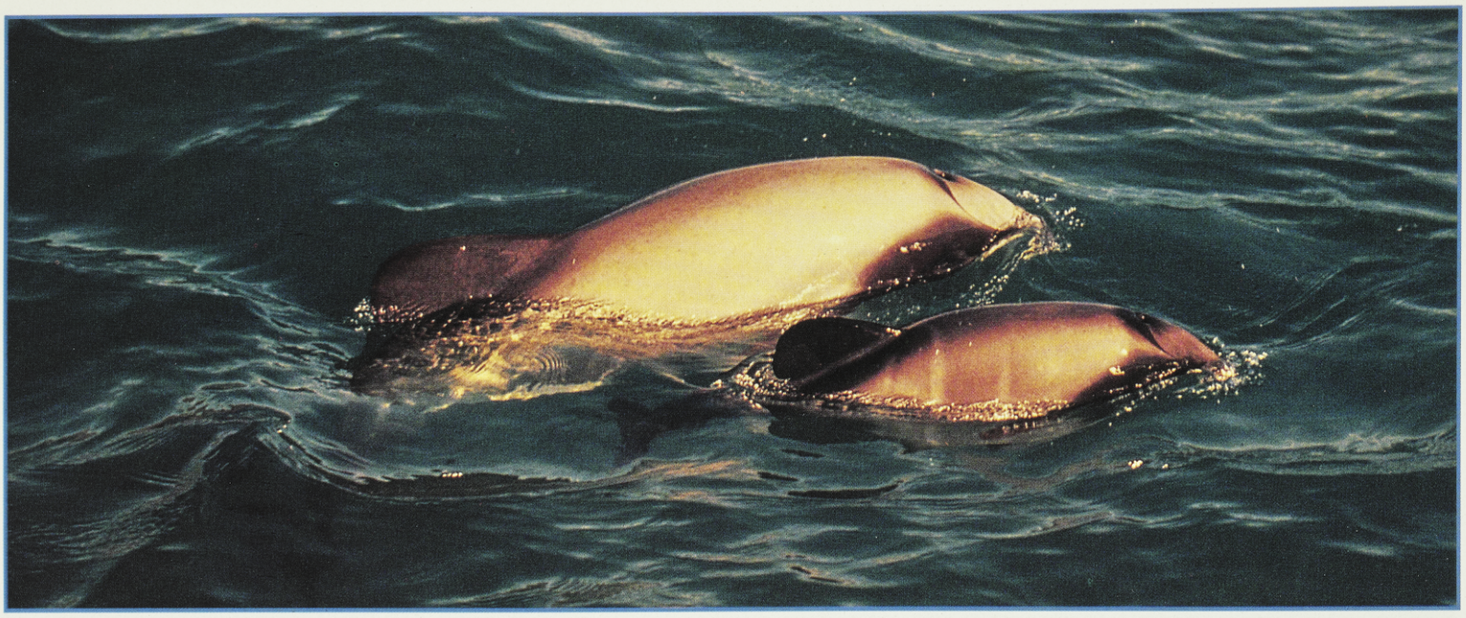

Hector's dolphin mother and her newborn calf. The youngster is about three weeks old. *Photo: Steve Dawson.*

the smaller groups changing from day to day? Do males and females form separate groups? Our observations are helping to answer these questions, and an ongoing photographic-identification programme is the key to it. Individuals can be recognised from photographs taken from the boat, making it possible to follow the movements and associations of individual dolphins. Observations on shorter-term group movements from clifftop observation sites help complete the picture. Most groups are of mixed sexes and sizes, and the only sexual segregation we see occurs only occasionally, in groups which are comprised mostly of mothers and young calves. As to the stability of groups, it appears that the small groups are quite flexible, but we need more data to be sure.

Reproduction

Newborn dolphins start to appear in the late spring month of November, and births occur over about three months into March. The newborns are 60-75cm long, about half the length of the mother, and are a darker grey than the adults. A series of light bands overlies the darker pigmentation which fades over the months following birth. Six months after birth the grey has faded to the adult hue, and the bands have disappeared. In the weeks following birth the calf is usually seen in very close proximity to its mother, almost as if they were glued together. As time passes the calf becomes more independent, and by six months is supplementing its mother's milk with solid food such as squid.

Sounds

Our work with the sounds of this animal is in its early days, but we now have many tapes awaiting detailed analysis. Unlike other dolphins they make very few sounds that are audible to us, and make none of the squeals and whistle noises so often heard from Bottlenose dolphins. Most of the sound we have analysed so far have been sequences of high frequency clicks, each click around 1/5000th of a second long, and extending far beyond the range of human hearing. Our ears have a range of 20Hz to 20,000Hz when we are young, and this response declines with increasing age. Most of the energy in Hector's dolphin clicks is concentrated around 128,000Hz.

Very sophisticated equipment is required to record these high frequencies. Sounds are picked up by a tiny high-frequency hydrophone (underwater microphone), boosted by a special amplifier and then fed into a tape recorder that gobbles tape at five feet per second. By comparison a standard cassette recorder uses tape at 1.875 inches per second. A commentary of the behaviour of the dolphins is recorded on another of the recorder's four channels.

The short clicks are used in echolocation, that is, the dolphins emit a click and listen for the returning echo. From the time delay of the echo, they can tell how far away the object is. This is the principle behind all sonar (Sound Navigation and Ranging) systems. Hector's dolphins apparently do not emit another click until the echo of the first is received, thus as a dolphin approaches an object the click rate increases as the dolphin gets closer. Dolphins can discriminate between similar objects using echolocation, although precisely how they do it is not yet understood. Just what other information a dolphin can gain from the echoes is poorly know, and their significance to communication between individuals is the stuff of further study.

The Future for Hector's dolphins

The threats to the continued survival of Hector's dolphins are several. Probably the greatest threat is from accidental entanglement in coastal gill nets. Made from nylon monofilament, the nets seem to be invisible to the dolphin's sonar. One navigational blunder and they are snagged, unable to reverse out. Caught with net around the snout, flippers and dorsal fins, they panic and drown. Gill netting around New Zealand is currently declining, but in the Banks Peninsula area kills between 10-15 percent of the local Hector's dolphin population each year. That "incidental" kill is probably worst around Banks Peninsula where dolphins and gill netting combine to disastrous effect.

There are natural predators also. Seven-Gill sharks are known predators, one caught recently had a whole dolphin head in its stomach, and five others caught the same day revealed dolphin remains also. Local fishermen claim to have found similar dolphin remains in blue sharks. Both these sharks are seasonally very abundant off parts of the New Zealand coast.

As everywhere there are sublethal factors that may influence the dolphins. Like many countries, New Zealand's coastal fish resources have been overfished and the stocks of some species appear to be severely depleted. While it is not possible to assess whether this depletion limits Hector's dolphin populations, it would be difficult to argue that the dolphins remain unaffected. Also unassessed as to their importance are the contaminants that are routinely found in samples of Hector's dolphin tissue. In general, heavy metal levels are low, but the levels of DDT and PCB contamination gives cause for concern.

Now is the time to act before Hector's dolphin crosses the unseen boundary between threatened and endangered. Conservation should perhaps be seen not as the preservation of endangered species (though that is obviously important) but as the prevention of species becoming endangered. Most conservation action taken on rare species seems analogous to parking an ambulance at the bottom of a cliff. What we are trying to do here is to fence off the cliff.

Acknowledgements

A study like this is not possible without financial support. We are very grateful for grants from the Royal Forest and Bird Protection Society, the New Zealand Lottery Board, Project Jonah (NZ), World Wide Fund for Nature (NZ), Cetacean Society International, Pacific Whale Foundation, IBM (NZ), Oceans Society (NZ), and New Zealand Underwater Association. Neptune Aquasuits, Hutchwilco, and Neill, Cropper and Co., sponsored their equipment for the study. Racal Electronics, Bruel and Kjaer, David Reid Electronics, Tait Electronics and Anthoni Computer Automations Consulting Ltd have generously lent equipment for our use.