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Short Note

Mortalities of Southern Right Whales (*Eubalaena australis*) in a Subtropical Wintering Ground, Southeast Queensland

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Southern right whales (*Eubalaena australis*) migrate from high latitude (e.g., sub-Antarctic) feeding grounds to lower latitude breeding grounds in the austral winter each year (Bannister, 1986; Dawbin, 1986; Burnell & Bryden, 1997; Bannister et al., 1999; Carroll et al., 2011). The coastal waters of southern Australia (north to 34° S on the east coast to 29° S on the west coast) are recognised as over-wintering grounds for two genetic populations of *E. australis* (Kemper et al., 1997; Carroll et al., 2011). The larger *southwest* population migrates north along the west coast of Tasmania, then heads towards calving grounds off Western Australian and Head of the Bight (southern Australian) regions (Burnell & Bryden, 1997; Bannister, 2001; Burnell, 2001, 2008). A significantly smaller *southeast* group migrates along the east Tasmanian coast and uses calving grounds in Victoria (including Warrnambool) and New South Wales (NSW) (Kemper et al., 1997; Carroll et al., 2011). As these southern Australian populations continue to recover post-whaling, they have extended their winter ranges and recolonised coastal bays within their historical distribution and/or within new areas (Allen & Bejder, 2003). Newer wintering grounds or stopover sites during migration for the southeast population include embayments along the entire NSW coast (including Sydney Harbour) and into southern Queensland (Chilvers, 2000; Noad, 2000) and as far north as Hervey Bay (Brigden, 2001; Franklin & Burns, 2005). The sheltered waters of Moreton Bay off Brisbane have hosted small groups of *E. australis*, including cow–calf pairs, intermittently since 1998 (Natalie Reed & John Esdaile, QPWS, pers. comm. to HJ, 15 April 2015; Chilvers, 2000; Allen & Bejder, 2003), suggesting that this area is now a regular subtropical wintering ground. However, as whales (re)colonise these new areas, they face modern levels of anthropogenic threats, including habitat degradation and disturbance, principally from coastal development; vessel traffic (Vanderlaan & Taggart, 2006); and net, fishing gear, or float/buoy entanglement (Allen & Bejder, 2003; Kemper et al., 2008). This note reports on the first recorded mortalities of *E. australis* in Queensland in the winters of 2013 and 2014.

On 26 August 2013, the body of a 15-m adult female *E. australis* was sighted by Marine Parks officers, floating approximately 500 m offshore from Wurtulla Beach, Sunshine Coast (latitude -26° 44.54' S, longitude 153° 08.53' E). No other right whales were recorded in the area. The animal was towed away from the shore by the coast guard but later entered the North West Shipping Channel and washed ashore on the northern end of Bribie Island on 30 August 2013 (latitude -26° 50.50' S, longitude 153° 07.75' E) (Figure 1a). There were no obvious external signs of injury, although only the ventral side was visible as the animal had washed ashore on its back. It was also badly decomposed and had lost all baleen and some caudal vertebrae. The skeletal material along with tissue samples were retrieved by the Queensland Museum, registered as QMJM20043, and the cleaned skull was reconstructed. The skull showed breakages at the base of the rostrum and through the back of the skull, cutting at an angle through the frontal bone, into the brain case to the occipital condyle (Figure 1b). The rostral break can be attributed to the immense pressure above from the weight of the tongue and mandibles on the arched bones, which pushed these sideways. However, the trauma to the posterior of the skull (Figure 1b) was a severe straight slice through thick bone and, given that the animal was sighted in the shipping channel, may indicate an impact injury from a large propeller blade. Whether this occurred *pre-* or *postmortem* is unclear.

Figure 1. Adult *E. australis* recovered from Bribie Island, Queensland, in August 2013: (a) whale carcass *in situ* (Photo credit: Lou Coles, QPWS); and (b) ventral view of reconstructed skull showing clean strike through right brain (arrowed). Note that the rostrum was fractured *postmortem* due to the weight of the tongue on the upside-down skull.

On 15 August 2014 at ~0530 h, two *E. australis* were struck by a west-bound passenger ferry just north of Goat Island in Moreton Bay (latitude -27° 30.6' S, longitude 153° 22.2' E). Reports from observers onboard the vessel suggest that a third whale may have been present (D. Burns, pers. comm. to JML, 16 August 2014). Two whales sustained massive propeller injuries, and one of these died as a result. The dead *E. australis* was a 7.1-m female (calf-sized but not neonate), suggesting that it may have been a calf from the previous season (Figures 2a & 2b). The boat strike injury consisted of 10 long, deep parallel propeller cuts (15 to 20 cm spacings) across the head and cranial right dorsum (Figure 2a). Nine lacerations penetrated the entire outer body wall and entered the underlying cranium and viscera. The severity of the injury, including incursion into the cranium, suggested that instant death was likely. The second *E. australis* to be struck was an adult in close contact with the calf, possibly its mother. This whale sustained obvious multiple propeller cuts to its body but may have survived the injury. Four hours after the ship strike, one of the authors (JML) observed a live *E. australis* at 27° 33' 59" S, 153° 19' 5" E, just north of Coochiemudlo Island and 4.3 nmi (8 km) southwest of the site of the ship strike. It is unknown if this sighting was the last recorded of the live injured whale (in the local area) or one of another group. The dead whale calf was towed to the intertidal mud flat of Peel Island for necropsy on 16 August (Figure 2a). Blubber, baleen (Figure 2b), and tissue samples were collected and registered into the Queensland Museum database (QMJM20617). No further carcasses were recovered from the Moreton Bay region.

Small numbers of *E. australis* have been visiting southern Queensland intermittently for at least 17 consecutive winters, but it is only in these recent years that mortalities have been recorded. As far as we know, these are the first mortalities of this species ever recorded in Queensland waters. That vessel strike caused the death of one and possibly both of these whales is of grave concern. Of all the "great" whales, right whales are arguably most prone to ship strike due to their surface resting and feeding behaviours, slow swim speed, limited hearing range (Terhune & Verboom, 1999; Verboom, 2002), and consequent lack of response to vessel approach (Best et al., 2001; Nowacek et al., 2004). The related North Atlantic right whale (*Eubalaena glacialis*) is among the most endangered whales in the world, and vessel strike is the single greatest threat to its survival (Vanderlaan & Taggart, 2007; Perrin, 2012).

Although *E. australis* is currently classified globally as a marine mammal species of *least concern* (International Union for Conservation of Nature [IUCN], 2014), the Australian "population," estimated at ~3,500, is listed as *endangered* under the Commonwealth *Environment Protection and Biodiversity Conservation Act of 1999* (EPBC Act) (Department of Sustainability, Environment, Water, Population and Communities [DSEWPC], 2012). While the southwest Australian genetic population is growing, the southeast Australian group of *E. australis* remains small (probably numbering tens of animals; Carroll et al., 2011) and, consequently, is likely to be the most vulnerable. Its listing as *critically endangered* (Department of Sustainability and Environment [DES], 2013) may be more realistic. In Queensland, right whales are protected under the Nature Conservation Act of 1992. The number of nonfatal injuries and mortalities from anthropogenic incidents in Australia has increased four-fold since the mid-1970s, and this is thought to be a significant factor limiting population growth (Kemper et al., 2008).

Currently, there is little understanding of the extent of critical habitat, including migration corridors, for *E. australis*; and there are no whale sanctuaries along the southeastern Australian coast nor regulations in place to mitigate the risk of lethal ship injury to this species. As new and potentially critical *E. australis* habitat is identified (e.g., Moreton Bay in southern Queensland), it is imperative that agencies charged with conservation of this species consider appropriate protective measures. While entanglement (in fishing gear, lines and nets associated with crustacean pots, and float and buoy lines) has been identified as the major threat to Australian right whales elsewhere (Kemper et al., 2008), it is significant that the first death(s) in Queensland waters come from vessel strikes. While the number of vessel collisions with right whales in Australian waters remains small compared to populations elsewhere, it is critical that this threat be recognised. Increased awareness by mariners is key as behaviours presented by right whales differ from the more abundant migrating humpback whales (*Megaptera novaeangliae*) that vessels are acquainted with during winter. Other measures may include vessel speed and route restrictions in certain areas during the winter breeding seasons as is practiced for North Atlantic right whales (Russell et al., 2001; Ward-Geiger et al., 2005; Vanderlaan & Taggart, 2007; Schick et al., 2009; Mullen et al., 2013). As *E. australis* expands its range along the eastern Australian seaboard, including into areas of busy vessel traffic, the risk of lethal injury through vessel strike is likely to increase. Management strategies must reduce this overlap between vessels and whales. Further monitoring also is required to determine distribution, calving activity, and residence

Figure 2. Immature *E. australis* recovered from Moreton Bay, Queensland, in August 2014: (a) anterior view of head showing propeller injury to anterior right of cranium (Photo credit: Darren Burns, QYAC); and (b) baleen plates (with 50-cm scale bar) indicate it is a very young animal; calves are born with ~9-cm-long plates which grow to 70 cm (including gum) in a yearling (Best, 2007).

periods in any new aggregation areas utilised by right whales along the Queensland coast in the future.

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