

# California sea lion pup demography

Unusually warm sea surface temperatures have been associated with declines in California sea lion pup births and increased pup mortality.



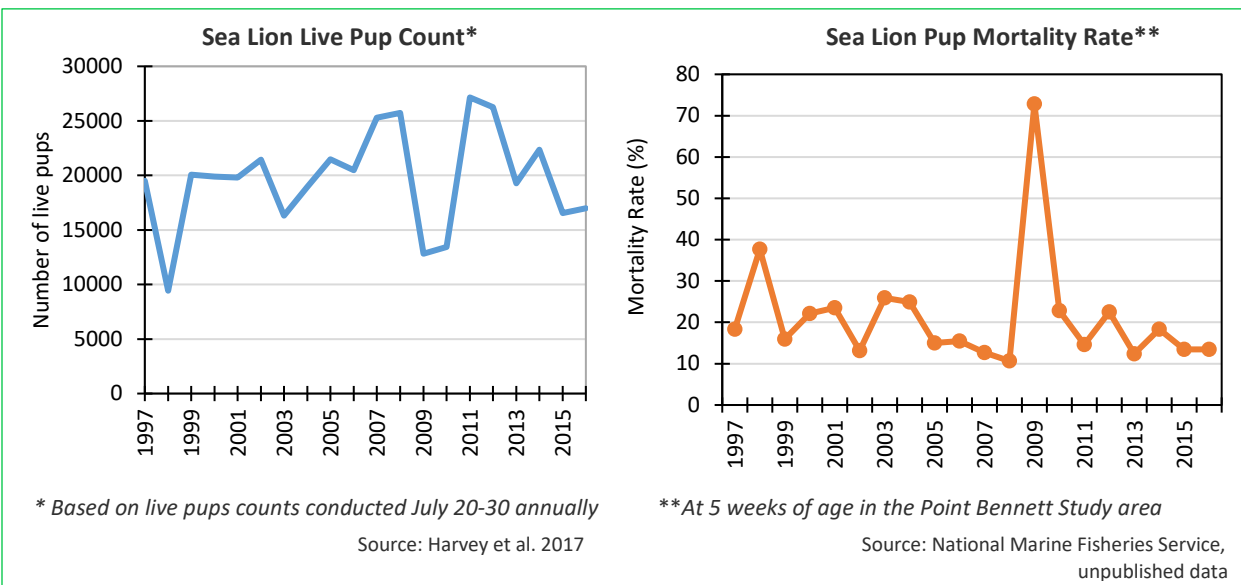
The number of sea lion pups at a breeding colony along the Channel Islands near Santa Barbara has fluctuated over the past two decades with ocean conditions, particularly warm surface water temperatures. Ocean temperatures affect the availability of food for sea lion pups and pregnant sea lion mothers.

The California sea lion is a top predator in coastal and offshore waters. Predator species provide insights into how organisms within the food chain respond to warming temperatures and other changes in the ocean. Scientists are increasingly using population measures of sea lions and other marine mammals in studies of changing ocean conditions influenced by climate change.



## What does the indicator show?

The annual number of live sea lion pups at the San Miguel Island study area ranged from a low of 9,428 to a high of 27,146 between 1997 and 2016 (left graph). The numbers were lowest in 1998, 2009, and 2010. These years were characterized by warm ocean conditions. High counts occurred in 2011 and 2012 when cool ocean conditions prevailed. The pup mortality rate reflects survival beyond the first 5 weeks of life (right graph). High pup mortality rates in 1998 and especially in 2009 – when the rate was four times greater than the long-term average – were associated with high ocean temperatures. In addition, other ocean conditions in 2009 that affected the availability of prey may have influenced the unusually high mortality rate.





High ocean temperatures can affect sea lion populations in multiple ways. Warmer waters can reduce the abundance of plants that make up the base of the marine food chain along the California coast. Changes to plant populations affect higher levels of the food chain, including sea lions.

In addition, prey are likely to move farther north or to deeper waters as temperatures warm. Lactating females must travel farther to obtain food, leaving behind pups entirely dependent on their mother's milk. Increased numbers of malnourished sea lion pups have been found stranded along the coast when prey are scarce. During a period of unusually warm sea surface temperatures throughout the Pacific Coast in 2014-2015, significant declines in prey occurred and the growth rate of pups was low. Pup mortality did not significantly change, suggesting that lactating females were able to support their pups for immediate survival but could not provide adequate nourishment for longer-term growth.

Unusually warm ocean temperatures can also amplify harmful algal blooms that periodically occur along the California coast. Certain algae species produce toxins such as domoic acid that enter the marine food web and ultimately harm sea lions.

### **Why is this indicator important?**

One of the greatest threats to the California sea lion comes from changes in their food resources due to climate and other influences. Tracking pup populations provides insight into how the California sea lion population is responding to environmental and anthropogenic changes. Although the population of California sea lions in coastal waters from the United States-Mexico border to southeast Alaska has steadily increased since the early 1970s, recent declines in pup production and survival in this area suggest that the population may have stopped growing.

Sea lions and other marine mammals are prominent animals that reflect ecosystem variability and degradation in the ocean. Top predators like sea lions provide insights into how marine organisms at all levels in the food chain are influenced by oceanographic conditions.

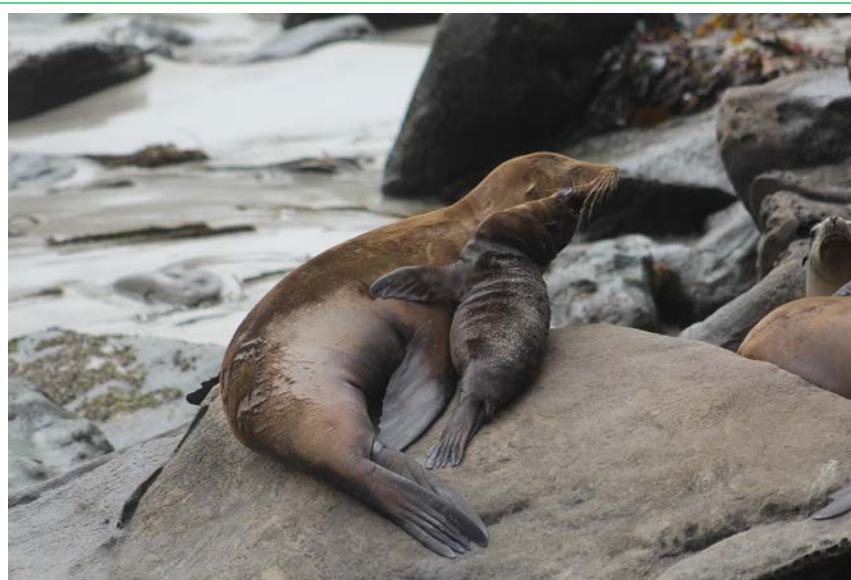


Photo: Tony Orr, NOAA

For more information about this and other climate change indicators, visit:

<https://oehha.ca.gov/climate-change/report/2018-report-indicators-climate-change-california>

