



Southern California Bight marine mammal density and abundance from aerial surveys 2008-2013



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ABSTRACT

We conducted 18 aerial surveys for marine mammals in the Southern California Bight around San Clemente Island from October 2008 to July 2013. Data were collected to obtain density and abundance estimates, as well as focal behavioral observations of marine mammals. The primary platform used was a *Partenavia* P68-C or P68-OBS (glass-nosed) high-wing, twin-engine airplane. A total of 76,989 km were flown with 2,510 marine mammal groups sighted. Nineteen marine mammal species were identified. Density and abundance estimates were made using line-transect methods and DISTANCE 6.0 software. Due to limited sample sizes for some species, sightings were pooled to provide four detection function estimates for baleen whales, large delphinids, small delphinids, and California sea lions. Estimates were limited to species observed at least 20 times during line-transect effort. For the May-October warm-water season, the estimated average numbers of individuals present were as follows: short-beaked common dolphins (8,520), long-beaked common dolphins (3,314), Risso's dolphins (1,450), California sea lions (818), bottlenose dolphins (496), fin whales (137), and gray whales (6). During the November-April cold-water season, estimates were: short-beaked common dolphins (15,955), long-beaked common dolphins (6,440), California sea lions (1,454), Risso's dolphins (993), bottlenose dolphins (290), gray whales (221), and fin whales (140). Several other species were observed for which sightings were too few to estimate numbers present and/or were seen only off effort: blue, Bryde's, minke, humpback, sperm, Cuvier's beaked, and killer whales; Pacific white-sided and northern right whale dolphins; Dall's porpoise; and northern elephant and harbor seals.



Bernd Würsig, 15 Feb 2011, NMFS permit 14451

Northbound gray whale mother and calf. As expected, this species was most common in cold-water months during the species' annual migration. Frequency of habitat use decreased while group size increased with increasing distance from shore. Large groups were commonly seen and mother-calf pairs were occasionally seen west of San Clemente Island.

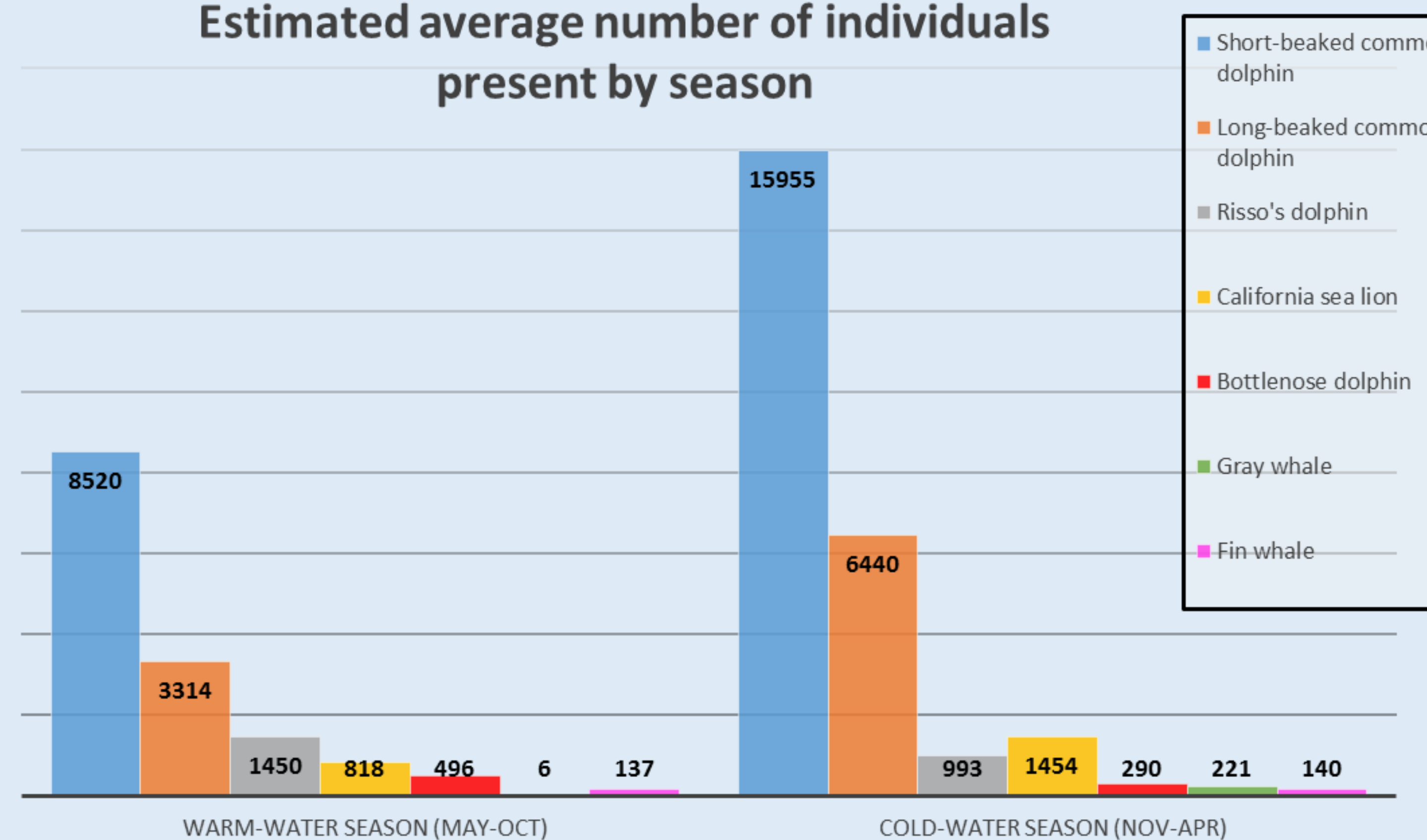
Two California sea lions foraging on a fish school in the SCB. Mari Smultea, 29 Jul 2013, NMFS permit 14451



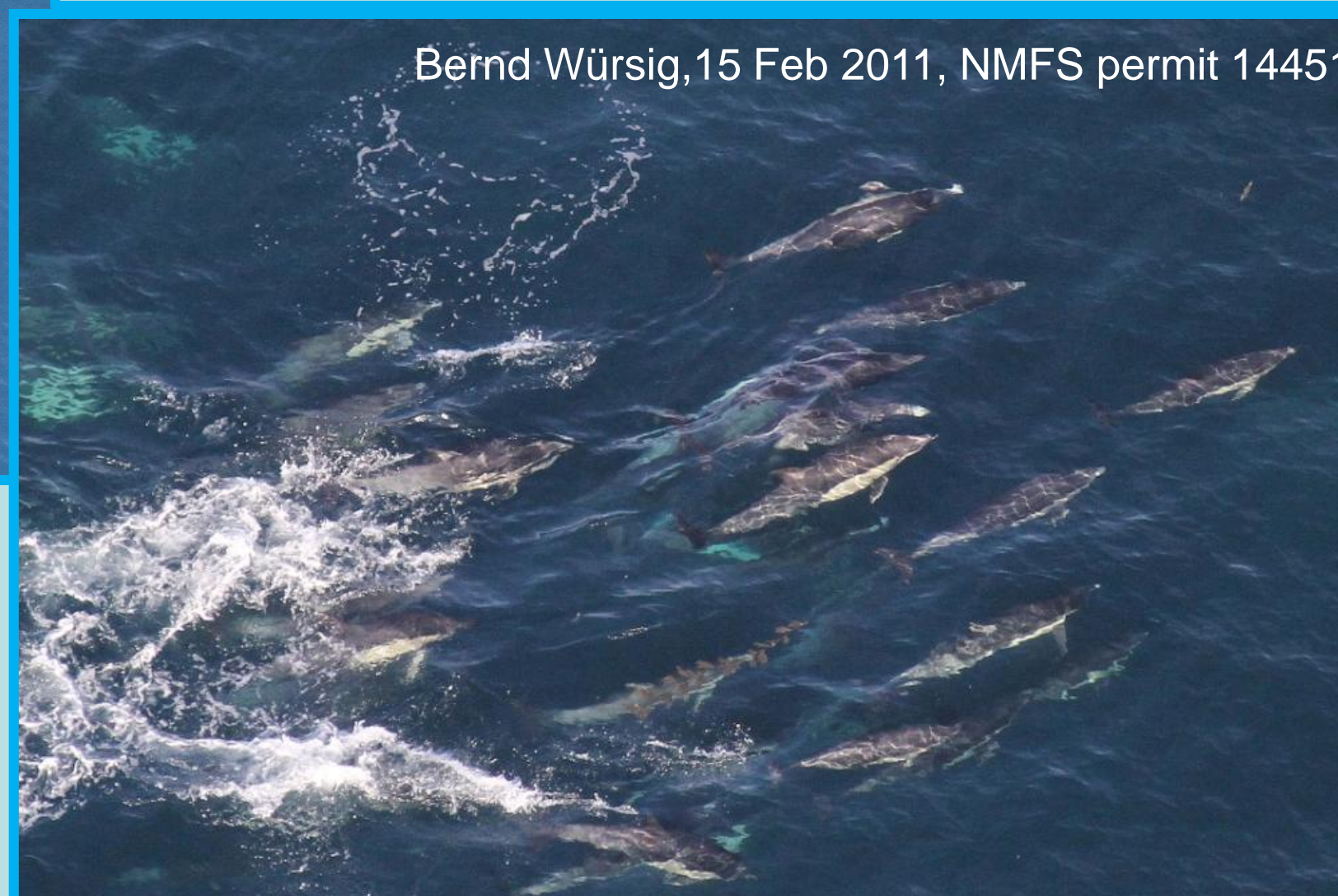
The California sea lion is the most abundant pinniped along the CA coast. Our lower densities (vs. Carretta et al. 2000) may be expected as our surveys did not have extensive coverage in the nearshore shallow waters where this pinniped is most frequently observed. Density at sea (rarely previously documented) tends to be lower in the warm-water season during the species' breeding season.

RESULTS

Estimated average number of individuals present by season



Estimated average number of individuals observed in the Southern California Bight (SCB), by warm and cold-water seasons. Density and abundance were calculated using 39.7% (n=997) of the total sightings made while observers were on dedicated search effort, on systematic lines, with a Beaufort sea state of 4 or less.



Bernd Würsig, 15 Feb 2011, NMFS permit 14451

As common dolphin species were not easily distinguishable from the air, photos were taken as possible to later determine species for each sighting. The majority of the 191 sightings identified to species (72%) were *D. delphis*.



Mark Deakos, 15 Nov 2008, NMFS permit 15369

The fin whale is one of the most common large whales seen in the region and is observed in all seasons.



Mari Smultea, 29 Jul 2013, NMFS permit 14451

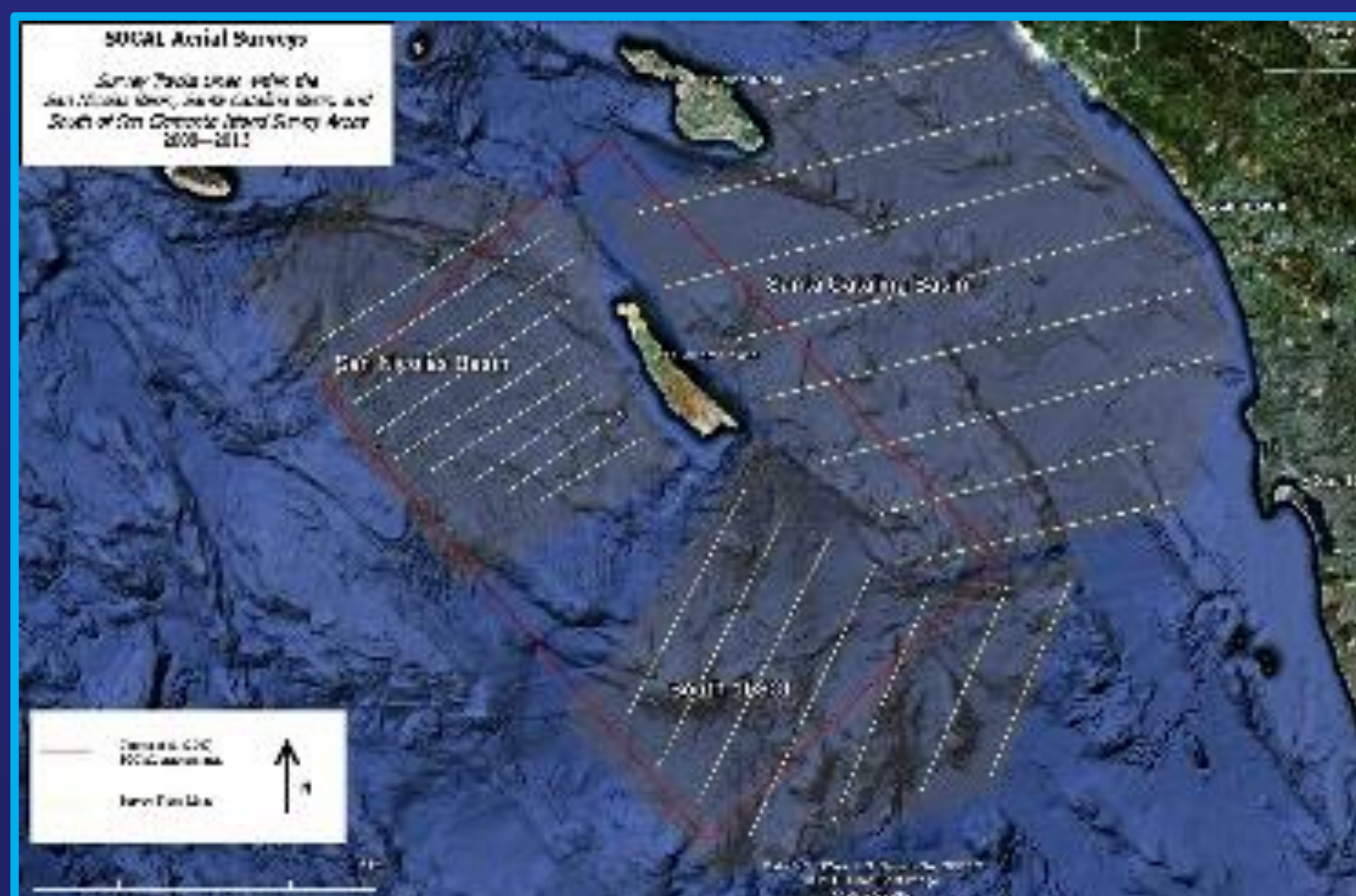
Risso's dolphins are currently one of the most common species of delphinids off the California coast. They were the third most sighted delphinid species during our aerials, after the two species of common dolphins. See the Smultea et al. poster here for results of Risso's dolphin behavior studies.



Lori Mazzuca, 18 May 2010, NMFS permit 15369

Bottlenose dolphins observed around San Clemente Island are presumably members of an island-specific or offshore stock (i.e., not coastal bottlenose dolphins). In comparison to Carretta et al. (2000), Our estimates are somewhat different, which is not surprising, considering that our study areas did not completely match.

METHODS



Surveys were performed using established line-transect methods. Transect lines were parallel to one another, running perpendicular to the bathymetric contours of the region. Lines were spaced 7 km apart west of San Clemente Island, and 14 km apart east of this island. A total of 18 surveys were flown, with at least one survey for all calendar months (except December).



Aerials were performed in a twin-engine Partenavia P68-C or P68-OBS, equipped with bubble windows for two biologist observers, left and right. In addition, one data recorder/computer scientist was part of the aerial team. An altitude of 800-1000 feet was maintained during the surveys.

DISCUSSION

- Our surveys provide the most recent and comprehensive fine-scale estimation available of year-round marine mammal density and abundance in the region.
- When compared to past studies, our estimates indicate that the relative density of some species has changed in the SCB since the 1950s and 1960s (Smultea and Jefferson 2014).
- The region continues to be used by several marine mammal species during both warm and cold-water seasons.
- The difference of seasonal density for some species suggest strong variability in occurrence/density patterns. These differences may be due to shifts in prey species resulting from oceanographic events and anthropogenic impacts, and the recovery from such impacts (Henderson et al. 2014).
- We have ongoing plans to incorporate data into an environmental modeling study to allow for more accurate, fine-scale information and predictive capabilities for US Navy monitoring and assessment efforts.

ACKNOWLEDGEMENTS

We thank all those who participated in the surveys and helped collect or process data: K. Ampela, I. Bates, O. Bates, C. Boerger, R. Braaten, J. Bredvik, M. Cotter, M. Deakos, D. Engelhaupt, A. Fowler, G.L. Fulling, S. Garrett, C. Goertz, J.C. Grady, V. James, C. Johnson, C. Kyburg, K. Lomac-MacNair, M. MacKay, L. Mazzuca, R. Merizan, J. Mobley, M. Moore, T. Norris, M. Richie, F. Robertson, D. Steckler, and B. Würsig. In addition, our pilots from Aspen Helicopters (C. Bartush, A. Blasingame, N. Carrillo, M. Estomo, B. Hanson, S. Jones, D. Moody, I. Ufford, and K. Veatch) did an excellent job of keeping us safe and making sure the surveys went smoothly, and R.Throckmorton made all the logistic arrangements. We thank J. Carretta for assisting TAJ with learning the newer version of the program DISTANCE, and G. Campbell for assistance in preparing maps. Data were collected under NMFS permit numbers 14451, 15369 and 774-1714-09.

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