Seabirds on the CalCOFI/CCE-LTER Survey, Spring 2022 Data Report

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Introduction

Seabird surveys are an integral part of the California Cooperative Oceanic Fisheries Investigation (CalCOFI), California Current Ecosystem - Long-term Ecological Research (CCE-LTER), and Southern California Coastal Ocean Observing System (SCCOOS) programs. The seabird data are valuable for several reasons. First, information on seabird distribution and abundance provides an upper trophic level perspective that complements the lower trophic level plankton and hydrographic data collected by others. Second, estimates of seabird abundance, diversity, and distribution contribute to understanding the spatial ecology of the Southern California Bight and adjacent marine habitats (e.g., Santora et al. 2017), a region characterized by substantial temporal environmental heterogeneity and a major biogeographic boundary associated with Point Conception. Third, by extending our existing records (currently 35 years and building; 1987–present) and coupling this information with long-term hydrographic and plankton data, seabird data contribute to understanding the effects of climate variability and change on the southern sector of the CCE (e.g., Veit et al. 1996, Hyrenbach and Veit 2003, Santora and Sydeman 2015, Sydeman et al. 2015).

This data report summarizes observations made during the 2022 spring CalCOFI/CCE-LTER cruise. We present data on survey effort as well as summary information on seabird abundance, expressed at density (birds/km²).

Methods

Observations of seabirds are made continuously during daylight ship transits between oceanographic and plankton sampling 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. The observer records all birds seen within a 300-meter strip transect to one side and front of the vessel while the ship is underway at > 5 knots. Observations are entered into a portable computer using the dedicated application "DLog"; the ship's position is automatically recorded periodically from an external GPS every 20 seconds. Each observation includes the species, the number of individuals observed, and their behavior (mostly "flying" or "sitting on the water"). Observation data are post-processed using standardized species codes, validation of positioning data, and binning of observations into along-track sections of 3 km in length. The data are then integrated into a survey database that contains data from 1987 to the present. These data are used to derive summary statistics.

Table 1. The following criteria were applied to the survey database to select data for the summary.

Criteria	Value
Behavior codes included	All values
Species categories included	Birds, Unidentified
Species categories excluded	Mammals, Fish, Excluded Species List
Year	2022
Month	All
Bin length	All bins $> 0.1 \text{ km}$
Region	Lines 77-93 (core area only)
Season	Spring

Taxa excluded from this summary were all mammals, fish, terrestrial birds, and most shorebirds except phalaropes, which are largely pelagic. Species density was calculated as the total number of individuals observed per species divided by the area (km²) surveyed. Density over time was shown for select species of warm- and cold-water affinities, 1987–2022. For this spring survey, we defined species with warm-water affinity to include black-footed albatross, black-vented shearwater, Cook's petrel, elegant tern, Leach's storm-petrel, and pink-footed shearwater (Hyrenbach and Veit 2003). Since 2017 we have used a category for unidentified Leach's storm-petrels that includes all newly-described species and subspecies under a single heading; in the summary, these birds are combined with Leach's storm-petrel. Cold-water affinity species include Bonaparte's gull, common murre, fork-tailed storm-petrel, rhinoceros auklet, Sabine's gull, and sooty shearwater (Hyrenbach and Veit 2003).

Results

A summary of survey effort is shown in Table 2; transects surveyed are shown in Figure 1. Summarized species observations for all species in the core area are shown in Table 3 (see Appendix 1 for exclusions). A total of 21 days of survey effort covering 2,424 km (727 km²) of ocean habitat was tallied over the entire survey. Density over time for the selected seabird species (listed above) was calculated and is shown as anomalies in Figures 2 (warm-water affinity), 3 (cold-water affinity), and 4 (all seabird species).

Among the warm-water species, black-footed albatross had very low density this year. There were also very few Leach's storm-petrel observed compared to normal (Table 3, Figure 2); 2022 held the second lowest value in the time series. On the other hand, density of pink-footed shearwater was higher than average, over one standard deviation above the mean (Figure 2). The other warm-water species were near average density (Figure 2). Among the cold-water species, no fork-tailed storm-petrels were seen this year; this species is seen in sporadic high abundances in our time series (Figure 3). Bonaparte's gull, common murre, rhinoceros auklet and sooty shearwater had near-normal densities, all within one standard deviation of the mean, and Sabine's gull had average density this year (Figure 3). The general picture provided by these results is that the abundance of these seabird species was average during spring 2022, with the exception of a couple of the warm-water species. This interpretation is supported by the density of all 51 species observed, which was slightly lower than average (Figure 4).

Table 2. Summary of survey effort and seabird statistics for the core area and extended survey area, spring 2022.

Spring 2022	Core + extended area
Survey vessel	RV Bell M. Shimada
Start date	4/7/2022
End date	4/27/2022
Number of survey days	21
Distance surveyed (km)	2,424
Area surveyed (km²)	727
Number of bird species	51
Overall bird density (per km ²)	8.18
Total individuals counted	5,950

Figure 1. Transects sampled during the CalCOFI spring 2022 survey. The core study area is denoted with the box, and includes CalCOFI lines 93 (south) to 77 (north).

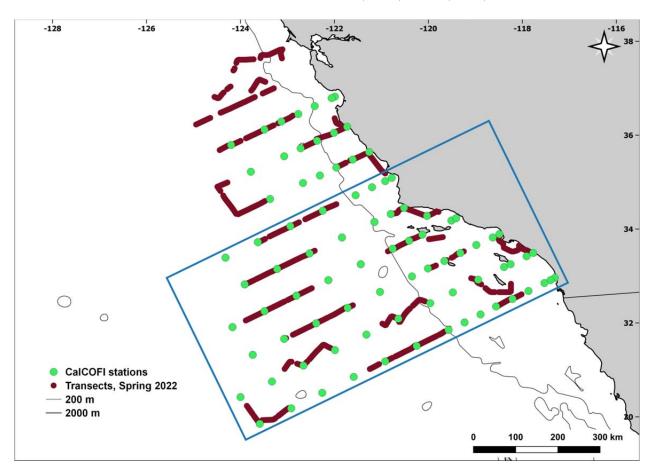


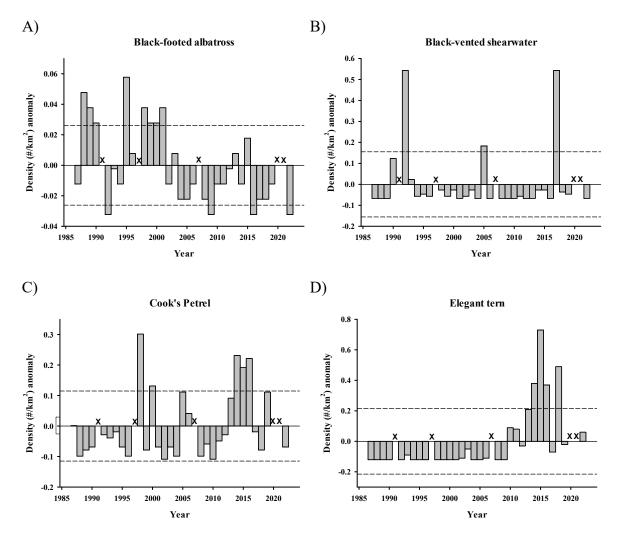
Table 3. Observations in spring 2022 by species in the core area. No surveying was done in the extended area (see Figure 1). Cell values: total number of individuals (ind.) / number of observations per species (obs.) / species density (dens.) in individuals per km².

Common Name	Scientific Name	Core only
American White Pelican	Pelecanus erythrorhynchos	
Ancient Murrelet	Synthliboramphus antiquus	
Arctic Loon	Gavia arctica	
Arctic Tern	Sterna paradisaea	
Ashy Storm-Petrel	Oceanodroma homochroa	4 / 2 / 0.01
Black guillemot	Cepphus grylle	
Black Scoter	Melanitta nigra	
Black Storm-Petrel	Oceanodroma melania	1 / 1 / 0
Black-Footed Albatross	Phoebastria nigripes	4 / 4 / 0.01
Black-Legged Kittiwake	Rissa tridactyla	
Black-Vented Shearwater	Puffinus opisthomelas	
Bonaparte's Gull	Larus philadelphia	89 / 12 / 0.19
Brandt's Cormorant	Phalacrocorax penicillatus	81 / 27 / 0.17
Brant	Branta bernicla	
Brown Booby	Sula leucogaster	
Brown Noddy	Anous stolidus	
Brown Pelican	Pelecanus occidentalis	23 / 19 / 0.05
Buller's Shearwater	Puffinus bulleri	
California Gull	Larus californicus	86 / 42 / 0.18
Caspian Tern	Sterna caspia	1 / 1 / 0
Cassin's Auklet	Ptychoramphus aleuticus	17 / 8 / 0.04
Clark's Grebe	Aechmophorus clarkii	
Common Loon	Gavia immer	2/2/0
Common Murre	Uria aalge	1 / 1 / 0
Common Tern	Sterna hirundo	
Cook's Petrel	Pterodroma cookii	18 / 15 / 0.04
Craveri's Murrelet	Synthliboramphus craveri	1 / 1 / 0
Dark Shearwater	(species group)	1 / 1 / 0
Dark-Rumped Petrel	Pterodroma phaeopygia sandwichensis	
Double-Crested Cormorant	Phalacrocorax auritus	
Eared Grebe	Podiceps nigricollis	
Elegant Tern	Sterna elegans	84 / 34 / 0.18
Flesh-Footed Shearwater	Puffinus carneipes	
Fork-Tailed Storm-Petrel	Oceanodroma furcata	
Forster's Tern	Sterna forsteri	2/2/0
Franklin's Gull	Larus pipixcan	
Glaucous Gull	Larus hyperboreus	
Glaucous-Winged Gull	Larus glaucescens	
Glaucous-winged/Western Hybrid Gull		
Guadalupe Murrelet	Synthliboramphus hypoleucus	

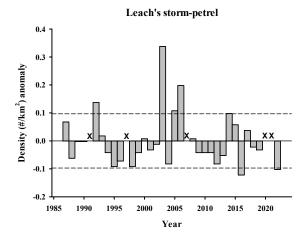
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Parkinson's Petrel	Parasitic Jaeger		2/2/0
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Pomarine Jaeger Stercorarius pomarinus 11 / 10 / 0.02 Red Phalarope Phalaropus fulicaria 192 / 90 / 0.4 Red-Billed Tropicbird Phaethon aethereus Red-Footed Booby Sula sula Red-Necked Grebe Podiceps grisegena Red-Necked Phalarope Phalaropus lobatus 59 / 21 / 0.12 Red-Tailed Tropicbird Pheathon rubricauda Red-Throated Loon Gavia stellata Rhinoceros Auklet Cerorhinca monocerata 31 / 22 / 0.06 Ring-Billed Gull Larus delawarensis Royal Tern Sterna maxima Ruddy Turnstone Arenaria interpres Sabine's Gull Larus sabini 15 / 7 / 0.03 Scripps's murrelet Synthliboramphus scrippsi 2 / 1 / 0 Short-Tailed / Slender-Billed Shearwater	Pink-Footed Shearwater	Puffinus creatopus	223 / 73 / 0.47
Red PhalaropePhalaropus fulicaria192 / 90 / 0.4Red-Billed TropicbirdPhaethon aethereusRed-Footed BoobySula sulaRed-Necked GrebePodiceps grisegenaRed-Necked PhalaropePhalaropus lobatus59 / 21 / 0.12Red-Tailed TropicbirdPheathon rubricaudaRed-Throated LoonGavia stellataRhinoceros AukletCerorhinca monocerata31 / 22 / 0.06Ring-Billed GullLarus delawarensisRoyal TernSterna maximaRuddy TurnstoneArenaria interpresSabine's GullLarus sabini15 / 7 / 0.03Scripps's murreletSynthliboramphus scrippsi2 / 1 / 0Short-Tailed / Slender-Billed ShearwaterPuffinus tenuirostris	Pomarine Jaeger		11 / 10 / 0.02
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Red-Throated Loon Rhinoceros Auklet Cerorhinca monocerata 31 / 22 / 0.06 Ring-Billed Gull Larus delawarensis Royal Tern Sterna maxima Ruddy Turnstone Sabine's Gull Larus sabini Synthliboramphus scrippsi Short-Tailed / Slender-Billed Shearwater Savia stellata 31 / 22 / 0.06 31 / 22 / 0.06 31 / 22 / 0.06 31 / 22 / 0.06 31 / 22 / 0.06 31 / 22 / 0.06 Sterna maxima Larus delawarensis Sterna maxima 15 / 7 / 0.03 2 / 1 / 0 Short-Tailed / Slender-Billed Shearwater	Red-Tailed Tropicbird	•	
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Short-Tailed / Slender-Billed Shearwater Puffinus tenuirostris	Sabine's Gull		15 / 7 / 0.03
Short-Tailed / Slender-Billed Shearwater Puffinus tenuirostris	Scripps's murrelet	Synthliboramphus scrippsi	2/1/0
	Short-Tailed / Slender-Billed Shearwater		
Short-Tailed Albatross Phoebastria albatrus	Short-Tailed Albatross	Phoebastria albatrus	

Solander's Petrel	Pterodroma solandri	
Sooty Shearwater	Puffinus griseus	219 / 67 / 0.46
South Polar Skua	Stercorarius maccormicki	
Stejneger's Petrel	Pterodroma longirostris	
Surf Scoter	Melanitta perspicillata	4 / 1 / 0.01
Thayer's Gull	Larus thayeri	
Townsend's Storm-Petrel	Oceanodroma socorroensis	11 / 5 / 0.02
Tufted Puffin	Fratercula cirrhata	
Unidentified Albatross	(species group)	
Unidentified Auklet	(species group)	
Unidentified Cormorant	(species group)	
Unidentified Duck	(species group)	
Unidentified Grebe	(species group)	
Unidentified Gull	(species group)	59 / 17 / 0.12
Unidentified Jaeger	(species group)	
Unidentified Large Alcid	(species group)	
Unidentified Leach's Storm-		
Petrel	(species group)	1 / 1 / 0
Unidentified Loon	(species group)	1 / 1 / 0
Unidentified Murre	(species group)	
Unidentified Petrel	(species group)	
Unidentified Phalarope	(species group)	25 / 14 / 0.05
Unidentified Procellarid	(species group)	
Unidentified Shearwater	(species group)	
Unidentified Skua	(species group)	
Unidentified Small Alcid	(species group)	
Unidentified Storm-Petrel	(species group)	1 / 1 / 0
Unidentified Tern	(species group)	2 / 1 / 0
Unidentified Tropicbird	(species group)	
Wedge-Rumped Storm-Petrel	Oceanodroma tethys	
Wedge-Tailed Shearwater	Puffinus pacificus	
Western Grebe	Aechmophorus occidentalis	
Western Gull	Larus occidentalis	119 / 83 / 0.25
Wilson's Storm-Petrel	Oceanites oceanicus	
Xantus's / Craveri's Murrelet	(species group)	4 / 1 / 0.01
Xantus's Murrelet	Synthliboramphus hypoleucus	

Figure 2. Density (expressed as anomalies) over time from spring surveys for species with warm-water affinity, core survey area, 1987–2022. A) black-footed albatross, B) black-vented shearwater, C) Cook's petrel, D) elegant tern, E) Leach's storm-petrel (includes unidentified Leach's storm-petrels since 2017), and F) pink-footed shearwater. The dashed lines indicate ± 1 s.d. of the long-term mean, and 'X' indicates years when no spring survey was conducted.







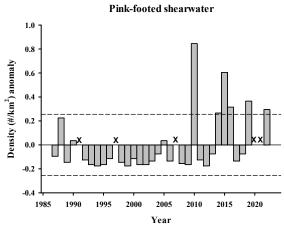
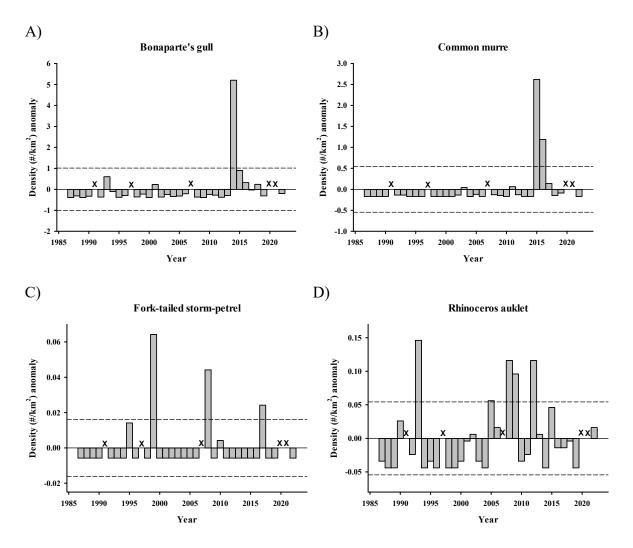


Figure 3. Density (expressed as anomalies) over time in the spring for species with cold-water affinities, core area only, 1987–2022. A) Bonaparte's gull, B) common murre, C) fork-tailed storm-petrel, D) rhinoceros auklet, E) Sabine's gull, and F) sooty shearwater. The dashed lines indicate ± 1 s.d. of the long-term mean, and 'X' indicates years when no spring survey was conducted.



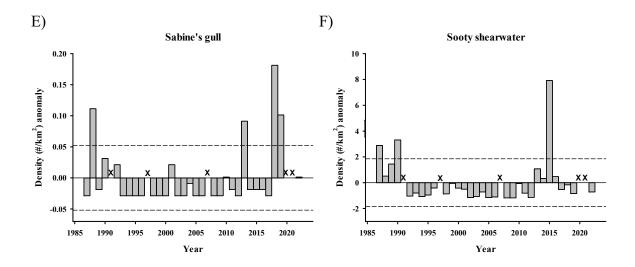
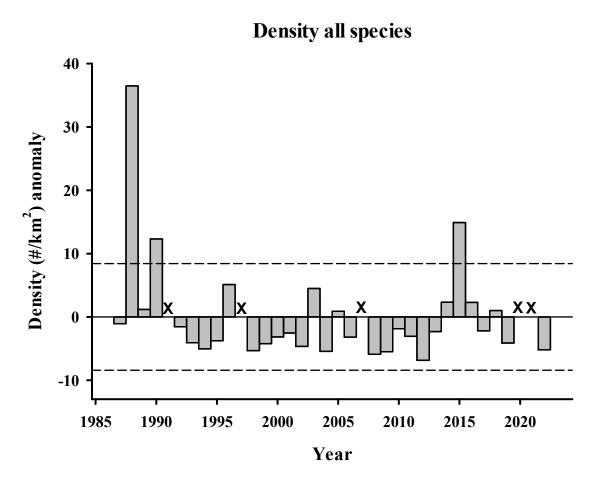


Figure 4. Density (expressed as anomalies) over time in the spring for all species in the core area only, 1987-2022. The dashed lines indicate ± 1 s.d. of the long-term mean, and 'X' indicates years when no spring survey was conducted.



List of References

Hyrenbach, D.K., and R.R. Veit. 2003. Ocean warming and seabird communities of the Southern California Current System (1987–98): response at multiple temporal scales. Deep-Sea Research Part II 50:2537–2565.

Santora, J.A. and W.J. Sydeman. 2015. Persistence of hotspots and variability of seabird species richness and abundance in the southern California Current. Ecosphere 6:214.

Santora, J.A., W.J. Sydeman, I.D. Schroeder, J.C. Field, R.R. Miller, and B.K. Wells. 2017. Persistence of trophic hotspots and relation to human impacts within an upwelling marine ecosystem. Ecological Applications 27:560–574.

Sydeman, W.J., S.A. Thompson, J.A. Santora, J.A. Koslow, R. Goericke, and M.D. Ohman. 2015. Climate-ecosystem change off southern California: Time-dependent seabird predator-prey numerical responses. Deep-Sea Research Part II 112:158–170.

Veit, R.R., P. Pyle, and J.A. McGowan. 1996. Ocean warming and long-term change in pelagic bird abundance within the California Current System. Marine Ecology Progress Series 139:11–18.

Velarde, E., E. Ezcurra, M.H. Horn, and R.T. Patton. 2015. Warm oceanographic anomalies and fishing pressure drive seabird nesting north. Science Advances 1:e1400210.

Cover photo: Nazca booby, photo by Michael Force.

Appendix 1. List of bird species excluded from this summary. These species may or may not have been observed during the survey.

Common Name	Scientific Name
American Coot	Fulica americana
Black Oystercatcher	Haematopus bachmani
Black Skimmer	Rynchops niger
Black Tern	Chlidonias niger
Black Turnstone	Arenaria melanocephala
Black-throated gray warbler	Setophaga nigrescens
Brewer's Sparrow	Spizella breweri
Brown-headed cowbird	Molothrus ater
Bufflehead	Bucephala albeola
Chapman's Storm-Petrel	Oceanodroma leucorhoa chapmani
Eurasian collared dove	Streptopelia decaocto
European Starling	Sturnus vulgaris
Great Blue Heron	Ardea herodias
Great Egret	Ardea alba
Green Heron	Butorides virescens
Least Sandpiper	Calidris minutilla
Long-billed Curlew	Numenius americanus
Long-billed Dowitcher	Limnodromus scolopaceus
Mallard Duck	Anas platyrhynchos
Marbled Godwit	Limosa fedoa
Mourning Dove	Zenaida macroura
Red-Breasted Merganser	Mergus serrator
Ruddy Duck	Oxyura jamaicensis
Sanderling	Calidris alba
Savannah sparrow	Passerculus sandwichensis
Snow Goose	Chen caerulescens
Snowy Egret	Egretta thula
Townsend's warbler	Setophaga townsendi
Unidentified Bird	(species group)
Unidentified Dowitcher	
Unidentified Goose	(species group)
Unidentified Hummingbird	(species group)
Unidentified Passerine	(species group)
Unidentified raptor	(species group)
Unidentified Shorebird	(species group)
Wandering tattler	Tringa incana
Western Sandpiper	Calidris mauri
Whimbrel	Numenius phaeopus
White-Winged Scoter	Melanitta fusca
Willet	Catoptrophorus semipalmatus
Wilson's warbler	Cardellina pusilla
Yellow-Rumped Warbler	Dendroica coronata