Cephalorhynchus hectori (P.-J. van Beneden, 1881)

English: Hector's dolphin
German: Hector-Delphin
Spanish: Delfín de Héctor
French: Dauphin d'Hector

Family Delphinidae

1. Description

Similar to the other representatives of the genus, these are small, blunt-headed chunky dolphins without a beak (and therefore often wrongly called porpoises) with rounded, almost paddle-shaped flippers. The dorsal fin is proportionally large and with a rounded, convex trailing edge, like a "Mickey Mouse ear". The colour scheme of the Hector's dolphin is well defined with areas of grey, black and white. Mass and size of the two subspecies found in New Zealand vary: North Island 152 cm, 65 kg, South Island 145 cm, 50 kg (Dawson, 2009).

The sides of the head, the flippers, dorsal fin and the tail are all gray to black. The belly is white except for a small area between the flippers. There is also a distinctive finger-like swoosh of white that extends from the belly, along the flanks towards the tail. (Jefferson et al. 2008).

2. Distribution

http://www.iucnredlist.org/apps/redlist/details/4162/0/rangemap

Distribution of Cephalorhynchus hectori *(Reeves et al. 2008): coastal waters of New Zealand, especially South Island and the western coast of North Island; © IUCN.`*

Hector's dolphin is endemic to inshore waters of the main islands of New Zealand. Pichler et al. (1998) used mitochondrial DNA analysis to determine that *C. hectori* was subdivided into sub-populations, which total four (Pichler, 2002): North Island, East Coast South Island, West Coast South Island, and South Coast South Island - with only little or no female dispersal. The North Island subpopulation of Hector's Dolphin was subsequently recognized as a subspecies, *C. h. maui* (Baker *et al*. 2002).

Cephalorhynchus hectori hectori: most common along the east and west coasts of South Island between 41° 30' and 44° 30'S, with hot spots of abundance at Banks Peninsula and between Karamea and Makawhio Point. A smaller, isolated population exists on the South Coast of the South Island, with sightings concentrated in Te Wae Wae Bay (Dawson, 2009).

Cephalorhynchus hectori maui: occurs on the west coast of North Island between 36°25' and 39°'S, but is generally only seen between the entrance of Manukau Harbour and Port Waikato (Dawson, 2009).

3. Population size

North Island: Slooten et al. (2006a) from 2004 data, estimated the total *C. h. maui* population size at 111 individuals (95% confidence interval = 48-252). The small population size confirms its critically endangered IUCN status and the suggestion that it is vulnerable to extinction (Dawson et al. 2001). It has been suggested that one dolphin every 6.4 years is the maximum level of human-caused mortality to maintain the population, therefore, considerable steps need to be taken to allow for population recover.

South Island: Line-transect surveys of Hector's dolphins on the East Coast of the South Island conducted prior to 2000 in the coastal zone to 4 nm offshore yielded an abundance estimate of 1,880 individuals (CV=15.7%) (Dawson et al. 2004). Maximum densities peaked at 5-18 individuals per nautical mile of coastline between Cape Foulwind and Hokitika (Braeger and Schneider 1998).
Aerial surveys prior to 2002 suggested that the populations of *C. h. hectori* numbered ca. 1,900 (east coast) and ca. 5,400 (west coast) animals (Slooten et al 2002). In 2000 – 2001 the total population estimate for South Island Hector's dolphins was 7,270 (CV = 16.2%)(Slooten et al. 2002; 2004). The most recent estimate was 7,873 (Slooten, 2007), showing little change for the past 7 years.

4. Biology and Behaviour

Habitat: The most consistent factor influencing the distribution of Hector's dolphins appears to be their preference for shallow waters. This may explain their apparent absence from Fiordland, where depths in excess of 300 m are very common, and their apparent reluctance to cross Cook Strait to North Island waters. Hector's dolphins inhabit a wide range of water temperatures (surface temperature 6.3-22˚C;) and water turbidity (<10cm to >15m) (Slooten and Dawson, 1994).

Bräger et al. (2003) encountered most dolphins in waters < 39 m depth, with < 4 m Secchi disk visibility and > 14 °C temperature. Habitat selection by dolphins differed between study areas, particularly between east and west coasts, in summer (December-February) and winter (June-August). Dolphin abundance appeared to change seasonally in some study areas. This was so especially in summer (the main reproductive season), when dolphins (frequently with calves) occupied shallow and turbid waters, whereas in winter less use was made of this habitat, possibly due to a more offshore distribution of their prey.

Behaviour: Large groups often show eyecatching behaviour such as leaps, chases and lobtailing. Hector's dolphins are strongly attracted to boats and readily bow-ride (Dawson, 2009). Mothers with newborn calves are shy and seldom approach stationary or moving boats. Except in ports and other areas of very intensive boat traffic, it seems unlikely that the presence of boats will greatly affect the behaviour and distribution of this species (Slooten and Dawson, 1994, and refs. therein).

Schooling: Hector's dolphins live in groups of 2 to 8 individuals. Larger aggregations of up to 50 can be seen at times (Jefferson et al. 1993). Braeger and Schneider (1998) reported that small to medium-sized groups of Hector's dolphins with 1-60 individuals were observed in almost all areas of the west coast of South Island in winter as well as in summer. Groups rarely stay in tight formation, though several individuals may swim and surface together in a row. Most active when small groups join together (Carwardine, 1995).

Reproduction: Females bear their first calf at age 6-9 years, and males reach sexual maturity at 5-9 years. Mating and calving occur in spring to late summer and gestation lasts 10-11 months. Females calve every 2-4 years. At Banks peninsula, six photographically identified Hector's dolphins attained a maximum age of at least 22 years(Dawson, 2009).

Food: Hector's dolphins appear to feed mostly in small groups. They feed opportunistically, both at the bottom and throughout the water column, and take a wide variety of species: surface-schooling fish (e.g. yellow-eyed mullet, *Aldrichetta forsteri*, kahawai, *Arripis trutta*) and arrow squid, *Nototadarus* sp., along with benthic fish such as ahuru, *Auchenoceros punctatus*, red cod, *Pseudophycis bacchus* and stargazer, *Crapatalus novaezelandiae*. Crustaceans are occasionally found among the stomach contents, including *Ovalipes catharus*, *Hymenosoma depressum* and *Macroptkalmus hirtipes*, but these appear to be from the stomach contents of fish taken by the Hector's dolphins. In summer, dolphins occasionally follow inshore trawlers, apparently stationing themselves behind the cod-end of the net. The dolphins themselves are rarely caught in trawl nets (Slooten and Dawson, 1994, and refs. therein).

5. Migration

Despite wide-ranging surveys over more than 20 years, no sightings of the same Hector's dolphin were more than 106 km apart (Dawson, 2009). Most individuals ranged over less than 60 km (Mean 31.0 km, SE = 2.43) of coastline. Site fidelity was high: e.g. in Akaroa Harbour individuals were seen for about two thirds of the years they were known to be alive (Bräger et al. 2002).

Stone et al. (1998) confirmed short-range movement patterns via radio-telemetry and found them to be remarkably consistent. Dolphins remained in Akaroa Harbor for a period of between one and five hours, after which they left in a westerly direction, always in the late afternoon or early evening. Two dolphins returned to Akaroa Harbor the next morning. These patterns support previous studies which described a diurnal movement pattern for this species (Stone et al. 1995).

A similar picture was obtained from a theodolite tracking and boat-based photo-identification survey in Porpoise Bay, on the south-east corner of South Island. Results are consistent with the model of a small resident population (48 dolphins; 95% CI = 44-55 in 1996/97) that is visited occasionally by members of neighbouring populations. Dolphins spent a large proportion of their time in a small area inside the bay. There, no pattern of diurnal movement into and out of the bay was observed (Bejder and Dawson, 2001).

6. Threats

Direct catch: Hector's and Maui's dolphins are protected under the Marine Mammals Protection Act (1978) therefore any direct take is illegal.

Incidental catch: Total population size today (7,873) was estimated at 27% of the population size estimated for 1970 (29,316, CV 0.16), before a major expansion of commercial gillnetting (Slooten, 2007).The catch of Hector's dolphins in coastal gillnets, many of them used by recreational fishermen, has been repeatedly documented. It is believed that the effects of fishing are the greatest cause of human induced mortality on the dolphins (MoFNZ 2007).One example is that strandings are exclusively of single animals and many beach-cast

dolphins bear cuts and abrasions consistent with being caught and killed in gill nets (Slooten and Dawson, 1994). Due to evidence that the catches were seriously threatening the population, the N.Z. government created a marine mammal sanctuary in 1989 to protect them (Jefferson et al. 1993; Slooten and Dawson, 1994).

Stone et al. (1997) showed that Hector's dolphin distributions were affected by 10 kHz pingers and that dolphins avoided the immediate area where the pingers were active. This suggests that pinger use could reduce mortality in gill nets. A pilot study to test the use of electronic monitoring (EM) systems to examine interactions between protected species and fishing gear (McEldeny et al. 2007) such as inshore set net and trawl fisheries was shown to effectively monitor retrieval operations and encounters with protected and endangered species.

Clearly, these efforts are promising: Reducing fisheries mortality to levels approaching zero shows the strongest promise of meeting national and international guidelines for managing dolphin bycatch, with a 59% probability of reaching 50% of estimated 1970 population size by 2050 (Slooten, 2007).

Slooten et al. (2006b) suggested a size extension of the Banks Marine Sanctuary beyond the 4 nm from shore: In summer, the proportion of sightings inside the 4-nautical-mile offshore boundary of the sanctuary was 79%. This dropped to just over 35% in winter. The authors suggest that appropriate modifications to the sanctuaries extension could significantly reduce mortality due to bycatch. Since then, alterations to the Banks Peninsula marine mammal sanctuary have been notified, extending the northern and southern boundaries significantly while at the same time extending the seaward boundary to 12 nautical miles. Furthermore, a series of additional marine mammal sanctuaries have been put in place (Dept. Cons. NZ, 2010).

Pollution: The strictly coastal distribution of this species makes it vulnerable to accumulation of pollutants such as heavy metals and pesticide residues. Although their precise biological effects are poorly known, the level of some of the contaminants gives some cause for concern. Moderate to high levels of DDT, PCBs and Dioxin have been found in the tissues of Hector's dolphins. These compounds are known to interfere with reproduction and their effects are worsened by synergism between compounds. Mercury, cadmium and copper levels are also relatively high when compared to other species. It is not known to what extent pesticide contamination or other forms of pollution contribute to mortality or to the low reproductive rates observed in Hector's dolphins (Slooten and Dawson, 1994).

Tourism: There has been a rapid growth in marine mammal-based tourism around the world, because marine mammals have a wide appeal for many people and are readily found around many coastal areas and are therefore readily accessible. Marine mammal-based tourism in New Zealand is a wide-ranging, species-diverse industry with an increasing demand for permits from land, boat and air-based platforms. One publication cites that e.g. a total of 74 permits at 26 sites have been issued from Maunganui to Stewart Island (Constantine, 1999).

Hector’s Dolphins are not displaced by boats or by human swimmers. Swimmers cause only weak, non-significant effects, perhaps because the dolphins can very easily avoid them. Reactions to dolphin-watching boats are stronger. Analyses of relative orientation indicate that dolphins tend to approach a vessel in the initial stages of an encounter but become less interested as the encounter progresses. (Bejder et al. 1999).

7. Remarks

The endemic New Zealand Hector's dolphin is considered one of the rarest species of marine dolphin (WWF, 2009).

The North island population of *C. h. maui* is considered "Critically Endangered" by the IUCN (Reeves et al. 2008): it is assumed that there are fewer than 250 mature animals, and the principal cause for the population decline has not been stopped; gillnetting and trawling continue in areas occupied by the subspecies, with bycatch rates exceeding recovery rate. Its vulnerability is further increased by its fidelity to local natal ranges and the genetic isolation of regional populations. Given its small size, reproductive isolation and reduced genetic diversity, the North Island population is likely to become extinct. The time-series of reduction in genetic variation provides independent evidence of the severity of population decline and habitat contraction resulting from fisheries and perhaps other human activities (Pichler and Baker, 2000).

The South Island population of *C. h. maui* is listed as "Endangered" by the IUCN (Reeves et al. 2008): the decline due to fisheries bycatch seems to be ongoing (but see above) and projected to be larger than 50% over 3 generations. Furthermore, the range of the species is very limited.

New Zealand Hector's dolphin is not included in Appendix II of the CMS because it is endemic to New Zealand.

Both subspecies are listed in CITES Appendix II.

Acknowledgement: We are grateful to Laura Boren, New Zealand Dept. of Conservation, for kindly reviewing this species summary.

8. Sources

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