Aquatic Mammals 2012, *38*(4), 418-422, DOI 10.1578/AM.38.4.2012.418

Short Note

Seaweed Interactions by Humpback Whales (*Megaptera novaeangliae*): A Form of Object Play?

Kylie Owen,[1] Rebecca Dunlop,[1] and David Donnelly[1, 2]

[1] *Cetacean Ecology and Acoustics Laboratory, School of Veterinary Science, University of Queensland, Gatton Campus, QLD, Australia, 4343*
E-mail: kylie.owen@uqconnect.edu.au
[2] *Dolphin Research Institute, PO Box 77, Hastings, VIC, Australia, 3915*

Cetaceans have been shown to use a range of natural and manmade objects such as kelp, bubbles, sponges, coconuts, nets, rope, and even other animals for a potential number of reasons that are yet to be properly investigated. The function of the use of these objects has been proposed to range from tool use (Smolker et al., 1997; Parra, 2007), to socio-sexual displays (Martin et al., 2008), epimeletic behaviour (Fertl & Fulling, 2007), and object play (Payne, 1972; Würsig et al., 1989; Bloom, 1991; Miles & Herzing, 2003). However, the function of object use in cetaceans is often difficult to determine given the sporadic occurrence of such behaviour and difficulties in observing behaviour under water.

Reports of object use by cetaceans are far more prevalent for odontocetes than for mysticetes. For example, sticks, branches, and clumps of grass are believed to be used as a socio-sexual display in Amazon River dolphins (*Inia geoffrensis*) (Martin et al., 2008). Additionally, bottlenose dolphins (*Tursiops* sp.) in north Western Australia have been shown to use sponges on their rostrum as a form of tool use to assist with foraging in the sand (Smolker et al., 1997), and there is some evidence that Indo-Pacific humpback dolphins (*Sousa chinensis*) may do the same (Parra, 2007). Many dolphin species have been shown to use seaweed as a form of object play, passing the seaweed between their melon, pectoral fins, and tail flukes and even between members of a pod (Würsig & Würsig, 1979, 1980; Bloom, 1991; Miles & Herzing, 2003; Kuczaj & Yeater, 2007).

Unpublished anecdotal observations of humpback whales (*Megaptera novaeangliae*) interacting with seaweed appear to be relatively common, yet there is no attention paid to the function and characteristics of this behaviour in the literature. Consequently, the reason for such behaviour is not yet fully understood. Herein, the authors present what is believed to be the first published account of three instances of humpback whales interacting with seaweed. These observations provide the basis for the first discussion of the likely reason for this behaviour in this species.

All observations were made opportunistically off the coast of Eden, New South Wales, Australia by two of the authors (KO and DD) while conducting research on humpback whale feeding behaviour during their southward migration between the Great Barrier Reef breeding grounds and the Antarctic feeding grounds. The observations were made from a 5.5-m rigid hulled inflatable boat. Photographs were taken using digital SLR cameras and an underwater housed GoPro video camera mounted on a ski pole, which was held off the side of the vessel to collect underwater images of the behaviour. Observations were made by the naked eye, through the camera lens, and through the review of underwater video footage.

The first observation was made on 16 September 2011. In this case, the animal involved was a subadult humpback whale that had a D-tag attached to it prior to the observations and, as a consequence, was the subject of a focal follow lasting just over 2 h. The tag was on the animal at the time observations were made. At the time of tag deployment (approximately 1230 h), the whale was part of a group of three whales feeding on krill. The focal animal split from the group approximately 15 min after tagging and continued feeding alone until 1312 h. At 1333 h, it was noted that there was an Australian fur seal (*Arctocephalus pusillus*) close to the focal animal which the whale appeared to start to follow. By 1338 h, it was noted that the seal often surfaced just in front of the whale's rostrum. By this point, the whale's behaviour was very surface-orientated, with repeated rolling and spy hopping observed. At 1347 h, the whale spy hopped and rotated 360° with rostrum

out and vertical in the water column. A piece of seaweed (*Phyllospora comosa*) was sighted in the water beside the whale. At 1348 h, the authors noticed the whale had the seaweed in its mouth (exterior to the baleen plates), and it began to roll and made snake-like movements at the surface before draping the seaweed across its head. After 3 min, the whale dropped the seaweed and moved directly towards another piece of seaweed which it again grasped in its mouth. This was quickly followed by a spy hop with the seaweed draped over the head of the whale. The whale then rolled and dropped the seaweed, only to retrieve it on its pectoral fin and dive with it draped over the fin. After another 2 min of interacting with the seaweed, the whale dropped it and appeared to swim away but then turned around and came back to the seaweed. It continued to grab the seaweed in its mouth and logged at the surface with it draped over its back. During this time interacting with the seaweed, the whale made a number of trumpeted (tonal) blows. The last time the whale was seen interacting with the seaweed was 1400 h, and the interaction lasted 12 min. By 1406 h, the whale was back to feeding alone. No other whales were in visual range at the time of these observations. The focal whale was determined to be a male by visual inspection of the genital region during rolling behaviour at the surface, confirming the absence of a hemispherical lobe immediately anterior to the genital slit as is present in females (Glockner, 1983).

Two additional observations were made on 22 September 2011. The first of these was a short observation during a focal follow. In this instance, the animal was a nontagged subadult whale. The animal had been observed feeding with another whale for half an hour on patches of krill. At 0914 h, 12 min after the last feeding lunge was observed, the whale picked up a piece of seaweed (species was also *P. comosa*) in its mouth and manipulated the seaweed at the surface. It then dropped the seaweed in a position that allowed it to slide down its back. The two animals then continued to travel east further offshore. No change in the behaviour of the second whale was evident as a result of the first whale picking up the piece of seaweed. The sex of both whales is unknown.

Later that day, at 1054 h, we observed another whale interacting with seaweed (species was again *P. comosa*) with no other whales in visual range. This whale was identified to be a subadult male (from visual inspection of the genital region), and he had been observed feeding at 0900 h, 1 h and 54 min prior to being observed interacting with the seaweed. This whale exhibited similar behaviour to the two previous whales with the animal swimming around with the seaweed on its pectoral fin (Figure 1 A), picking up the seaweed in its mouth (Figure 1 B & C), and draping the seaweed over its back (Figure 1 D). We left the whale when it moved away from the seaweed at 1123 h—almost half an hour after we encountered the whale already interacting with the seaweed.

Our observations are very similar to those made by Payne (1972) of southern right whales (*Eubalaena australis*) interacting with seaweed: the whales lifting the seaweed with their heads, sliding the seaweed along their backs, and manipulating the seaweed with their pectoral fins. Other mysticete species have also been reported to interact with objects. Bowhead whales (*Balaena mysticetus*) in the Beaufort Sea have been seen to interact with logs up to 10 m long (Würsig et al., 1989). During these interactions, the whales nudged the logs, lifted them with their back, and even laid belly up with the log clasped between their pectoral fins. In both of these interactions, this behaviour was deemed to be object play behaviour.

To the best of our knowledge, there are no currently published reports of humpback whales interacting with seaweed. However, humpback whales have been reported to interact with objects other than seaweed. For example, in Hawaii, a juvenile female humpback whale was observed for over an hour to be passing a piece of cargo netting between her pectoral fin and rostrum. She then continued this behaviour with a piece of rope (Deakos et al., 2010). This behaviour has similarities to the behaviour described herein with an object being passed between the mouth and pectoral fins. Also in Hawaii, a humpback whale has been observed to lift a bottlenose dolphin (*Tursiops truncatus*) completely out of the water. This observation was concluded to be the result of social play by the dolphins and a form of object play by the whale (Deakos et al., 2010). A humpback whale was also observed overturning a turtle that appeared to be suffering from buoyancy issues. This interaction was hypothesised to be a form of epimeletic or care-giving behaviour by the whale (Fertl & Fulling, 2007). It seems that a regular conclusion drawn from mysticetes interacting with objects is that for them it is play behaviour.

Play behaviour has been observed in a number of different animal phyla and is prevalent within mammals. In a recent review, play was defined as behaviour that is (1) not obviously functional; (2) voluntary, spontaneous, and self-rewarding in nature; (3) different structurally or temporally from other obviously functional behaviours; (4) repeated during the life span of the animal; and (5) initiated when the animal is in a favourable situation (well-fed, safe from predators). It can be divided into three different types: (1) locomotor play (leaping, running), (2) social play (directed towards another living animal), and (3) object play (directed towards an inanimate object) (Burghardt, 2005).

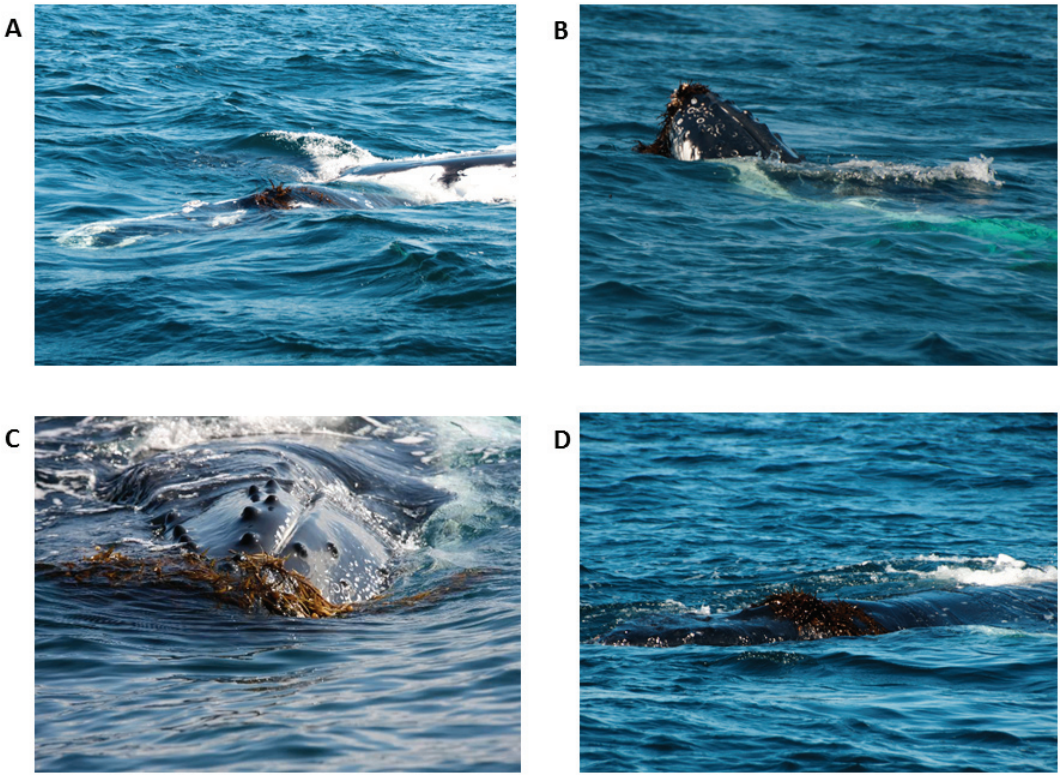

Figure 1. Seaweed interactions by humpback whales. (A) The whale dives with the seaweed on its left pectoral fin; (B) the whale raises its head out of the water with the seaweed in its mouth; (C) the whale pushes the seaweed around while swimming with the seaweed in its mouth; and (D) the whale drops the seaweed and rises below it so that the seaweed is placed on top of its head.

This definition fits well with the observations described herein of seaweed interactions in humpback whales. During these interactions, there appeared to be no obvious functional gain (e.g., prey capture, mating success, or communication benefits) that the whale could be receiving from the interaction. Additionally, the behaviour started with no other obvious prompt other than the whale locating a piece of seaweed. The fact that two of our three observations occurred when no other whales were in visual range suggests that this behaviour was self-rewarding and was not used as a form of social display as there were no conspecifics around to witness the display. Additionally, in the one instance where a second whale was present, no change in behaviour was observed in the second animal. While interacting with the seaweed, the animal stayed in the one location, and no feeding lunges were observed, suggesting that seaweed interactions were distinct from other observed behaviours such as feeding and travelling. In all three instances, the animal had been observed feeding prior to the seaweed interaction (36 min, 12 min, and 1 h 54 min, respectively). In the study area the main predation threats towards humpback whales come from killer whales (*Orcinus orca*) and, given the presumably low population size of this predator, predation levels on humpback whales in this area are believed to be relatively low. Consequently, it is likely that the animals were all in favourable situations (well-fed and safe from predators) at the initiation of the behaviour. All of our observations came from subadult animals, so it is difficult to comment on the likelihood that this behaviour occurs at different life stages of individual animals. However, a calf has been observed interacting with seaweed (also *P. comosa*) for approximately 1 h in the same area as these observations with very similar behaviour to what was observed in the subadults (D. Donnelly, pers. comm., 29 March 2012) (Figure 2). It is therefore possible that this behaviour does occur throughout different stages of the individual humpback whales' lives. We therefore conclude that object play appears to be the most likely explanation for seaweed interactions in humpback whales.

Figure 2. A humpback whale calf interacting with seaweed off Eden, New South Wales, Australia

However, whether or not these interactions are determined to be play behaviour does not provide us with information on the specific function of the behaviour. Given that *play behaviour* is thought to provide a mechanism for animals to perfect motor skills (Paulos et al., 2010), is it possible that the whales interact with the seaweed to learn how to manipulate objects? If so, what function does this level of object manipulation serve to the humpback whales' later life stages?

Another possible explanation for the play behaviour is that the whales interact with the seaweed because they enjoy the sensation of the seaweed on their skin similar to killer whales rubbing themselves on pebble beaches (Ford, 1989). Additionally, cow/calf pairs of many whale species often make physical contact, and the fact that only subadults and a calf were observed interacting with seaweed may suggest that young animals could be seeking out tactile stimulation that is no longer provided by a conspecific. Mysticete whales are believed to have a well-developed sense of touch, with many vibrissae and dermal receptors located around the lower jaw and head area and a smaller amount located in other parts of the body (Tinker, 1988). It is therefore possible that objects such as seaweed are interacted with for the sensation they create. In addition to tactile stimulation, the seaweed may be used to assist with shedding skin and ectoparasites similar to belugas (*Delphinapterus leucas*) in northern Canada that use rocky estuaries as a place to rub on the bottom (Smith et al., 1992). Perhaps the unsuitable bottom type present in some locations means that whales have to seek out floating objects to elicit the same sensation or result.

These observations are believed to represent the first published description of humpback whales interacting with seaweed. While a likely reason for this behaviour appears to be object play, the function of such behaviour still remains unknown, and future research documenting the age class, gender, and situations in which this behaviour is observed is recommended. Additionally, potential correlations between feeding behaviour and seaweed interactions should be investigated further as should similarities between the tactile stimulation provided by seaweed and that of humpback whale cows to their calves. Such studies will assist in increasing our understanding of the function of interactions with seaweed and other objects in humpback whales.

Acknowledgments

The authors would like to acknowledge Dr. Michael Noad and the staff and students of the Cetacean Ecology and Acoustics Laboratory for their support and Scott Sheehan for his assistance on the research vessel. In addition, thank you to the Australian Marine Mammal Centre for providing the funding for the project during which these opportunistic observations were made. Thanks to Cat Balou Whale Watching Cruises and the Sapphire Coast Marine Discovery Centre for their ongoing support in the field. These observations were conducted under Permit Numbers 2011-0002 and SL100183.

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