

within 8-10 km of the recorder. These changes in vocal behaviour occurred when broadband levels exceeded 95–98 dB (HF) re 1 mPa. In Koluktoo Bay, knock rates increased slightly when a ship was within 12 km of the recorder. High and low whistle call rates decreased when a ship was within 9-10 km of the recorder. Broadband levels in Koluktoo Bay remained low regardless of shipping activity, never exceeding 10 dB above ambient levels. The insensitivity of narwhal hearing at low frequencies and the blocking of sound transmission by headlands along the inlet likely contribute to the absence of behavioural vocal changes until the ships were within 10 km.

Anticipatory and overnight whistling behaviour of bottlenose dolphins in human care

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Bottlenose dolphins are highly social marine mammals and vocal communication is an important way in which they maintain contact. They are the most common cetacean found in human care, and are therefore one of the most studied of the cetacean species. Nevertheless, their overnight vocal activity is not very well understood. One method to analyse change in vocal behaviour is to look at change in whistle production over time. Whistles are a major component of their vocal repertoire and are primarily used to indicate heightened excitement, arousal or stress. The set routines of a dolphinarium can result in anticipatory behaviour in the dolphins and understanding the changes in whistle behaviour in response to this could be a valuable animal welfare tool for dolphin-keeping facilities. Continuous overnight recordings were collected over 24 nights in May, July and August 2018 from 17:00 to 7:00 at the uShaka Sea World dolphinarium, Durban, South Africa. A signature whistle catalogue of 10 known signatures was created, eight of which were confidently allocated to eight of the 10 individuals. Whistle production was measured using total signature whistle counts as well as counts of other non-signature whistle categories. Preliminary results indicate an obvious trend in whistle production during pre-feeding, feeding and post-feeding activities, which suggests an increase in whistle production in response to the anticipation of the morning feed. Further results will indicate whether this trend is statistically sound using

generalised additive models, and give the first account of nocturnal vocal behaviour of the dolphins at uShaka Sea World.

Occurrence and pathologies associated with foreign body ingestion in stranded cetaceans, Canary Islands.

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One of the major concerns in aquatic environment is the impact of marine litter. Plastic is the most prevalent item within marine litter and not only affects the chemical quality of the water but also impacts marine organisms. Currently, the presence of debris ingestion has been reported all over the world in different marine species, though little is known in cetaceans. In this research, we study the occurrence and pathologies associated with the presence of foreign bodies (FB) in stranded cetaceans in the Canary Islands during a sixteen years period (n = 465). Fifteen species were affected by FBs including eight out of the nine year-round species in the archipelago. A total of 36 individuals (7.74%; 36/465) presented at least one FB, being plastic the most common item found

(80.56%). Deep divers were the most affected group with *Grampus griseus* as the most affected species followed by *Physeter macrocephalus* and beaked whales. Two individuals of baleen whales were also affected (*Balaenoptera physalus* and *B. acutorostrata*). Ingestion of debris was lethal in 36.11% (13/36) of the cases presenting lesions such as stomatitis, bleeding ulcers, gastritis, perforations and impactions. As previous reports, no lesions were found in ten individuals which presented ingested FB. This is the first forensic study that, based on statistical analysis, define two risk factors for FB ingestion (poor body condition and deep diving behavior) and a protective factor (adult age).

Environmental factors affecting the Irrawaddy dolphin (*Orcaella brevirostris*) distribution in the Mahakam River, East Kalimantan.

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The Mahakam River in East Kalimantan, Indonesia, is typical of other tropical rivers in Southeast Asia but is distinguished by a riverine population of the iconic Irrawaddy dolphins, known locally as *Pesut*. Like many other tropical rivers in Southeast Asia, the Mahakam River is also facing problems from rapid development in rural areas, characterised by a massive conversion of peatland forest to oil palm plantation, an increasing number of mining activities, and ongoing development of settlements. These developments are likely to have had both direct and indirect effects on *Pesut*.

Water quality parameters and land use type from sites in the upper, middle, and lower sections of the Mahakam River were used to quantify relationships with between broadscale catchment land-use changes and river habitat changes while anthropogenic factors such as fishing pressure and other forms of human disturbance were also assessed in relation to dolphin distribution. The objectives of this analysis were to (i) quantify changes in water quality in relation to land use, (ii) investigate the key environmental factors associated with *Pesut* distribution and abundance in the Mahakam River, and (iii) integrate these findings with other information on dolphin ecology to make recommendations that support dolphin conservation management.

Over 1996–2017, the land use in the sub-catchments of government water quality monitoring sites demonstrated changes that reflected increasing concentration on total dissolved solids (TDS), followed by nitrite (NO₂-N) and sulphate (SO₄). The middle reach of the Mahakam River was indicated as the primary habitat for *Pesut*. Several land-use related water quality parameters appeared to influence dolphin distribution through indirect effects on prey distribution. Accordingly, conservation management of Irrawaddy dolphins in the Mahakam River should focus on factors influencing prey species productivity in the river, such as the formation of fish reserves.

Evidence for factors that shift virus from endemic to outbreak in ongoing circulation of both IAV and PDV within pinnipeds of the Northwest Atlantic

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The Northwest Atlantic has been a hotspot for pinniped viral infections for at least half a century. Of the 9 virus associated unusual mortality events that have been documented globally in pinnipeds, 6 have occurred in the Gulf of Maine. Each of the mortality events has been attributed to either Influenza A Virus (IAV) or Phocine Distemper Virus (PDV) and in both systems, it has generally been thought that unique seeding events initiated each outbreak. A