interactions at the level of the individual. Social relationships within and between units were diverse (S>0.8). Most significantly, we identified long-term patterns of association between units consistent over decadal time scales, which bare a resemblance to 'bond-groups' among African elephants. Social units had characteristic vocal repertoires, but all were dominated by the '*1+1+3*'and '*5R*' coda types. There were differences between units in the use of certain 4-click coda types. Individuals varied in how they produced '*5R*' codas, but the '*1+1+3*' coda was stereotyped across all individuals and units studied. Individual repertoires differed consistently across years, and contrary to an existing hypothesis, new mothers did not vary their repertoire to be more distinct. However, calves did use a class-specific '*3+1*' coda. The repertoires of different units were as similar as units within vocal clans in the Pacific. These results support the hypothesis that the '*5R*' coda may function in individual identification, while the stability of the '*1+1+3*' coda may be the result of selection for a marker of cultural clan membership. Variation in the social and vocal behaviour of female sperm whales appears to result from a trade-off between individuality and conformity within units and clans.

Using habitat modeling for improved estimation of distribution and abundance from non-random surveys

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Due to limited budgets, marine mammal scientists sometimes use data from platforms of opportunity to estimate distribution and abundance. The problem with such data is that they do not represent random samples, and therefore may give biased estimates. However, if animal density is associated with habitat covariates, we can use that association to reduce the bias and to improve the ability to detect changes in abundance from such data. We consider a Bayesian approach to the estimation of density from line-transect data as a function of one or more habitat variables. Within sections of a transect, the number of detections is modeled with a generalized Poisson distribution, conditional on the length of survey effort, the actual but unobserved density of animals, and covariates which affect detection probability. Methods are tested with simulated data and applied to actual data on long-beaked common dolphins, *Delphinus capensis*. The density of this dolphin, based on randomized ship surveys conducted off the northwest coast of Mexico between 1986 and 2006, is estimated as a function of depth and sea surface temperature. We subsample the survey data in biased ways, and show that estimates of abundance from such biased survey data can be improved by modeling the habitat association. The use of the habitat model enabled us to estimate dolphin density in non-surveyed areas and on a finer spatial scale. In a monitoring context, such a model may improve detection of change in abundance by accounting for variability in habitat conditions at different periods of time.

Amphibious hearing in the southern sea otter (*Enhydra lutris nereis*): Implications for conservation and comparative sensory biology

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As public concern about the impacts of human-generated noise in marine ecosystems increases, scientists addressing this issue have identified a priority need for research investigating the hearing capabilities of data deficient species. Sea otters are amphibious marine mammals whose auditory sense remains virtually undescribed—a knowledge gap that limits our ability to appropriately manage this threatened species with regard to noise and presents a significant obstacle for conservation efforts attempting to evaluate anthropogenic impacts collectively. Sea otters are also one of the most recent mammals to evolve an aquatic lifestyle, and therefore are of special interest with respect to possible auditory adaptations. In this study we experimentally evaluated the amphibious hearing abilities of the southern sea otter. Our aims included describing aerial and underwater sensitivity across the range of hearing, and then measuring the detection of simple signals under conditions of controlled noise, so that these features of auditory perception could be directly compared to those of other marine mammals and terrestrial carnivores. An adult otter was trained to respond to calibrated tones presented in an acoustic chamber or at a submerged underwater apparatus. Psychoacoustic methods were used to measure detection thresholds in each medium. Audiograms were constructed from the thresholds obtained in each environment at 11 frequencies from 0.125—38.1 kHz. The sea otter's aerial hearing closely resembled that of a sea lion, and showed reduced sensitivity on both ends of the audiogram relative to terrestrial mustelids. Alternatively, underwater hearing sensitivity was significantly reduced when compared to a sea lion, especially at frequencies below 1 kHz. Critical ratios, derived from aerial thresholds measured in the presence of octave-band noise, were over 10 dB higher than those measured in pinnipeds, suggesting that sea otters are not especially well-adapted for extracting acoustic signals from noise compared to other amphibious marine carnivores.

Population status of humpback whales migrating past New Zealand

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The recovery of humpback whales in New Zealand waters is poorly understood since the cessation of commercial whaling in 1964 with the closure of the last whaling station in Tory Channel. Stocks had been so diminished that humpback whales were no longer migrating through Cook Strait. The first modern day dedicated land and boat-based surveys were undertaken from 2004-2012 to investigate the recovery of humpback whales in New Zealand waters during their peak northward migration period. Attempts were made to replicate historical (pre-1960's) surveys undertaken by Dr William Dawbin including the use of ex-whalers as spotters to collect direct counts for comparison with historical data. Collection of photo identification (n=122) and skin samples (n=193) for mark-recapture analysis of population size were also undertaken. The low number of photo identification (n=1) and genetic resights (n=2) within Cook Strait over nine years indicate an open population and no ability to derive an accurate population estimate. Direct counts have been very low (2 whales per 9 hours) with little indication of any increase for eight years, until 2012 when they dramatically increased to 5 whales per 9 hours. This suggests there is a slow recovery of humpback whales migrating through Cook Strait after almost 50 years of protection. This population has not demonstrated any significant trend in abundance which contradicts the recovery seen in most other humpback whale populations worldwide. This is of interest for conservation management of this population especially given the threat of proposed scientific whaling by Japan in the Ross Sea, which will almost certainly be some of the same whales migrating past New Zealand.