklet sightings, two examples. a = All sightings during June surveys, b= all sightings during September surveys.

I. Species composition

Fifty-one bird species were encountered during these surveys, which include 43 marine bird species and 8 species of waterfowl and seaducks. The most commonly observed species include the Common Murre, Sooty Shearwater, Pink-footed Shearwater, Northern Fulmar, Glaucous-wing/Western type Gulls (includes hybrid gulls), California Gull, Northern Phalarope, Cassin's Auklet. (Table 1) Other alcids consistently encountered include the Rhinoceros Auklet and Tufted Puffin.

Common Murres were observed on every completed survey and made up between 5% and 68% of all birds encountered. They were the most commonly encountered species on over half the surveys (6 out of 11).

Sooty Shearwaters were also encountered on every survey in relatively abundant numbers (Sooty shearwaters composed 3.5% to 35.3% of the birds observed on a given survey).



IV. Annual Variation

Pink-footed Shearwaters were much more abundant in the later parts of 2008 and 2009. In September 2008, they were the most abundant species encountered with a total survey relative abundance of 15.1 birds/km². (Figure 4)

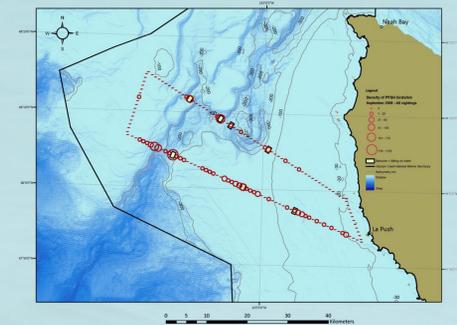


Figure 4. Pink-footed Shearwater relative abundance from September 2008, the highest count for this species. Densities in birds per km² for all sightings with locations where birds were observed sitting on the water only (not flying).

Conclusion

These data begin to capture some of the seasonal variation in the marine bird community using the OCNMS. They indicate that there may be locations within the sanctuary, possibly defined by bathymetric features, which are used in higher frequency by birds. Such information can be useful in oil spill response planning as well as resource monitoring. Using a vessel in-house allows for more frequent surveys, improving the sanctuary's ability to detect trends over time.

As OCNMS continues to produce high resolution bottom-mapping and monitors ocean conditions through its buoy array, the real-time seabird data collection, if continued over the long term, will allow us to evaluate habitat usage patterns and potentially detect impacts from changing oceanographic conditions on bird distributions and abundance within the sanctuary. These preliminary data, with further analysis, may compliment other long-term at-sea monitoring programs both within the sanctuary and within the broader California Current system.

Literature Cited

Ballance, L. T. 2005. Seabird survey instruction manual, CSCAPE 2005. Unpublished document. Ecosystem Studies Program, Southwest Fisheries Science Center, 8604 La Jolla Shores Drive, La Jolla, CA 93037.

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