



## Research Brief

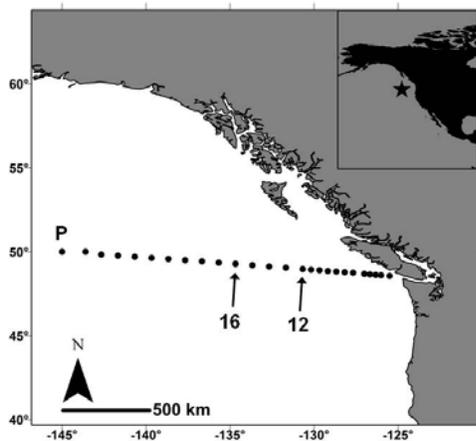
### Changes in Seasonal Abundance of Seabirds



FARALLON INSTITUTE

#### *What is phenology? How is it affected by global climate change?*

Phenology refers to the timing of life cycle events and the study of this timing addresses influences of a species' environment. Because phenology is altered by climate (temperature, weather and wind patterns, etc.), it stands to follow that species phenology will adjust with global climate change. Changes in plankton phenology can affect a region's seasonal productivity during a given season, which can lead to changes in the phenology of upper-level species, such as forage fish and seabirds.



#### *What did we do?*

First, we demonstrated the effects of climate change on the Alaska Gyre, detailing an increase in average temperature and poleward shifts in isotherms. These changes appear to be long-term and can be attributed to anthropogenic global warming. We then created a model illustrating the relationship between the abundance of 15 different seabird species in relation to seasonality and climate in the Alaska Gyre. Plankton was measured as chlorophyll *a* concentration, which is widely accepted as an indicator of a system's potential productivity. We found that from 1996-2006, there appears to have been a general increase in the abundance of seabirds, with the most evident change occurring in late summer.

#### *What is the significance of our results?*

These results suggest a major shift in migratory and reproductive patterns of seabirds caused by large-scale changes in the oceanic climate. Further climate change may lead to a gradual redistribution of marine species. It is clear that seabirds are staying in the Alaska Gyre for a longer period of time each year, possibly due to improved conditions (i.e. warmer temperatures) and changes in phenology of primary productivity.

#### *Caveat*

The time period for the seabird data used was relatively short (11 years).

-Brief by Marie M. Sydeman

Citation: Thompson, S.A., W.J. Sydeman, J.A. Santora, K.H. Morgan, W. Crawford, M.T. Burrows. 2012. Phenology of pelagic seabird abundance relative to marine climate change in the Alaska Gyre. *Marine Ecology Progress Series* 454:159-170. doi: 10.3354/meps09598.