of four criteria, and the distinctiveness of individuals was based on unique markings on the dorsal fin. High quality dorsal fin photographs were used to identify 105 distinctively marked individuals (DMIs). Estimates of the number of individuals in each encountered group were obtained using closed population mark-recapture models and ranged from 30 to 389 (CV 0.63 and 0.47, respectively; median = 276). Photographs of DMIs from each group were compared and there was no evidence of interchange between groups encountered at different islands. The results of our analysis suggest that melon-headed whales utilize specific nearshore habitat that puts them at risk from a variety of anthropogenic effects such as fishery and tourism operations. Our study provides the first step in establishing a photo-identification catalog to characterize these local communities and to provide new information crucial for the preservation and conservation of melon-headed whales in the Marquesas Islands.

Large localised differences in prey of New Zealand sea lions (*Phocarctos hookeri*) at Stewart Island

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New Zealand sea lions (*Phocarctos hookeri*) frequent shorelines of eastern Stewart Island, New Zealand, including Port Pegasus, a large harbour with an area c. 40 km^2. Prey represented in 60 scat samples from Port Pegasus were compared with 119 scat samples collected elsewhere within 20 km of the entrance to Port Pegasus from 26 January to 3 February 2013. Scat analyses indicate relative importance among fish prey species in pinniped diets. Diagnostic prey remains were identified and enumerated, with estimates for prey length and mass calculated from reference collections of potential prey. A percentage index of relative importance (%IRI) was calculated for each prey species using a combination of frequency of occurrence, number and mass of prey. Wrasse (Labridae), nearshore demersal fishes, predominated among Port Pegasus samples (58%IRI), but were unimportant elsewhere (1%IRI). Redbait (*Emmelichthys nitidus*), an offshore pelagic fish, predominated among samples from elsewhere (51%IRI) but was distinctly less important among Port Pegasus samples (16%IRI). The only other species with ≥10%IRI from either set of scat samples were two demersal fish species with distributions extending from inshore to the edge of the continental shelf: rough skate (*Raja nasuta*), with 16%IRI from Port Pegasus and 34% from elsewhere, and red cod (*Pseudophycis bachus*) with 5%IRI and 10%IRI, respectively. Another 32 prey species were recorded but together accounted for only 5%IRI for both sets of samples. The prevalence of wrasse in scats from sea lions ashore within Port Pegasus indicated that most of these individuals foraged within the harbour, whereas the prevalence of redbait from most sea lions along the adjacent coastline indicated foraging at sea across the continental shelf. These large differences in prey through a relatively small spatial range highlighted the importance of collecting samples from a variety of sites in order to produce a representative assessment of diet.

Effect of Danish operating wind farms on seal movements

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Globally, the maritime generation of energy from the wind is rapidly increasing. At the same time there is both public and legislative concern about potential detrimental effects to marine. The current uncertainty in being able to predict any such effects hinders appropriate and efficient regulatory decisions. Operating wind farms may attract marine mammals through the formation of a 'reef effect'. Conversely, their operating noise may deter. To resolve this question, a study of seal movements was conducted near Nysted and Rødsand II wind farms in southern Denmark. Very high resolution track (mean 43.3 GPS locations/day) and dive behaviour data were obtained from five harbour (Phoca vitulina) and five grey (Halichoerus grypus) seals over an average duration of 160 days using SMRU GPS/GSM tags. Both species frequently transited from two haulout sites through the two nearby (< 5km) wind farms. The effect of the wind farms on movements was assessed in three ways: 1. residence times within wind farm zones, 2. a comparison of path speed and tortuosity inside and outside the wind farms and 3. the proximity of individual locations to individual wind farm towers. All three analyses indicated no significant effect of the wind farms on seal behaviour. This is in accord with another local study of haulout counts that concluded that the wind farms had no long term effect on the local seal population trends. Furthermore the current harbour seal foraging areas tally with historic data collected before these wind farms were constructed. Whilst caution is urged in extrapolating these findings to all wind farms and to other seals colonies, this study demonstrates robustly that these operating wind farms have minimal impact of the movements of grey and harbour seals from a neighbouring colony.

Resource Selection Function Analyses: Assessing habitatuse relative to behavior and resource characteristics/availability for fivecommon marine mammal species in the Southern California Bight

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In 2008-2012, fifteen aerial surveys of systematic line-transects were conducted in the Southern California Bight to monitor and obtain baseline data on occurrence, distribution, density, abundance and behavior of marine mammals. Site characteristics at marine mammal locations were analyzed by estimating Resource Selection Functions (RSF) which quantified and described baseline habitat use as a precursor to assessing potential changes in these patterns relative to anthropogenic activities, including Navy exercises. For RSF analyses, characteristics at marine mammal locations were contrasted to characteristics at 35,167 randomly selected "available" locations in the study area. RSFs were estimated via the use-availability approach and predicted probability of species occurrence at all locations in the study area as a function of seven covariate habitat variables. Models for five species (n = 60 fin and 40 gray whale groups, 135 Risso's and 31 bottlenose dolphin groups, 157 California sea lion groups) were fit for three behavior states (mill, rest/slow travel, medium/fast travel) and all behavior combined to document behavior and habitat associations. Species differed in habitat use and corresponding habitat associations. For example, medium-fast traveling fin whales were significantly associated with deep water over relatively flat basins/plateaus (p=0.0017). Fin whales also had significantly higher probability of using the San Nicolas Basin (p=0.0517). For Risso's dolphins, rest/slow travel was associated with deeper water (i.e., steep ridges) (p=0.0803). These patterns suggest fast movement across basins and rest/slow travel over ridges. The RSF approach has been successfully implemented for terrestrial systems, quantitatively documenting changes in habitat-use patterns in response to human activities. Results herein illustrate successful application of RSF to pelagic marine mammals, quantitatively considering the role of behavior in habitat selection. Data provide an important 5-year baseline for little-known species to compare potential future changes in habitat selection patterns, assisting in

conservation/management decisions in a relatively high-anthropogenic use area.

How to Dive Deep: Heart Rate and Stroke Rate in Diving California Sea Lions

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Heart rate, peripheral blood flow distribution and muscle workload are the primary determinants of the rate and pattern of oxygen store utilization and ultimately breath-hold duration. We investigated dive heart rate and stroke rate in five California sea lions (*Zalophus californianus*) during maternal foraging trips by instrumenting them with digital electrocardiogram loggers and time / depth / 3-axis acceleration data loggers. Sea lions displayed a true bradycardia with a mean dive f_H (total heartbeats/duration) of 48 beats min^{-1}, significantly less than resting f_H (62 +/- 11 beats min^{-1}); both dive f_H and minimum instantaneous f_H significantly decreased with increasing dive duration. Typical instantaneous f_H profiles of deep dives (> 100 m) consisted of 1) an initial rapid decline in f_H resulting in the lowest instantaneous f_H of the dive at the end of decent, often below 10 beats min^{-1} in dives longer than 6 min in duration, 2) a slight increase in f_H to ~ 20-40 beats min^{-1} during the bottom portion of the dive, and 3) a gradual increase in f_H during ascent with a rapid increase prior to surfacing. Initial high flipper stroke rates during deep dives rapidly declined to zero, indicating that sea lions glided during the latter portion of descent. Stroke rate was low during the bottom phase of the dive, and increased slightly but fluctuated during ascent. There was no correlation between f_H and stroke rate during these latter phases of the dive. Extreme bradycardia during descent should conserve both blood and lung oxygen stores, as well as limit nitrogen absorption at depth. Because heart rate is not coupled with stroke rate, muscle presumably relies primarily upon myoglobin-bound oxygen for energy metabolism, which is probably low due to prolonged gliding and low stroke rates throughout most of the dive.

Changes in Sperm Whale Acoustic Behavior in the Northern Gulf of Mexico Following the Deepwater Horizon Oil Spill

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Sperm whales (Physeter macrocephalus) are one of the top predators in the Gulf of Mexico ecosystem, and the health of their population is critical to the Gulf of Mexico community. These whales use sound for a variety of functions, and their vocalizations are well-studied, highly distinguishable, produced regularly, and can be detected at relatively long ranges. We used passive acoustic monitoring techniques to record sperm whale calls in the Northern Gulf of Mexico, and to infer sperm whale behavior from these stereotyped vocalization patterns. We then used these behaviors to measure changes in the time budgets of foraging and social behavior of sperm whales in order to understand behavioral patterns over time in this region. Autonomous recording units recorded sound in three locations in the Northern Gulf of Mexico in July-August of 2010 and 2011. Sperm whale vocalizations were identified between 0 and 3500 Hz in the recorded sound to establish hourly presence in the area. Four types of sperm whale vocalizations – usual clicks, codas, slow clicks, and social buzzes – were identified in each hour and classified as either social or foraging behavior. We developed an Acoustic Activity Index to represent time budgets of social and foraging behavior based on the hourly occurrence of calls. We found 39% higher vocal activity of sperm whales in 2011 than in 2010 across all three sites. Additionally, the proportion of hours with social calls to hours with foraging vocalizations doubled between 2010 and 2011. This difference indicates that sperm whales had a higher foraging budget in 2010 than in 2011, which suggests that sperm whales spent less time socializing and more time foraging in the period immediately following the 2010 BP Deepwater Horizon oil spill than in the following year.

Are Vibrissae of Northern Elephant Seals Viable Sensory Structures for Prey Capture?

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Little is known about the tactics northern elephant seals (NES) use to capture prey due to the difficulties in observing these animals underwater. NES are deep divers (up to 1600m) and are known to forage both diurnally and nocturnally. Although NES have increased visual sensitivity in deep water, vision is likely a limited sensory modality. Pinnipeds can follow hydrodynamic trails using their vibrissae, and are highly sensitive to water velocity changes. These cues are likely important to NES chasing prey in deep, dark habitats. In lieu of performance data, vibrissal innervation can be used as a proxy for sensitivity. Although comparative data are few, seals average 1000-1600 axons per vibrissa (5-8 times > terrestrial mammals). To test the hypothesis that NES vibrissae have similar organization and increased innervation as other pinnipeds, we collected vibrissae from the ventral-caudal mystacial field from nine individuals. Vibrissae were sectioned and stained for microstructure (Trichrome) and innervation (Bodian silver stain). Vibrissal follicles possessed trabecular lower and upper cavernous sinuses separated by a ring sinus that included a large ringwulst. The upper cavernous sinus was the largest of the three and no innervation was observed. The deep vibrissal nerve penetrated the follicular capsule at the base, branched into several bundles and coursed through the lower cavernous sinus to the ringwulst and upper ring sinus. Smaller branches in the lower cavernous sinus left the main bundles to presumably innervate mechanoreceptors in that region. Axons in the ring sinus terminated in the ringwulst and apically along the inner conical body. NES possessed an average of 1610 axons per vibrissa and an average of 101 vibrissae. We estimate that approximately 162,610 axons innervate the entire mystacial vibrissal array. The results support the hypothesis that NES vibrissae are highly sensitive and likely are an important sensory modality for prey capture.

Interactions between bottlenose dolphins (*Tursiops truncatus)* and crab fisheries near Sarasota, Florida, USA

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Marine mammal interactions with commercial and recreational fishing activity are a management concern due to the potential for animals to become injured or killed by fishing gear. During photographic identification surveys of the long-term resident Sarasota Bay bottlenose dolphin community from 1993-2013, we documented 80 observations of dolphin interactions with fixed fishing gear (i.e. crab traps) utilized in commercial or recreational blue and stone crab fisheries. Interactions included: 1) repeated diving near crab pots without associated surface foraging behavior (52%), 2) probable or confirmed feeding behavior focused around crab pots (37%), 3) direct physical contact with trap lines and floats (9%), and 4) temporary entanglements (2%). 59 individuals representing all