*Journal of the Royal Society of New Zealand*
*Volume 34, Number 4, December, 2004, pp 347–356*

# Observations of live Gray's beaked whales (*Mesoplodon grayi*) in Mahurangi Harbour, North Island, New Zealand, with a summary of at-sea sightings

**Merel L. Dalebout[1]*, Kirsty G. Russell[1], Murray J. Little[2], and Paul Ensor[3]**

**Abstract** A pair of free-swimming Gray's beaked whales, *Mesoplodon grayi*, an adult female and a calf, were observed in Mahurangi Harbour, near Warkworth, on the North Island of New Zealand, over 5 consecutive days in June 2001. Beaked whales (family Ziphiidae) are seldom seen at sea due to their oceanic distribution, deep diving ability, elusive behaviour, and possible low abundance. Gray's beaked whale is the most common beaked whale species to strand in New Zealand but observations of live animals in these waters are rare. Colour pattern and behaviour of these little known cetaceans are described. Although both animals appeared to be in good condition, the adult female had a series of deep corrugated scars behind her dorsal fin, likely the result of a ship strike. Other at-sea sightings of this species from International Whaling Commission (IWC)—International Decade of Cetacean Research (IDCR) minke whale assessment cruises and IWC—Southern Ocean Whale and Ecosystem Research (SOWER) circumpolar cruises are summarised. A cluster of sightings to the south-west of the Chatham Islands may indicate the existence of a "hotspot" for *M. grayi* in the New Zealand region.

**Keywords** *Mesoplodon grayi*; Ziphiidae; colour pattern; behaviour; ship strike; New Zealand; Chatham Islands

## INTRODUCTION

More species of whale and dolphin are found in New Zealand waters than almost anywhere else in the world (Baker 1999). This rich diversity includes 11 species of beaked whale (family Ziphiidae), a group that is among the least known of all mammals. Beaked whales are rarely seen at sea due to their oceanic distribution, deep diving ability, elusive habits, and possible low abundance (Mead 2002). Of the 21 species currently recognised, many have been described from only a small number of stranded animals (e.g., Dalebout et al. 2002, 2003; van Helden et al. 2002). Several have yet to be seen alive, and it is possible that unknown species still exist.

[1]School of Biological Sciences, University of Auckland, Private Bag 92 019, Auckland, New Zealand.
[2]8 Mera Road, Algies Bay, Warkworth, New Zealand.
[3]Governors Bay, Lyttelton RD1, New Zealand.

*Present address: Biology Department, Dalhousie University, Halifax, Nova Scotia, Canada B3H 4J1. Email: dalebout@dal.ca

*R03012; Received 31 October 2004; accepted 1 November 2004; Online publication date 6 December 2004*

Gray's beaked whale, *Mesoplodon grayi*, has a circumpolar distribution in deep, cold temperate Southern Hemisphere waters, with most strandings and sightings occurring south of 30°S (Folkens et al. 2002). Although generally considered to be a comparatively rare species, it is the most common beaked whale to strand in New Zealand (Baker 1999), with 188 *M. grayi* stranding events reported since records began in the 1840s (New Zealand Stranding Database; A. L. van Helden pers. comm.[1]). In contrast, there have been few published sightings of *M. grayi* at sea. Most sightings have occurred in sub-Antarctic and Antarctic waters, and usually consist of only a brief glimpse of animals at the surface (e.g., de Boer & Simmonds 2000). Information on colour pattern has been derived primarily from dead, stranded animals, although colour darkens rapidly within a few hours of death (Mead 1989). Overall, little is known about the behaviour, life history, migratory movements, or abundance of Gray's beaked whales.

Here we present information on the behaviour and colour pattern of *M. grayi* based on observations of a free-swimming mother-calf pair. These animals, while apparently in good health, spent 5 days in the shallow waters of Mahurangi Harbour (36°29′S 174°44′E), near Warkworth, c. 70 km north of Auckland, on the North Island of New Zealand. Mahurangi is a large, shallow, estuarine harbour (18.8 $km^2$ with an average water depth of <6 m at high tide), of which c. 7 $km^2$ consists of mudflats that are exposed at low tide.

We also present a summary of sighting data for this species collected during the International Whaling Commission (IWC)—International Decade of Cetacean Research (IDCR) minke whale assessment cruises and IWC—Southern Ocean Whale and Ecosystem Research (SOWER) circumpolar cruises.

## OBSERVATIONS

The two whales were seen in Mahurangi Harbour from 11 to 15 June 2001, and c. 30 h of boat-based observations were made. The mother was observed on 5 consecutive days; the calf on all but the first day. Local people noted that the whales had also been seen in this area on 10 June 2001.

The animals were identified as Gray's beaked whales, *Mesoplodon grayi*, based on the long white beak, small low melon, uniform dark body coloration, and estimated size of the adult female (>5 m; Baker 1999). This conclusion is supported by the high frequency of *M. grayi* strandings in New Zealand. The colour pattern, particularly the absence of a light gray "cape" over the back between the head and dorsal fin, also suggested that these animals were unlikely to be straptooth whales (*M. layardii*), the other large *Mesoplodon* species found in this region (Baker 1999). The whales were further identified as a cow-calf pair based on their comparative size, and the calf echelon position maintained by the smaller animal, swimming close beside, yet slightly behind, the larger animal, during the majority of surfacings (Mann & Smuts 1999). A distinctive pattern of scars on the back of the adult female confirmed that it was this same whale, and her calf, that were seen on all 5 days (Fig. 1). Given the normal deep-water distribution of this species and rarity of observations at sea, it is also unlikely that other *M. grayi* were present in the area during this time. No other cetacean species was observed during these encounters.

Both animals appeared calm during the majority of observations, based on their slow, constant swimming speed and regular breathing rate. They often brought their beaks and heads fully out of the water when surfacing, and spent some time resting on or just below the surface ("logging"). In general, both animals surfaced together, and blew 3–5 times, before

[1]A. L. van Helden, Marine Mammals Collection Manager, Museum of New Zealand Te Papa Tongarewa, 169 Tory Street, Wellington, New Zealand. Email dated 29 May 2003.

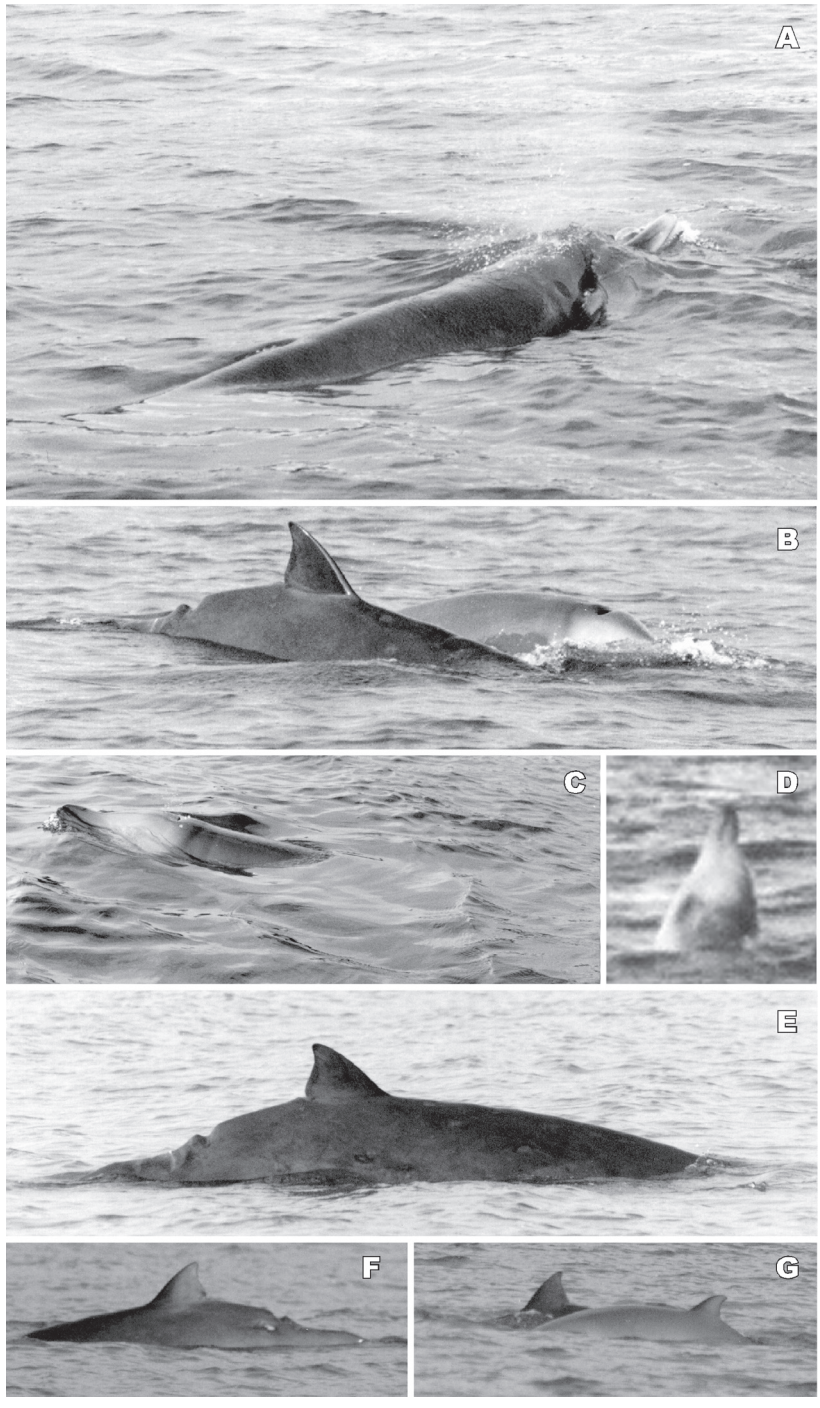


**Fig. 1** Images of the Gray's beaked whale cow-calf pair in Mahurangi Harbour. **A**, adult female at surface; **B**, adult female with calf in echelon position; **C**, calf at surface; **D**, calf spyhopping; **E**, adult female, lateral right-hand side showing deep indentations and scars behind dorsal fin from past ship strike; **F**, adult female lateral left-hand side, showing ship strike scars and fresh cookie cutter bite; **G**, calf (foremost) with adult female behind. Photos: all images, except D, by KGR. Image D by MJL.

diving again to surface elsewhere in the harbour, 10–15 min later. In this fashion they travelled slowly around the main inlet, remaining at least 100 m from the shore at all times. The presence of the calf was not noted on the first day (11 June 2001), but it was seen with the adult female on all subsequent days. The whales did not appear confused or disoriented while in the harbour. In some encounters, both animals approached the boat and appeared to be curious about it, staying with us for periods of up to 10 min. The cow-calf swimming position was not maintained when the animals came close to the boat. They often split up and circled the boat in opposing directions, or one circled while the other passed underneath the boat. Closest approaches ranged from c. 1 m (passing under the boat) to c. 2 m (on the surface). Both animals seemed to be in overall good condition, although the dorsal processes on their backs were visible when they arched up to dive, suggesting some emaciation. During low tide, the whales generally remained in the deeper water (10 m) channel near the mouth of the harbour. On the last day of observations (15 June 2001), the whales' behaviour was more energetic than on the previous days, and included pectoral slapping, lobtailing, and frequent breaching (both animals). The calf also performed a spyhop and held this position for 10–15 s (Fig. 1D). The whales apparently left the harbour on 16 June 2001, as they were not seen on that day and have not been sighted since. No stranded animals fitting their description were reported from this region in the following weeks. We assume, therefore, that the whales returned to their normal habitat in deep water off the continental shelf.

## PHYSICAL DESCRIPTION

### Adult female

Using our 5.5-m motorboat as a comparison, the adult female was estimated to be >5 m in length. Body colour was dark grey dorsally and lighter grey ventrally. Anterior to the blowhole, the melon and proximal section of the beak were light grey-white. The distal end of the beak (upper jaw) and upper "lips" were white (Fig. 1A). The lower jaw was several centimetres longer than the upper jaw, and the protruding portion was white. The mouthline was straight. No teeth were visible in the lower jaw, as expected for an adult female of this species.

A series of deep indentations was present along the back behind the dorsal fin (Fig. 1B,E,F). These scars, attributed to propeller gashes from a ship strike, appeared to have fully healed. Swimming movement was fluid and did not appear to be affected by this old injury. A fresh oval wound, c. 10 cm in diameter, due likely to a bite from a cookie-cutter shark, *Isistius* sp. (Jones 1971), was present on the right flank, just below the propeller scars (Fig. 1F). Several other healed cookie-cutter shark scars were visible as lighter, mottled oval patches on the head, back, and flanks. No linear scars were observed. (Adult males of most species in this genus commonly have linear scars on their backs which are thought to result from tooth rakes inflicted by conspecific males during aggressive encounters; Heyning 1984). The dorsal fin was comparatively tall, set far back on the body, and had a trailing edge that was concave in the upper portion and convex in lower portion (Fig. 1E). When surfacing, the beak broke the water first, followed by a gentle arch of the back (e.g., Fig. 1A).

The blow was low and diffuse. When diving, the back was arched high before the animal descended, and the flukes were not lifted out of the water (dives of 10–15 min duration). The shallow waters of Mahurangi Harbour are assumed to have influenced dive duration. Beaked whales generally do not perform fluke-up dives (e.g., Folkens et al. 2002).

[2]J. G. Mead, Curator of Marine Mammals, Smithsonian Institution National Museum of Natural History, Mail Stop NHB 108, Washington DC, USA. Email dated 24 June 2003.

### Calf

The calf was estimated to be c. 2.5 m in length. No foetal folds were visible and the dorsal fin was fully erect. The calf was light grey-brown dorsally and lighter grey ventrally. A white patch highlighted the genital region, which was partly visible when the calf performed a half roll on the surface. The tail lacked a centre notch, as did that of the adult female. A swath of grey-brown pigmentation continued forward from the blowhole, covering the top of the melon (Fig. 1B,D). The sides of the head and the anterior slope of the melon were cream. The eye patches and distal portion of the beak were grey-brown (Fig. 1C,D). The beak was relatively short compared with that of the adult female. The size of the calf and its juvenile coloration, similar to that observed in the young of other ziphiid species, suggest that it was a few months old (J. G. Mead pers. comm.[2]). Two cookie-cutter shark scars were present on the flanks and were slightly lighter in colour than the surrounding pigmentation. The calf performed several partial spyhops (with the eyes remaining under the water), and on one occasion, lifted its head completely out of the water at an angle exposing its eyes (Fig. 1D).

## OTHER SIGHTINGS IN THE NEW ZEALAND REGION

Twelve sightings of Gray's beaked whales were recorded from the New Zealand region (defined here as between longitudes, 150°E and 150°W) by IWC—IDCR and IWC—SOWER cruises conducted between December 1985 and December 2002. These survey cruises focused primarily on Antarctic waters (between 60°S and the edge of the pack ice), but additional standardised surveys were conducted while in transit to and from the Antarctic. IWC research vessels departed from Wellington, New Zealand on seven cruises and returned to Wellington from the Antarctic on eight cruises during this period. Gray's beaked whales were recorded in the New Zealand region during six of these cruises (Table 1; Fig. 2).

The 12 sightings recorded comprised a total of 40 animals (mean group size 3.3 ± 1.97, range 1–7; Table 1). Calves were observed in three of these groups. Sightings were made over a range of latitudes, between 44°47′S and 61°02′S, with eight sightings made between 44°47′S and 45°29′S (Fig. 2). Remarkably, five of these sightings were made on a single day, 1 March 1996. These sightings, comprising a total of 14 animals, were made south-west of the Chatham Islands, along a 66.3 nautical mile section of trackline between positions 45°29.35′S 178°37.64′W and 44°47.21′S 179°50.22′W. Here, the trackline passes over the southern slope of the Chatham Rise and water depth varies from c. 3500 to 1500 m. A group of five animals

**Table 1** Sightings of Gray's beaked whales in the New Zealand region from IWC—SOWER and IWC—IDCR cruises. Time refers to local longitude time. *, best estimate of total number of animals in school; ?, undetermined.

| Date | Time | Position | Total animals* | Calves |
|---|---|---|---|---|
| 19 Dec 1985 | 10:09:00 | 45°29′S 172°34′E | 7 | 2 |
| 2 Jan 1991 | 08:30:25 | 61°02′S 174°48′W | 1 | 0 |
| 22 Dec 1991 | 15:44:40 | 45°28′S 172°00′E | 3 | 0 |
| 24 Dec 1991 | 17:09:07 | 51°20′S 163°33′E | 4 | 0 |
| 12 Feb 1992 | 18:46:05 | 57°44′S 174°45′E | 1 | ? |
| 1 Mar 1996 | 07:23:10 | 45°29′S 178°38′W | 2 | ? |
| 1 Mar 1996 | 08:28:46 | 45°23′S 178°50′W | 1 | ? |
| 1 Mar 1996 | 09:07:00 | 45°18′S 178°57′W | 5 | ? |
| 1 Mar 1996 | 13:36:00 | 44°53′S 179°42′W | 2 | 1 |
| 1 Mar 1996 | 14:22:05 | 44°47′S 179°50′W | 4 | 0 |
| 5 Jan 2001 | 09:00:00 | 44°54′S 176°27′E | 5 | 1 |
| 18 Dec 2002 | 13:08:55 | 45°53′S 150°06′E | 5 | 0 |

was also sighted in this area on 5 January 2001 (position 44°53.89′S 176°27.03′E) in the vicinity of the 1000 m isobath. For 11 sightings, the initial cue was a glimpse of a back/body. For one sighting, the initial cue was a splash caused by four or five animals breaching simultaneously.

Over the 25-year history of IWC—IDCR and IWC—SOWER cruises (1978/79–2002/03), a total of 31 groups of *M. grayi* comprising 96 animals have been recorded (mean group size, 3.1 ± 1.85; range, 1–8). This total is made up of the 12 groups comprising 40 animals from the New Zealand region as described above, and a further 19 groups comprising 56 animals seen outside this area (Table 2). The sightings from the entire IWC—IDCR and IWC—SOWER cruise series during the austral summer confirm previous observations (e.g., Baker 1999) that the distribution of *M. grayi* is circumpolar and covers a wide latitudinal range (latitude of sightings from 32°06′S to 65°15′S).

## DISCUSSION

Sightings of beaked whales in shallow coastal waters generally occur only as a prelude to stranding (MLD pers. obs.). As such, the 5-day sojourn of this apparently healthy cow-calf pair in the shallow waters of Mahurangi Harbour (depth 2–10 m), and their assumed successful return to deep water, is puzzling. The Warkworth region is well populated and most of its coastline is readily accessible to people. As such, the whales would likely have been seen and reported if they had stranded in this area after leaving the harbour. In New Zealand, the majority of *M. grayi* strandings have occurred between December and February (Baker 1999). Strandings of mature females with young calves are common during this period, indicating a late spring-summer breeding season in these waters (Baker 1999). This may involve the inshore movement of females seeking areas suitable for calving, as observed in some baleen whales (e.g., humpback and right whales, *Megaptera novaeangliae* and *Eubalaena* spp., Dawbin 1966; Payne 1986). However, the lack of inshore sightings of *M. grayi* suggests that

**Table 2** Sightings of Gray's beaked whales made outside the New Zealand region during IWC—SOWER and IWC—IDCR circumpolar cruises. Time refers to local longitude time. *, best estimate of total number of animals in school; ?, undetermined.

| Date | Time | Position | Total animals* | Calves |
|---|---|---|---|---|
| 22 Dec 1984 | 18:41:00 | 37°08′S 114°20′E | 4 | ? |
| 24 Dec 1984 | 06:08:00 | 42°32′S 111°55′E | 2 | 0 |
| 8 Jan 1987 | 09:06:00 | 61°57′S 037°25′W | 2 | 0 |
| 14 Feb 1987 | 10:56:00 | 41°32′S 044°27′E | 2 | 1 |
| 24 Dec 1987 | 10:40:00 | 61°41′S 064°58′E | 3 | 1 |
| 4 Feb 1988 | 12:56:00 | 32°06′S 049°02′E | 6 | ? |
| 27 Dec 1989 | 18:19:01 | 58°13′S 064°01′W | 3 | 0 |
| 31 Dec 1989 | 14:18:33 | 62°40′S 066°17′W | 3 | 0 |
| 5 Jan 1990 | 07:34:42 | 65°15′S 071°21′W | 1 | ? |
| 5 Jan 1990 | 16:23:54 | 64°23′S 067°51′W | 8 | 0 |
| 7 Jan 1993 | 20:25:00 | 65°40′S 014°60′E | 5 | ? |
| 11 Feb 1993 | 14:35:33 | 39°02′S 098°05′E | 1 | 0 |
| 5 Jan 1994 | 19:47:11 | 61°35′S 108°22′W | 4 | ? |
| 6 Jan 1994 | 19:33:55 | 62°59′S 106°52′W | 3 | ? |
| 7 Jan 1994 | 06:57:13 | 63°08′S 106°43′W | 2 | ? |
| 18 Jan 1997 | 08:42:08 | 65°09′S 001°42′W | 1 | 0 |
| 23 Feb 1997 | 12:56:00 | 40°46′S 016°03′E | 2 | 1 |
| 22 Jan 2001 | 15:56:30 | 61°59′S 135°58′W | 2 | 1 |
| 24 Dec 2001 | 11:09:29 | 58°58′S 136°3′E | 2 | 0 |

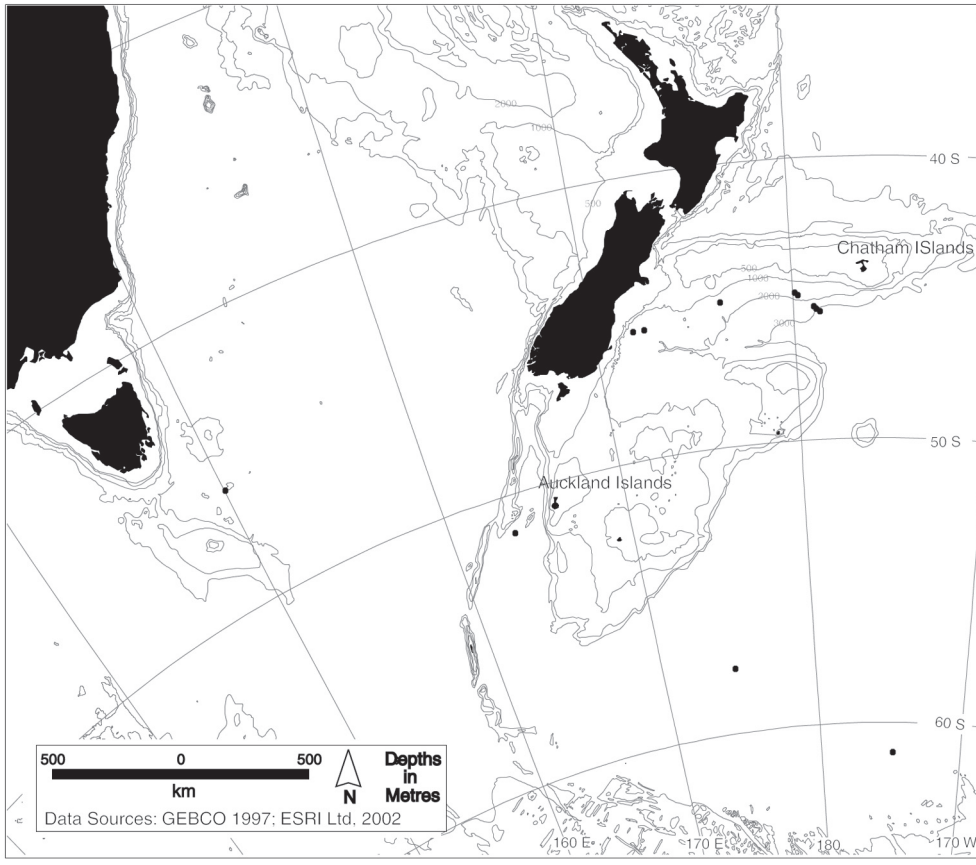


**Fig. 2** Positions of Gray's beaked whale sightings (black circles) recorded from the New Zealand region during IWC—IDCR and IWC—SOWER circumpolar cruises conducted between December 1985 and December 2002. See Table 1 for details.

if such movement occurs, it does not bring animals very close to the coast. The time of the Mahurangi Harbour observations (early winter), the size/age of the calf, and its scarring by cookie-cutter sharks (which are generally found in deeper offshore waters; Nakano & Tabuchi 1990) also appear to rule out calving-associated behaviour as a reason for the whales' visit. However, cookie-cutter sharks may come closer to shore in some parts of New Zealand. Near Kaikoura, groper (*Polyprion oxygeneios*), ling (*Genypterus blacodes*), and southern dogfish (*Squalus acanthias*) caught c. 3 km from shore in 80–150 m of water often carry cookie-cutter shark scars, and a number of these sharks have been foul-hooked from the same locale (M. Little pers. obs.). As such, we cannot rule out the possibility that the cookie-cutter shark scars observed on the Mahurangi Harbour whales were acquired while in coastal waters.

Seasonal inshore movement may also be related to prey availability as has been observed for some populations of dolphin (e.g., New Zealand dusky dolphin, *Lagenorhynchus obscurus*; Würsig et al. 1991). Examination of stomach contents from stranded *Mesoplodon* spp. indicates that these animals feed primarily on deep-water cephalopods (e.g., *Histioteuthis* spp., *Taonis* spp., and *Gonatus* spp.), with most prey caught at depths of 200 m or more (Pitman 2002; Macleod et al. 2003). These observations, in conjunction with the deep-water distribution of most sightings (Fig. 2), indicate that *M. grayi* probably does not feed in shallow coastal waters.

It is unlikely, therefore, that food availability was the primary reason for the whales' visit. Cephalopods, such as broad-finned squid (*Sepioteuthis bilineata*) may be found in Mahurangi Harbour during the winter months (S. O'Shea pers. comm.[3]), together with a variety of fish species. As such, some prey may have been taken by the whales on an opportunistic basis during their stay.

Both animals appeared to be alert and aware of their surroundings during the time they spent in the harbour. No obvious confused or stereotypic behaviour was observed, as has been the case with many other beaked whales trapped in shallow harbour areas (e.g., northern bottlenose whales, *Hyperodon ampullatus*; Kastelein & Gerrits 1991; Robinson & Gimenez-Reguera 1999). These situations inevitably end with the animals stranding and dying, but see Simmonds (1999) for an exception. It is nonetheless possible that the apparent absence of the calf on the first day of observations was indicative of a short-lived health problem, although the cow did not seem distressed during this period as might be expected in a species with strong cow-calf bonds (as assumed from the stranding frequency of cow-calf pairs; Baker 1999). Other reasons for the short-term shallow water residence of these animals, such as the presence of predators in the deeper waters, as observed for humpback whales with young calves (Whitehead & Moore 1982), also cannot be ruled out.

The propeller scars possessed by the adult female are of some concern. The size of the scars suggests that they were the result of a collision involving a large ocean-going vessel, such as a container ship, bulk carrier, or cruise liner. The danger that ship strikes pose for large baleen whales and coastal dolphins is well known (e.g., Wells & Scott 1997; Caswell et al. 1999; Pesante et al. 2000; Laist et al. 2001), but this threat is less well documented for deep-diving, oceanic odontocetes. In their summary of ship strike statistics for great whales (baleen whales and the sperm whale), Laist et al. (2001) found comparatively few records for sperm whales, and noted that the great majority of ship strikes seemed to occur over or near the continental shelf. Beaked whales and sperm whales have a similar ecology, with both groups feeding on deep-water squid at the continental shelf edge or in deep, open-ocean waters (e.g., Waring et al. 2001). As such, the deep-water distribution of these species may protect them from some of the danger posed by ship strikes. The positive behaviour displayed towards our boats by both animals suggests that the adult female did not form a general association between motorised vessels and her past trauma. Such boat-positive behaviour also contrasts that of most other *Mesoplodon* encounters at sea, in which the animals are generally elusive and appear to actively avoid boats (e.g., Pitman 2002). Although not fatal in this case, the potential risks posed by ship strikes and other vessel-related activities (e.g., use of military sonar; Jepson et al. 2003) to deep-water cetaceans in the New Zealand region should not be overlooked.

Overall, this unusual encounter with the cow-calf pair in Mahurangi Harbour, together with the at-sea sightings data collected as part of the IWC—IDCR and IWC—SOWER surveys, have given us a better understanding of Gray's beaked whales in New Zealand waters. The cluster of sightings that occurred south-west of the Chatham Islands suggests that this area (45°29.35′S 178°37.64′W, and 44°47.21′S 179°50.22′W) would be worthy of further scrutiny. Though rarely sighted at sea, some beaked whale species do appear to be more common in certain regions (e.g., Cuvier's beaked whales in the Bay of Biscay; Williams et al. 1999; northern bottlenose whales in the Gully, a submarine canyon on the edge of the continental shelf off eastern Canada; Whitehead et al. 1997). Strandings of Gray's beaked whales occur with some regularity on the Chatham Islands, and at least four mass strandings have been

[3]S. O'Shea, Senior Research Fellow, Auckland University of Technology (AUT), Private Bag 92 006, Auckland. Email dated 6 June 2004.

documented (Baker 1999; Dalebout 2002), including one in 1874 involving c. 25 animals from which this species was initially described (von Haast 1876). This combination of sightings and strandings suggest that the zone to the south-west of the Chatham Islands may be a "hotspot" for *M. grayi*, and could present New Zealand with a unique opportunity for future research on this little known species.

## ACKNOWLEDGMENTS

We are grateful to the International Whaling Commission for providing access to the sightings data from the IWC—IDCR and IWC—SOWER circumpolar cruises and particularly thank Marion Hughes for extracting these data from the IWC database. We also thank James Boxall and Ross Compton, Dalhousie University, for their help with Fig. 2. The manuscript benefited from comments by two anonymous reviewers. MLD is supported by a Dalhousie University Killam Postdoctoral Fellowship and the International Fund for Animal Welfare.

## REFERENCES

Baker, A. N. 1999: Whales and dolphins of New Zealand and Australia: an identification guide. Wellington, Victoria University Press. 133 p.

de Boer, M. N.; Simmonds, M. P. 2000: Beaked whales in the Southern Ocean. Unpublished report to the Scientific Committee of the International Whaling Commission (SC/53/SM8). Available from The Red House, International Whaling Commission, 135 Station Road, Impington, Cambridge, Cambridgeshire, CB4 9NP, United Kingdom.

Caswell, H.; Fujiwara, M.; Brault, S. 1999: Declining survival probability threatens the North Atlantic right whale. *Proceedings of the National Academy of Sciences of the United States of America 96*: 3308–3313.

Dalebout, M. L. 2002: Species identity, genetic diversity and molecular systematic relationships among the Ziphiidae (beaked whales). Unpublished PhD thesis, School of Biological Sciences, University of Auckland, Auckland, New Zealand.

Dalebout, M. L.; Mead, J. G.; Baker, C. S.; Baker, A. N.; van Helden, A. L. 2002: A new species of beaked whale *Mesoplodon perrini* sp. n. (Cetacea: Ziphiidae) discovered through phylogenetic analyses of mitochondrial DNA sequences. *Marine Mammal Science 18*: 1–32.

Dalebout, M. L.; Ross, G. J. B.; Baker, C. S.; Anderson, R. C.; Best, P. B.; Cockcroft, V. G.; Hinsz, H. L.; Peddemors, V.; Pitman, R. L. 2003: Appearance, distribution and genetic distinctiveness of Longman's beaked whale, *Indopacetus pacificus*. *Marine Mammal Science 19*: 421–461.

Dawbin, W. H. 1966: The seasonal migratory cycle of humpback whales. *In*: Norris, K. S. *ed*. Whales, dolphins and porpoises. Berkeley, University of California Press. P. 232.

Folkens, P. A.; Reeves, R. R.; Brent, S. S.; Clapham, P. J.; Powell, J. A. 2002: *National Audubon Society Guide to Marine Mammals of the World*. New York, Chanticleer Press. 496 p.

Heyning, J. E. 1984: Functional morphology involved in intraspecific fighting of the beaked whale, *Mesoplodon carlhubbsi*. *Canadian Journal of Zoology 62*: 1645–1654.

Jepson, P. D.; Arbelo, M.; Deaville, R.; Patterson, I. A. P.; Castro, P.; Baker, J. R.; Degollada, E.; Ross, H. M.; Herraez, P.; Pockwell, A. M.; Rodriguez, F.; Howie, F. E.; Espinosa, A.; Reid, R. J.; Jaber, J. R.; Martin, V.; Cunningham, A. A. 2003: Gas-bubble lesions in stranded cetaceans. *Nature 425*: 575–576.

Jones, E. C. 1971: *Isistius brasiliensis*, a squaloid shark, the probable cause of crater wounds on fishes and cetaceans. *Fishery Bulletin US 69*: 791–798.

Kastelein, R. A.; Gerrits, N. M. 1991: Swimming, diving and respiration patterns of a northern bottlenose whale (*Hyperoodon ampullatus*, Forster 1770). *Aquatic Mammals 17*: 20–30.

Laist, D. W.; Knowlton, A. R.; Mead, J. G.; Collet, A. S.; Podesta, M. 2001: Collisions between ships and whales. *Marine Mammal Science 17*: 35–75.

MacLeod, C. D.; Santos, M. B.; Pierce, G. J. 2003: Review of data on diets of beaked whales: evidence of niche separation and geographic segregation. *Journal of the Marine Biological Association of the United Kingdom 83*: 651–665.

Mann, J.; Smuts, B. B. 1999: Behavioural development of wild bottlenose dolphin newborns (*Tursiops* sp.). *Behaviour 136*: 529–566.

Mead, J. G. 1989: Beaked whales of the genus *Mesoplodon*. *In*: Ridgway, S. H.; Harrison, R. *ed*. Handbook of marine mammals. Vol. 4. London, Academic Press. Pp. 349–430.

Mead, J. G. 2002: Beaked whales, overview. *In*: Perrin, W. F.; Würsig, B.; Thewissen, J. G. M. *ed*. Encyclopedia of marine mammals. San Diego, Academic Press. Pp. 81–84.

Nakano, H.; Tabuchi, M. 1990: Occurrence of the cookie cutter shark *Isistius brasiliensis* in surface waters of the North Pacific Ocean. *Japanese Journal of Ichthyology 37*: 60–63.

Payne, R. S. 1986: Long-term behavioural studies of the southern right whale (*Eubalaena australis*). *In*: Brownell, R. L. Jr, Best, P. B.; Prescott, J. H. *ed*. Right whales: past and present status. Proceedings of the Workshop on the Status of Right Whales, New England Aquarium, Boston, MA, 15–23 June 1983. Reports of the International Whaling Commission, Special Issue 10. Cambridge, International Whaling Commission. Pp. 161–167.

Pesante, G.; Zanardelli, M.; Panigada, S. 2000: Evidence of man-made injuries on Mediterranean fin whales. *European Research on Cetaceans 14*: 192–193.

Pitman, R. L. 2002: Mesoplodont whales. *In*: Perrin, W. F.; Würsig, B.; Thewissen, J. G. M. *ed*. Encyclopedia of marine mammals. San Diego, Academic Press. Pp. 738–742.

Robinson, K.; Gimenez-Reguera, B. 1999: Close encounters of the beaked whale kind. *Whale World 1*: 8. (Issue 3; published by Nature Alert, P.O. Box 2060, Bath BA1 3YB, United Kingdom).

Simmonds, M. P. 1999: Northern bottlenose whales, *Hyperoodon ampullatus,* in Skye, Scotland: behaviour and disturbance. Unpublished report to the Scientific Committee of the International Whaling Commission (SC/51/WW3). Available from the International Whaling Commission, The Red House, 135 Station Road, Impington, Cambridge, CB4 9NP, UK.

van Helden, A. L.; Baker, A. N.; Dalebout, M. L.; Reyes, J. C.; Van Waerebeek, K.; Baker, C. S. 2002: Resurrection of *Mesoplodon traversii* (Gray, 1874), senior synonym of *M. bahamondi* Reyes, Van Waerebeek, Cárdenas and Yañez, 1995 (Cetacea: Ziphiidae). *Marine Mammal Science 18*: 609–621.

von Haast, J. 1876: On a new ziphioid whale. Proceedings of the Zoological Society of London. Pp. 7–13.

Waring, G. T.; Hamazaki, T.; Sheehan, D.; Wood, G.; Baker, S. 2001: Characterization of beaked whale (Ziphiidae) and sperm whale (*Physeter macrocephalus*) summer habitat in shelf-edge and deeper waters off the northeast U.S. *Marine Mammal Science 17*: 703–717.

Wells, R. S.; Scott, M. D. 1997: Seasonal incidence of boat strikes on bottlenose dolphins near Sarasota, Florida. *Marine Mammal Science 13*: 475–480.

Whitehead, H.; Gowans, S.; Faucher, A.; McCarrey, S. W. 1997: Population analysis of northern bottlenose whales in the Gully, Nova Scotia. *Marine Mammal Science 13*: 173–185.

Whitehead, H. P.; Moore, M. J. 1982: Distribution and movements of West Indian humpback whales in winter. *Canadian Journal of Zoology 60*: 2203–2211.

Williams, R.; Williams, A. D.; Brereton, T. M. 1999: Seasonal variation and topographic preference in the beaked whales in the Bay of Biscay. Abstract for poster presentation at the Thirteenth Biennial Conference on the Biology of Marine Mammals. Wailea, Maui, Hawaii (28 November–3 December 1999).

Würsig, B.; Cipriano, F.; Würsig, M. 1991: Dolphin movement patterns: information from radio and theodolite tracking studies. *In*: Pryor, K.; Norris, K. S. *ed*. Dolphin societies: discoveries and puzzles. Berkeley, University of California Press. Pp. 79–111.