



# INVESTIGATION OF CASSIN’S AUKLET MORTALITY IN THE EASTERN PACIFIC DURING THE 2014 POST-BREEDING SEASON

## BACKGROUND AND PURPOSE

- Beginning approximately September 2014, surveyors conducting routine beached-bird surveys recorded unusually high numbers of dead Cassin’s Auklets (*Ptychoramphus aleuticus*) on beaches from British Columbia through central California.
- Unusual numbers of dead and debilitated auklets on some beaches, and observations of dead auklets floating at-sea off the California coast also prompted numerous inquiries from the public, and generated increasing media attention.
- Our **OBJECTIVES** were to compile available information to document the event, and attempt to investigate potential causes.
- To achieve these objectives, we quickly assembled a working group of experts from a wide variety of government agencies and NGOs (see contributors below).

## BEACHED BIRD SURVEYS

- We compiled data from three major standardized beached bird programs:
  - COASST** (University of Washington, established 1999 )
  - Beach Watch** (Gulf of the Farallones National Marine Sanctuary and Farallones Marine Sanctuary Association, established 1993)
  - BeachCOMBERS** (Moss Landing Marine Labs and Monterey Bay National Marine Sanctuary, established 1997)
- Between September 2014 and January 2015, more than 8,000 Cassin’s Auklet (CAAU) carcasses were documented by these programs. Note, as of poster publication, this event is ongoing and data for January 2015 are preliminary.
- For each of 8 geographical regions, we calculated the number of freshly deposited CAAU (new CAAU encounter rate) found per kilometer of beach surveyed by month, both for the current event (September 2014 through January 2015), and for previous years, as an indication of “normal” baseline deposition of CAAU (**Figure 1**). Regional encounter rate was calculated as the mean encounter rate for each beach segment in that region (if the beach segment was surveyed >1 time per month, the mean of those surveys was used as the beach segment encounter rate for that month).
- Encounter rate (CAAU per km) peaked in December and January in northern regions, but in central California, encounter rate peaked in November and December.
- For many beaches surveyed during the event, CAAU encounter rate was >100 times greater than baseline for that month; for at least one beach, encounter rate was >1,000 times greater than baseline.
- The unusually high deposition during this event appeared to be limited to CAAU; other (primarily piscivorous) species did not strand in exceptional numbers.

## EXAMINATION OF CARCASSES

- A total of 153 carcasses were necropsied to document age, sex, and body condition, and to attempt to assess probable cause of death. Necropsies were performed by the CA Dept. of Fish and Wildlife (n = 32 from CA in November), CA Academy of Sciences (n = 23 from CA in November and early December), USGS National Wildlife Health Center (n = 12 from CA, OR, and WA in November and December), Oregon State University (n = 5 from OR in December and January), and the BC Ministry of Agriculture (n = 81 from BC in December).
- Most birds collected in CA (mostly from November) were hatch-year (HY) birds (more males than females); most birds collected in OR, WA, and BC (mostly from December) were after-hatch-year birds (AHY; **Figure 2**).
- Most of the birds necropsied from CA, OR, and WA were in emaciated or poor body condition, and most were presumed to have died of starvation. In contrast, many of the birds examined from BC were in fair body condition and were suspected to have died of complications associated with drowning. A consistent finding in birds examined from all sites was gastrointestinal hemorrhage, interpreted as a sign of physiological stress. We continue to investigate additional carcasses from this event to rule out disease, and determine the probable cause of death.

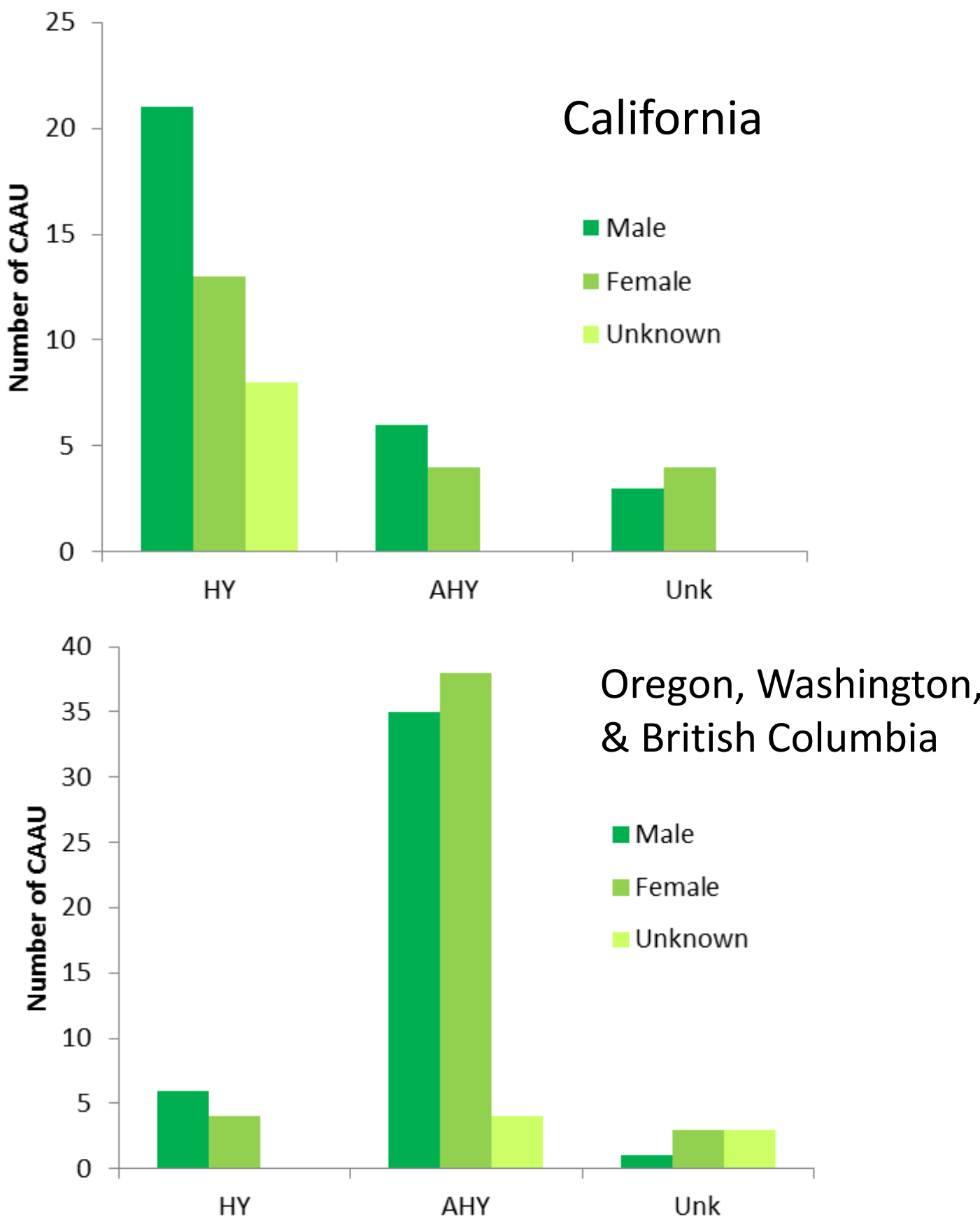


Figure 2. Age and sex of CAAU examined.

## BREEDING SUCCESS AND OCEANOGRAPHIC CONDITIONS

- At major CAAU breeding colonies in California (Farallon Islands) and British Columbia (Scott Islands; >80% of the world population of CAAU), breeding success in 2014 was very high, resulting in an exceptional number of hatch-year birds dispersing away from colonies after the 2014 breeding season.
- Ocean conditions in the North Pacific during summer and fall 2014 were unusual; a “Blob” of anomalously warm water remained offshore from the Gulf of Alaska south to the northern California Current for much of 2014, then with the relaxation of upwelling in late summer, the Blob moved inshore to the coast in approximately September 2014 (**Figure 3**).
- The anomalously warm water of the Blob apparently affected zooplankton community composition; krill (Euphausiacea) were detected at normal abundance on trawl surveys off central California during July, but were absent during surveys in September.
- Winter storms began affecting the northern portion of the study area during late October 2014. These storms may have affected both ocean conditions and CAAU energetics.

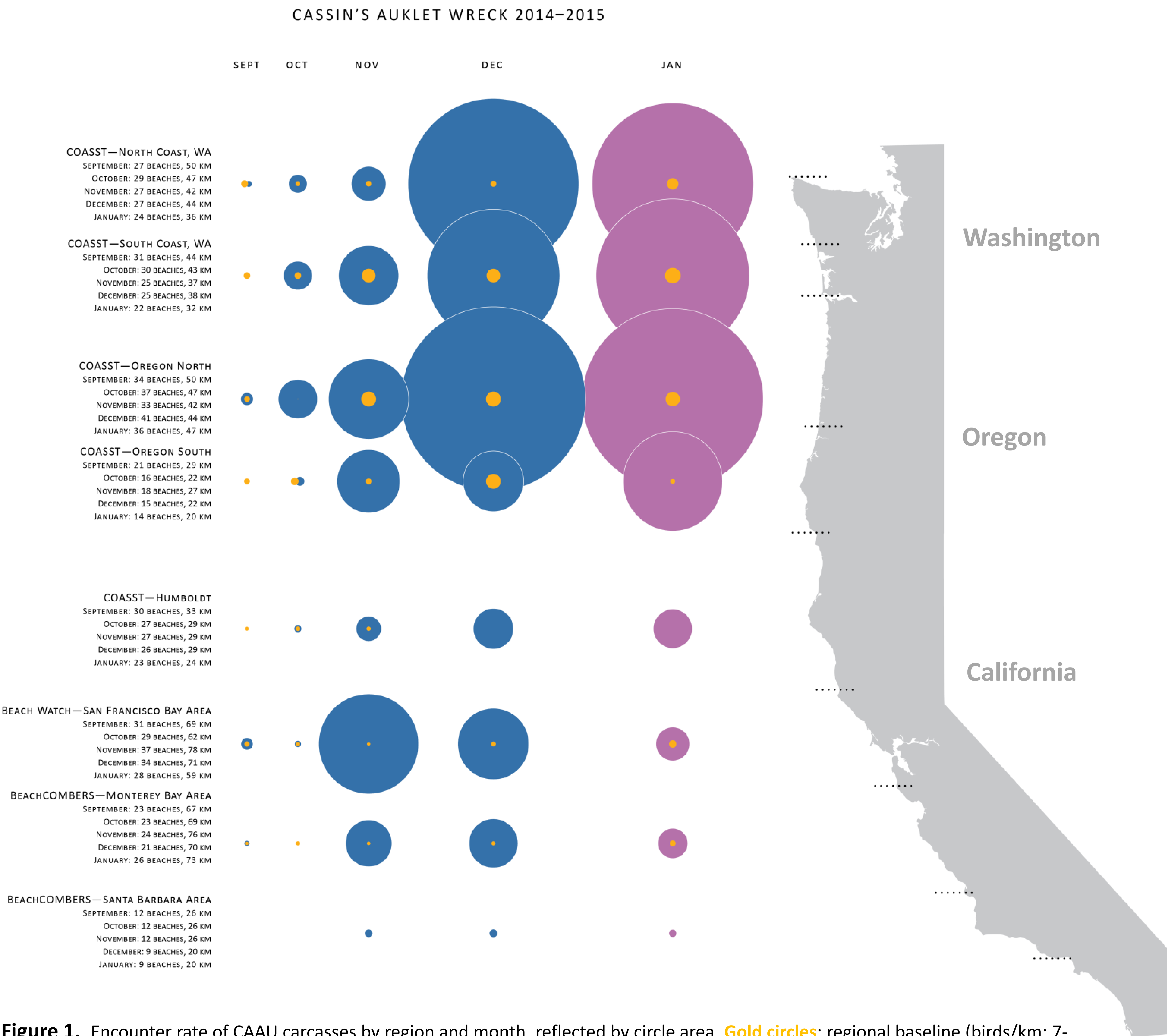
## SUMMARY

- Although we are continuing to investigate this ongoing event, we believe that a contributing cause of this mortality event is the **unusually large cohort of hatch-year auklets** that were apparently unable to find adequate prey resources to survive their first winter.
- Environmental factors may have exacerbated normal juvenile mortality of first-winter CAAU in 2014/2015, and mortality of other age classes of CAAU in this event also points to possible **prey shortages**. We continue to investigate evidence for prey shortages during this event, including anomalous ocean conditions. It may be possible that different factors contributed to varying degrees in different regions.
- We also continue to investigate probable causes of mortality through detailed pathology investigations and additional information on demographics. Although it was clear that at least early in this event, most birds were dying of starvation/emaciation, we continue to work to rule out other potential causes of death.
- This event provided a valuable learning opportunity in terms of collaboration among various government agencies and NGOs, to investigate events such as this. This event and investigation highlighted the benefit of standardized monitoring of seabird mortality, as well as the need for greater coordination, cooperative effort, and planning across the migratory ambit of coastal seabirds to investigate unusual mortality events.

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**Figure 1.** Encounter rate of CAAU carcasses by region and month, reflected by circle area. **Gold circles:** regional baseline (birds/km; 7-20 years prior to 2014), no regional baseline available for BeachCOMBERS-Santa Barbara area; **blue circles:** 2014 birds/km; **magenta circles:** preliminary 2015 birds/km with approximately 80% of sites reporting. Largest circles (December and January for Oregon North) represent an encounter rate of 21 birds/km. Dotted lines show regional boundaries. Total number of monitored beaches and combined beach length displayed below region headers.

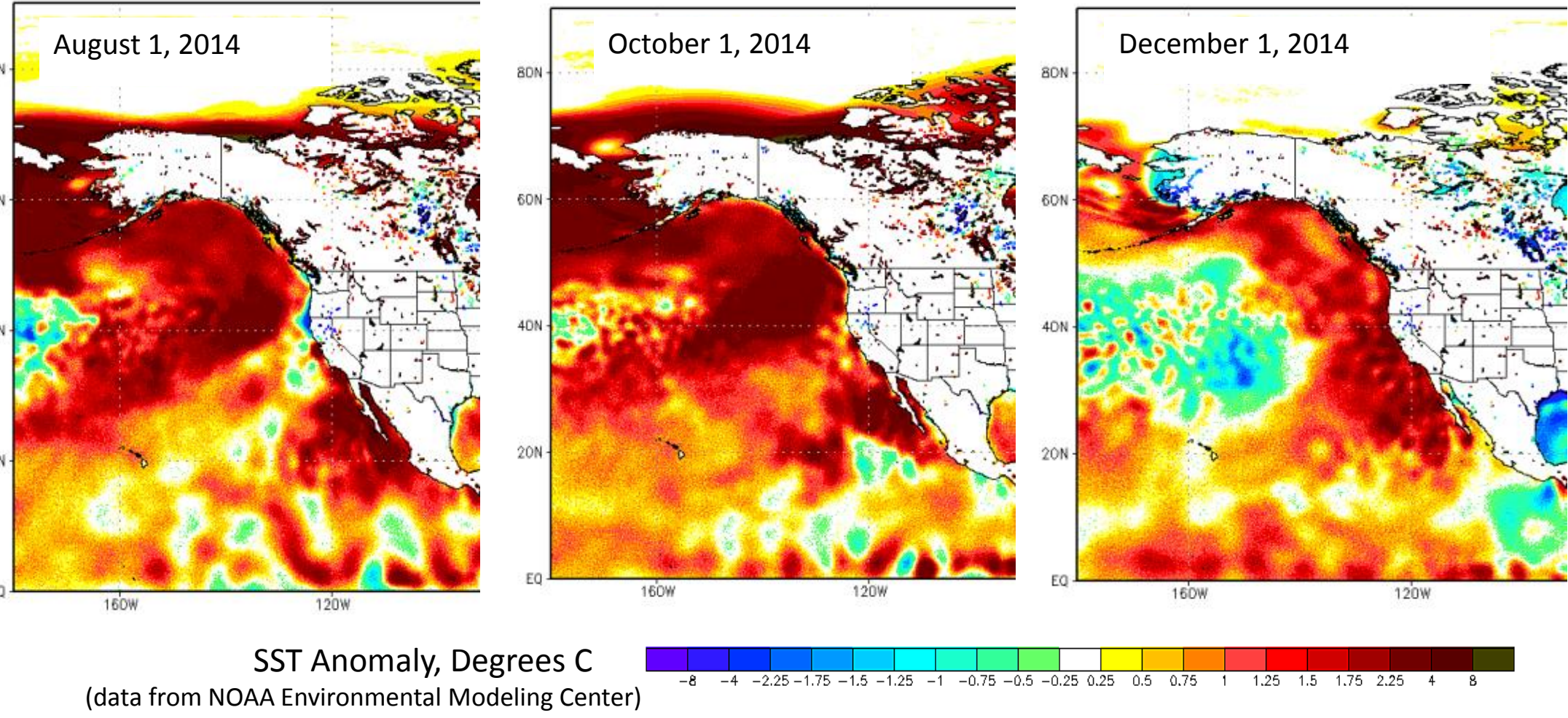


Figure 3. Progression of the warm water Blob.

## ACKNOWLEDGMENTS

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