CHAPTER 5

RESEARCH

Research on Captive Cetacea

5.1 As noted in Chapter 4, much of what is currently known about cetacea was discovered either through observations of, or experiments with, cetacea in some oceanaria. These studies have been carried out both by veterinarians or employees of oceanaria and by other interested bodies such as government authorities or university departments using the facilities of oceanaria. Oceanaria have also carried out studies of cetacea in the wild and have built up considerable expertise in rehabilitating stranded cetacea, complementing the work done by government bodies.

5.2 Vancouver Aquarium, for instance, has published a list of all research on wild and captive cetacea carried out between 1975 and 1982 which involved the use of aquarium staff, facilities, materials, animals or funding.

5.3 Hubbs Sea World Research Institute is a non-profit foundation with aquarium and acoustics laboratory which has access to the animals at Sea World oceanarium in San Diego. Among its projects it has co-operated with the Institute of Developmental Biology in Moscow in a study of distinctive natural markings to identify individual cetacea for population studies, done aerial surveys of marine mammals in the Bering Sea, carried out bioacoustic studies for future identification of regional populations of killer whales, pilot whales and several species of dolphins and studied the effects of noise pollution on behaviour of beluga whales in Bristol Bay, Alaska.

5.4 Many of the publications cited in this report were the result of studies carried out on captive cetacea in oceanaria, or in other institutional captive or controlled situations. Knowledge of behaviour, nutritional requirements, communication and reproduction was established through these studies. The United States Navy Department has, over the past 20 years, conducted studies on cetacea at centres in California and Hawaii which have provided information on physiology, anatomy, diseases and diving.

5.5 However, Defran and Pryor, while summarising the available scientific literature on the behaviour of cetacea in captivity, complained that:

> 'given the number and diversity of species that have been maintained in captivity ... one would expect to find a rich literature on species-typical behaviour and on the comparative behaviours of captive cetaceans. Such is far from the case. Relatively little published information is available for captive species and what does exist is heavily weighted toward the bottlenosed dolphin.'[1]

5.6 Knowledge about cetacea has also come from a variety of other sources.

Other Research on Cetacea

Strandings

5.7 Information on aspects of cetacean research such as taxonomy, anatomy, life history, social structure, pathology and diet have been gained from strandings. Strandings can also provide an opportunity for obtaining data on the impact of human activities on cetacea and on marine ecosystems such as heavy

metal and organochloride accumulation. Collation and analysis of stranding records may provide information on patterns and changes in distribution and abundance of cetacea.

Commercially Harvested Cetacea

5.8 Most early knowledge of anatomy, distribution, migration and feeding habits came from commercially harvested cetacea and from observations by whalers. Curtailment of whaling in some countries and high public awareness about preservation of whales has led, more recently, to an increasing emphasis on research on live cetacea.

Benign Research

5.9 Research has recently emphasised benign or non-intrusive methods. At the preparatory meeting held at the Seychelles, May 1983, for the Conference on Non-Consumptive Utilisation of Cetacean Resources, benign research was defined as:

> 'research that does not depend on the human-caused death of wild animals nor involve significant stress or injury to them. This would in principle include research on dead stranded animals, but such research was not thought to be within the scope of this Conference. Regarded, in this context, as a form of non-consumptive utilisation of cetaceans, and to the extent that taking and holding cetaceans in captivity is regarded as non-consumptive, it follows that research on captive animals which meets the above criteria would also be encompassed by the term.'[2]

5.10 A recent application by Sea World of San Diego for a permit to capture 90 orcas for scientific research was considered by many critics to be invasive and cruel because it

involved processes such as stomach lavages, tooth pulling, liver biopsies, tagging, and hearing and eye tests. The orcas were released after the tests.

5.11. Studies of the type carried out on three cetacea at Whipsnade in the United Kingdom, using video and sound recordings, notes and keepers records, could be considered non-intrusive because behaviour was monitored without disturbing the animals.

Wild Cetacea

5.12 Studies on cetacea in the wild are becoming popular as benign forms of research and increasingly effective with advanced technology. Field studies using radio-tracking, static tagging, aerial surveys, photography and observations of naturally marked animals have provided information on diving behaviour, movement patterns, population structure, social behaviour and bioacoustics. Field work is expensive and is often carried out or funded by governments. In the U.S.A., the National Marine Fisheries Service has conducted a range of research programmes. These included a census of the bowhead whale population conducted between 1978 and 1981; a three-year census of grey whales in Alaska, including studies on feeding, ecology, migration and distribution; field studies on humpback whales in Glacier Bay, including an acoustic survey, behaviour of the whales in response to vessels; radio tracking and photographic identification to provide information on distribution, abundance and movements; and information gathering on all cetacea on the north-east region's continental shelf. During the 1970s an assessment of the killer whale populations in British Columbia and Washington State was made by Canadian and United States scientists using photo-identification techniques. The study identified the number of pods and the number of individuals within each pod.

5.13 In Australia, research on cetacea funded by the ANPWS includes: aerial surveys of southern right and humpback whales in Western Australia; aerial and shore-based surveys of humpback whales on the east coast to assess numbers during northward migration and to obtain information on behaviour such as sighting cues, diving time, diving interval and period between blows; and investigations into the incidental catch of small cetacea in gillnet fishing in northern Australian waters.

5.14 Other institutions and individual researchers are also involved with studies on cetacea in Australia. McNamara and Harwood have stated that:

> 'in Australia there is a good deal of scientific interest in cetaceans; scientists in government departments, museums, universities and other institutions are engaged in a range of research programs. The fields being covered include population dynamics and modelling of exploited species, collection and analysis of sightings information on a wide range of species, investigations of interactions between small cetaceans and commercial fishing operations in Australian waters and analysis of historical information on whaling. Some research is also being carried out on cetacean reproduction, taxonomy, anatomy, behaviour and ecology.'[3]

Twenty-seven publications on cetacean research were listed in the 'Australian Progress Report on Cetacean Research, June 1982 to May 1983', presented to the IWC. To date, the only detailed study of the ecology and behaviour of small cetacea in Australian waters was of bottlenose dolphins, by Lear and Bryden.[4]

5.15 Several voluntary whale sighting programmes have been carried out in other countries. Voluntary workers have provided useful information by observing the behaviour of cetacea along the South African coast. The Annual Symposium of the European

Association for Aquatic Mammals, which was held in Germany in March 1985, listed sightings along the coasts of Belgium, France, Monaco, Netherlands, Spain, Sweden and the United Kingdom. Information gained included data on distribution, population status, movements, feeding, group size, size and species.

5.16 A cetacean sanctuary has been established by the IWC in the Indian Ocean. In 1981 a workshop to plan a programme of scientific research in the sanctuary recommended benign research on the biology of cetacea and their role in the marine ecosystem, the establishment of research centres and investigation of 'frontier' areas of cetacean research such as communication, navigation, behaviour and physiology of diving.

Voluntary and Short-term Captivity

5.17 Another research alternative is emerging which is somewhere between captivity and the wild. In the Institute of Delphinial Research, directed by Jean-Paul Forton-Gouin, the dolphins are in direct contact with the sea and are free to come and go as they please. Paul Spong has established a floating 'orcalab' which allows him to observe orcas. Research proposed included pod movement and acoustics, sensory psycho-physiology, language learning, communications, behaviour, diving, frequency of food intake, heart function and body temperature. Norris has suggested a dolphin science sabbatical, a proposal previously foreshadowed by John Lilly, where dolphins would be captured and studied for a short period then released. In 1971, Hubbs Sea World took a grey whale for a year to study then released it again.

Opposition to Research on Captive Cetacea

5.18 Opponents of oceanaria have been critical of research with captive cetacea for four main reasons. Many believe that sufficient research on captive cetacea has already been undertaken. Project Jonah considered that:

> 'increasingly, scientists are realising that the limits of the knowledge to be gained from captive cetaceans have already been reached and that to take understanding of these wonderful creatures any further will necessitate observations in the wild.'[5]

5.19 It has been stated that research on captive cetacea does not benefit cetacea generally. Belford concluded that:

> 'although public service, and research have been said by some to be benefits of keeping captive cetaceans ... few, if any, benefits accrue to wild populations from this research. The public can be equally or better-served by viewing free-ranging animals either directly or on television. I am unaware of any behaviour or nutritional research on captive dolphins which has been directly advantageous for wild animals. To the best of my knowledge, no diseases which can be treated in wild populations have been identified in captive cetaceans.'[6]

5.20 Critics have claimed that studies done on captive cetacea produce distorted results. Pilleri considered that:

> 'even when the only purpose is scientific study - the animals are so physically and psychologically deformed in the process that any discoveries made are distorted and give a thoroughly inadequate picture of true behaviour in the wild.'[7]

Saayman and Tayler have stated:

> 'Studies of captive dolphins have been made possible largely as the result of the establishment of public oceanaria where the primary emphasis is upon commercial display of trained animals. Results derived from such studies may be distorted by a variety of factors. Dolphins unresponsive to training procedures are generally rejected, and the colony therefore does not contain representative samples of animals. Furthermore, the age/sex ratios of normal populations of dolphins are not known and therefore cannot be duplicated in captivity. In many institutions captive conditions are grossly inadequate and the death rate is high ...; thus the possibility of long-term studies on stable populations is often excluded.'[8]

5.21 It is also considered that the potential for adverse effects of captivity on cetacea is likely to outweigh any benefits from research findings obtained. Holt maintained that:

> 'in our view there are virtually no subjects of scientific research that can now justify the retention of wild dolphins in the artificial conditions of tanks and circulating sea waters.'[9]

Rice quoted Eglash as saying:

> 'I cannot think of any reason, research or otherwise, which would justify the lengthy captivity which many cetaceans have been subject to. Field research and specimens from natural mortality should provide enough data to allow our understanding to progress; if not, then ignorance seems to me the best alternative.'[10]

Arguments in Favour of Research on Captive Cetacea

5.22 Ling has pointed out that:

> 'the need to study captive animals to complement field studies has become essential since access to biological material from commercial sources (whaling) has ceased, in Australia at least.'[11]

5.23 Abel has argued for the continuation of oceanaria for research 'to develop our knowledge and understanding of the animals and their needs to better protect them in the wild'.[12]

5.24 Klinowska and Nicholson, in a supplementary paper to the Conference on Non-Consumptive Utilisation of Cetacean Resources, believed that:

> 'although interest in cetaceans has increased greatly in recent years, the flow of new quantitative scientific information has not matched this interest, except in a few areas, particularly those related to the management of large whales. There is a great need for reliable information about the smaller species, some of which are, or may be, endangered particularly through by-catching and environmental change. Traditional field work is very costly in time and money - the animals are visible for perhaps 5% of the time and new observers need much training before they can even reliably identify species. Small cetaceans, however, can be kept in captivity and it has been shown (Ray, Carlson, Carlson and Upson, 1981; Ray, Upson and Henderson, 1977; Martinez and Klinghammer, 1978; Pryor and Kang, 1980) that the basic behaviours are present in captivity, and in the field.'[13]

5.25 The Animals on Display workshop concluded that:

> 'although technological developments have made it possible to extend some laboratory studies to field situations, many other studies can only be done effectively - if at all - with captives.'[14]

5.26 Although Holt is opposed to keeping cetacea captive he has come to the conclusion that:

> '... there is one scientific enterprise, and one only, involving the cetaceans, which could justify maintenance of certain of the smaller species in captivity under special conditions. That is the attempt to communicate between the species - us and them ... But even there, the most interesting things are coming from observations and experiment in the wild or in "open captivity".'[15]

5.27 Bryden has called for 'symbiotic investigations of wild and captive dolphins' because these are:

> 'central to the development of population models, and demonstrates how important studies of captive animals can be in the development of conservation strategies for dolphin stocks.'[16]

Research Aims

5.28 While a great deal has been discovered about cetacea through research and a considerable amount of literature exists on studies of captive and wild cetacea, the main concern is whether it actually contributes to the welfare of the animals.

5.29 Threats to cetacean welfare in the wild have been identified in Wake of the Whale[17] as whaling, pollution, fishing and harassment. Baltic seals abort their pups from

excess of poly-chlorinated biphenyls and it is possible that cetacea do also. Whales entering the Mediterranean are likely to be badly burned by chemical wastes. Dumped radioactive waste, explosives and chemical weapons may possibly affect the deep-diving species of cetacea such as the bottlenose dolphins and sperm whales.

5.30 Fishing is an immediate and even greater threat because cetacea become entangled and drown in fishing nets. Fishing could also reduce the food supply to the extent that it might prevent recovery from previous depletion through whaling. If the proposed krill fishery in the Antarctic goes ahead, baleen whales may be classed as pests.

5.31 Overseas, there are examples of oceanaria carrying out studies, on both captive and wild cetacea, which address some of the identified threats to cetacean welfare, and of institutions or individuals using the facilities or animals of oceanaria for research for this purpose. This research function exists only in a minority of oceanaria.

Research Programmes in Australian Oceanaria

5.32 In Australia, one oceanarium, Pet Porpoise Pool, has had a major role in research on and preservation of cetacea. It has co-operated with the Australian Museum at its own expense, to monitor annually the populations of sperm, humpback and southern right whales off the mid north coast of New South Wales. It has a long record of rescue and rehabilitation attempts for sick and stranded cetacea often at considerable expense to the oceanarium. This has led to the identification of species of cetacea virtually unknown in Australia and, in one case, considered extinct. The management stated that:

> 'the oceanarium's experience and expertise is widely utilized being regularly called upon in a consultancy capacity by Government and

> Private interests, both locally and overseas. Significant marine life specimens resulting from the area's fishing industry operations and strandings are regularly, voluntarily collected, often at considerable expense and effort by the oceanarium and supplied to the Aus[tralian] Museum Sydney and appropriate Universities, etc.'[18]

The oceanarium was used by CSIRO in 1972 for studies on seal moulting. In 1973 researchers studying human blood clotting at Austin Hospital, Melbourne, used blood collected from Marineland (Surfers Paradise) and Pet Porpoise Pool. Dolphin blood samples were also supplied to the Port Elizabeth Museum, South Africa, in 1981. In 1984 the marine mammals at Pet Porpoise Pool were used for research into animals' sweating mechanisms by the Faculty of Veterinary Science at the University of Queensland. Dawbin noted that Goodall's work has been recognised by his appointment as an associate of the Australian Museum.[19]

5.33 Atlantis has also recently made a contribution to the preservation of wild cetacea by co-operating in studies on the threat of gillnet fishing to small cetacea. ANPWS provided funds for a study by the Western Australian Museum on incidental drownings of cetacea in gillnet fishing. In this study, captive cetacea at Atlantis Marine Park were used to determine whether they could detect acoustically reflective materials which might be attached to gillnets to help cetacea to avoid being caught in those nets.

5.34 Marineland of South Australia conceded that it had not initiated any scientific studies and stated 'we are not in the science business'.[20] However, they had been approached by a Federal Government Department inquiring into the possible training of dolphins in particular patterns of behaviour.[21]

5.35 Hyne stated that he has not carried out any experiments on the cetacea in his veterinary care at the African Lion Safari, Warragamba, but that 'the routine findings that we have accumulated both from monthly examinations and from examinations on sick animals have been the basis of a couple of papers that I have had published'. Two veterinary students have produced papers which involved study of captive cetacea and some 'people claiming to have knowledge of communication, mental telepathy, with cetaceans have been allowed to associate with the animals'.[22]

5.36 King Neptune's Park at Port Macquarie does not have any research programmes. They do not employ a biologist or scientist. The management stated that because their facility was not situated near a university, no research in association with scientific studies was carried out. They had written to Newcastle University, however, inviting use of their captive animals for research purposes.[23] They had also been involved in rescue and rehabilitation of sick and stranded marine animals.

5.37 Sea World has worked closely with University of Queensland for a number of years. A study of parasites in marine mammals has been carried out by Dr R. Lester of the University. Sea World and the University have planned a tagging programme to study the migratory habits of local herds of Tursiops. Anatomy students from the University regularly visit Sea World. Dr Bryden, from the Anatomy Department, specialises in marine mammals and uses the animals at Sea World. He has published several papers on his findings.

Assessment of Research Benefits

5.38 The research carried out by or in association with oceanaria in Australia, with the notable exception of Pet Porpoise Pool cannot be said to have made a major contribution to the preservation and conservation of cetacea. In relation to the gillnet fishing trials carried out using captive cetacea at Atlantis, seemingly the most important contribution made by an oceanarium to the preservation of cetacea which die in their thousands in this manner annually, ANPWS said:

> 'It would be fair to say that that research could not have been done with wild animals. Whether it was absolutely essential to do it is really not at issue. It certainly made the research that we were considering more efficent in that we were able to eliminate some materials and select others. It really devolves into a question of a particular piece of research, the benefits that are seen to come from that research in themselves and the costs involved in keeping an animal in captivity. It is a matter of weighing those in individual instances.'[24]

5.39 It has been argued that the costs to cetacea of keeping them in captivity have been considerably reduced; that studies on cetacea have led to a greater understanding of their needs in captivity and to subsequent improvements in captive techniques, husbandry and conditions. These have often been incorporated into guidelines which many oceanaria must now comply with. However, evidence currently available does not conclude that captive cetacean welfare is necessarily improved under these conditions. Atlantis, the only oceanarium in Australia established under guidelines, has had no capture or captive mortalities. However, it has only been established since 1981 so insufficient time has elapsed to make any conclusive assessment. Marineland of South Australia, which in the view of the Committee does not have ideal conditions, has had two successful

births in captivity and its present three adult inhabitants have been held there for 16 years. Two of the original colony have died, one after seven years and the other after 14 years in captivity. Pet Porpoise Pool, similarly, does not use the husbandry system recently developed after research and used currently by Atlantis, yet it has had two successful births and some very successful cases of rehabilitation of cetacea in difficult circumstances.

5.40 Even if it could be demonstrated that captive cetacean welfare had improved considerably through research, there is not adequate evidence to show that this research has yet had results for the welfare of cetacea generally which would justify that captivity.

5.41 Captive cetacean research has contributed to knowledge of physiology, behaviour, nutritional requirements, communication and life history. However, as well as having the potential for adversely affecting cetacean welfare, it has the disadvantage that captive behavioural modifications will affect research results. Research on diseases in captivity is similarly constrained because different microbial pathogens exist in the wild. Ecology of the species, population studies, migratory patterns, social structure and feeding behaviour cannot be studied in captivity.

5.42 Research on wild cetacea, however, also has some disadvantages. Traditional field work is costly in time and money. Research directed at migrating, breeding or feeding animals has the potential for disruption of normal behaviour patterns and population studies require a long-term commitment for meaningful results to emerge. There is no opportunity to control some environmental variables while varying others for experimental research.