

# Seabirds and Marine Mammals on the NMFS Juvenile Rockfish – Ecosystem Survey: 2014 Data Report

William J. Sydeman, PI  
Sophie Webb, Observer  
Marcel Losekoot, Analyst



Farallon Institute,  
101 H Street, Suite Q,  
Petaluma, CA 94952  
[www.faralloninstitute.org](http://www.faralloninstitute.org)

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## Introduction

Seabird and marine mammal observations are an integral part of the NMFS Juvenile Rockfish – Ecosystem Survey (JRES), providing data valuable on several fronts: 1) measurements provide an upper trophic level perspective to complement the oceanographic, lower-, mid-trophic level data collected by NMFS; 2) estimates of seabird and marine mammal abundance, diversity and distribution may contribute to various aspects of ecosystem and fisheries management; and, 3) by extending our existing time series (now 16 years and counting), measuring annual variation in the seabird community contributes to understanding the effects of climate variability and change on the central-northern California Current ecosystem. This data report summarizes the at-sea survey observations made during the 2014 NMFS JRES cruise, and presents basic distribution and abundance estimates for seabirds and mammals. A total of 2685 km (805 km<sup>2</sup>) of ocean habitat was surveyed over a period of 27 days.

## Methods

Observations are made continuously during daylight ship transits between trawl and hydrographic stations. The observer, located on the bridge approximately 15 meters

above sea level, uses hand-held binoculars to assist in the identification and enumeration of birds and mammals. The observer records all bird seen within a 300 meter strip transect to one side of the vessel while the ship is underway at > 5 knots. Marine mammals are surveyed out to the horizon. Observations are entered into a portable computer using the dedicated application “Dlog”; the ship’s position is automatically recorded every 10 seconds using an external GPS. Each observation includes the species, the number of individuals observed, and their behavior (mostly flying or sitting on the water for birds). At-sea observation data are post-processed using standardized species codes, validation of positioning data, and binning of observations into along-track sections 3km in length. The data are then integrated into a survey database containing data from May 1996 to the present. These data are used to derive the summary statistics reported herein.

Data are presented for both the core region, and the extended region surveyed since 2004 (see Sakuma et al. 2006); relevant seabird species are listed in Table 2. Taxa excluded from this summary include fish, terrestrial birds, and most shorebirds with the exception of phalaropes which are largely pelagic. Species density is calculated as the total number of individuals observed per species divided by the area (km<sup>2</sup>) surveyed. Mammal abundance is estimated as the number of individuals observed by the distance surveyed (100 km). The distribution of seabirds and mammals is illustrated by plotting abundance at each bin’s center position. Abundance is represented by a circle whose diameter is scaled using the Jenks method in ArcGIS version 9.3.

## Results

A summary of survey effort is shown in Table 1. The areas surveyed and transects are shown in Figure 1 and Figure 2. A summary of species observations is shown in Table 2 (seabirds) and Table 3 (mammals).

**Table 1. Summary of survey effort, seabird and mammal community statistics.**

<b>Annual Survey Summary</b>	<b>Core region</b>	<b>Extended region</b>	<b>Total</b>
Survey Vessel	-	-	R/V Ocean Starr
Start Date	5/17/2014	5/17/2014	5/17/2014
End Date	6/15/2014	6/15/2014	6/15/2014
Survey Days	27	1	27
Distance Surveyed (km)	2579	106	2685
Area Surveyed (birds; km <sup>2</sup> )	774	32	805
Number of Bird Species Obs.	40	11	41
Overall Bird Density (per km <sup>2</sup> )	39.274	4.243	37.89
Total Birds Observed	30382	135	30517
Number of Mammal Species	13	3	12
Overall Mammal Encounter Rate (per 100 km surveyed)	3.107	11.79	31.3
Total Mammals Observed	830	9	839

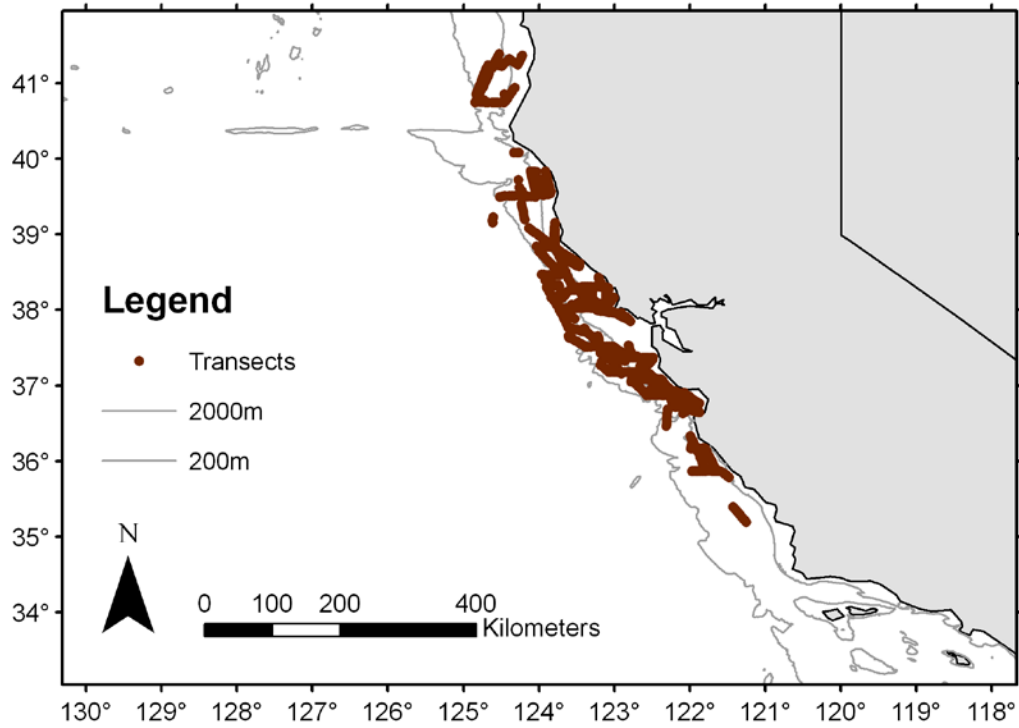


Figure 1. 2014 survey transects for the total region.

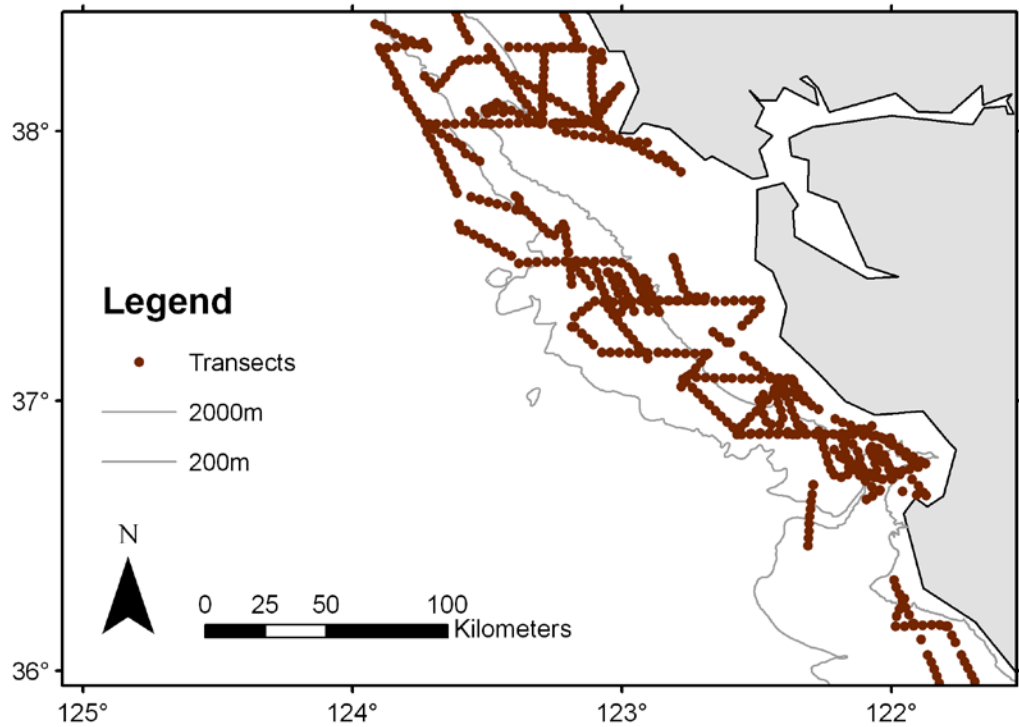


Figure 2. 2014 survey transects for the core region.

**Table 2. Bird survey observations, stratified by region and species. Cell values represent: the total number of individuals seen / number of species sightings / average density (birds per km<sup>2</sup>).**

<b>Common Name</b>	<b>Latin Name</b>	<b>Core Region</b>	<b>Extended Region</b>	<b>Total</b>
American White Pelican	<i>Pelecanus erythrorhynchos</i>			
Ancient Murrelet	<i>Synthliboramphus antiquus</i>	1 / 1 / 0.00		1 / 1 / 0.00
Arctic Loon	<i>Gavia arctica</i>			
Arctic Tern	<i>Sterna paradisaea</i>	1 / 1 / 0.00		1 / 1 / 0.00
Ashy Storm-Petrel	<i>Oceanodroma homochroa</i>	13 / 10 / 0.02		13 / 10 / 0.02
Black Scoter	<i>Melanitta nigra</i>			
Black Storm-Petrel	<i>Oceanodroma melania</i>			
Black-Footed Albatross	<i>Phoebastria nigripes</i>	769 / 573 / 0.99	5 / 5 / 0.16	774 / 578 / 0.96
Black-Legged Kittiwake	<i>Rissa tridactyla</i>			
Black-Vented Shearwater	<i>Puffinus opisthomelas</i>			
Bonaparte's Gull	<i>Larus philadelphia</i>			
Brandt's Cormorant	<i>Phalacrocorax penicillatus</i>	6 / 6 / 0.01		6 / 6 / 0.01
Brant	<i>Branta bernicla</i>	2 / 1 / 0.00		2 / 1 / 0.00
Brown Booby	<i>Sula leucogaster</i>			
Brown Noddy	<i>Anous stolidus</i>			
Brown Pelican	<i>Pelecanus occidentalis</i>	6 / 6 / 0.01		6 / 6 / 0.01
Buller's Shearwater	<i>Puffinus bulleri</i>			
California Gull	<i>Larus californicus</i>	297 / 164 / 0.38	3 / 3 / 0.09	300 / 167 / 0.37
Caspian Tern	<i>Sterna caspia</i>	2 / 2 / 0.00		2 / 2 / 0.00
Cassin's Auklet	<i>Ptychoramphus aleuticus</i>	591 / 155 / 0.76	2 / 1 / 0.06	593 / 156 / 0.74
Clark's Grebe	<i>Aechmophorus clarkii</i>			
Common Loon	<i>Gavia immer</i>			
Common Murre	<i>Uria aalge</i>	2809 / 1191 / 3.63		2809 / 1191 / 3.49
Common Tern	<i>Sterna hirundo</i>	1 / 1 / 0.00		1 / 1 / 0.00
Cook's Petrel	<i>Pterodroma cookii</i>			

Craveri's Murrelet	<i>Synthliboramphus craveri</i>			
Dark Shearwater	(species group)			
Dark-Rumped Petrel	<i>Pterodroma phaeopygia sandwichensis</i>			
Double-Crested Cormorant	<i>Phalacrocorax auritus</i>			
Eared Grebe	<i>Podiceps nigricollis</i>			
Elegant Tern	<i>Sterna elegans</i>			
Flesh-Footed Shearwater	<i>Puffinus carneipes</i>			
Fork-Tailed Storm-Petrel	<i>Oceanodroma furcata</i>	2 / 2 / 0.00		2 / 2 / 0.00
Forster's Tern	<i>Sterna forsteri</i>			
Franklin's Gull	<i>Larus pipixcan</i>			
Glaucous Gull	<i>Larus hyperboreus</i>			
Glaucous-Winged Gull	<i>Larus glaucescens</i>	10 / 10 / 0.01	1 / 1 / 0.03	11 / 11 / 0.01
Guadalupe Murrelet	<i>Synthliboramphus hypoleucus</i>			
Hawaiian Petrel	<i>Pterodroma sandwichensis</i>	1 / 1 / 0.00		1 / 1 / 0.00
Heermann's Gull	<i>Larus heermanni</i>	35 / 35 / 0.05		35 / 35 / 0.04
Herring Gull	<i>Larus argentatus</i>	1 / 1 / 0.00		1 / 1 / 0.00
Horned Puffin	<i>Fratercula corniculata</i>			
Hybrid Gull	(species group)			
Juan Fernandez Petrel	<i>Pterodroma externa</i>			
Kelp Gull	<i>Larus dominicanus</i>			
Kermadec Petrel	<i>Pterodroma neglecta</i>			
Laughing Gull	<i>Larus atricilla</i>			
Laysan Albatross	<i>Phoebastria immutabilis</i>	1 / 1 / 0.00		1 / 1 / 0.00
Leach's Storm-Petrel	<i>Oceanodroma leucorhoa</i>	7 / 6 / 0.01		7 / 6 / 0.01
Least Storm-Petrel	<i>Oceanodroma microsoma</i>			
Least Tern	<i>Sterna antillarum</i>			
Long-Tailed Jaeger	<i>Stercorarius longicaudus</i>			
Marbled Murrelet	<i>Brachyramphus marmoratus</i>			

Mew Gull	Larus canus			
Mottled Petrel	Pterodroma inexpectata			
Murphy's Petrel	Pterodroma ultima			
Northern Fulmar	Fulmarus glacialis	256 / 239 / 0.33	5 / 5 / 0.16	261 / 244 / 0.32
Osprey	Pandion haliaetus			
Pacific Loon	Gavia pacifica	26 / 12 / 0.03	1 / 1 / 0.03	27 / 13 / 0.03
Parakeet Auklet	Aethia psittacula			
Parasitic Jaeger	Stercorarius parasiticus	3 / 3 / 0.00		3 / 3 / 0.00
Parkinson's Petrel	Procellaria parkinsoni			
Pelagic Cormorant	Phalacrocorax pelagicus			
Peregrine Falcon	Falco peregrinus			
Pigeon Guillemot	Cephus columba	6 / 4 / 0.01		6 / 4 / 0.01
Pink-Footed Shearwater	Puffinus creatopus	481 / 396 / 0.62	31 / 24 / 0.97	512 / 420 / 0.64
Pomarine Jaeger	Stercorarius pomarinus	1 / 1 / 0.00		1 / 1 / 0.00
Red Phalarope	Phalaropus fulicaria	345 / 95 / 0.45	30 / 4 / 0.94	375 / 99 / 0.47
Red-Billed Tropicbird	Phaethon aethereus			
Red-Footed Booby	Sula sula			
Red-Necked Grebe	Podiceps grisegena			
Red-Necked Phalarope	Phalaropus lobatus	35 / 6 / 0.05		35 / 6 / 0.04
Red-Tailed Tropicbird	Pheathon rubricauda			
Red-Throated Loon	Gavia stellata			
Rhinoceros Auklet	Cerorhinca monocerata	110 / 61 / 0.14		110 / 61 / 0.14
Ring-Billed Gull	Larus delawarensis			
Royal Tern	Sterna maxima			
Ruddy Turnstone	Arenaria interpres			
Sabine's Gull	Larus sabini	4 / 3 / 0.01		4 / 3 / 0.00
Scripps's Murrelet	Synthliboramphus scrippsii	2 / 1 / 0.00		2 / 1 / 0.00
Short-Tailed / Slender-Billed	Puffinus tenuirostris		1 / 1 / 0.03	1 / 1 / 0.00

Shearwater				
Short-Tailed Albatross	Phoebastria albatrus	1 / 1 / 0.00		1 / 1 / 0.00
Solander's Petrel	Pterodroma solandri			
Sooty Shearwater	Puffinus griseus	23275 / 2982 / 30.09	27 / 19 / 0.85	23302 / 3001 / 28.93
South Polar Skua	Stercorarius maccormicki	5 / 5 / 0.01		5 / 5 / 0.01
Stejneger's Petrel	Pterodroma longirostris			
Surf Scoter	Melanitta perspicillata	5 / 1 / 0.01		5 / 1 / 0.01
Thayer's Gull	Larus thayeri			
Tufted Puffin	Fratercula cirrhata	6 / 6 / 0.01		6 / 6 / 0.01
Unidentified Albatross	(species group)			
Unidentified Auklet	(species group)			
Unidentified Cormorant	(species group)			
Unidentified Duck	(species group)			
Unidentified Grebe	(species group)			
Unidentified Gull	(species group)	24 / 24 / 0.03		24 / 24 / 0.03
Unidentified Jaeger	(species group)			
Unidentified Large Alcid	(species group)			
Unidentified Loon	(species group)			
Unidentified Murre	(species group)	1 / 1 / 0.00		1 / 1 / 0.00
Unidentified Petrel	(species group)	1 / 1 / 0.00		1 / 1 / 0.00
Unidentified Phalarope	(species group)	2 / 1 / 0.00		2 / 1 / 0.00
Unidentified Procellarid	(species group)			
Unidentified Shearwater	(species group)			
Unidentified Skua	(species group)			
Unidentified Small Alcid	(species group)			
Unidentified Storm-Petrel	(species group)			
Unidentified Tern	(species group)			

Unidentified Tropicbird	(species group)			
Wedge-Rumped Storm-Petrel	<i>Oceanodroma tethys</i>			
Wedge-Tailed Shearwater	<i>Puffinus pacificus</i>			
Western Grebe	<i>Aechmophorus occidentalis</i>			
Western Gull	<i>Larus occidentalis</i>	1238 / 994 / 1.60	29 / 28 / 0.91	1267 / 1022 / 1.57
Wilson's Storm-Petrel	<i>Oceanites oceanicus</i>			
Xantus's / Craveri's Murrelet	(species group)			



**Table 3. Mammal survey observation summary, broken down by survey region and by species. Cell values represent: the total number of species individuals / number of species sightings / average species encounter rate (individuals per 100 km).**

<b>Common Name</b>	<b>Latin Name</b>	<b>Core Region</b>	<b>Extended Region</b>	<b>Total</b>
Baird's Beaked Whale	<i>Berardius bairdii</i>			
Blue Whale	<i>Balaenoptera musculus</i>	15 / 10 / 0.6		15 / 10 / 0.6
Bottlenose Dolphin	<i>Tursiops truncatus</i>			
California Sea Lion	<i>Zalophus californianus</i>	28 / 24 / 1.1	3 / 3 / 2.8	31 / 27 / 1.2
Common Dolphin	<i>Delphinus delphis</i>			
Cuvier's Beaked Whale	<i>Ziphius cavirostris</i>			
Dall's Porpoise	<i>Phocoenoides dalli</i>	23 / 7 / 0.9	4 / 2 / 3.8	27 / 9 / 1.0
False Killer Whale	<i>Pseudorca crassidens</i>			
Fin Whale	<i>Balaenoptera physalus</i>	2 / 2 / 0.1		2 / 2 / 0.1
Gray Whale	<i>Eschrichtius robustus</i>	2 / 1 / 0.1		2 / 1 / 0.1
Green Sea Turtle	<i>Chelonia mydas</i>			
Guadalupe Fur Seal	<i>Arctocephalus townsendi</i>			
Harbor Porpoise	<i>Phocoena phocoena</i>			
Harbor Seal	<i>Phoca vitulina</i>			
Humpback Whale	<i>Megaptera novaeangliae</i>	108 / 70 / 4.2		108 / 70 / 4
Killer Whale	<i>Orcinus orca</i>	8 / 1 / 0.3		8 / 1 / 0.3
Long-beaked Common Dolphin	<i>Delphinus capensis</i>			
Minke Whale	<i>Balaenoptera acutorostrata</i>			
Northern Elephant Seal	<i>Mirounga angustirostris</i>	2 / 2 / 0.1		2 / 2 / 0.1
Northern Fur Seal	<i>Callorhinus ursinus</i>	10 / 8 / 0.4		10 / 8 / 0.4
Northern Right Whale Dolphin	<i>Lissodelphis borealis</i>	28 / 2 / 1.1		28 / 2 / 1
Pacific White-Sided Dolphin	<i>Lagenorhynchus obliquidens</i>	497 / 51 / 19.3		497 / 51 / 18.5
Pilot Whale	<i>Globicephala</i> spp.			
Pygmy Sperm Whale	<i>Kogia breviceps</i>			
Ridley Sea Turtle	<i>Lepidochelys olivacea</i>			

<b>Common Name</b>	<b>Latin Name</b>	<b>Core Region</b>	<b>Extended Region</b>	<b>Total</b>
Risso's Dolphin	<i>Grampus griseus</i>	90 / 9 / 3.5		90 / 9 / 3.4
Sea Otter	<i>Enhydra lutris</i>			
Sei Whale	<i>Balaenoptera borealis</i>			
Short-Beaked Common Dolphin	<i>Delphinus delphis</i>			
Short-Finned Pilot Whale	<i>Globicephala macrorhynchus</i>			
Sperm Whale	<i>Physeter macrocephalus</i>			
Steller Sea Lion	<i>Eumetopias jubatus</i>			
Striped Dolphin	<i>Stenella coeruleoalba</i>			
Unidentified Baleinoptera				
Unidentified Beaked Whale				
Unidentified Cetacean				
Unidentified Dolphin				
Unidentified Large Whale				
Unidentified Pinniped				
Unidentified Sea Lion				
Unidentified Seal				
Unidentified Whale		17 / 15 / 0.7	2 / 1 / 1.9	19 / 16 / 0.7

## Appendix. Species Lists

### *Data selection criteria*

The following criteria were applied to the survey database to select data for the summary.

Behavior codes included	All values
Species categories included	Birds, Mammals, Unidentified
Species categories excluded	Fish, Excluded Species List
Years	2014
Months	All months
Bin length	All bins > 0.1km
Region	JRS core region and extended region
Seasons	All seasons

### *Excluded Species List*

The following species were excluded from the analysis.

<b>Common Name</b>	<b>Latin Name</b>
American Coot	Fulica americana
Basking Shark	Cetorhinus maximus
Black Oystercatcher	Haematopus bachmani
Black Skimmer	Rynchops niger
Black Tern	Chlidonias niger
Black Turnstone	Arenaria melanocephala
Blue Shark	Prionace glauca
Brewer's Sparrow	Spizella breweri
Bufflehead	Bucephala albeola
European Starling	Sturnus vulgaris
Great Blue Heron	Ardea herodias
Great Egret	Ardea alba
Green Heron	Butorides virescens
Hammerhead Shark	Sphyrna spp.
Hawksbill Sea Turtle	Eretmochelys imbricata
Least Sandpiper	Calidris minutilla
Leatherback Turtle	Dermochelys coriacea
Long-billed Curlew	Numenius americanus
Long-billed Dowitcher	Limnodromus scolopaceus
Mako Shark	Isurus oxyrinchus
Mallard Duck	Anas platyrhynchos
Marbled Godwit	Limosa fedoa
Mola Mola	Mola mola

Mourning Dove	Zenaida macroura
Red-Breasted Merganser	Mergus serrator
Ruddy Duck	Oxyura jamaicensis
Sanderling	Calidris alba
Snow Goose	Chen caerulescens
Snowy Egret	Egretta thula
Unidentified Bird	(species group)
Unidentified Dowitcher	(species group)
Unidentified Fish	(species group)
Unidentified Goose	(species group)
Unidentified Hummingbird	(species group)
Unidentified Mammal	(species group)
Unidentified Passerine	(species group)
Unidentified Shark	(species group)
Unidentified Shorebird	(species group)
Unidentified Turtle	(species group)
Western Sandpiper	Calidris mauri
Whimbrel	Numenius phaeopus
White-Winged Scoter	Melanitta fusca
Willet	Catoptrophorus semipalmatus
Yellow-Rumped Warbler	Dendroica coronata

### ***Included Species List***

For a list of species included in the analysis, please refer to Table 2 and Table 3.