A new VHF tag and attachment technique for small cetaceans

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Introduction

Telemetry studies offer unique insights into the ways in which cetaceans use their aquatic habitat (e.g. Martin & da Silva, 1998; Hooker & Baird, 1999). For small cetaceans, tags are either deployed remotely (Hanson & Baird, 1998; Schneider et al., 1998; Stone et al., 1998) or attached to animals that are captured and released (Scott et al., 1990; Martin & Smith, 1992; Martin et al., 1994). Capture and handling allows tags to be attached to animals for periods of weeks or months. Tags have been bolted through animals’ dorsal fins (Irvine et al., 1982; Scott et al., 1990), attached using harnesses (Tanaka, 1987; Tanaka et al., 1997), attached to narwhal tusks, Memelmann macrocerus (Martin et al., 1994; Dietz & Heide-Jőgensen, 1995), and attached to dorsal edges of behugas, Delphinapterus leucas, and Amazon river dolphins, Inia geoffrensis (Martin & Smith, 1992; Martin & de Silva, 1998).

Advances in electronics have seen a dramatic reduction in the size of telemetry packages, allowing radio-tagging of small marine animals, for example little penguins, Eudyptula minor (Collins et al., 1999). Boiling large radio packages to dorsal fins has caused discolouration, necrosis, and migration of bolts out of the dorsal fin (Irvine et al., 1982). Tags that harm animals are counterproductive to research not only from the damage to animals, but also because abnormal behaviour by a tagged animal could yield misleading results for research (Scott et al., 1990).

Material and Methods

Here, we describe a new attachment technique for a compact radio tag on inshore bottlenose dolphins, Tursiops aduncus, in Moreton Bay, southeast Queensland, Australia (27°15’S, 153°17’E). This technique was used to attach the tags to dolphins in November 1997. The observed short and long term reactions, and minimal dorsal fin damage from the tagging technique are discussed.

Keywords: radio telemetry, VHF, bottlenose dolphin, Tursiops aduncus, Australia.

Abstract

The use of telemetry in cetacean research has steadily increased in recent years. The type of tag used, the attachment technique, and the lengths of deployment vary greatly, affecting the behaviour and information collected from tagged animals. A new VHF tag was trialled on the inshore bottlenose dolphins (Tursiops aduncus) of Moreton Bay, Australia, using a new attachment technique. Tags were attached to three female bottlenose dolphins in November 1997. The observed short and long term reactions, and minimal dorsal fin damage from the tagging technique are discussed.

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passed through the needle from the bevelled end, before the needle was withdrawn (Fig. 2). The line was then looped around a 22 mm mild steel washer with the rim filed down to 3 mm width (Australian Standard mild steel washer are plated with a minimum of 40 μm zinc and have an approximate carbon content of 28%), and threaded back through the dorsal fin (Fig. 3). The free end of each line was crimped onto itself with a size 3 non-corrosive leader sleeve. Washers were anticipated to corrode in seawater over approximately three months, allowing the tag to pull out. This estimation was based on observed corrosion rates of washers used by professional fishermen within Moreton Bay (L. Nash & P. Skinner, pers. com.). The tag housing and the washer had a 9 mm neoprene backing (wetsuit material), to reduce chafing against the dolphin’s skin (Fig. 3). Dolphins were freeze-branded on both sides of the dorsal fin, anterior to the tag position, using stainless-steel branding irons cooled in liquid nitrogen and applied to the skin for 10 sec (Barnhardt, 1996).

Tagged animals were tracked for up to 45 days and photographed from a 5.8 m rigid-hulled inflatable boat or from land. Tracking was attempted once every two days until all transmitters ceased operation. Dolphins were not sighted or a radio signal received on every occasion. Animals were tracked using a Model CE12 receiver (Custom Electronics, Urbana, USA), with an omnidirectional and Yagi (directional) antenna (Vertrack). From January to December 1998, animals were located by their identifiable freeze-brands and photographed during ad libitum surveys.

Results
Five bottlenose dolphins were caught. Two adult females with calves were caught together on 17 November, and a single adult female was caught on 19 November. VHF tags were attached to the three adult females, and they were freeze branded Q1, Q13 and Q15, respectively. The larger calf was also freeze branded Q12, but neither calf was tagged.

Of the three tags, Q13’s tag transmitted for 45 days with seven fixes and 19 sightings in 12 months. Q13’s tag was last heard on 29 December 1997 and her next sighting was on 14 March 1998, so tag detachment occurred between 46 and 117 days after attachment. Q11’s tag stopped transmitting after two days but Q11 and her calf was subsequently sighted 8 times in total in 12 months, always in association with Q13 and calf. Q11 was last seen with the tag attached on 25 December 1997, 38 days after attachment, and was not sighted again until 28 September 1998, so no
realistic estimate of tag detachment time could be made. Q15 was radio-tracked 6 h after tagging, but was then neither re-sighted nor heard from for five months. Q15 was subsequently reighted 14 times over 12 months. Q15's first sighting, which was without her tag, was 150 days after attachment. Receiving range of the tags from the boat at sea level in calm sea conditions (Beaufort <3) with the omnidirectional antennae was approximately 3.5 km. Damage to the animal's dorsal fins was minimal. After the tags were shed, Q13 and Q11 had one nick each in the lower back edge of their fins, while Q15 showed no marks from her tag (Fig. 4).

Discussion

Dolphins' short-term reactions to capture and tagging vary. Both Irvine et al. (1982) and Mate et al. (1995) reported long-distance movements (10 to 15 km) of some tagged bottlenose dolphins immediately after release. In contrast, Martin and da Silva (1998) reported that post-capture behaviour changes were limited to a few minutes after release for Amazon river dolphins, if any occurred at all.

Animals in our study showed limited short-term reactions to tagging, with Q11, Q13 and calves seen close to their capture site within a week of capture. Q13 was seen 6 h after tagging, within 1 km from her capture site, behaving normally and showing no wariness of our vessel.

Long-term reactions and dorsal fin damage from tagging were reported by Irvine et al. (1982), with two of 10 VHF tagged dolphins developing abnormal swimming. Irvine et al. (1982) also reported five animals showed dorsal fin damage from bolts ripping out, including one dolphin losing the tip of its dorsal fin due to births and tag migration. One of three tagged calves in our study (Q13) spent more time swimming on the surface with her tagged dorsal fin visible, than she did after the tag dropped off. This behaviour was not observed from Q11. The nicks in Q11s and Q13s dorsal fins indicate that the tag wash may corrode unevenly. This appears to result in one mono filament strand being left attached and possibly pulling out of the rear of the dorsal fin (Fig. 4). However, this result was not observed on Q15's dorsal fin, so variability between washers may be expected. In the months after capture, tagged animals exhibited no apparent wariness towards boats. It was not determined if Q15's absence from the surveyed area after tagging was due to a reaction to tagging or the possibility that she was tagged at the limit of her normal summer range which extended outside the usual survey range.

The ability to attach tags successfully, the length of attachment and ability to receive transmissions from tags were comparable from other reported tags using bolts (see review Scott et al., 1990), with two tags known minimum attachment length being 38 and 45 days, and minimum transmission of 45 days for one tag. A consideration for the future use of this technique is that the wash corrosion time will vary between environments, particularly in relation to water temperature and salinity. Therefore, we recommend corrosion rates be undertaken in all areas when using this technique.

This study suggests that this technique can be used to attach small VHF transmitters to bottlenose dolphins, indicating less damage to dorsal fins, but with similar attachment periods, to other bolted tag attachments. The attachment of these tags is simple, appears to be less intrusive and inexpensive to attach, and caused negligible damage to the dorsal fin.

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**Literature Cited**


