

an associated increase in shipping activity and a rapidly recovering population of whales, ship strikes with breeding humpback whales are likely to be an emerging issue in Australia.

Comparisons of the behavioral ecology of three delphinid and three baleen whale species: Risks and rewards of group living

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The behavioral ecology of offshore delphinids and baleen whales is poorly known. A comparative approach was used to assess group size and behavior versus risks/rewards of group living in the Southern California Bight, U.S.. Scan sampling/photographs/video documented first-observed group size, maximum nearest-neighbor distance (MNND - in body lengths [BL]), and behavior state during 72,467 km of aerial surveys between 2008-2012. Regression modeling analyses involved 566 common, 293 Risso's and 96 bottlenose dolphin groups and 115 fin, 78 gray and 62 blue whale groups. Species body size, group size, and MNND were correlated. Group size, MNND and behavior state were significantly influenced by species, sub-region, calf presence, time of day/year, water depth, and/or slope/aspect. Group size was significantly larger for common dolphin sp. (combined) (277.1) vs. bottlenose (19.2) and Risso's (18.4) and with calf presence. MNND was significantly less for commons (5.1 BL) vs. Risso's (6.7). Group size was larger for grays (2.2) vs. fins (1.6) and blues (1.7). Gray MNND (1.5) was significantly closer than fins (5.1) and blues (12.6). Risso's groups were observed resting 13 times more often (38%) than commons (3%). Smaller group size and more daytime resting of Risso's match presumed nocturnal foraging patterns of this species. Larger tighter groups and frequent daytime foraging of commons match clumped high-density schooling fish distribution. Larger tighter common and gray whale groups match presumed higher predation pressure associated with smaller relative body size. Results indicate species ecological diversion in the same habitat in response to differing predation pressure and food resource availability as predicted by terrestrial mammal group-living patterns. Data lend insight into baseline behavior and ecological triggers influencing behavior. This information is needed to differentiate potential impacts of anthropogenic sources. Larger group size benefits include reduced predation pressure and improved prey detection/mate access, at the risk of increased resource competition.

Potential cumulative impacts of swim-with activities on dwarf minke whales

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Worldwide, concerns about potential negative impacts of whale-watching tourism are growing and numerous studies have shown short- and long-term consequences of human activities. Swim-with whales programs in particular present special management challenges and such activities are considered by the International Whaling Commission as potentially "highly invasive". We investigated the potential cumulative impacts of permitted dive-tourism on dwarf minke whales using photo-identification data collected on board nine vessels involved in

swim-with programs in the northern Great Barrier Reef. Of the whales identified in 2006 (195 whales) and 2007 (171 whales), around one third interacted at least twice with vessels and swimmers over the course of a season (29% and 33% in 2006 and 2007, respectively). The estimated size of the interacting population was relatively small: 449 + s.e. 68 whales in 2006, and 342 + s.e. 62 whales in 2007. Individual whales stayed in the interacting population for a relatively short time, with the mean time interval between first and last sighting being eight or ten days in 2006 and 2007, respectively. This finding indicated regular immigration into and emigration from the interacting population, which are characteristics of an open population. There was considerable individual variation in recorded cumulative interaction durations within a season, varying from just over an hour to nearly 42 hours. These findings raise concerns about potential cumulative impacts of the swim-with whales activity on some individual dwarf minke whales and helps inform the sustainable management of the industry.

Measuring Cetacean Responses to Military Sonar: Behavioral Response Studies in southern California (SOCAL-BRS)

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SOCAL-BRS is a multi-team collaboration designed to increase understanding of marine mammal behavior and provide a more robust scientific basis for estimating risk and minimizing effects of active, mid-frequency military sonar systems. The research team includes interdisciplinary expertise in marine mammal biology, behavior, and communication, as well as underwater acoustics, engineering, and biostatistics. Three field seasons were conducted involving visual observations, passive acoustic monitoring, animal-attached acoustic and movement tags, photo ID, biopsy, and controlled sound exposure methods on over 20 cetacean species in biologically important areas throughout the southern California Bight. Ninety-six individuals of ten species were tagged with six tag types, including two species [Baird's beaked whale (*Berardius bairdii*), Risso's dolphin (*Grampus griseus*)] that had not been previously studied using such monitoring tools. Fifty-six controlled sound exposure experiments were conducted using specific protocols and protective measures to ensure animals were not harmed. Several sound types, including simulated military sonar, were projected through a deployed sound source from a research vessel and changes in vocal, diving, and horizontal movement behavior were measured. Results to date indicate that Cuvier's beaked whales (*Ziphius cavirostris*) react most strongly to simulated sonar exposures with clear changes in vocal and diving behavior indicating avoidance responses at quite low received sound levels. Blue whale (*Balaenoptera musculus*) responses are more variable and depend on complex interactions of exposure conditions and individual behavioral state. Ongoing efforts include expanding sample sizes in other species using simulated sounds and the novel experimental use of operational Navy mid-frequency sonar systems.