position of each individual in groups. In this paper, the three dimensional trajectories of six sperm whales are described using data recorded off Ogasawara to show the diving behavior of sperm whales in a group. The clicks of sperm whales are used for communication and echolocation, so the range to the target can be estimated from inter click interval (ICI). Comparing the three dimensional trajectories and the estimated target range of the group, three pairs of whales' target range cohere with the distance to the adjacent whale. Moreover, both the target range and distance dose not fit to the depth of seafloor. Hence, it indicates that the subset of sperm whales in a group recognize each other during their dives.

Temporal variation in odontocete vocal events in Onslow Bay, North Carolina

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Long-term recordings from passive acoustic monitoring allow examination of diel, seasonal, and inter-annual variation in the occurrence of vocalizing marine mammals. We used High-frequency Acoustic Recording Packages (HARPs) to determine how odontocete vocal events varied temporally in Onslow Bay, North Carolina from October 2007 to April 2010. The recordings showed Risso's dolphins, sperm whales, and unidentified delphinids are present throughout the year, with sporadic occurrence of *Kogia spp*. Risso's dolphins and sperm whales showed a nocturnal increase in the occurrence of clicks; *Kogia spp*. showed no significant diel variation in the occurrence of clicks; and unidentified delphinids showed either an increase in vocal events at dawn or at night, depending on the time of year and recording site. From mid-November to January, a pattern of long-duration and clustered vocal events is evident in the late-night, early-morning period at a shallow site along the shelf break. These signals were not seen at a deeper site during the same time period, suggesting that animals are moving toward the shelf break area, are staying in the shallow area for longer periods of time, are composed of larger group sizes, and/or are from a migratory species or stock. In addition, these extended vocal events may be indicative of a behavioral change, such as an increase in foraging. Future studies will focus effort on discriminating vocalizations belonging to unidentified delphinids as the majority of the vocalizations came from this group and could shed light on the species responsible for the dawn increase in vocal events.

A successful demonstration of Unmanned Aerial Vehicles for detecting dugongs and a range of other species

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Aerial surveys of marine mammals are routinely conducted to assess and monitor species' habitat use and population status. In Australia, dugongs (*dugong dugon*) are regularly surveyed and long-term datasets have formed the basis for predicting their critical habitat and risk assessments of human impacts. Unmanned Aerial Vehicles (UAVs) may facilitate more accurate, human-risk free, and cheaper aerial surveys. The first Australian UAV survey trial was conducted in Shark Bay, Western Australia in September 2010. Insitu Pacific

Ltd programmed a *ScanEagle* UAV with a digital SLR camera payload to fly a set of ten transects over an area frequently used by dugongs. Image capture was controlled (including start, stop and capture rate) via the Ground Control Station and the capture rate was scheduled to achieve a prescribed 10% overlap between images ensuring complete coverage along transect lines. During each of five flights, the transects were flown at 500, 750 and 1,000ft. Images were manually reviewed *posthoc* for animals and scored according to glare, Beaufort sea state and turbidity. We captured 6243 images, 627 containing dugongs. Bottlenose dolphins (*Tursiops aduncus*), a humpback whale (*Megaptera novaeangliae*), turtles and other marine fauna were also identified. The ability to detect dugongs under the full range of environmental conditions and altitudes is being assessed using generalised linear models. A one-way ANOVA suggested there was no significant difference according to flight altitude in the proportion of dugongs identified with certainty versus those labelled "possible dugongs but unclear/uncertain" ($F(2,15)=1.69$, p=0.22). The overlap between images needs further investigation, proving valuable for detecting animals that were masked by glare in the corners of images, and identifying animals initially captured at an awkward body angle. This initial trial of a basic camera system has successfully demonstrated that the *ScanEagle* UAV has great potential as a tool for marine mammal aerial surveys.

Bayesian inference of a historical genetic bottleneck in a heavily exploited marine mammal

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Emerging Bayesian analytical approaches offer increasingly sophisticated means of reconstructing historical population dynamics from genetic data, but have been little applied to scenarios involving demographic bottlenecks. Consequently, we analysed a large mitochondrial and microsatellite dataset from the Antarctic fur seal *Arctocephalus gazella*, a species subjected to one of the most extreme examples of uncontrolled exploitation in history when it was reduced to the brink of extinction by the sealing industry during the late eighteenth and nineteenth centuries. Classical bottleneck tests, which exploit the fact that rare alleles are rapidly lost during demographic reduction, failed to provide convincing evidence for a bottleneck. In contrast, Bayesian skyline plots and approximate Bayesian computing revealed strong evidence for a recent and dramatic reduction in population size, the extent and timing of which was in good agreement with the historical accounts of sealing captains. This study suggests that Bayesian approaches could prove a powerful tool for conservation biologists interested in reconstructing the recent demographic history of threatened natural populations.

Cross-Modal Matching of Rotated Stimuli by a Bottlenose Dolphin

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A dolphin was trained to match shapes made from PVC pipes and fittings across the senses of echolocation and vision. In previous publications we have suggested the dolphin might perceive the shape of objects interrogated through its echolocation sense holistically and not just as a collection of features. To explore this hypothesis further, we conducted a cross-modal matching experiment where the dolphin