Secret Life of Elephant Seals Not Secret Anymore

August 7 2007

The tag on a male elephant seal on Kerguelen. Photo by: Dr C. Giunet

Miniature oceanographic sensors attached to southern elephant seals have provided scientists with an unprecedented peek into the secret lives of seals.

The measurements reveal in detail where the seals go on their winter feeding trips, where they find food and where they don't, and help explain why some populations have remained stable since 1950 while others have declined.

The results are the subject of a paper published today in the prestigious Proceedings of the National Academy of Sciences in the USA.

The work was carried out by an international team including scientists from France, the United States and the United Kingdom and included

Australian researchers Professor Mark Hindell from the University of Tasmania's Animal Wildlife Research Unit, Dr Steve Rintoul, from the Antarctic Climate and Ecosystem Cooperative Research Centre and CSIRO (through the Wealth from Oceans Flagship), and Professor Nathan Bindoff from the University of Tasmania and the Flagship. Lead author of the paper is Dr Martin Biuw, from the Sea Mammal Research Unit at the University of St Andrews in the UK.

Until recently, the response of large marine predators to environmental variability has been almost impossible to observe directly.

Sensors were deployed on 85 elephant seals from key colonies in January and February 2003 and lasted throughout most of the Antarctic winter season. The longest track was 326 days and up to 30,000 profiles of temperature and salinity were obtained.

By simultaneously recording movements, dive behaviour and oceanographic conditions, the new sensors allow researchers to examine in detail how elephant seals respond to changes in ocean conditions.

"Most of what we know about these seals has been based on observations made when the seals haul out on sub Antarctic islands to breed, such as the number and physical condition of the animals," Professor Hindell said. "In particular, we have had no way to study how the seals interact with their environment and the prey within it."

By monitoring changes in the rate at which seals drift up or down during passive "drift dives," the scientists could determine where the seals were gaining fat (and becoming more buoyant) and where food was harder to find and the animals lost fat.

"These measurements have allowed us for the first time to make circumpolar maps of the areas that provide good foraging for seals, and areas where conditions are less favourable for them," Professor Hindell said.

The oceanographic measurements collected by the seals provided a detailed view of the feeding behaviour of the seals in relation to oceanographic features. "The measurements of temperature and salinity collected by the seals show that the seals target very specific water bodies," Dr Rintoul said.

"An intriguing surprise was that the feeding preferences of the Atlantic seals were very different from seals tagged on Kerguelen and Macquarie Islands, in the Indian and Pacific sectors of the Southern Ocean," Dr Rintoul said.

The Atlantic seals preferred the open ocean waters of the Antarctic Circumpolar Current. The Kerguelen and Macquarie seals spent the winter feeding season in the sea ice pack, near the Antarctic continent.

"We think the fact that these seal populations have different foraging strategies may explain why seal numbers in the Indian and Pacific declined between the 1950s and 1970s, while Atlantic populations remained stable," said Professor Hindell.

"The Indian and Pacific seals have to travel more than 1000 km further during their winter migration than Atlantic seals. The extra energy expended would mean less energy for breeding in years of low food abundance," he said.

"Studies suggest that the amount of sea ice declined during the 1950s to 1970s off east Antarctica; since the Indian and Pacific seals prefer to feed in the sea ice zone, the decline in sea ice may have contributed to the decline in those seal populations," added Dr Rintoul.

By providing detailed information on how animals at the top of the Southern Ocean food chain respond to variability in the ocean, this study will guide development of effective strategies for management of living resources in the Southern Ocean and predictions of how animals will respond to climate change.

Oceanographic sensors with satellite transmitters were deployed on southern elephant seals (Mirounga leonina) in three locations – Macquarie Island south of Tasmania, the French sub-Antarctic island of Kerguelen and South Georgia in the Atlantic.

The tags are glued to the fur of the elephant seals before they leave on long foraging journeys. The tags are retrieved when the animals return to the same beach to moult, which is up to 10 months later.

The tags record the position of the animal, monitor its diving cycle with a pressure sensor, and record water temperature and salinity – data which they upload to satellite while they are at the surface.

Southern elephant seals can dive to 1,500 metres but more commonly frequent depths of 200-500 metres.

Source: CSIRO

Citation: Secret Life of Elephant Seals Not Secret Anymore (2007, August 7) retrieved 25 April 2024 from https://phys.org/news/2007-08-secret-life-elephant-anymore.html