pronounced. Within the CCE, summer/fall models have been developed based on multiple surveys that capture some of the temporal oceanographic variability. In this study we evaluate whether such summer/fall models can inform species predictions during winter/spring periods. Generalized additive models were constructed to predict animal density for four cetacean species known to have year-round occurrence in waters off California: common dolphins (*Delphinus* spp.), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*), northern right whale dolphin (*Lissodelphis borealis*), and Dall's porpoise (*Phocoenoides dalli*) based on six summer/fall surveys conducted during 1991-2008. Predictor variables included a combination of temporally dynamic remotely sensed environmental variables and geographically fixed variables. Models were selected based on Akaike's Information Criterion and predictive power within the summer/fall period, and evaluated based on observations during winter/spring aerial surveys. Across-season predictive ability was examined quantitatively using observed:predicted density ratios, nonparametric Spearman rank correlation tests ($\alpha = 0.05$), and visual inspection of predicted and observed distributions by species. Seasonal geographic patterns of species density were captured effectively for most species, although some limitations of the models were evident, particularly when the original summer/fall data did not adequately capture winter/spring habitat conditions.

The efficacy of management interventions in response to decline in relative abundance of bottlenose dolphins (*Tursiops* sp.) in Shark Bay, Western Australia

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When evaluating impacts of human activities on cetaceans, adequate research design, spatio-temporal scale, and baseline data for comparative analysis are generally lacking. The current study examines changes in bottlenose dolphin abundance in Shark Bay, Australia (8855 dolphin group encounters, 1988-2011) across five consecutive ~4.5-year time periods: no dolphin-watch tourism (T0), one tour boat (T1), two periods with two tour boats (T2;T3) and lastly back to one tour boat (T4). Previously we documented a significant decline (14.9% per km^2) in dolphin abundance within the tourism site compared with adjacent 36-km^2 control sites when tour operations increased from one (T1) to two boats (T2) (Cons Bio 2006, Bejder *et al*.). Subsequently, a ministerial decision allowed both licensed operators to continue their tours, but with two primary conditions: 1) only one operator was licensed to interact with dolphins within the tourism site; the second was permitted to transit through the site to interact with dolphins outside the area; and 2) GPS "black boxes" were installed on both tour-boats, which download GPS coordinates every minute to track movements. Here, we examine dolphin abundance during T3 and T4. Using the same modelling techniques as in the original study, and 2847 additional group encounters, analyses indicate no significant change in dolphin abundance within the tourism site before (T3; +4.6% per km^2; 95% CI=−5.7 to 22.2) and after (T4; -6.8% per km^2; 95% CI=−27.1 to 27.3) management intervention. Four years of black box data (2007-2011; 650,000 GPS coordinates) showed a reduction in the total amount of time tour operators spent within the tourism site after management intervention (T4). Results suggest that the declining trajectory in dolphin abundance previously reported had halted during T3 (prior to management) but that the original number of dolphins present prior to tourism (T0) has not been re-established.

Whisker growth dynamics: a validated approach for assigning timescales to stable isotope analyses

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The extensive foraging migrations of many pinniped species discourage the use of traditional methodologies (e.g. scat analysis) for dietary reconstruction. Stable isotope analysis (SIA) of serially sub-sampled vibrissae (whiskers) is a common method to investigate pinniped foraging ecology; however, knowledge of tissue synthesis is required to assign accurate timelines to past foraging activity. In some species, whisker synthesis rates slow as the length asymptotes, so equally-sized subsamples for SIA represent differing time-scales. Applying linear growth values to tissues exhibiting non-linear growth would lead to severe misinterpretations of temporal scales represented by serial isotope data. Photogrammetric analysis allows for non-invasive documentation of vibrissae growth and molting patterns in living animals. In this study, we used photogrammetric methods to obtain length measurements of 93 vibrissae over 18 months in a trained, captive northern elephant seal (*Mirounga angustirostris*). Vibrissae exhibited consistent asymptotic growth that was regulated by three von Bertalanffy growth function parameters: (1) initial time of growth, (2) asymptotic length and (3) a species-specific curvature constant. Unfortunately, photogrammetry does not account for the portion of vibrissae contained within the follicle. To correct for this photogrammetric underestimation, we constructed a linear correction model by correlating photogrammetric estimates to direct vibrissae measurements in three deceased northern elephant seals. Lastly, we quantified $\delta^{13}C$ and $\delta^{15}N$ ratios in archived blood, vibrissae, and prey samples from the captive seal. $\delta^{13}C$ and $\delta^{15}N$ ratios fluctuated along the length of each analyzed vibrissae, but exhibited similar values when matched to appropriate time scales based on length-specific curvature values. The vibrissae growth rates calculated from this captive seal are a key component in placing SIA data from vibrissae of wild pinnipeds within appropriate time frames. This study is the first to use vibrissae growth dynamics for appropriate interpretation of isotopic ratios in the northern elephant seal.

Red Queens or tumbleweeds? Studying harbour porpoise behaviour in tidal-stream environments

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There is increasing interest in developing tidal-stream environments (with current speeds ≥3m/s) for renewable energy generation. The behaviour of marine mammals at small spatiotemporal scales in such environments is emerging as an important component of the regulatory consenting process. A key problem is lack of understanding regarding preferred animal positioning in tidal currents, specifically whether animals orientate to the stationary seabed vs. the moving water column. This could significantly bias survey design. To study how harbour porpoises (*Phocoena phocoena*) orientate in tidal currents, we developed a method involving multiple platforms: sea-bed moored and passively drifting with the current. We simultaneously deployed these with passive acoustic porpoise click detectors (C-PODs) within small and large tidal-stream systems off western Scotland (Kyle Rhea and Gulf of Corryvreckan respectively) over seven periods in 2010-2012. With porpoises contained within a moving body of water, encounter durations (minutes) were expected to vary between