
Monitoring the after-effects of the largest baleen whale mass mortality event ever recorded

Blue Marine Foundation and Patagonia Projects

Project overview - June 2020



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Headlines

- Sei whales (*Balaenoptera borealis*) are IUCN listed endangered species and the third largest whales in the world.
- The largest baleen whale stranding ever recorded happened in the Golfo De Penas in 2015 (Patagonia Projects study area).
- Over 350 sei whales were found stranded on the shorelines.
- The likely cause was toxic poisoning from a Harmful Algal Bloom (HAB).
- HABs are increasing in frequency.



This image: A new beached sei whale. Credit: Keri-Lee Pashuk
Front cover: A baleen whale skeleton on the Golfo de Penas shoreline. Credit: Isabella Clegg



Sampling a whale skull. Credit: Keri-Lee Pashuk

Story

Large mass mortality events (MMEs) are well known for toothed whales but are rare in the less gregarious baleen whales. In 2015, the largest baleen whale Mass Mortality Event (MME) ever recorded occurred right in the Golfo de Penas region, where more than 350 sei whales were found dead on the shorelines from the outer to inner fjords. The Patagonia Projects team, in collaboration with Dr Vreni Haüssermann, were the first to discover this unprecedented event which has significant consequences for the conservation of the endangered sei whale. The Patagonia Projects team were able to document more than 30 of the whales, taking samples where possible, and providing valuable on-the-ground photo documentation of the event. Subsequently the whales were counted from a small airplane, and then using Very High Resolution satellite (VHR) imagery in the first application of this technology. Although some results are still being analysed, the cause of the MME was concluded as Parasitic Shellfish Poisoning (PSP) caused by a Harmful Algal Bloom (HAB) building El Niño.

The MME was the catalyst in establishing Patagonia Projects as advocates for marine conservation, and they were driven by the question of why the HABs were happening, and whether it was going to happen again soon. Patagonia Projects' discovery of older whale skeletons in the Golfo de Penas region, as well as new whale carcasses in the years since 2015, suggests that this is a current threat to the sei whales. The sheer number of these whales that were shown to have died close to shore (as opposed to being washed in) suggested that the Golfo de Penas is a feeding ground for this species, who were previously thought to stay in the open ocean environments. Indeed, stable isotope analysis revealed that the sei whales were feeding on copepods, euphausiids, amphipods before they died, but that diet as well as migratory patterns vary between individuals. Through collaborations with Dr Carolina Gutstein, Dr Carlos Olavarria and others, conducting expeditions every year to the MME site and documenting any old and new carcasses, Patagonia Projects is providing invaluable information on the ongoing mortality of sei whales in the area and how the skeletons are eroded and transported over time.

Papers

Directly from Patagonia Projects expeditions:

- Haüssermann et al. (2017), Largest baleen whale mass mortality during strong El Niño event is likely related to harmful toxic algal bloom. PeerJ 5:e3123; DOI 10.7717/peerj.3123
- Reiss, L., Häussermann, V., & Mayr, C. (2020). Stable isotope records of sei whale baleens from Chilean Patagonia as archives for feeding and migration behavior. Ecology and Evolution, 10(2), 808–818.
- Suarez Santana, C.M., Fernández Rodríguez, A.J., Llinas, D., Arbelo Hernández, M.A., Español-Jiménez, S., Herrera, G., Durán-Torres, S., Kean, M., Pashuk, K.L., Landreth, G. and Häussermann, V., 2017. Expedición para el estudio de las poblaciones de ballenas sei (*Balaenoptera borealis*) en el Golfo de Penas y parque nacional Laguna de San Rafael (La Patagonia, Chile). Mayo 2017. X Congreso de la Sociedad Española de Cetáceos (SEC). Valencia, España, 29 and 30 September 2017 / editado por Natalia Fraija Fernández, p. 85

From Patagonia Projects scientists on the same topic:

- Fretwell PT, Jackson JA, Ulloa Encina MJ, Haüssermann V, Perez Alvarez MJ, Olavarría C, et al. (2019) Using remote sensing to detect whale strandings in remote areas: The case of sei whales mass mortality in Chilean Patagonia. PLoS ONE 14(10): e0222498. <https://doi.org/10.1371/journal.pone.0222498>

Activities

- Document all new whale carcasses in the Golfo de Penas region (photos, measurements, GPS), and take samples of baleen, bone, and flesh where possible.
- Establish a whale skeleton catalogue, where all skeletons are tagged with an identification number.
- On each expedition, take samples of invertebrates at several locations in the area to test for PSP from HABs.
- Use drones to take aerial photos of the whale skeletons each year.

Targets

- Understand which species of whales are stranding, how often and at what times of year.
- Correlate results to HAB data (from SERNAPESCA as well as own invertebrate sampling).
- Tag and identify all observable skeletons on the shorelines of the Golfo de Penas region, so that new skeletons can be more accurately identified.
- Aerial drone photography of old, identified whale skeletons.

Outcomes

- An understanding of the baseline level of mortalities in the area.
- Discover whether the HAB presence is correlated to mortalities.
- A catalogue with individual IDs for each whale skeleton.
- Data on the movements and decomposition of whale skeletons over time.



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