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A NEW TAG FOR IDENTIFYING SEALS

Many studies in marine mammal ecology and biology rely on being able to identify individual animals. This has been achieved using a number of temporary or permanent marking techniques or by being able to identify animals from their natural markings. Flipper tags are generally unsuitable for identifying individuals at sea. Even when animals are hauled out on land they often cannot be approached close enough to allow tag numbers to be read. This may especially be a problem outside the breeding season when seals are easily disturbed into the water. Although brand marks may be more visible on land, they are still poorly visible when animals are at sea and the quality of the marks obtained is often variable (Pomeroy *et al.* 1999). The technique of photo-identification enables large numbers of animals to be "marked" and subsequently "recaptured" when rephotographed. This has been used successfully on female gray seals (*Halichoerus grypus*) from the east coast of the United Kingdom (Hiby 1994) but has the disadvantage that it cannot be used for poorly marked individuals, such as males and juveniles.

To allow seals to be identified when at sea or hauled out on land, we constructed an inexpensive, highly visible plastic tag that can be glued to the hair on top of a seal's head. The tag has a code embossed on it which allows seals to be uniquely identified. We initially designed it for weaned gray seal pups (Fig. 1) but the tag has subsequently been produced for general use by Daltons Animal Identification Systems Ltd (Henley-on-Thames, Oxford, UK) and has been deployed on adult harbor seals (*Phoca vitulina*) in the UK and California.[1] It is made from high impact styrene, which is strong enough to withstand abrasion. It can be produced in several bright colors and has a large two-digit letter or number cypher embossed on each side. Further information (such as a contact telephone number for finders of shed tags) can also be added. The tag is filled with a resin filler mixture of a polyester casting resin (Norpol 342-510, Jacobson Chemicals Ltd, Farnham, Surrey, UK) and microspheres (Armospheres, Jacobson Chemicals Ltd) which make it buoyant and impervious to pressure. It weighs 30 g when out of the water and can be glued to a seal's head with a variety of quick-setting epoxies. Approximately 5–8 ml of glue is required for each tag. Holes in the tag's base allow glue to flow out and provide a more secure attachment (Fig. 2). The tags are lost when the animals molt, and this may limit their use on species that have a prolonged molt. We were able to recapture some animals after tagging and observed that a small proportion of tags were slightly detached. Some were also worn such that the cyphers were becoming illegible. However, this was largely on those recaptured six months after tagging.

The tag may increase hydrodynamic drag, but its effect on the seal's foraging

[1] Personal communication from Jennifer Burns, Institute of Marine Science, EMSA-316, University of California, Santa Cruz, CA 95064, U.S.A., July 1998.

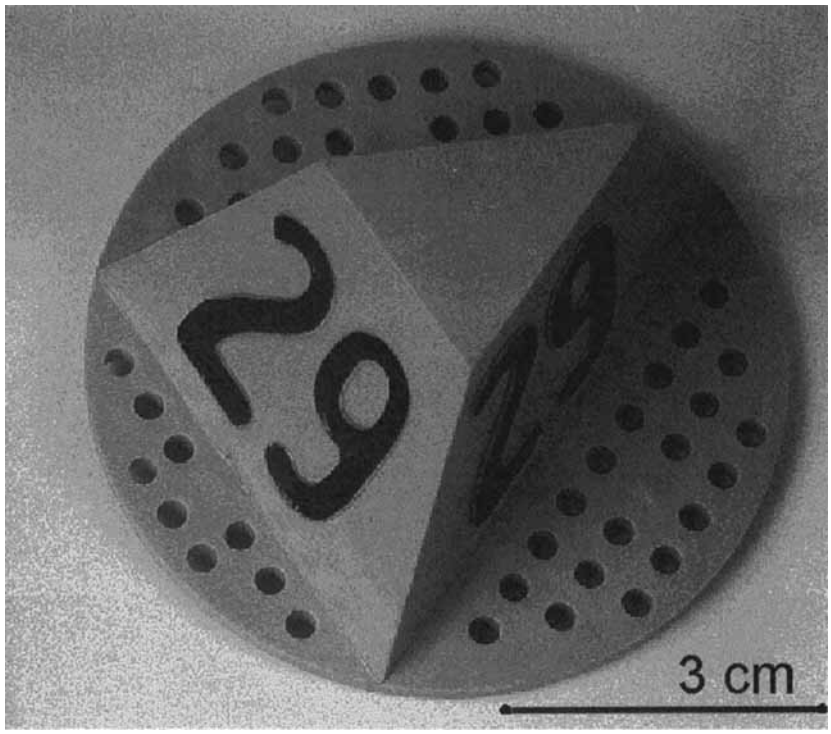

Figure 1. A new tag for the individual identification of seals. The base of the tag is 6.4 cm in diameter and the height is 3.6 cm.

behavior is difficult to assess. However, they have also been used on rehabilitated gray seal pups[2] and a number of these animals were kept and observed in a pool for several days before being released. No effects on diving or any evidence of discomfort and distress were seen, although how this equates with the likely effects when animals are at sea remains difficult to determine. From observations on animals in captivity and in the wild, untagged conspecifics did not appear to react differently to their tagged counterparts. There is the possibility the tags could attract increased attention from fishermen, particularly in areas where seal and fishery interactions are a problem. Although we are not able to assess this question fully in our study, none of the dead tagged seals we have examined had bullet wounds.

We tagged 206 weaned gray seal pups at the Isle of May (Firth of Forth, Scotland) in order to estimate first-year survival from subsequent resights. Animals were lightly sedated with a 1.0–2.0-mg dose of Zoletil (Virbac, France), before the tags were applied. If necessary, the fur was dried with

[2] Personal communication from I. Robinson, Royal Society for the Prevention of Cruelty to Animals, Norfolk Wildlife Hospital, Station Road, East Winch, King's Lynn, Norfolk PE32 1NR, U.K., December 1998.

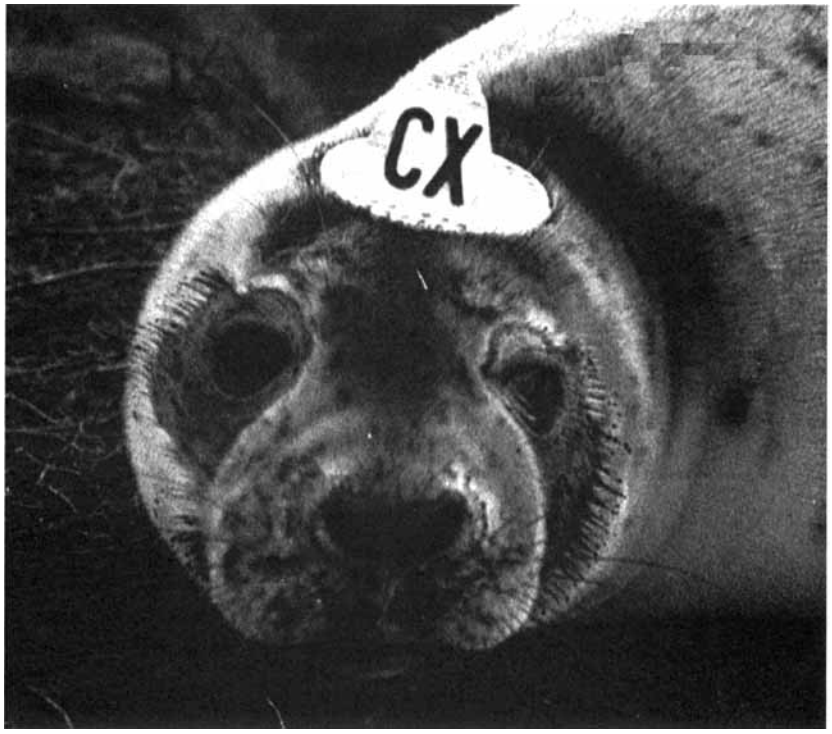

Figure 2. A weaned grey seal pup with the "head" tag glued to its fur.

methylated spirit and degreased with acetone to ensure the glue bonded to the fur. Total handling times were usually less than 10 min.

Ninety-seven of the 206 pups (47%) from the Isle of May were later seen at or near the haul-out sites on the east coast of the UK over the next year. Ten tags were later recovered, and eight dead seals with their tags still attached were found ashore. We estimate the tag loss rate, from the observations of animals with only glue on their heads, to be approximately 7%–10% *per annum.* However, this figure may be subject to bias because of failure to spot "glue-only" seals or due to double counting.

We were able to recognize tagged seals at distances up to 100 m while at sea or on crowded haul-out sites and could read the numbers reliably at distances of up to 50 m with 10 × 50 binoculars. Such recognition allowed us to recapture 28 of the seals while hauled out.

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AILSA HALL, SIMON MOSS and BERNIE MCCONNELL, Sea Mammal Research Unit, NERC, Gatty Marine Laboratory, University of St Andrews, St Andrews, Fife, Scotland, KY16 8LB; e-mail: a.hall@smru.st-andrews.ac.uk. Received 2 February 1999. Accepted 10 June 1999.

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AGE AT FIRST PARTURITION IN A MEDITERRANEAN MONK SEAL MONITORED LONG-TERM

Age at first reproduction is an important parameter in developing models of population dynamics and serves as an index in population management (Fowler and Siniff 1992). Although this parameter has not been studied in the Mediterranean monk seal (*Monachus monachus*), which is a highly endangered species (IUCN 1996), some information is available on age at attainment of sexual maturity (ASM). The earliest estimate ASM for the species was first reported to be 5–6 yr (King 1983), but this was later reduced to 4 yr after examination of the ovaries of a 185-cm female from the Cabo Blanco colony whose age was determined by counting cement layers in the teeth (Marchessaux 1989). In addition, a 198-cm female from the eastern Mediterranean was reported to ovulate at an estimated age of 3–4 yr based on tooth-aging techniques (Cebrian 1993). Sergeant *et al.* (1978) classified females longer than 210 cm as adults.

The lack of reliable data for this parameter has meant that the age at first parturition was assumed to be 5 yr in the demographic model applied to the Cabo Blanco colony when estimating the time to, and probability of, extinction (Durant and Harwood 1992); this is the earliest age of first parturition for the congeneric Hawaiian monk seal (*M. schauinslandi*) (Johanos *et al.* 1994). Iwasa and Atkinson (1996) found that some, but not all, female Hawaiian monk seals were sexually mature at 5 yr. However, because of differences in the reproductive biology of the two species (University of Barcelona 1998), it cannot be assumed that this age is also correct for *M. monachus.*

This report provides the first evidence concerning age at first parturition in the species, based on long-term monitoring of one individual.

The study area was located on the western coast of the Cabo Blanco peninsula (21°02'N, 17°03'W) in western Sahara (see details in González *et al.* 1997), where the only large aggregation of the species occurs. Seals haul out inside large, deep caves along the coast. Females bear their pups throughout