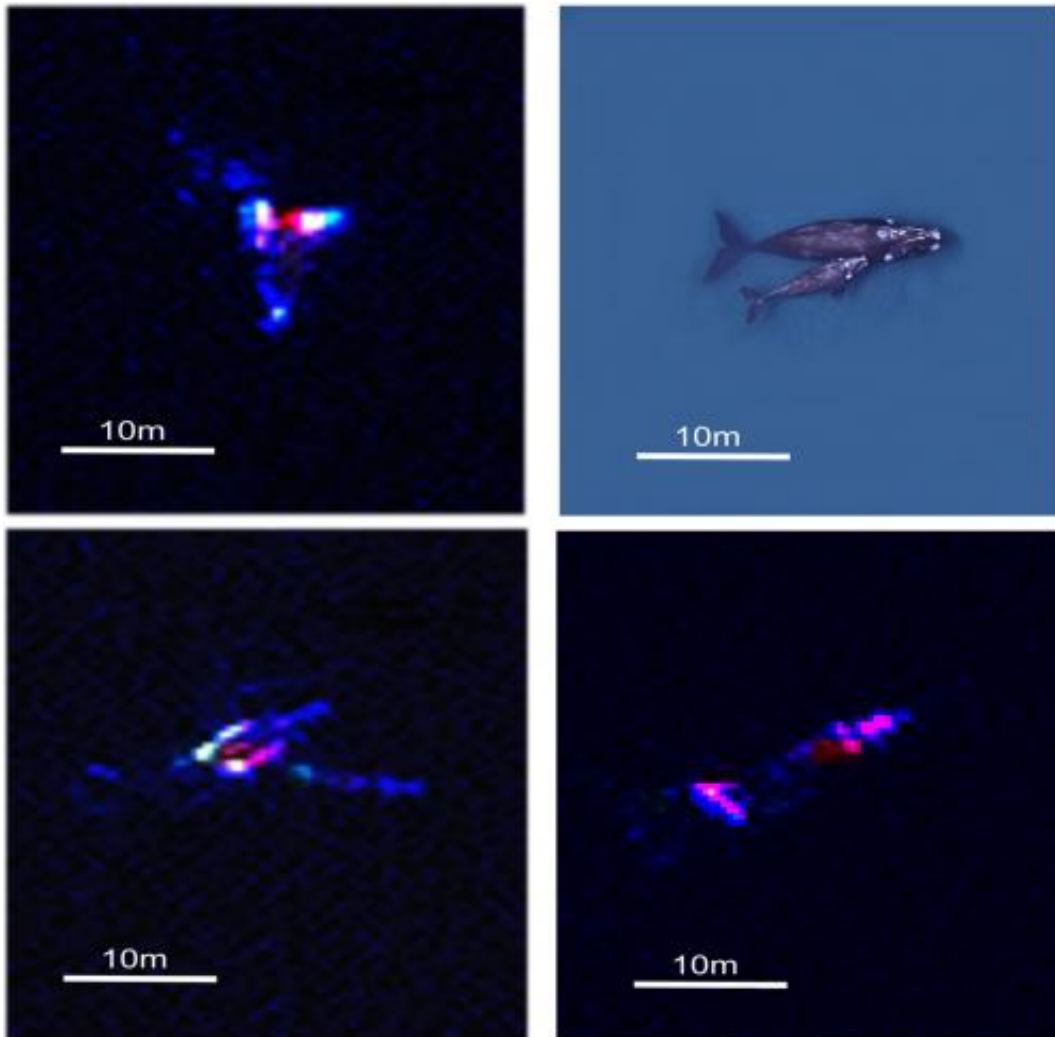


# Scientists using satellites to identify whales

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This is a satellite versus aerial view of southern right whales. Credit: British Antarctic Survey

Scientists have demonstrated how new satellite technology can be used to

count whales, and ultimately estimate their population size. Using Very High Resolution (VHR) satellite imagery, alongside image processing software, they were able to automatically detect and count whales breeding in part of the Golfo Nuevo, Peninsula Valdes in Argentina.

The new method, published this week in the journal *PLoS ONE*, could revolutionise how whale [population size](#) is estimated. Marine mammals are extremely difficult to count on a large scale and traditional methods, such as counting from platforms or land, can be costly and inefficient.

Lead author Peter Fretwell from the British Antarctic Survey (BAS), which is funded by the UK's Natural Environment Research Council (NERC), explains;

"This is a proof of concept study that proves [whales](#) can be identified and counted by satellite. Whale populations have always been difficult to assess; traditional means of counting them are localized, expensive and lack accuracy. The ability to count whales automatically, over large areas in a cost effective way will be of great benefit to conservation efforts for this and potentially other whale species."

Previously, satellites have provided limited success in counting whales but their accuracy has improved in recent years.

The BAS team used a single WorldView2 satellite image of a bay where southern right whales gather to calve and mate. Driven to near extinction, these whales have made a limited recovery following the end of whaling. In recent years, however, many deaths have been seen on their nursery grounds at Peninsula Valdes. Their population size is now unknown but with this sharp increase in calf mortality, estimates are needed.

The enclosed bays in this region contain calm, shallow waters which

increase the chance of spotting the whales from space. Three main criteria were used to identify whales: objects visible in the image should be the right size and shape; they should be in the right place (where whales would be expected to be) and there should be no (or few) other types of objects that could be mistaken as whales.

Whales in the image were manually identified and counted, finding 55 probable whales, 23 possible whales and 13 sub-surface features. Several automated methods were then tested against these numbers. A 'thresholding' of the Coastal Band of the WorldView2 image gave the greatest accuracy. This part of the image uses light from the far blue end of the spectrum which penetrates the water column deeper and allows us to see more whales. This technique found 89% of probable whales identified in the manual count. This is a semi automated technique that needs some user input to identify the best threshold.

Future satellite platforms will provide even high quality imagery and Worldview3 is planned to be launched this year. This will allow for greater confidence in identifying whales and differentiating mother and calf pairs. Such technological advancements may also allow scientists to apply this method to other whale species.

**More information:** Whales from space: counting southern right whales by satellite by Peter T Fretwell, Iain J Staniland and Jaume Forcada is published in *PLOS ONE* on Wednesday 12 February 2014. [dx.plos.org/10.1371/journal.pone.0088655](https://doi.org/10.1371/journal.pone.0088655)

Provided by British Antarctic Survey

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