Report

Paul M. Thompson and Philip S. Hammond

The Use of Photography to Monitor Dermal Disease in Wild Bottlenose Dolphins (*Tursiops truncatus*).

There is concern that some populations of small cetaceans have declined as a result of increases in pollution and other human activities in coastal areas. Pollution and other environmental stresses may directly or indirectly increase the susceptibility of dolphins and porpoises to disease. However, few opportunities exist to monitor the health status of cetacean populations. This paper describes skin lesions which were observed on bottlenose dolphins from Scottish waters and suggests that conventional photo-identification studies could be extended to assess the prevalence of dermal disease symptoms in cetacean populations.

INTRODUCTION

It has been suggested that some populations of bottlenose dolphins (*Tursiops truncatus*) have declined in recent years, possibly as a result of increased mortality associated with human activity (1). In particular, coastal bottlenose dolphins have been found to contain high levels of organochlorine residues (2) which, in other mammals, can lead to immuno-suppression (3). The species' coastal habits may also bring dolphins into close contact with discharges of untreated sewage which, in addition to toxic compounds, could contain infective levels of pathogenic organisms transmissible from humans to dolphins (4, 5).

In order to assess whether these or other human impacts affect the health of dolphins, comparative data are required on mortality rates and the incidence of disease in populations from areas of differing water quality and human activity. Mortality rates and other population parameters such as abundance, calving interval and age at first reproduction can be estimated from multiple resightings of individuals identified by photography (6, 7). But, although the infectious diseases found in captive bottlenose dolphins have been studied (8, 9) few data exist on the identity or prevalence of pathogens in wild populations. Indeed, the collection of such data poses many problems. Deliberate live-capture of wild individuals is only practicable under certain conditions, and the few individuals found ashore may not be representative and are often too decomposed for meaningful post-mortem investigations.

This report describes how photo-identification techniques can be extended to record the prevalence of certain signs of disease in bottlenose dolphins, and suggests that these methods could be used to complement other studies of disease in wild cetacean populations.

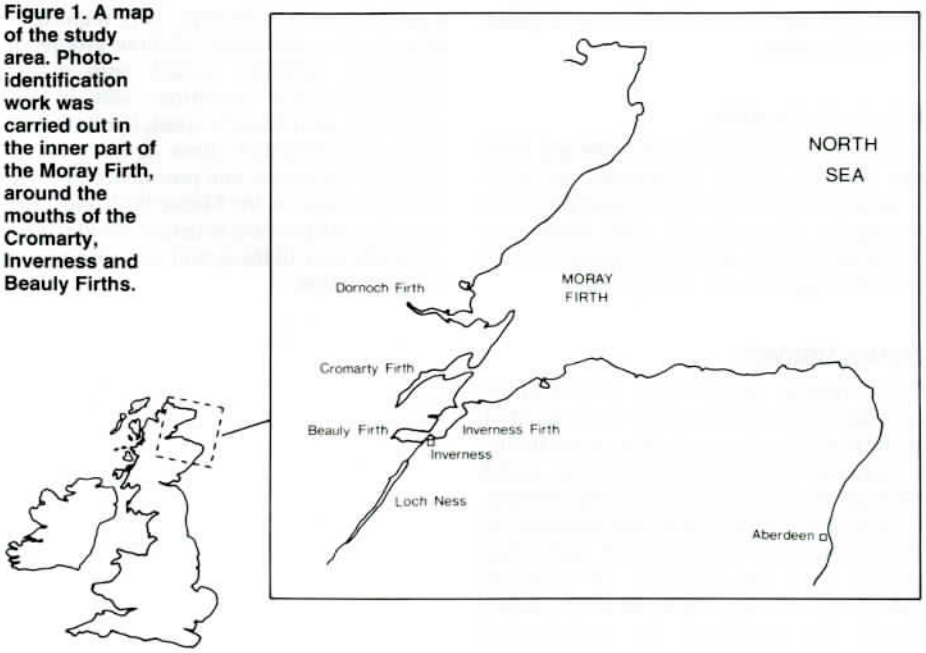

Figure 1. A map of the study area. Photo-identification work was carried out in the inner part of the Moray Firth, around the mouths of the Cromarty, Inverness and Beauly Firths.

METHODS

The study was carried out in NE Scotland, where a resident group of at least 62 bottlenose dolphins (10) occurs in the Moray Firth (Fig. 1). In 1989, a photo-identification study of this population was initiated in order to assess population parameters, group structure and individual movements of dolphins in the firth. Groups were followed from a 5.2 m rigid-hull boat, and photographs taken using an autofocus camera with a 75–300 mm lens and 200 ISO color transparency film. Pictures were later analyzed to identify individual dolphins using a variety of natural marks such as dorsal fin nicks and tooth rakes (7).

RESULTS AND DISCUSSION

During this study, it was noted that many individuals showed evidence of skin patterns or lesions which might be symptomatic of disease. Other conditions such as deformity of body contour were also evident from the photographs. These findings can be summarized as follows.

Dark Lesions

Dark skin lesions were seen on many individuals. Natural skin pigmentation in bottlenose dolphins is variable, and young animals are much paler than adults. Normal color variations on a particular individual are, however, gradual; with darker dorsal areas shading to a paler ventral surface. In contrast, these dark skin lesions were distinct and patchy. In some cases lesions occurred in a reticulate pattern around normal skin. (Fig. 2a). In other cases, lesions formed diffusely encrusted areas across the back and flanks of the animal (Figs 2b, 2c). In general appearance, the dark lesions were similar to descriptions of cutaneous candidiasis in captive cetaceans, where areas

Figure 2. Dark skin lesions on three different dolphins (a, b, c), with one individual (d) with widespread lesions and skin eruptions.

of skin colonized by *Candida* sp. appear darkened and lack the slick texture of normal cetacean skin (11, 12). One individual had much more widespread lesions and apparent skin eruptions (Fig. 2d). It is not known whether or not this represents a more advanced stage of the same condition.

Ring Lesions

Grey ring lesions, estimated to vary in diameter from 1 to 5 cm were occasionally identified from photographs (Fig. 3a) and were observed more closely on a dead adult female (Fig. 3b). Similar lesions on both captive and wild bottlenose dolphins from other areas are known to result from infection by dolphin pox virus (13, 14). Studies in captivity suggest that dolphins infected by pox virus may show no ill effects for years, but that skin lesions tend to appear during periods of stress or illness (14). Although the cause of ring lesions in Moray Firth dolphins is not known, this illustrates how such lesions may be a useful indicator of general health status.

De-pigmentation

Several dolphins exhibited blotchy areas of de-pigmented skin (Fig. 4). De-pigmentation of skin following trauma can occur in land mammals and may be permanent (15). Repeated sightings of one individual confirmed that this pattern remained stable over a period of at least one year. We have found no descriptions of similar skin changes from either captive or wild bottlenose dolphins from other areas.

Injuries/Deformities

Two individuals seen in both 1989 and 1990 had marked dorsal deformities of body contour. Similar deformities have been noted in captive (9) and wild (16) bottlenose dolphins, but data on the prevalence or cause of such conditions are unavailable.

CONCLUSIONS

These results suggest that photographic methods may be useful in the assessment of health in wild bottlenose dolphin populations. Systematic photographic surveys could estimate the prevalence of dermal disease. Longer-term studies could also monitor the development or resolution of individual lesions and the survival of affected individuals. Ideally, more detailed studies should be supported by pathological examinations of stranded animals to identify lesions and their aetiology. Tentative diagnoses may also be possible through further comparative studies of visible lesions with those of known causation in captive animals. Comparative studies in other wild populations would be especially important. In particular, studies of offshore groups of bottlenose dolphins would help assess whether the skin conditions seen in this study may be related to coastal pollution or other environmental stress. Until more is known of the nature and prevalence of these dermal diseases in the Moray Firth and other areas, it is not possible to determine the cause of significance of the conditions observed in this population.

(a)

(b)

Figure 3. Ring lesions (a) on one wild individual and (b) on a stranded adult female.

Figure 4. A dolphin with areas of de-pigmented skin. This individual was photographed in July 1980 and in May 1990 and showed the same areas of de-pigmentation on both occasions.

References and Notes

1. Evans, P.G.H. 1980. Cetaceans in British waters. *Mammal Rev. 10,* 1–15.
2. Morris, R.J., Law, R.J., Allchin, C.R., Kelly, C.A. and Fileman, C.F. 1989. Metals and organochlorines in dolphins and porpoises of Cardigan Bay, West Wales. *Mar. Pollut. Bull. 20,* 512–523.
3. Safe, S. 1984. Polychlorinated biphenyls (PCBs) and polybrominated biphenyls (PBBs): biochemistry, toxicology, and mechanism of action. *CRC Critical Rev. Toxicol. 13,* 319–395.
4. Minette, H.P. 1986. Salmonellosis in the marine environment: a review and commentary. *Int. J. Zoonoses 13,* 71–75.
5. Buck, J.D. 1980. Occurrence of human-associated yeasts in the feces and pool waters of captive bottlenosed dolphins (*Tursiops truncatus*). *J. Wildl. Dis. 16,* 141–149.
6. Hammond, P.S. 1990. Capturing whales on film—estimating cetacean population parameters from individual recognition data. *Mammal Rev. 20,* 17–22.
7. Hammond, P.S., Mizroch, S.A. and Donovan, G.P. 1990. Individual recognition of cetaceans: Use of photo-indentification and other techniques to estimate population parameters. *Report of the International Whaling Commission (Special Issue 12).* IWC, Cambridge.
8. Medway, W. 1980. Some bacterial and mycotic diseases of marine mammals. *J. Am. Vet. Med. Assoc. 177,* 831–834.
9. Sweeney, J.C. and Ridgway, S.H. 1975. Common diseases of small cetaceans. *J. Am. Vet. Med. Assoc. 167,* 533–540.
10. Hammond, P.S. and Thompson, P.M. 1991. Minimum estimate of the number of bottlenose dolphins (*Tursiops truncatus*) in the Moray Firth. *Biol. Conserv. 56,* 79–88.
11. Dunn, J.L., Buck, J.D. and Spotte, S. 1982. Candidiasis in captive cetaceans. *J. Am. Vet. Med. Assoc. 181,* 1316–1321.
12. Nakeeb, S., Targowski, S.P. and Spotte, S. 1977. Chronic cutaneous condidiasis in bottle-nosed dolphins. *J. Am. Vet. Med. Assoc. 171,* 961–965.
13. Flom, J.O. and Houk, E.J. 1979. Morphologic evidence of pox virus in "tattoo" lesions from captive bottlenosed dolphins. *J. Wildl. Dis. 15,* 593–596.
14. Geraci, J.R., Hicks, B.D. and St Aubin, D.J. 1979. Dolphin pox: a skin disease of cetaceans. *Can. J. Comp. Med. 43,* 399–404.
15. Jubb, K.V.F., Kennedy, P.C. and Palmer, N. 1985. *Pathology of Domestic Animals.* Academic Press, London. Vol. 1, p. 431–432.
16. Shane, S.H. 1988. *The Bottlenose Dolphin in the Wild.* West Coast Whale Research Foundation, Felton, Ca.

17. We thank Harry Ross, John Baker, Tero Härkönen and an anonymous referee for their constructive criticism of an earlier draft of this paper, and the British Ecological Society and the Association for the Study of Animal Behaviour for financial support.
18. First submitted October 8, 1990, accepted for publication after revision April 8, 1991.

Dr. Paul Thompson is a research fellow in the University of Aberdeen's Department of Zoology where he works primarily on the population and feeding ecology of common seals in Scottish waters. His address: Lighthouse Field Station, George Street, Cromarty, Ross-shire, IV11 8YJ, Scotland. Dr. Philip Hammond is a principal scientific officer at the NERC's Sea Mammal Research Unit where he is studying various aspects of the ecology of seals and cetaceans. He is also currently vice-chairman of the International Whaling Commission's Scientific Committee. His address: SMRU, c/o British Antarctic Survey, High Cross, Madingley Road, Cambridge, CB3 OET, UK. The authors have been carrying out a study of the ecology of the Moray Firth's resident group of bottlenose dolphins since 1989.