of marine protected areas. In the equatorial Pacific, El Nino Southern Oscillation (ENSO) events can affect the food web by altering primary productivity related to patterns of seasonal upwelling. The temporal availability of food for marine mammals within the Galápagos Marine Reserve (GMR) may be affected by ENSO events. As apex predators, killer whales (*Orcinus orca)* in the GMR are potentially responsive to temporal variation in prey availability. If food resources are not available year-round, residency by killer whales may be less likely than transient use of resource pulses. We used meta-analysis to evaluate two sets of GMR killer whale sighting data (n=157) spanning a twenty-year time frame collected via opportunistic sightings by an observer network and shipboard line-transect surveys. We tested (a) the correlation between the total annual killer whale sightings and the Multivariate ENSO Index and (b) the association between killer whale sightings, the ENSO index, and seasonal upwelling. Sightings were roughly evenly distributed between non-upwelling (58%) and upwelling seasons (July-December). We found no direct correlation between killer whale sightings and the ENSO index. Killer whales were sighted more often than expected by chance during the peak upwelling months of August-November when the ENSO index was within one standard deviation of the average (binomial z=2.80, p=0.05). These results do not suggest a strong pattern of seasonal occupancy and indicate an alternative pattern such as a single resident population, multiple resident and transient populations, or that killer whales observed in the GMR are part of a population inhabiting the eastern tropical Pacific region that visit the GMR at various times. Our results provide additional evidence for the hypothesis that killer whales in the GMR are opportunistic foragers utilizing multiple prey sources.

Additional drag forces and associated energetic requirements of an entangled right whale

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Large whales swimming entangled in fishing gear are often subject to emaciation by reduced foraging capacity and the increased energetic demand imposed by towing accessory gear. We estimate the drag forces experienced by a right whale (Catalog number Eg#3911) based on its body proportions, and the additional drag experienced and energetic demand required under various phases of its entanglement. Three sets of gear were towed off a 7.3m Carolina Skiff from anchor points at the surface and at 2m depth (consistent with the animal's body depth); approximately 24.93 m of 1.12 cm diameter floating line removed from Eg#3911 in a disentanglement procedure on January 15 2011, this line with an A3 Polyform buoy (42.5cm diameter) and an NB60 Scanmarin buoy (45.4cm diameter) as attached during the disentanglement, and 160m of 0.89cm sinking line. An MLP-100 load cell tensiometer measured drag forces at multiple boat speeds. Mean drag forces (N) were consistently though not significantly greater at all speeds with buoys attached. There was no significant difference in the slope of the power curves of mean drag force and tow speed for surface and bottom tow points. Speed-specific drag values were then plotted against speed; drag effects of sinkline and gear-only configurations at both tow points are proportionate across speeds. Increasing values at higher velocities for gear and buoy configurations at the surface, and a significantly non-zero slope for gear and buoy configuration from the bottom tow point suggest buoys have a disproportionate effect on drag across velocities. The percent increase in power demand (watts) required by Eg#3911 to overcome additional drag forces imposed by various gear configurations ranged from 10 – 125% at speeds of 0.75 – 2.9m/s. Such estimates are crucial in understanding the effects of entanglement aside from direct injury, and the energetic demands associated with gear.

Changes in Abundance, Density and Diversity of Marine Mammals in the Southern California Bight 1998-1999 vs. 2008-2011

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Twelve line-transect aerial surveys occurred during fall/summer 2008-2011 to monitor the occurrence, abundance and behavior of marine mammals in the Southern California Bight. The study area overlapped where Carretta et al. (2000) flew surveys in 1998-1999, coinciding with their "warm-water period". Density and abundance were estimated using standard line transect methods and DISTANCE software. Analyses were limited to 12,206 km flown in Beaufort 0-4 conditions and 495 marine mammal sightings of the seven most commonly observed species. Blue whale densities were all well below historical estimates. Fin whales continue to be the most commonly abundant large whale. Risso's dolphins have apparently dramatically increasedin numbers and/or distribution over the last several decades: calculateddensity east of San Clemente Island (SCI) was 19.99 animals/100 km^2.This is much higher than those for Carretta et al.'s warm season, but similarto those they estimated for the cold season. Our densities of common dolphinswere lower than Carretta et al.'s warm-water season (318.99 animals/100 km^{2}east of and 58.43 animals/100 km^2 west of SCI). However, short-beaked common dolphins were still by far the most abundant species (~29,044 individuals). Historically, Pacific white-sided dolphins were seen only in the cold-water season, but we had 26 sightings (density 19.7 individuals/100 km2) in the warm-water period. Pilot whales, though historically common, were never seen. Results indicate that recent patterns of cetacean relative abundance and presence are, in many cases, very different from historical records. This is likely related to previous exploitation and depletion of these species and long-term changes in oceanographic conditions, concomitant changes in prey distribution and densities, and anomalous El Niño and La Niña events. This study provides the only available recent estimates of abundance for marine mammal species east and west of San Clemente Island where the U.S. Navy conducts major training exercises.

Estimation of United States Total Annual Removal of Pacific Walrus due to Subsistence Harvest

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The U.S. Fish and Wildlife Service (Service) has management authority over Pacific walrus (*Odobenus rosmarus divergens*) in the United States. The Service requires walrus hunters to self-report harvest of walrus and present tusks for tagging within 30 days. This is accomplished through the Marking, Tagging, and Reporting Program (MTRP), which utilizes a network of local data collectors in each walrus hunting community in Alaska. The Service also conducts the Walrus Harvest Monitor Project (WHMP) in the two largest U.S. walrus hunting communities of Gambell and Savoonga on St. Lawrence Island, Alaska. The WHMP is an observer based real-time harvest data collection program. Even though a harvest is recorded