

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/253654151>

Anomalously Pigmented Common Dolphins (*Delphinus* sp.) off Northern New Zealand

Article in *Aquatic Mammals* · June 2014

DOI: 10.1578/AM.31.1.2005.43

CITATIONS

21

READS

308

2 authors:



Karen A Stockin
Massey University

183 PUBLICATIONS 1,549 CITATIONS

[SEE PROFILE](#)



Ingrid Natasha Visser
Orca Research Trust

48 PUBLICATIONS 661 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:

Project

Foraging ecology of New Zealand's odontocetes [View project](#)

Project

Nutritional Ecology of Australasian gannets [View project](#)

Anomalously Pigmented Common Dolphins (*Delphinus* sp.) off Northern New Zealand

Karen A. Stockin¹ and Ingrid N. Visser²

¹*Coastal-Marine Research Group, Institute of Natural Resources, Massey University,
Private Bag 102 904, North Shore MSC, Auckland, New Zealand*

²*Orca Research Trust, P.O. Box 1233, Whangarei, New Zealand*

Abstract

Anomalous pigmentations have been recorded in many cetacean species. However, typically only one variation is reported from a population at a time (e.g., an albino). Here we record a spectrum of pigmentation from common dolphins (*Delphinus* sp.) off northern New Zealand. All-black, dark-morph, pale-morph, and all-white individuals, as well as variations between these have been recorded. Pale-coloured pectoral flippers are prevalent, and a number of individuals with white “helmets” have been observed.

Key Words: common dolphin, *Delphinus delphis*, *Delphinus capensis*, anomalous pigmentation, taxonomy, pectoral flipper, New Zealand

Introduction

To date, two species of common dolphin are recognised worldwide: (1) the short-beaked (*Delphinus delphis*) and (2) the long-beaked (*D. capensis*) common dolphins, with a subspecies of the long-beaked (*D. capensis tropicalis*) acknowledged (Jefferson & Van Waerebeek, 2002). Given the relatively recent recognition of the latter two, it comes as no surprise that cetacean field guides specific to New Zealand (e.g., Baker, 1983; Dawson, 1985) list only the short-beaked common dolphin as present in those waters. Heyning & Perrin (1994) did not include New Zealand or Australia in the known range of the long-beaked common dolphin; they found no information nor morphological data that would indicate the species was present. Amaha (1994), Jefferson & Van Waerebeek (2002), and Bell et al. (2002) suggested that all Australian specimens were *D. delphis* based on morphometric analyses. Rice's (1998) statement that specimen(s) of long-beaked common dolphin have been identified from New Zealand was apparently based on an inaccurate citation of Heyning & Perrin (1994) (D. W. Rice, pers. comm., and W. F. Perrin, pers. comm.). Some putative evidence of *D. capensis* in

New Zealand waters is provided by Bernal et al. (2003) who suggested that common dolphins exhibiting long rostra, as photographed in New Zealand by Doak (1989; Plates 34A, 34B), are long-beaked common dolphins. However, as Amaha (1994) and Jefferson & Van Waerebeek (2002) highlighted, neither New Zealand nor Australian common dolphins neatly fit the morphological description of either *D. delphis* or *D. capensis*. In the past, New Zealand common dolphins have been identified from pigmentation patterns in the field and classified as short-beaked common dolphins (Bräger & Schneider, 1998; Gaskin, 1968; Neumann, 2001; Webb, 1973), although pigmentation alone may not be sufficient to positively identify these dolphins to species.

While cetaceans are not a colourful taxonomic group of animals, Perrin (2002) suggested colouration patterns observed in whales, dolphins, and porpoises are still important, presumably having both function and adaptive value. Although some species of cetacean show limited variation within their typical pigmentation patterns—for example, false killer whale (*Pseudorca crassidens*) (Stacey et al., 1994)—others are known to differ widely within and between populations—for example, humpback whales (*Megaptera novaeangliae*) (Kaufman et al., 1987) and Indo-Pacific humpback dolphins (*Sousa chinensis*) (Jefferson & Karczmarski, 2001).

Colouration is known to change between birth and adulthood in some odontocetes—for example, beluga whales (*Delphinapterus leucas*) (Brodie, 1989), Indo-Pacific humpback dolphins (Jefferson & Karczmarski, 2001), and Atlantic spotted dolphins (*Stenella frontalis*) (Perrin et al., 1994). Changes in pigmentation may also occur rapidly post mortem (P. Duignan, pers. comm.). Deviations from the typical pigmentation pattern found on any species of cetacean occur along a continuum, which may range from hyperpigmentation (i.e., darker colours being prevalent)—melanistic/all-black individuals—to hypopigmentation (i.e., paler colours being prevalent or normal

pigmentations reduced/absent)—albino/all-white animals. Additionally, extremes may mask other pigmentation patterns.

Typically, common dolphins have a distinctive hourglass colour pattern (Heyning & Perrin, 1994; Mitchell, 1970), which makes them readily identifiable in the field. Heyning & Perrin (1994) noted that this pigmentation varies considerably between the two recognised species, with identified differences being the angle of the flipper stripe in relation to the gape and the point of its interception with the lip patch, the level of contrast exhibited between the thoracic patch and black/dark spinal field, and the extent to which the abdominal field extends forward of the pectoral flippers. Common dolphins found off northern New Zealand exhibit a wide range of pigmentation forms, including anomalous examples from the recognised patterns.

Materials and Methods

During non-systematic, small boat surveys for cetaceans between 1993 and 2004, we irregularly searched the area between the Cavalli Islands ($34^{\circ} 58' \text{ S}$, $173^{\circ} 57' \text{ E}$), Northland, and Auckland ($36^{\circ} 45' \text{ S}$, $174^{\circ} 50' \text{ S}$), Hauraki Gulf (Figure 1). In 2002-2004, as part of an ongoing study of New Zealand common dolphins, a concentrated search effort was made in the Hauraki Gulf, a semi-enclosed body of water with a maximum depth of 53 m. Observations were made at Beaufort 0-3.

Photo-identification methods (Hammond et al., 1990) were used. Animals were catalogued using only the left side of the dorsal fin due to asymmetrical pigmentation. If anomalously pigmented dolphins were observed, a concerted effort was made to photograph the pigmentation and photo-identify each anomalous individual. Data, including location, group size and composition, and number of anomalous pigmented animals, was recorded during each observation. Additionally, photographs were collected opportunistically from other researchers and the public.

Although water conditions may affect how colour is perceived on marine mammals (Mitchell, 1970), we observed and photographed the dolphins as they surfaced and, therefore, there was no mistaking the anomalous pigmentations. To ensure that records involved different individual dolphins, we used additional pigmentation features as well as congenital and acquired marks on the dorsal fin to crossmatch and avoid false positive records (e.g., compare Figure 2a to Figure 2b).

Results

We collected 63 records of anomalously pigmented common dolphins in northern New Zealand

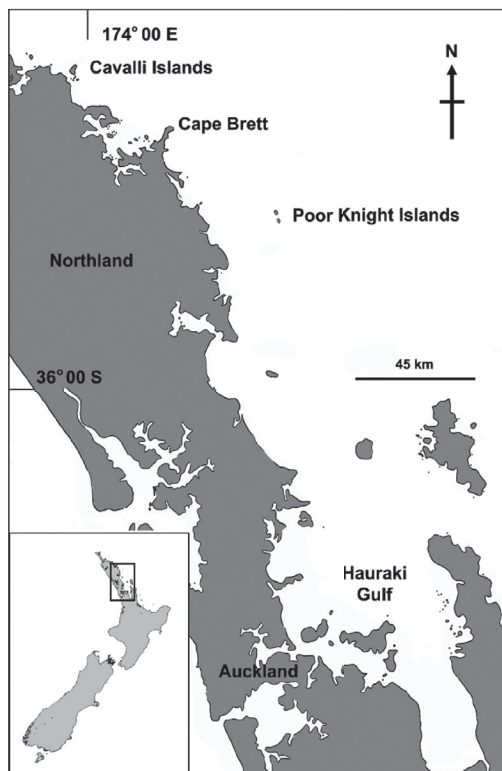


Figure 1. The study areas in Northern New Zealand

waters. We have photographic evidence for 44 of these records (Table 1), including melanistic and all-white individuals (Figure 3). The eyes of the all-white animal (record # 44, Table 1) were not observed (N. Croft, pers. comm.); therefore, it could not be determined whether this animal was a true albino (with pigmentless pink eyes) or simply leucistic (with pigmented dark eyes). Records lacking photographic evidence were separated to maintain data accuracy (Table 2). On eight occasions we observed multiple anomalously pigmented individuals, with two to eight individuals in the same group (Tables 1 & 2).

We broadly divided the photographed animals into dark- or pale-morph categories; however, in some instances, features of both dark and pale pigmentation were evident on the same animal (e.g., records #19-#30, Table 1). The dark-morph dolphins were typically darker in the thoracic patch, which would normally be ochre-coloured (e.g., compare Figure 4a to 4b). The pale-morph dolphins displayed the ochre thoracic patch, with one exception (record #30, Table 1), which exhibited a patchy combination of grey- and ochre-colour. Additionally, the pale-morphs had pale pigmented areas on a range of body parts (e.g., the melon, beak, and/or pectoral flippers).

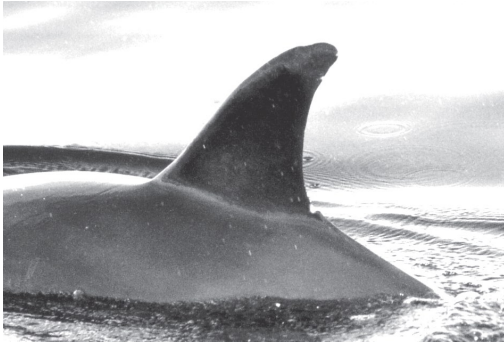


Figure 2a. Close-up of dorsal fin of dark-morph common dolphin HG127 (record #13, Table 1) showing variation used to ensure individual identification

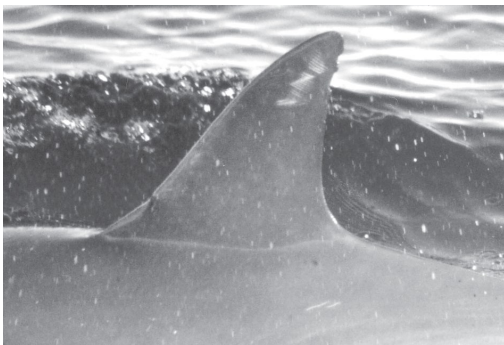


Figure 2b. Close-up of dorsal fin of dark-morph common dolphin HG235 (record #12, Table 1) showing variation used to ensure individual identification (Photographs from K. A. Stockin)



Figure 3. All-white common dolphin, record #44, Table 1 (Photograph from N. Croft)

In the Hauraki Gulf, a photo-identification catalogue of 358 individuals was established (Stockin, unpublished data). Within this, 23 anomalously pigmented common dolphins were catalogued (Table 1), and of these, 14 also were photographed showing the pectoral flippers. One had dark, six had patchy-combination, and seven had lightly pigmented pectoral flippers (Table 1). This variation in pectoral flipper pigmentation is also apparent in conjunction with other variations in

pigmentation such as grey-sides (e.g., see records #17-#29, Table 1) and white “helmets” (e.g., see records #33-#43, Table 1 and Figure 4b).

Animals exhibiting white “helmets” were observed in both Northland and Hauraki Gulf waters (e.g., records #19-#20 and #30-#43, Table 1). These individuals ($n = 14$, collectively) exhibited a varying extent of white pigmentation across the melon and beak, which visually resembled a “helmet.” All but one of the helmeted animals retained other pigmentation features typical of common dolphins (e.g., Figure 5), with the exception (see record #19) lacking the ochre-coloured thoracic patch.

Collectively, anomalously pigmented common dolphins in the Hauraki Gulf represent 6.4% of the current catalogue. This does not include a further seven encounters with anomalously pigmented animals whose dorsal fins were photographed but deemed insufficiently marked for inclusion in the catalogue, nor those animals recorded in Table 2, which were not photographed.

In the Hauraki Gulf, common dolphins exhibiting apparently “typical” pigmentation displayed a wide degree of variation. For example, colouration of the pectoral flipper and the pectoral flipper stripe varied from all-black to pale cream, with pale pectoral flippers being prevalent. Of 100 catalogued animals from the Hauraki Gulf for which the pectoral flippers were also photographed, 68 exhibited pale pectoral flippers (Stockin, unpublished data) (e.g., see Figure 4a). On one other photographed animal, the pectoral flipper stripe was masked by the pale pigmentation of the abdominal field, to the extent that it appeared almost absent (record #43, Table 1). Variation was also observed in eye-patch colouration, with one photographed animal exhibiting white pigmentation around the eye as opposed to the dark grey or black usually observed in this species. We did not include this example in the present analysis, however, since the observation was made on a dead stranded animal. Additionally, in a number of observed animals, the hourglass pattern characteristic of common dolphins appeared far from sharp or contrasting and was more inconspicuous than that described for *D. delphis* from California (Heyning & Perrin, 1994).

Discussion

There is clearly a wide range of variation in pigmentation on common dolphins of both species within schools and between geographic locations worldwide (Evans, 1994). Reports of outliers from this normal variation have included melanistic (Visser et al., 2004), partially dark (Perrin et al., 1995), partially white (Leatherwood et al., 1988),

Table 1. Photographed, anomalously pigmented common dolphins in northern New Zealand; records are in order from dark to light.

Record #	Date	Location	Details D = dark-morph; P = pale-morph	Source (catalogue #)
1	15 September 1993	Cavalli Islands 34° 58' S, 173° 57' E	melanistic D	Visser et al., 2004
2	15 September 1993	Cavalli Islands 34° 58' S, 173° 57' E	dark all over, with lighter melon D	Visser
3	15 September 1993	Cavalli Islands 34° 58' S, 173° 57' E	grey-sided, dark pectoral flippers D	Visser
4	10 March 1999	Whitianga 36° 33' S, 175° 42' E	grey-sided, dark pectoral flippers D	Neumann et al., 2002 (WT1)
5	5 June 2002	Hauraki Gulf 36° 50' S, 174° 51' E	grey-sided, dark pectoral flippers D	Stockin
6	26 November 2002	Hauraki Gulf 36° 35' S, 174° 58' E	grey-sided D	Stockin (HG092)
7	10 February 2003	Hauraki Gulf 36° 35' S, 174° 57' E	grey-sided D	Stockin (HG045)
8	3 April 2003	Hauraki Gulf 36° 36' S, 175° 05' E	grey-sided D	Stockin (HG241)
9	11 July 2003	Hauraki Gulf 36° 34' S, 174° 58' E	grey-sided D	N. Wiseman, pers. comm.
10	13 October 2003	Hauraki Gulf 36° 39' S, 175° 06' E	grey-sided D	Stockin (HG109)
11	6 May 2004	Hauraki Gulf 36° 32' S, 175° 00' E	grey-sided D	Stockin (HG238)
12	16 May 2004	Hauraki Gulf 36° 30' S, 175° 01' E	grey-sided D	Stockin (HG235)
13	21 May 2004	Hauraki Gulf 36° 34' S, 175° 04' E	grey-sided D	Stockin (HG127)
14	9 June 2004	Hauraki Gulf 36° 39' S, 174° 52' E	grey-sided D	Stockin
15	9 June 2004	Hauraki Gulf 36° 33' S, 174° 57' E	grey-sided D	Stockin (HG101)
16	24 November 2004	Outer Hauraki Gulf 36° 11' S, 174° 57' E	grey-sided D	Stockin
17	4 August 2003	Hauraki Gulf 36° 29' S, 174° 55' E	grey-sided, patchy pectoral flippers D	Stockin (HG221)
18	27 October 2004	Outer Hauraki Gulf 36° 38' S, 175° 02' E	grey-sided, patchy pectoral flippers D	Stockin
19	4 April 1979	Northern New Zealand 34° 58' S, 173° 36' E	grey-sided, dark pectoral flippers, white "helmet," white beak, black lip patch D, P	Perrin et al., 1995
20	31 August 2004	Hauraki Gulf 36° 27' S, 175° 04' E	grey-sided, patchy pectoral flippers pale white "helmet" D, P	Stockin (HG233)
21	31 August 2002	Hauraki Gulf 36° 29' S, 174° 54' E	grey-sided, light pectoral flippers D, P	Stockin (HG218)
22	15 October 2002	Hauraki Gulf 36° 38' S, 175° 09' E	grey-sided, light pectoral flippers D, P	Stockin (HG004)
23	10 February 2003	Hauraki Gulf 36° 35' S, 174° 57' E	grey-sided, light pectoral flippers D, P	Stockin (HG094)
24	15 May 2003	Hauraki Gulf 36° 37' S, 175° 02' E	grey-sided, light pectoral flippers D, P	Stockin (HG032)
25	31 August 2003	Hauraki Gulf 36° 28' S, 174° 59' E	grey-sided, light pectoral flippers D, P	Stockin (HG049)

26	11 September 2003	Hauraki Gulf 36° 41' S, 175° 11' E	grey-sided, light pectoral flippers D, P	Stockin (HG153)
27	11 June 2004	Hauraki Gulf 36° 37' S, 174° 49' E	grey-sided, light pectoral flippers D, P	Stockin ^a (HG216)
28	31 October 2004	Hauraki Gulf 36° 31' S, 175° 03' E	grey-sided, masked by pale overlay, pale melon and pectoral flippers D, P	Stockin
29	10 February 2003	Hauraki Gulf 36° 35' S, 174° 57' E	patchy grey-sided, patchy pectoral flippers D, P	Stockin (HG099)
30	9 May 2004	Hauraki Gulf 36° 37' S, 175° 03' E	patchy grey & ochre thoracic patch, distinct white "helmet," white beak, black lip patch D, P	N. Wiseman, pers. comm. (HG242)
31	23 July 1997	Poor Knight Islands 35° 31' S, 174° 43' E	ochre thoracic patch, white "helmet," white beak, black lip patch P	Visser (INV-Dd-#007)
32	4 January 2004	Hauraki Gulf 36° 39' S, 175° 06' E	ochre thoracic patch, faint white "helmet," distinct white beak, black lip patch P	Stockin
33	23 July 1997	Poor Knight Islands 35° 31' S, 174° 43' E	ochre thoracic patch, patchy pectoral flippers white "helmet," white beak, black lip patch P	Visser (INV-Dd-#003)
34	24 November 2004	Outer Hauraki Gulf 36° 13' S, 175° 10' E	ochre thoracic patch, patchy pectoral flippers white "helmet," white beak, black lip patch P	Stockin (HG258)
35	24 November 2004	Outer Hauraki Gulf 36° 13' S, 175° 10' E	ochre thoracic patch, patchy pectoral flippers white "helmet," white beak, black lip patch P	Stockin (HG259)
36	24 November 2004	Outer Hauraki Gulf 36° 13' S, 175° 10' E	ochre thoracic patch, patchy pecto- ral flippers white "helmet," white beak, black lip patch P	Stockin (HG260)
37	18 December 2004	Auckland 36° 51' S, 174° 49' E	ochre thoracic patch, patchy pectoral flippers white "helmet," white beak, black lip patch P	Stockin (WS04-36Dd) ^c
38	23 July 1997	Poor Knight Islands 35° 31' S, 174° 43' E	ochre thoracic patch, light pectoral flippers white "helmet," white beak, black lip patch P	Visser (INV-Dd-#004)
39	23 July 1997	Poor Knight Islands 35° 31' S, 174° 43' E	ochre thoracic patch, light pectoral flippers faint white "helmet," distinct white beak, black lip patch P	Visser (INV-Dd-#002)
40	23 July 1997	Poor Knight Islands 35° 31' S, 174° 43' E	ochre thoracic patch, light pectoral flippers faint white "helmet," patchy beak P	Visser (INV-Dd-#001)
41	23 July 1997	Poor Knight Islands 35° 31' S, 174° 43' E	ochre thoracic patch, light pectoral flippers faint white "helmet," dark beak P	Visser (INV-Dd-#005)
42	23 July 1997	Poor Knight Islands 35° 31' S, 174° 43' E	ochre thoracic patch, light pectoral flippers faint white "helmet," dark beak P	Visser (INV-Dd-#006)
43	5 March 2004	Outer Hauraki Gulf 36° 13' S, 175° 12' E	ochre thoracic patch, light pectoral flippers faint white "helmet," very pale flipper stripe P	Stockin
44	28 December 1978	Cape Brett 35° 07' S, 174° 20' E	all-white P	N. Croft, pers. comm. Fertl, 1999 ^b

^a Observed in association with bottlenose dolphins

^b Fertl et al. (1999) record three all-white common dolphin sp. from New Zealand. The N. Croft and W. Doak (1981) records are the same animal (N. Croft & W. Doak, pers. comm.).

^c Observed during a live stranding; animal subsequently euthanized (PM #36752)

Table 2. Anomalously pigmented common dolphins in northern New Zealand (not photographed); records are in order from dark to light.

Record #	Date	Location	Details	
			D = dark-morph; P = pale-morph	Source
1	3 December 2002	Hauraki Gulf 36° 28' S, 174° 59' E	grey-sided D	Stockin
2	17 December 2002	Hauraki Gulf 36° 37' S, 174° 59' E	grey-sided D	Stockin
3	22 July 2003	Hauraki Gulf 36° 36' S, 174° 57' E	grey-sided D	N. Wiseman, pers. comm.
4	25 July 2003	Hauraki Gulf 36° 41' S, 175° 07' E	grey-sided D	N. Wiseman, pers. comm.
5	4 August 2003	Hauraki Gulf 36° 29' S, 174° 55' E	grey-sided D	Stockin
6	5 August 2003	Hauraki Gulf 36° 33' S, 174° 56' E	grey-sided D	Stockin
7	6 August 2003	Hauraki Gulf 36° 35' S, 174° 57' E	grey-sided D	Stockin
8	7 August 2003	Hauraki Gulf 36° 31' S, 175° 03' E	grey-sided D	Stockin
9	30 August 2003	Hauraki Gulf 36° 33' S, 175° 04' E	grey-sided D	Stockin
10	31 August 2003	Hauraki Gulf 36° 28' S, 174° 59' E	grey-sided D	Stockin
11	21 October 2003	Hauraki Gulf 36° 39' S, 175° 09' E	grey-sided D	N. Wiseman, pers. comm.
12	31 October 2003	Hauraki Gulf 36° 39' S, 175° 08' E	grey-sided D	N. Wiseman, pers. comm.
13	3 November 2003	Hauraki Gulf 36° 38' S, 175° 08' E	grey-sided D	Stockin
14	7 November 2003	Hauraki Gulf 36° 46' S, 175° 18' E	grey-sided D	Stockin
15	3 February 2004	Outer Hauraki Gulf 36° 06' S, 175° 18' E	grey-sided D	Stockin
16	7 February 2004	Hauraki Gulf 36° 25' S, 174° 56' E	grey-sided D	Stockin
17	16 May 2004	Hauraki Gulf 36° 29' S, 175° 03' E	grey-sided D	Stockin
18	1 August 2004	Hauraki Gulf 36° 26' S, 175° 02' E	grey-sided D	Stockin ^a
19	23 July 1997	Poor Knight Islands 35° 31' S, 174° 43' E	grey-sided, white "helmet" D, P	Visser

^a Observed in association with a striped dolphin

Full details of personal communications:

Elisabeth Burgess, Coastal-Marine Research Group, Institute of Natural Resources, Massey University, Private Bag 102 904, North Shore MSC, Auckland, New Zealand

Nigel Croft, 21 Albert Street, Whangarei, New Zealand

Wade Doak, P.O. Box 20, Whangarei, New Zealand

Padraig J. Duignan, Institute of Veterinary and Animal Biomedical Sciences, Massey University, Private Bag 11-222, Palmerston North, New Zealand

David Lambert, Institute of Molecular Biosciences, Allan Wilson Centre for Molecular Ecology and Evolution, Massey University, Private Bag 102 904, North Shore MSC, Auckland, New Zealand

William F. Perrin, National Marine Fisheries Service, Southwest Fisheries Science Center, La Jolla, CA 92037, USA

Dale W. Rice, National Marine Mammal Laboratory, 7600 Sand Point Way, Seattle, WA 98115, USA

Nicky Wiseman, Laboratory of Molecular and Evolutionary Sciences, School of Biological Sciences, University of Auckland, Private Bag 92019, Auckland, New Zealand



Figure 4a. “Typical” colouration of a New Zealand common dolphin with ochre-coloured thoracic patch; note pale-coloured pectoral flipper.



Figure 4b. Anomalous patchy “grey-sided” common dolphin (HG099) (record #29, Table 1); note patchy-coloured pectoral flipper. (Photographs from K. A. Stockin)

and all-white individuals (Fertl et al., 1999). Our records from northern New Zealand are interesting in that within this restricted geographic area, the complete continuum of pigmentation has been observed. A wide degree of variability was also found within an even smaller area—the Hauraki Gulf. We would not expect geographic variation alone to explain such variability given the small area within which the present data were collected.

The diagnostic field characteristics for short-beaked common dolphins include either darkly pigmented or patchy pectoral flippers with diffuse edges (e.g., Evans, 1994; Mitchell, 1970; Perrin, 1972). Cetacean field guides specific to New Zealand waters (e.g., Baker, 1983; Dawson, 1985) illustrate short-beaked common dolphins with dark flippers. However, common dolphins from the Hauraki Gulf predominantly exhibit light-coloured flippers (e.g., Figure 4a). Similar variations have also been observed and photographed off the southeast coast of Australia (E. Burgess, pers. comm.). The significance of this remains unclear, although we acknowledge that flipper pigmentation can vary considerably between populations. Pale-coloured pectoral flippers have been observed on various age classes within the Hauraki Gulf (Stockin, unpublished data) and, therefore, are not age-specific, contrary to Heyning & Perrin (1994), who suggested that patchy and pale-coloured pectoral flippers develop with age.



Figure 5. Common dolphin (INV-Dd-#007) exhibiting anomalous white “helmet” pigmentation (record #31, Table 1); note pigmentation on dorsal fin, typical of an additional feature used to ensure individual identification. (Photograph from I. N. Visser)

Only two previously published accounts detail anomalous pigmentation in common dolphins (Neumann et al., 2002; Perrin et al., 1995). Neither discussed the presence of pale-coloured pectoral flippers in either “typical” or anomalously pigmented individuals, although both illustrated anomalous grey-sided common dolphins from New Zealand waters that exhibit dark pectoral flippers (see our records #4 and #19, Table 1). Additionally, although not originally mentioned in Perrin et al. (1995), their Figure 1 of an anomalously pigmented common dolphin off northern New Zealand also shows a white “helmet,” similar to those described here. This suggests that white-helmeted dolphins are not a new phenomenon in this population since known observations of these animals have occurred between 1979 (Perrin et al., 1995) (record #19, Table 1) and 2004 (records #30-#43, Table 1).

Little is known about the genetic basis of colouration in cetaceans, although Perrin (1972) proposed that the colour patterns observed in common dolphins result from the interaction of two independent genetic components. Perrin et al. (1995) observed what we would classify as dark-morph common dolphins, and supported the Perrin (1972) hypothesis of independent cape and overlay pigments.

Hyperpigmentation may result from hybridisation (e.g., Willis et al., 2004; Zornetzer & Duffield, 2003). Perrin et al. (1995) observed striped dolphins (*Stenella coeruleoalba*) in association with typical and anomalously pigmented short-beaked common dolphins off California. This has also been observed on two occasions in both Auckland and Northland waters (Stockin and Visser, unpublished data). Additionally, common dolphins have, on two separate occasions, been observed in association with bottlenose dolphins (*Tursiops truncatus*) in the Hauraki Gulf (Stockin, unpublished data). During one of these sightings, a dark-morph common dolphin was observed (record #27, Table 1).

Regardless of the causation of anomalous pigmentation, the ecological context of pigmentation patterns of cetaceans, both on the individual and species level, is poorly understood. Hain & Leatherwood (1982), Fertl et al. (1999), and Forestell et al. (2001) discussed the possible costs for anomalously white individuals. Visser et al. (2004) addressed the costs of anomalous pigmentation in melanistic cetaceans.

While photo-identification remains in its infancy for this region, the wide range of pigmentation patterns observed within this population and the proportion of animals exhibiting anomalous colouration (i.e., 6.4%) are much greater than previously reported (e.g., Neumann et al., 2002, 1%; Perrin et al., 1995, < 1%). One possible explanation for this relates to differences in field effort between sites. An alternative hypothesis for the high proportion of anomalous colouration reported here is perhaps that this population exhibits signs of reduced gene-flow between it and other populations (D. Lambert, pers. comm.). Neumann et al. (2002) recorded photo-identification matches between the Coromandel Peninsula (36° 50' S, 175° 42' E) and the Hauraki Gulf (100 km distance), which suggests these populations may be linked genetically. No detailed genetic or morphometric studies have been undertaken on New Zealand common dolphins. Amaha (1994) included only 15 skulls of New Zealand common dolphin sp. in her morphological analysis. When they were pooled with a further nine from Australia, she found all to be intermediate between short- and long-beaked types. Although the presence of *D. delphis* is almost certain in New Zealand waters, it would appear that the possible occurrence of *D. capensis* or an intermediate form should not be dismissed without further investigation. By reporting anomalies seen in the field, such as those recorded here, we hope to provide a framework for future investigations.

Acknowledgments

We thank Nicky Wiseman, Liz Burgess, and Nigel Croft for their unpublished reports and photographs, and Dirk Neumann and Alexandra Leitenberger for their communications regarding sightings of anomalous common dolphins. Additional thanks to Pdraig Duignan, Dave Lambert, Bill Perrin, and Dale Rice for their personal communications. Special thanks to Bill Perrin, Tom Jefferson, and Mark Orams for their comments, which improved this manuscript. KAS thanks *M.V. Dolphin Explorer* and the numerous research volunteers who assisted in the field. KAS was supported by a Commonwealth Scholarship, Whale and Dolphin Adoption Project (WADAP), Valder Conservation Group, Fujifilm NZ Ltd.,

Viko NZ Ltd., and Marine Power New Zealand Ltd. INV was supported by the Orca Research Trust, Whale and Dolphin Conservation Society, Trillian Trust, and Moller-Yamaha Marine.

Literature Cited

- Amaha, A. (1994). *Geographic variation of the common dolphin, Delphinus delphis (Odontoceti: Delphinidae)*. Ph.D. thesis, Tokyo University of Fisheries.
- Baker, A. N. (1983). *Whales and dolphins of New Zealand and Australia: An identification guide*. Wellington, New Zealand: Victoria University Press. 133 pp.
- Bell, C. H., Kemper, C. M., & Conran, J. G. (2002). Common dolphins *Delphinus delphis* in southern Australia: A morphometric study. *Australian Mammology*, 24, 1-10.
- Bernal, R., Olavarria, C., & Moraga, R. (2003). Occurrence and long-term residency of two long-beaked common dolphins, *Delphinus capensis* (Gray 1828), in adjacent small bays on the Chilean central coast. *Aquatic Mammals*, 29, 396-399.
- Bräger, S., & Schneider, K. (1998). Near-shore distribution and abundance of dolphins along the west coast of the South Island, New Zealand. *New Zealand Journal of Marine and Freshwater Research*, 32, 105-112.
- Brodie, P. F. (1989). The white whale *Delphinapterus leucas* (Pallas, 1776). In S. H. Ridgway & R. R. Harrison (Eds.), *Handbook of marine mammals* (pp. 119-144). London: Academic Press.
- Dawson, S. (1985). *The New Zealand whale and dolphin digest: The official Project Jonah guidebook*. Auckland, New Zealand: Brick Row Publishing Co. Ltd. 130 pp.
- Doak, W. (1989). *Encounters with whales and dolphins*. Auckland: Hodder and Stoughton. 250 pp.
- Evans, W. E. (1994). Common dolphin, white-bellied porpoise *Delphinus delphis* Linnaeus, 1758. In S. H. Ridgway & R. Harrison (Eds.), *Handbook of marine mammals* (pp. 191-224). London: Academic Press.
- Fertl, D., Pusser, L. T., & Long, J. J. (1999). First record of an albino bottlenose dolphin (*Tursiops truncatus*) in the Gulf of Mexico, with a review of anomalously white cetaceans. *Marine Mammal Science*, 15, 227-234.
- Forestell, P. H., Paton, D. A., Hodda, P., & Kaufman, G. D. (2001). Observations of a hypo-pigmented humpback whale, *Megaptera novaeangliae*, off East Coast Australia: 1991-2000. *Memoirs of the Queensland Museum*, 47, 437-450.
- 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.
- Hain, J. H. W., & Leatherwood, S. (1982). Two sightings of white pilot whales, *Globicephala melaena*, and summarised records of anomalously white cetaceans. *Journal of Mammalogy*, 63, 338-343.
- Hammond, P. S., Mizroch, S. A., & Donovan, G. P. (Eds.). (1990). *Individual recognition and the estimation of*

- cetacean population parameters*. Cambridge, UK: International Whaling Commission. 440 pp.
- Heyning, J. E., & Perrin, W. F. (1994). Evidence for two species of common dolphin (Genus *Delphinus*) from the Eastern North Atlantic. *Los Angeles County Museum of Natural History Contributions in Science*, 442, 1-35.
- Jefferson, T. A., & Karczmarski, L. (2001). *Sousa chinensis*. *Mammalian Species*, 655, 1-9.
- Jefferson, T. A., & Van Waerebeek, K. (2002). The taxonomic status of the nominal species *Delphinus tropicalis* van Bree, 1971. *Marine Mammal Science*, 18, 787-818.
- Kaufman, G. D., Smultea, M., & Forestell, P. H. (1987). Use of lateral body pigmentation patterns for photographic identification of east Australian (Area V) humpback whales. *Cetus*, 7, 3-17.
- Leatherwood, S., Reeves, R. R., Perrin, W. F., & Evans, W. E. (1988). *Whales, dolphins and porpoises of the eastern North Pacific and adjacent Arctic waters: A guide to their identification*. New York: Dover Publications. 245 pp.
- Mitchell, E. (1970). Pigmentation pattern evolution in delphinid cetaceans: An essay in adaptive coloration. *Canadian Journal of Zoology*, 48, 717-740.
- Neumann, D. R. (2001). Seasonal movements of short-beaked common dolphins (*Delphinus delphis*) in the north-western Bay of Plenty, New Zealand: Influence of sea surface temperatures and El Niño/La Niña. *New Zealand Journal of Marine and Freshwater Research*, 35, 371-374.
- Neumann, D. R., Leitenberger, A. A., & Orams, M. B. (2002). Photo-identification of short-beaked common dolphins, *Delphinus delphis*, in north-east New Zealand: A photo-catalogue of recognisable individuals. *New Zealand Journal of Marine and Freshwater Research*, 36, 593-604.
- Perrin, W. F. (1972). Color patterns of spinner porpoises (*Stenella* cf. *S. longirostris*) of the Eastern Pacific and Hawaii, with comments on Delphinid pigmentation. *Fishery Bulletin*, 70, 983-1003.
- Perrin, W. F. (2002). Coloration. In W. F. Perrin, B. Würsig, & J. C. M. Thewissen (Eds.), *Encyclopedia of marine mammals* (pp. 236-244). San Diego: Academic Press.
- Perrin, W. F., Caldwell, D. K., & Caldwell, M. C. (1994). Atlantic spotted dolphin *Stenella frontalis* (G. Cuvier, 1829). In S. H. Ridgway & R. Harrison (Eds.), *Handbook of marine mammals* (pp. 173-190). London: Academic Press.
- Perrin, W. F., Armstrong, W. A., Baker, A. N., Barlow, J., Benson, S. R., Collet, A. S., Cotton, J. M., Everhart, D. M., Farley, T. D., Mellon, R. M., Miller, S. K., Philbrick, V., Quad, J. L., & Rodriguez, H. R. L. (1995). An anomalously pigmented form of short-beaked common dolphin (*Delphinus delphis*) from the Southwestern Pacific, Eastern Pacific, and Eastern Atlantic. *Marine Mammal Science*, 11, 241-247.
- Rice, D. W. (1998). *Marine mammals of the world: Systematics and distribution* (Special Publication #4). Lawrence, KS: Society for Marine Mammalogy. 231 pp.
- Stacey, P. J., Leatherwood, S., & Baird, R. W. (1994). *Pseudorca crassidens*. *Mammalian Species*, 456, 1-6.
- Visser, I. N., Fertl, D., & Pusser, L. T. (2004). Melanistic southern right-whale dolphins (*Lissodelphis peronii*) off Kaikoura, New Zealand, with records of other anomalously all-black cetaceans. *New Zealand Journal of Marine and Freshwater Research*, 38, 833-836.
- Webb, B. F. (1973). Dolphin sightings, Tasman Bay to Cook Strait, New Zealand, September 1968 to June 1969. *New Zealand Journal of Marine and Freshwater Research*, 7, 399-405.
- Willis, P. M., Crespi, B. J., Dill, L. M., Baird, R. W., & Hanson, M. B. (2004). Natural hybridization between Dall's porpoises (*Phocoenoides dalli*) and harbour porpoises (*Phocoena phocoena*). *Canadian Journal of Zoology*, 82, 828-834.
- Zornetzer, H. R., & Duffield, D. A. (2003). Captive-born bottlenose dolphin x common dolphin (*Tursiops truncatus* x *Delphinus capensis*) intergeneric hybrids. *Canadian Journal of Zoology*, 81, 1755-1762.