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Short communication

Photo-identification of short-beaked common dolphins (*Delphinus delphis*) in north-east New Zealand: a photo-catalogue of recognisable individuals

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Abstract Photo-identification has been established as a helpful tool in cetacean research. However, no study to date has attempted to apply this method to short-beaked common dolphins (*Delphinus delphis* L.). We present here the results of two studies that were conducted concurrently in Mercury Bay and the Hauraki Gulf on the north-east coast of New Zealand's North Island. Methods for distinguishing between individual dolphins are discussed. Sighting records of recognisable individuals indicate that some common dolphins move between Mercury Bay and the Hauraki Gulf (100 km distance), as well as between Mercury Bay and Whakatane (200 km distance). Common dolphin abundance and site fidelity appeared to be greater in the Hauraki Gulf than in Mercury Bay. A selection of photographs of distinct individuals is presented to allow future studies to compare their sighting records to ours, which may help establish the extent of home ranges, site fidelity, and possibly even longevity for common dolphins.

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Keywords photo-identification; common dolphins; *Delphinus delphis*; re-sightings; movements; site fidelity; home range

INTRODUCTION

The study of many aspects of population biology and behaviour require the researcher to be able to identify animals individually, over time. This can be achieved by tagging them, or by using naturally occurring distinctive features of certain individuals. Würsig & Würsig (1977) discovered that bottlenose dolphin (*Tursiops truncatus*) individuals could be reliably identified over several years, from photographs of their dorsal fins. This non-intrusive method of "photo-identification" has now been well-established for dolphins and other cetaceans (Würsig & Jefferson 1990).

Photo-identification was employed in two separate studies on the behavioural ecology of common dolphins (*Delphinus delphis* L.), in an attempt to quantify the dolphins' movements, patterns of residency, and stability of group composition. Leitenberger (2001) examined the behaviour of common dolphins in the Hauraki Gulf, whereas Neumann (2001) investigated the species in Mercury Bay, and off Whakatane. All three locations are situated on the north-east coast of New Zealand's North Island (Fig. 1). The aim of this paper is to provide future studies of common dolphins in New Zealand with a photo-catalogue of a few very distinct individuals. These are by no means typical for common dolphins, and only a very small percentage of animals showed such distinct features. However, thanks to their uniqueness, the individuals presented here should be easily recognised by any future researchers working on common dolphins. With the date and sighting location for these individuals made available here, long-term tracking of some individuals might be possible, revealing information about long-range movements, site fidelity, and possibly even longevity of common dolphins in the wild.

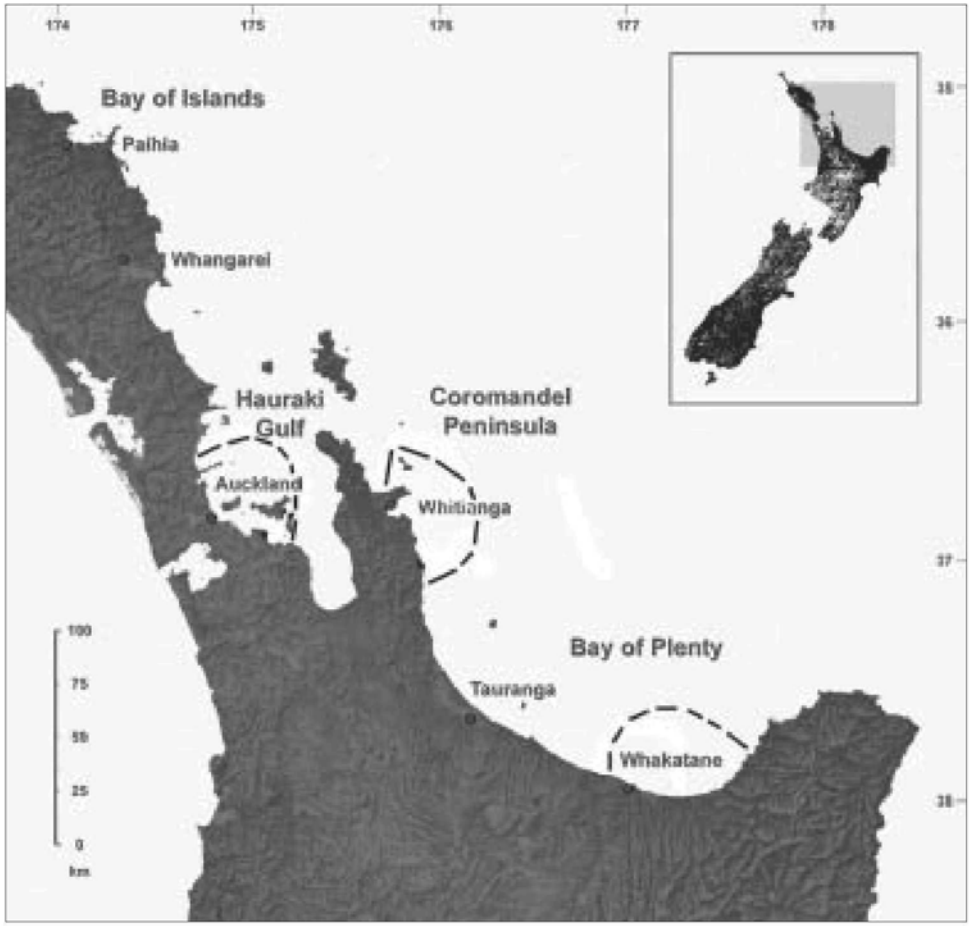

Fig. 1 Map of north-eastern New Zealand, featuring the Auckland, Whitianga, and Whakatane study areas (dashed lines).

METHODS

Observations in Mercury Bay were conducted from *Aihe*, a 5.5 m centre-console, rigid-hull inflatable boat, with a 90 hp outboard engine. In the Hauraki Gulf, the commercial dolphin-tourism vessel *Dolphin Explorer*, a 20 m twin diesel-powered catamaran, served as observation platform. Photographic field effort lasted from December 1998 to March 2001 (with the exception of the winter months May–August each year) in Mercury Bay (based from Whitianga), from October 2000 to April 2001 in the Hauraki Gulf (based from Auckland), and from mid March to mid April 2001 off Whakatane, south-eastern Bay of Plenty (Fig. 1). Photographs of individuals were obtained by opportunistically photographing animals that came close to the boat during focal-group-follows with a Canon EOS 300 SLR-camera. Both colour prints (Kodak Gold 200 ASA) and colour slides (Fujichrome 100 ASA) were used. Only pictures that clearly allowed the examination of one or more distinct characters were used in the analysis. To determine whether or not identifiable individuals had been sighted more than once, the photographs were then systematically checked against each other. Any potential matches were re-checked by experienced volunteers. Matches that were not rejected at this stage were then re-checked by the authors several months later. This process was designed to eliminate the possibility of falsely matching two separate individuals as a re-sighting. Once each photo-catalogue was complete, it was checked against each of the others for potential matches. The Mercury Bay

Fig. 2 Common dolphin (*Delphinus delphis*) dorsal fins, illustrating the variability of fin coloration from completely black to completely white.

Fig. 3 In some common dolphin (*Delphinus delphis*) individuals, the light-coloured yellowish lateral patch behind the eye is not expressed. Instead, this area is grey (arrowed), giving the animal an overall resemblance to bottlenose or spinner dolphins. (Greysides WT1, seen on 10 March 1999.)

Fig. 4 Common dolphin (*Delphinus delphis*) with a distinct black stripe behind the dorsal fin. (Black body-line WT91, seen on 14 October 2000, re-sighted off Whakatane on 10 April 2001.)

catalogue was also matched against the photo-catalogue created by Nicolle van Groningen (unpubl. data), University of Bergen, Netherlands (January–July 1998 in the Whakatane area, containing 108 individuals).

RESULTS

Over 4000 photographs were taken in Mercury Bay, and over 2500 in the Hauraki Gulf. After the rejection of unusable and indistinct photographs, this led to a photo-catalogue of 408 distinguishable

individuals for Mercury Bay, and 500 for the Hauraki Gulf. The number of individuals in each group was rarely small enough to allow a picture of each individual to be taken (mean group size exceeded 50 individuals in all study areas). Photographic effort was therefore targeted towards distinct individuals in the group, which typically represented c. 10% of the dolphins present.

Compared with most bottlenose dolphins, the majority of common dolphins showed very few nicks and notches in their dorsal fins, which made photo-identification much more difficult. However, common dolphins showed a great variability in fin coloration. It ranged from black all over to almost completely white, the most common pattern being a blackish dorsal fin, with a white, or light-grey patch in the centre (Fig. 2).

Observations of captive common dolphins in Marineland, Napier, New Zealand, confirmed that these colour patterns are stable over long periods of time (several years, D. Kyngdon pers. comm.). In some rare cases, other distinguishing features were used to identify individual dolphins. Common dolphins have been reported to occasionally suffer from a genetic defect, in which the typical hourglass pattern along the flanks is not expressed (Perrin et al. 1995). The patch behind the eye, instead of being ochre-coloured is grey, which gives the animals an overall resemblance to bottlenose, or spinner dolphins (Fig. 3). A handful of grey-sided individuals were encountered during this study, and they were identified mainly based upon the extent of the lateral grey patch, its hue, and any distinctive patterning of this patch. One individual that featured

Table 1 Features that were used to identify common dolphin (*Delphinus delphis*) individuals and how frequently they were employed in each study area.

Diagnostic feature	Mercury Bay	Hauraki Gulf
Nicks and notches	69	304
Unusual body pigmentation	6	6
Physical deformity	2	16
Dorsal fin colour (mostly white)	215	102
Dorsal fin colour (mostly black)	108	72

Table 2 Re-sightings of identifiable individuals, part 1. (Study seasons: A, 1998/99; B, 1999/2000; C, 2000/01; **WK**, sighted off Whakatane (March/April 2001); all others seen in Mercury Bay.)

Re-identified dolphin	1	2	3	4	5
Within one season					
Season A	none				
Season B					
Stubby tip WT222	4 Feb 2000	9 Feb 2000			
Lawnmower WT65	31 Oct 1999	19 Nov 1999			
Lead edge white WT76	2 Nov 1999	28 Jan 2000			
Season C					
Black sickle WT325	21 Dec 2000	26 Dec 2000			
Left-bent grey WT374	18 Feb 2001	19 Feb 2001			
Season C WK					
Juv. greysides WT388	8 Apr 2001	10 Apr 2001			
Between two seasons					
Seasons A and B					
Panhandle WT35	22 Mar 1999	11 Feb 2000			
Straight black WT18	17 Mar 1999	25 Dec 1999			
Lead white WT57	3 Apr 1999	1 Nov 1999			
Seasons B and C					
Platypus WT208	15 Jan 2000	10 Feb 2000	11 Feb 2000	23 Jan 2001	19 Feb 2001
Black trail WT290	4 Feb 2000	3 Mar 2001			
White WT299	11 Feb 2000	21 Dec 2000			

an otherwise completely normal colour pattern was identified based upon a line of black pigmentation, c. 5 cm wide, running at an angle from behind the dorsal fin, along the left side of its body halfway towards its venter (Fig. 4). The relative importance of these distinct features varied between the Hauraki Gulf and Mercury Bay (Table 1).

In Mercury Bay, 18 identified dolphins were seen more than once over the course of the 3-year study (4.4% of catalogued individuals). Most of these were seen only twice, but Platypus WT208 was identified on five separate occasions, Stumpy WT209 on four, and Black body-line WT91 3 times (Table 2). Eleven re-sightings occurred over consecutive seasons, four matches were found between the Whitianga and the Whakatane study areas (Table 3) and two individuals were matched between Whitianga and the Hauraki Gulf (Table 3). The interval between the first sighting and the most recent re-sighting ranged from one day (for Left-bent grey WT374) to at least 983 days (for Black body-line WT91).

In the Hauraki Gulf, 60% (n = 300) of the 500 individually identified dolphins, were seen only once during the 6-month study period. The remaining 40% (n = 200) were seen between 2 and 8 times. 13.6% (n = 68) were observed 3 times or more. The animal re-sighted most frequently was Cala (AK19), which was encountered 8 times between 26 October 2000 and 4 January 2001. AK59 was seen 7 times between 11 November 2000 and 5 February 2001. AK36 and AK42 were observed 6 times between 24 December 2000 and 4 March 2001.

Five different anomalously pigmented common dolphins with grey lateral patches were seen in Mercury Bay. Another five grey-sided individuals were observed in the Hauraki Gulf. Only one of them matched a Mercury Bay animal (Paintbrush greysides WT 345), bringing the combined total to nine grey-sided individuals. These represent 1% of the individuals catalogued in the two study areas. A similar prevalence of this phenomenon was found by Perrin et al. (1995) off California.

DISCUSSION

The most significant result of the photo-identification effort lies in providing a record for the spatial and temporal distribution of certain individuals. Thanks to re-sighting a number of individuals off Whakatane, that were previously identified in Mercury Bay (c. 200 km distant), one can safely presume that common dolphins are very mobile in the greater Bay of Plenty area (Fig. 1). Common dolphins have shown that they are able to cover such distances in relatively little time. Evans (1982) reported that a radio-tagged female common dolphin covered a distance of at least 270 n miles within 10 days. Black body-line and Stumpy were both documented by van Groningen (unpubl. data) off Whakatane sometime between January and July 1998. They were then spotted in Mercury Bay during the 1999/2000 (Stumpy WT209) and 2000/01 seasons (Black body-line WT91), respectively, and re-sighted again off Whakatane in 2000/01 (both). Local fishers and dolphin-tour operators speculate that common dolphins in the Bay of Plenty have a nomadic lifestyle which takes them in an annual cycle from the East Cape north along the coast to Coromandel Peninsula, offshore from there, and back south towards East Cape. The observed matches between Whitianga and Whakatane would fit into such a pattern.

Table 3 Re-sightings of identifiable individuals, part 2. Locations: **WT**, Whitianga; **WK**, Whakatane; **AK**, Auckland (Hauraki Gulf). Bold print indicates individual was seen in a location other than Mercury Bay.

Re-identified dolphin	1	2	3	4
Between two places				
WT and WK				
Pumpkin WT59	1 Apr 1999	**8 Apr 2001 WK**		
Stumpy WT209	**July 1998 WK**	1 Nov 1999	**24 Mar 2001 WK**	**30 Mar 2001 WK**
Jagged mum WT188	13 Nov 1999	**22 Mar 2001 WK**		
Black body-line WT91	**July 1998 WK**	14 Oct 2000	**10 Apr 2001 WK**	
WT and AK				
Low nick WT13	9 Mar 1999	**20 Jan 2001 AK**		
Paintbrush grey WT345	7 Mar 2000	13 Dec 2000	**19 Mar 2001 AK**	**25 Mar 2001 AK**

Common dolphins apparently do not restrict their movements to within the Bay of Plenty, however. Two Mercury Bay individuals were identified in the Hauraki Gulf (at least 100 km distant by sea) (Table 3). Information obtained from the dolphin tour operators in Whakatane suggests that common dolphin abundance there increases in autumn, whereas it simultaneously decreases in Mercury Bay. Quite possibly, this could be the result of an influx of individuals that were previously seen off Whitianga. Assuming that prey availability is the main driving force behind dolphin movements, Whakatane should be more productive at that time of year, than Whitianga. This hypothesis is supported by surface geostrophic current data for the 1996/97 summer, which revealed a pattern by which planktonic organisms would be pushed towards the east coast of Coromandel Peninsula in early November. These currents then turned south-easterly in December, moving plankton towards Whakatane and the East Cape (Chiswell & Booth 1999). The East Cape Eddy north-east of Whakatane, is also likely to channel plankton, and warmer water into the south-eastern Bay of Plenty (Roemmich & Sutton 1998). This means that the area off Whakatane might be a suitable habitat for dolphins throughout most of the year, whereas the conditions off Coromandel are more ephemeral, and probably not suited to support a resident population. Future research should now focus on the Whakatane area, where photo-identification could assist in establishing whether individual dolphins spend extended periods of time there, especially during autumn and winter. Further, surveys of the East Cape Eddy itself may reveal this location as a preferred offshore habitat for common dolphins.

Using the photo-catalogue presented here (Appendix), researchers will now be able to track some identifiable common dolphins all around New Zealand, for years to come. Future sightings may reveal the true extent of the dolphins' home range, the presence or absence of long-term associations between individuals, and possibly also provide information on the animals' longevity.

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Appendix Photo-catalogue of selected recognisable common dolphin (*Delphinus delphis*) individuals, including the dates they were seen in the Auckland (AK) and Whitianga (WT) study areas. (* indicates individual was re sighted in another study area; WK, Whakatane.)

AK12: 2, 6, 20, 28, 29 Jan 2001

AK17: 7 Jan, 8 Feb 2001

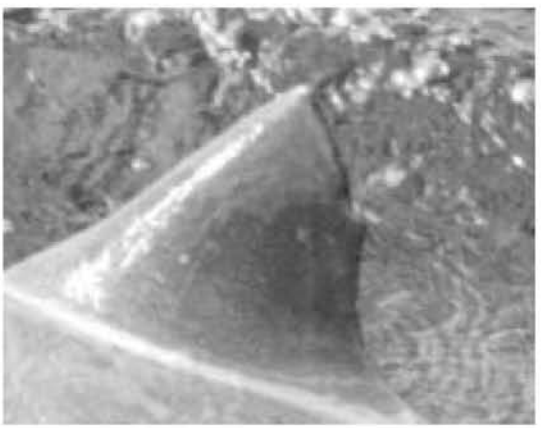
AK15: 4, 6, 7, 20 Jan 2001

AK26: 6 Jan, 12 Mar 2001

Continued

AK35: 6, 7, 17 Jan 2001

AK55: 19 Feb, 22 Mar 2001

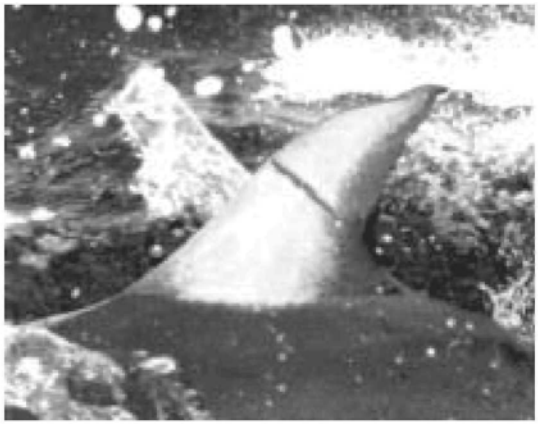


AK42: 25 Mar 2001

AK59: 26 Feb 2001

AK43: 12 Dec 2000, 5, 30 Jan, 16 Mar 2001

AK66: 20, 21 Jan 2001



AK80: 20, 24 Mar 2001

WT6: 10 Oct 1999

AK92: 13 Mar 2001

WT13: 1 Nov 1999

AK93: 15, 22, 24 Mar 2001

WT24: 5 Nov 1999

Continued

WT44: 30 Nov 1999

WT290: 4 Feb 2000, 3 Mar 2001

WT101: 8 Feb 2000
Dorsal feature arrowed.

WT297: 11 Feb 2000

WT208: 15 Jan, 10, 11 Feb 2000, 23 Jan, 19 Feb 2001
Misshapen beak arrowed.

WT322: 16 Oct 2000

WT323: 16 Oct 2000

WT369: 27 Dec 2000

WT335: 24 Nov 2000

WT377: 7 Jan 2001

WT348: 8 Dec 2000
Low notch arrowed.

*WT59: 1 Apr 1999, WK: 8 Apr 2001

Continued

*WT345: 7 Mar, 13 Dec 2000, AK: 19, 25 Mar 2001
Unusual coloration arrowed.