

SHORT COMMUNICATION

DUSKY DOLPHINS *LAGENORHYNCHUS OBSCURUS* ON THE CONTINENTAL SHELF NEAR OTAGO PENINSULA, SOUTH-EAST NEW ZEALAND

D.J. HAWKE

Chemistry Department, University of Otago, P.O. Box 56, Dunedin, New Zealand¹.

(Received 10 April, 1989; revised and accepted 17 May, 1989)

SUMMARY

Hawke, D.J. (1989). Dusky dolphins *Lagenorhynchus obscurus* on the continental shelf near Otago Peninsula, south-east New Zealand. *New Zealand Natural Sciences* 16: 113-116.

The number of dusky dolphins (*Lagenorhynchus obscurus*) sighted along 2 transects off Otago Peninsula by ship-borne observers varied from close inshore to the region of the continental shelf break. Most sightings were within 5 km of the coast. Group size ranged from 1-8 individuals, and often changed rapidly. No sightings were made in October, or from January-April. An observation of dusky dolphins in association with killer whales *Orcinus orca* is described.

KEYWORDS: dusky dolphin - *Lagenorhynchus obscurus* - killer whale - *Orcinus orca* - Otago Peninsula.

INTRODUCTION

The dusky dolphin *Lagenorhynchus obscurus* (Gray 1828) is a circumpolar coastal species of the temperate zone in the southern hemisphere. Near New Zealand it is most commonly seen around the South Island, but is also found along the east coast of the North Island as far north as Coromandel Peninsula (37°S) (Gaskin 1968, Webb 1973a,b). These observations are consistent with the assertion (Gaskin 1968) that the species is associated with coastal waters in the region of the Subtropical Convergence (STC).

Published observations of cetaceans off south-east New Zealand are very limited. Dusky dolphins are the most commonly seen cetacean species along the Otago coast (Hawke pers. obs.), at least in part due to its habit of following ships. This paper reports incidental observations made in the course of M.Sc. and Ph.D. field work from 1984 to 1988.

STUDY AREA AND METHODS

The hydrology of shelf waters around Otago Peninsula has been described by Jillett (1969) and reviewed by Heath (1985). Briefly, the STC is found as a surface feature in the region of the continental shelf break. Along the Otago coast, the continental shelf break occurs at approximately 150 m depth, and 17 km (southern transect) to 31 km (northern transect) offshore. Inshore, waters are of subtropical origin with a surface band of neritic water close to the coast. Relatively cold subantarctic waters are found immediately offshore of the STC.

Observations from the University of Otago's 14 m vessel *rv Munida* were made on 41 voyages from June 1984 to January 1988. Most voyages were in 1986 (18) and 1987 (15) (Table 1). All except six sets of observations were obtained from two transects north and east of Otago Peninsula (Fig. 1) in the course of gathering oceanographic data. Both transects ran to the region of the continental shelf break. The southern transect was extended for 1985 to a depth of 1200 m, 50 km offshore.

While travelling (6-8 knots), observations were made from the vessel wheelhouse. Being a small vessel, visibility forward and to each side

¹Present address: Rosenstiel School of Marine & Atmospheric Science, Division of Marine & Atmospheric Chemistry, University of Miami, 4600 Rickenbacker Causeway, Miami, Florida 33149-1098, U.S.A.

Year	J	F	M	A	M	J	J	A	S	O	N	D
1984						1						
1985			1		1		1	1	2			
1986			1	1	2	4	1	2	2	2	1	2
1987	1	2	3		1	3				2	2	1
1988	1											
Total	2	2	5	1	4	8	2	3	4	4	3	3

Table 1. Distribution of the 41 voyages by month and year.

was very good. Dolphins swimming at the surface were visible to a distance of approximately 100 m in typical sea conditions. A general lookout while stationary was maintained from the work area on the after deck. A lookout was maintained by the author and/or the vessel master at all times. The degree of watchfulness was approximately constant throughout the study period. All voyages were made in good conditions (swell height less than 2 m), because of the requirement for safe handling of oceanographic instrumentation and equipment. While there was considerable variability in sea conditions, weather, and visibility between voyages, there

phinus delphis and *Lagenorhynchus cruciger*). The close range of most of the sightings rendered all of these features clearly visible. Identification was confirmed by photographs taken on a number of occasions.

RESULTS

Dusky dolphin sightings were made on 16 of the 41 voyages. Killer whales (*Orcinus orca*) and humpback whales (*Megaptera novaeangliae*) (one sighting each) were the only other cetaceans seen during the study period.

On most occasions, the dolphins swam in the bow wave or vessel's wake. On three voyages, more than one discrete sighting was made, two on 11/11/86 and 17/11/87, and three on 11/6/87. Periods for which the vessel was followed ranged from a few seconds to 3.5 hours, but were mostly 5-10 minutes long. Vessel avoidance (active movement away from the vessel, without any following behaviour) was noted on three (15%) of the 20 individual sightings.

There was no difference between the two transects in the proportion of voyages resulting in sightings, with 40% of voyages returning sightings in both cases. Distances offshore over which dusky dolphins were seen ranged from 500 m, to 30 km at the shelf break on the northern transect. Seventy percent of observations were within 5 km of the coast, compared with 10% within 2-5 km of the shelf break. No sightings were recorded from beyond the shelf break during the five 1985 deep water surveys.

Since no conclusions about social structure within schools could be derived, the term "group" was used instead. A group was defined as an association of individuals moving at the same speed in the same general direction. Applying this definition, individual dolphins in a group were usually within 2-3 body lengths of an adjacent individual. Group size ranged from one to eight, with a mode and median of two. It often varied during a sighting, as individuals approached then departed from the vessel.

Substantial seasonal variability in the number of sightings was found (Fig. 2), with few or none in summer and autumn (January to May). There were also no sightings in October, the time of the spring phytoplankton bloom in Otago shelf wa-

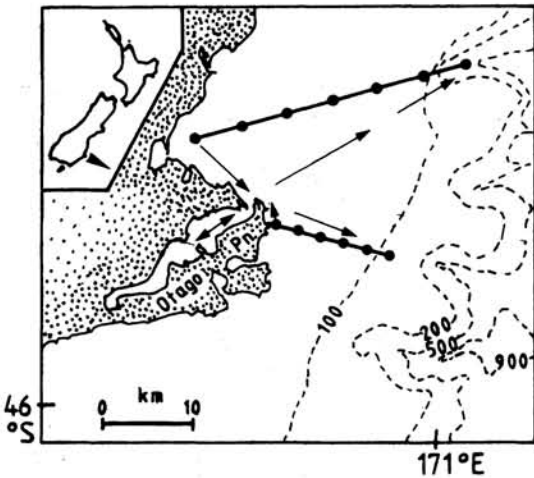


Figure 1. The study area, showing transects (heavy lines), routes travelled (arrows), and bathymetry (dashed lines; depths in metres). Inset: the location of the study area on the South Island's east coast.

was no discernible seasonality to the variability.

Dusky dolphins were recognised by their relatively small size (eliminating *Tursiops truncatus*), pointed dorsal fin (eliminating *Cephalorhynchus hectori*), and pale "brush stroke" markings across the tailstock and flanks (eliminating *Del-*

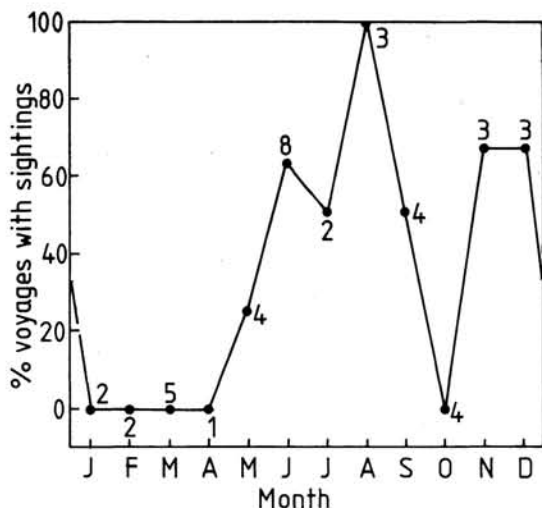


Figure 2. The proportion of voyages with dusky dolphin sightings. The numbers associated with each data point are the number of voyages in that month

ters (Hawke 1988). However, it is not known whether this has any relationship to the lack of dusky dolphin sightings.

AN INTERACTION WITH *ORCINUS ORCA*

Killer whales *Orcinus orca* are only occasionally seen in Otago coastal waters (C. Spiers, pers. com.). On 10/12/86, an interesting interaction between killer whales and dusky dolphins was observed immediately offshore of the shelf break at the end of the northern transect. Water depth was 300-400 m, with a sea surface temperature of 14°C. Sea conditions were calm, with a light NE wind. Visibility was excellent.

At 1010 h NZST five killer whales, one an adult male, were seen swimming close to the surface at 3-5 knots toward the north, parallel to the coast. A few hundred metres separated the first and last animals. Further inshore, more killer whales were visible.

A pair of female or subadult male killer whales were approached on a parallel course, whereupon five smaller cetaceans were seen to be following the killer whales closely. Once within about 200 m, the smaller animals swam swiftly as a group to the vessel to ride the bow wave. They were conclusively identified as dusky dolphins. A few minutes later, with the dusky dolphins still at the bow and the vessel's propeller stopped, one of

the killer whales (length 7-8 m) swam slowly just below the vessel and the bow-riding dolphins to surface about 15 m beyond the vessel, moving to a position about 100 m away. The dusky dolphin group then departed, at 1030 h NZST.

DISCUSSION

The seasonal distribution reported here can be compared with three other localities around New Zealand. Minimum abundances in Cook Strait (Webb 1973b) were in early (austral) spring and summer. In Hawke Bay (F. Robson, cited in Gaskin 1968), abundances were low in summer and autumn. Both of these observations are similar to the Otago pattern. Cipriano (1985) however, found a year-round presence of dusky dolphins off Kaikoura, with some movement offshore in winter. The Kaikoura sightings mostly involved groups of 100-400 individuals, with smaller groups of 2-20 being only occasionally reported. This is a marked contrast with the Otago pattern, where all groups fell into this small size. In Argentina, land observations by Würsig & Würsig (1980) found minimum abundances in winter.

Major problems in interpreting these diverse observations are (1) potential behavioural artifacts caused by the presence of the observers' ship and (2) the often small number of years covered by observations in a given locality. Previous explanations of seasonal changes in abundance have included water mass fidelity (Gaskin 1968), migration (Webb 1973b, Würsig & Bastida 1986), and prey migration (Würsig & Würsig 1980). Water mass fidelity is an unlikely explanation for Otago waters, given the year-round consistency of local hydrology (Jillett 1969). Lack of information prevents comment on the applicability of the other explanations to the Otago results.

The record of dusky dolphins accompanying killer whales is an interesting one. Killer whales are known to prey on marine mammals, including cetaceans (Hancock 1965), as well as squid and fish. Jefferson (1987) observed both active avoidance and peaceful interactions between Dall's porpoise *Phocoenoides dalli* and killer whales in Johnstone Strait, British Columbia. As summarised in Heimlich-Boran (1988), killer whale populations in this region fall into two categories,

transient and resident, from separate breeding stocks. Transient killer whales prey mainly on marine mammals, especially seals. Conversely, resident killer whales are primarily fish eaters (Jefferson 1987 and references therein). Jefferson (1987) argued that the behaviours performed by Dall's porpoise imply that these animals can distinguish between aggressive (transient) and non-aggressive (resident) killer whales.

Applying this argument to the dusky dolphin-killer whale interaction suggests that Otago Peninsula dusky dolphins can also distinguish between aggressive and non-aggressive killer whales. However, killer whales are seen relatively infrequently along the Otago coast in contrast to the situation in British Columbia and Washington. It is therefore unclear as to how dusky dolphins might acquire the requisite knowledge for identifying aggressive killer whales.

ACKNOWLEDGMENTS

Sincere thanks to Chris Spiers, master of rv *Munida*, for his enthusiastic support of the work reported here. Constructive comments on earlier versions of this paper by Elisabeth Slooten and Joseph McKee are much appreciated.

REFERENCES

- Cipriano, F. (1985). Dusky dolphin research at Kaikoura, New Zealand: a progress report. *Mauri Ora* 12: 151-158.
- Gaskin, D.E. (1968). Distribution of Delphinidae (cetacea) in relation to sea surface temperatures off eastern and southern New Zealand. *New Zealand Journal of Marine and Freshwater Research* 2: 527-534.
- Hancock, D. (1965). Killer whales kill and eat minke whale. *Journal of Mammalogy* 46: 341-342.
- Hawke, D.J. (1988). Aspects of the marine chemistry of phosphate. Ph.D. Thesis, University of Otago, New Zealand.
- Heath, R.A. (1985). Review of the physical oceanography of the seas around New Zealand. *New Zealand Journal of Marine and Freshwater Research* 19: 79-124.
- Heimlich-Boran, J.R. (1988). Behavioural ecology of killer whales (*Orcinus orca*) in the Pacific Northwest. *Canadian Journal of Zoology* 66: 565-578.
- Jefferson, T.A. (1987). A study of the behaviour of Dall's porpoise (*Phocoenoides dalli*) in the Johnstone Strait, British Columbia. *Canadian Journal of Zoology* 65: 736-744.
- Jillett, J.B. (1969). Seasonal hydrology of waters off the Otago Peninsula, south-eastern New Zealand. *New Zealand Journal of Marine and Freshwater Research* 3: 349-375.
- Webb, B.F. (1973a). Cetaceans sighted off the West Coast of the South Island, New Zealand, summer 1970 (Note). *New Zealand Journal of Marine and Freshwater Research* 7: 179-182.
- Webb, B.F. (1973b). Dolphin sightings, Tasman Bay to Cook Strait, New Zealand, September 1968 - June 1969 (Note). *New Zealand Journal of Marine and Freshwater Research* 7: 399-405.
- Würsig, B. & Bastida, R. (1986). Long-range movement and individual associations of two dusky dolphins, *Lagenorhynchus obscurus*, off Argentina. *Journal of Mammalogy* 67: 773-774.
- Würsig, B. & Würsig, M. (1980). Behaviour and ecology of dusky dolphins (*Lagenorhynchus obscurus*) in the South Atlantic. *United States Fisheries Bulletin* 77: 871-890.