

North Central California Ecosystem Status Update for 2014-2015

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The Applied California Current Ecosystem Studies (ACCESS) program is a collaborative partnership of Point Blue Conservation Science, Cordell Bank and Greater Farallones National Marine Sanctuaries. We investigate the spatial and temporal relationships between oceanographic processes, phytoplankton, zooplankton, and marine birds and mammals in the north central California region, and provide ecosystem information for management.

There were many physical indicators of warm water conditions in our region in 2014-15. Alongshore winds responsible for upwelling in the region were strong in early 2014, then relaxed mid-year and remained weak through spring/summer of 2015. The spring transition that marks the beginning of the upwelling season in each year occurred at the long-term average in 2014-15, although warm years typically had late transition dates (e.g. 2005 and 2010). Sea surface temperatures were warm from mid-2014 through 2015. Nutrient concentrations were anomalously low in 2014-15, consistent with other warm water events.

Lower trophic level organisms reacted to these conditions. Copepod community composition results are not yet available for 2014-15, but results to date indicate an increase in the abundance of boreal (northern) and transition zone (mid-latitude) copepods in cold, productive ocean conditions in our region (i.e., 2007-08, early 2009, late 2010, and 2011); so we may expect a decline in these species for 2014-15. Large volumes of doliolid salps and other gelatinous species dominated samples collected in the upper 50 m of the water column in these last two years. Adult krill dominated Tucker trawl samples in June 2014 and September 2015, but the remaining cruises of these years were characterized by mostly smaller, younger stages of krill. In addition, adult krill in 2014-15 (similar to other warm water years) were smaller and lacked two cohorts (as seen in cold water years).

Upper trophic levels had differing responses. The productivity of the Cassin's auklet, a zooplanktivorous seabird breeding on the Farallon Islands, was above the long-term average for this species in 2014-15. The blue whale, another krill predator, showed near-average densities in 2014, but then increased dramatically in 2015. Acoustic measurements of krill in the upper 30 m of the water column and down to 200 m have shown an increase in krill biomass through 2011, followed by a decline observed in 2012-15. Preliminary findings suggest that the mismatches observed between predators and krill may be due to high concentrations of krill near the Farallones yet overall low krill abundance in the study area.