

**NEW ZEALAND PROGRESS REPORT ON CETACEAN RESEARCH, APRIL 1999 TO APRIL 2000,  
WITH STATISTICAL DATA FOR THE CALENDAR YEAR 1999**

Compiled by S. Childerhouse  
Department of Conservation, Te Papa Atawhai,  
PO Box 10-420, Wellington, New Zealand

This report summarises information obtained from: Auckland, Massey, Otago and Museum of New Zealand, Department of Conservation, Ministry of Fisheries and independent researchers.

**1. Species and stocks studied**

Common name	Scientific name	Area/stock(s)	Items referred to
Andrews' beaked whale	<i>Mesoplodon bowdoini</i>	NZ	4.3
Bottlenose dolphins	<i>Tursiops truncatus</i>	NZ	2.1; 3.1.1; 4.3; 7.1; 9
Bryde's whale	<i>Balaenoptera edeni</i>	NZ	2.1.1; 4.3
Common dolphin	<i>Delphinus delphis</i>	NZ	4.2; 4.3
Cuvier's beaked whale	<i>Ziphius cavirostris</i>	NZ	4.3
Dusky dolphin	<i>Lagenorhynchus obscurus</i>	NZ	7.1
Gray's beaked whale	<i>Mesoplodon grayi</i>	NZ	4.3
Hector's dolphin	<i>Cephalorhynchus hectori</i>	NZ	2.1.1; 3.1.1; 4.1; 4.2; 4.4; 7.1; 7.9; 8; 9
Humpback whale	<i>Megaptera novaeangliae</i>	Area V	2.1.2; 3.1.1
Killer whale	<i>Orcinus orca</i>	NZ	2.1.2; 2.2; 3.1.1
Long-finned pilot whale	<i>Globicephala melas</i>	NZ	4.3; 7.1; 8
Pygmy sperm whale	<i>Kogia breviceps</i>	NZ	4.3; 8
Southern right whale	<i>Eubalaena australis</i>	NZ	2.1.2; 3.1.1
Sperm whale	<i>Physeter macrocephalus</i>	NZ	2.1.1; 3.1; 4.3; 8

**2. Sightings data**

**2.1 Field work**

**2.1.1 Systematic**

A two year aerial survey for Bryde's whales is being conducted off NZ's north-eastern coast between Cape Colville and North Cape by A. Baker (Dept of Conservation). Seven flights at monthly intervals have been undertaken along a predetermined track, and whale sightings have been logged on a GPS. Feeding aggregations, associated with gannets and dolphins have been encountered in spring and summer (food items possibly pilchards, anchovies, or mackerel). Calves have been sighted in early summer, and there are indications of seasonal movement between Hauraki Gulf (winter to early summer) and the coast to the north of the Gulf (mid to late summer). Photo-identification and biopsy sampling is proposed for future years.

Researchers from Otago University (N. Jaquet, E. Slooten, S. Dawson, C. Richter, Q. Hineland and L. Douglas) carried out fieldwork on sperm whales off Kaikoura during Jan-Feb, June and Nov-Dec 1999 as well as Mar-Apr 2000. A three-year study to assess the impact of current whalewatching activities on sperm whales is in its second year. Boat-based observations of diving and acoustic behaviour are combined with data on respiratory behaviour recorded by a shore-based team. In addition, long term changes in the spatial and temporal distribution can be assessed using a database compiled since 1990. Preliminary analyses of respiratory parameters indicate that sperm whales react to the presence of whalewatching vessels. This research on the effects of whale watching is part of a wider ecological research program that uses photographic identification, photogrammetric measurements of whale length, acoustics, and oceanographic data collection in order to study distribution, residency, habitat use, diving, foraging behaviour and vocal behaviour. Otago University's catalogue currently holds 152 different individuals, but at any one time there are generally about 20 individuals within a study area of 10 by 20 nautical miles. Significant differences in distribution between summer and winter suggest that, off Kaikoura, male sperm whales may change their diet in response to fluctuations in prey biomass. Recent investigations on the vocal behaviour of individually identified sperm whales during entire foraging dives show that, on average, sperm whales click for 85% of the time while underwater.

Researchers from Otago University carried out the third in a series of line-transect surveys for Hector's dolphins. Surveys so far cover the North, East and South Coast of the South Island. To complete work on a current total population estimate requires surveys off the West Coasts of the North and South Island. Analyses of the last survey's

data are underway (estimate for North East coast of South Island). Abundance estimates are now available for the survey from Timaru to Te Waewae Bay (South East coast of South Island). The Hector's dolphin population in this area was estimated at 399 (CV=25.5%). Data from calibration trials for these boat surveys have now been analysed. These trials used a helicopter to make sightings 1.5km in front of the boat and document their movement until seen by the boat's observers, to estimate  $g(0)$  and the effect of responsive movement by the dolphins. The correction factor for responsive movement (vessel attraction) and groups missed on the trackline was  $c = 0.5032$ . Progress reports have been lodged with the Department of Conservation (e.g. DuFresne et al. 1999).

Continuing research on Hector's dolphins includes fieldwork on behaviour and ecology (e.g. Bräger 1999a,b). New projects at Otago University include research on Hector's dolphins at Banks Peninsula (East Coast, South Island), Motunau (just north of Banks Peninsula) and Westport (West Coast, South Island). One of the main research questions for the Banks Peninsula project (by S. DuFresne) is determining the effectiveness of the Banks Peninsula Marine Mammal Sanctuary. The Westport project (by E. Secchi) is a study of the spatial distribution and abundance of Hector's dolphins, and the likely effect of fisheries interactions in the area. In a separate project, D.Clement is carrying out oceanographic research in areas of high and low Hector's dolphin densities (working with M.Gibbs and E. Slooten). This project aims to determine if areas of higher densities (hotspots) consistently occur and what are the effects of oceanographic features such as temperature (cold upwelling), salinity, Chlorophyll-a (primary productivity), and the pattern of tides and currents around islands and peninsulas. E. Martinez is studying the effects of dolphin watching on Hector's dolphins at Motunau. She is using cliff-top observations (with a theodolite) and boat observations (including photo-ID) to study the movements and behaviour of Hector's dolphins with and without boats. One of the aims is to compare results from Motunau with those gathered at Porpoise Bay (South Coast, South Island) by L. Bejder (Bejder et al. 1999).

New England Aquarium researchers (C. Nichols & G. Stone) have completed the second year of a two year study to assess the impact of vessel traffic and tourism operation targeted at Hector's dolphins in Akaroa Harbour. Cross-sectional survey observations were conducted from land using a theodolite tracking system for 264 hours over the 1999 and 2000 field seasons. A total of 2620 dolphin groups and 1374 boats were observed.

### 2.1.2 Opportunistic, platforms of opportunity

I. Visser (Univ. of Auckland) has continued to collect behavioural and sighting data of Orca including photo-identification. B. Todd (Project Tohora) conducted surveys of Southern right whales in the Port Ross, Auckland Islands, breeding area where a maximum of 110 individuals were counted including 21 Cow-calf pairs. Thirty five different individuals were identified from photo ID. A summary of Humpback whale sightings around NZ was compiled by N. Gibbs and recommendations made on the use of systematic surveys for monitoring in the future.

### 2.2 Analyses/development of techniques

I. Visser & P. Mäkeläinen (2000) have developed a technique for the photo-identification of orca using eye patches as an independent and comparative method to photo ID work.

## 3. Marking data

### 3.1 Field work

#### 3.1.1 Natural marking data

Species	Feature	Area/stock	Calendar year/season/	Catalogued (Y/N)	Catalogue total	Contact person/institute
Bottlenose dolphin	Fin/body	Fiordland	1990–2000	Yes	81	E. Slooten/ Otago Univ.
Bottlenose dolphin	Fin/body	Bay of Islands	1993–1999	Yes	377	R. Constantine/ Auckland Univ.
Hector's dolphin	Fin/body	East South I. West South I.	1984–2000 1994–1997	Yes	473	E. Slooten/ Otago Univ.
Humpback whale	Fluke	Area V	1991–1999	Yes	360	C. S. Baker/ Auckland Univ.
Orca	Fins/saddles/ eye patches	NZ	1993–2000	Yes	117	I. Visser/ Auckland Univ.
Southern right whale	Callosities/ lip lines	NZ sub-antarctic	1995–1999	Yes	402	N. Patenaude/ Auckland Univ.; B. Todd/ Project Tohora
Sperm whale	Fluke	Kaikoura	1990–2000	Yes	152	E. Slooten/ Otago Univ.

### 3.1.2. Artificial marking data

None

### 3.1.3 Telemetry data

None

## 4. Tissue/biological samples collected

### 4.1 Biopsy samples

Species	Area/stock	Calendar year/ season no. collected	Archived (Y/N)	No. analysed	Total holdings	Contact person/institute
Hector's dolphin	NZ	12	Yes	12	69	F. Pichler/ Auckland Univ.

### 4.2 Samples from directed catches or bycatches

Species	Area/stock	Calendar year/ season total	Archived (Y/N)	Tissue type(s)	Contact person/institute
Common dolphin	NZ	1	Yes	Skin, blubber, fixed tissues, skeletons	P. Duignan/ Massey Univ.; A. van Helden/ Museum of NZ
Hector's dolphin	NZ	5	Yes	Skin, blubber, fixed tissues, skeletons	P. Duignan/ Massey Univ.; A. van Helden/ Museum of NZ

No directed catches taken.

### 4.3 Samples from stranded animals

Species	Area/stock	Calendar year/ year (total)	Archived (Y/N)	Tissue type(s)	Contact person/institute
Andrews' beaked whale	NZ	1 (3)	Yes	Skin	M. Dalebout/ Auckland Univ.
Bottlenose dolphin	NZ	5 (23)	Yes	Skin, blubber, fixed tissues	M. Dalebout/ Auckland Univ.; P. Duignan/ Massey Univ.
Bryde's whale	NZ	1 (12)	Yes	Skin	M. Dalebout/ Auckland Univ.
Common dolphin	NZ	4 (19)	Yes	Skin, blubber, fixed tissues	M. Dalebout/ Auckland Univ.; P. Duignan/ Massey Univ.
Cuvier's beaked whale	NZ	1	Yes	Skin, blubber, fixed tissues	P. Duignan/ Massey Univ.
Gray's beaked whale	NZ	12 (64)	Yes	Skin	M. Dalebout/ Auckland Univ.
Hector's dolphin	NZ	3	Yes	Skin, blubber, fixed tissues	P. Duignan/ Massey Univ.
Long-finned pilot whale	NZ	12 (63)	Yes	Skin	M. Dalebout/ Auckland Univ.
Pygmy sperm whale	NZ	11	Yes	Skin, blubber, fixed tissues	P. Duigan/ Massey Univ.
Sperm whale	NZ	22 (41)	Yes	Skin	M. Dalebout/ Auckland Univ.

### 4.4 Analyses/development of techniques

F. Pichler and C. S. Baker (Univ. of Auckland) conducted NZ's first trial of biopsy darting on Hector's dolphins. A Paxarms system was used. 12 biopsy samples were obtained and data on behavioural impacts was collected. Preliminary analysis suggests that short-term responses of the dolphins to darting were mild - speed bursts and dives. Some dolphins were observed to return to the boat shortly (<1min) after darting. Two days after the first samples were collected, dolphins with dark coloured bruises were observed bowriding the boat. The bruises were small (approx. 2cm diameter) and were consistent in location to the target region for darting. This suggests that the dolphins do not become "boat-shy" as a result of the darting. F. Pichler and C. S. Baker also compared the mtDNA haplotype diversity of 55 historic museum specimens of Hector's dolphins, dating back to 1870 to contemporary diversity from 108 beachcast and live sampled specimens. They found significant declines in diversity in the East Coast South Island and North Island populations.

## 5. Pollution studies

None.

## 6. Statistics for large cetaceans

6.1 Direct catches (commercial, aboriginal and scientific permits) for the calendar year 1999

None.

6.2 Other non-natural mortality for the calendar year 1999

None.

6.3 Earlier years' statistics

No amendments.

## 7. Statistics for small cetaceans

7.1 For the calendar year 1999

Species	Area/stock	Directed catch		Incidental mortality			Live-capture
		Reported	Est. total	Reported	Est. total	Source	Reported
Bottlenose dolphin	NZ	0	?	1 <sup>1</sup>	?	Trawl	0
Dusky dolphin	NZ	0	?	0	?		2 <sup>1</sup>
Hector's dolphins	NZ	0	?	5 <sup>2</sup>	?	Gillnet	0
Pilot whale	NZ	0	?	3 <sup>1</sup>	?	Trawl	0

<sup>1</sup> details provided by R. Blezard, Department of Conservation from Ministry of Fisheries Observer Programme

<sup>2</sup> details provided by N. Gibbs, Massey University from Department of Conservation, Carcass Recovery Programme

7.2 Earlier years' statistics

No amendments.

## 8. Strandings

A. van Helden (Museum of NZ) estimated the total number of reported strandings for this period at 66 incidents involving 194 animals. This excludes those animals that have been reported but for which stranding data forms have not been sent to the Museum of NZ Te Papa Tongarewa before the end of March. At least 13 different species were recorded in the database for this period. The representation in the number of incidents of strandings for the different families that stranded in this period are: Balaenidae 0%, Balaenopteridae 3%, Ziphiidae 18.2%, Delphinidae 51.5% and Physeteridae 24.2%. The representation in number of animals for the different families that stranded in this period are: Balaenidae 0%, Balaenopteridae 1%, Ziphiidae 9.3%, Delphinidae 69.6% and Physeteridae 1%. The species with the highest incidents of strandings were Hector's dolphins with 14 incidents, and Pygmy sperm whales with 11 recorded. The largest number of animals of a species to strand is 102 for Long-finned pilot whales, 52.6% of the total number of animals stranded. The stranding on Pitt Island (Chatham Islands) is responsible for 99 of these. It should also be noted that there was a mass stranding of Sperm Whales of 20 animals, also on the Chatham Islands. Of all the cetaceans stranded in 1999 only 5 were refloated, 1 of which re-stranded and died.

## 9. Other studies and analyses

Researchers from the New England Aquarium and Department of Conservation (G. Stone and A. Hutt) continued work on acoustic pingers and provided advice to gillnet fishers in Canterbury, NZ on the use of pingers to mitigate bycatch of Hector's dolphin. Commercial gillnet fishers have voluntarily begun using pingers in the inshore gillnet fishery. A monitoring programme has recorded no dolphin mortalities since the introduction of pingers into this fishery.

Research at Otago University continues to look at the effect of stratification in coastal line-transect surveys for small cetaceans. This includes simulation work based on data collected during 1998 Banks Peninsula Hector's dolphin line-transect survey and estimates of the relative efficiency of line-transect survey designs for estimating abundance of inshore dolphins and porpoises.

A team of researchers from the National Marine Fisheries Service in the USA (B. Taylor, K. Fear) and Otago University (E. Slooten, D. Fletcher, S. Burkhart) are developing population models to assess the impact of gillnetting on Hector's dolphins around NZ (Martien et al. 1999; Slooten et al. in press). These models are helping to determine which populations are likely to decline if current levels of incidental take in gillnetting continue, and which populations are able to sustain the current level of incidental take in the local area. While gillnetting effort has been

substantially reduced in the Banks Peninsula Marine Mammal Sanctuary, in most parts of NZ waters, gillnets continue to be used by both commercial and amateur fishers. The population of Hector's dolphins off the North Island West Coast is very small (perhaps fewer than 100 individuals; Russell 1999) and at the greatest risk of extinction (Martien et al. 1999).

An on-going project at Otago University (Q. Rhineland and S. Dawson) aims to improve methods of remotely determining the lengths of sperm whales. Acoustic length determination using inter-pulse intervals is compared to lengths obtained through stereo-photogrammetry. Software is being developed to decrease the time and increase the accuracy of both of these techniques. Repeated measurements of individuals over periods of days to years will test the precision of the methods. A team of researchers from Otago University (E. Slooten and S. Dawson), Massey University (S. Haslett) and Texas A&M University (C. Gates) are working on methods of estimating sperm whale abundance from directional hydrophone data, collected using a hand-held directional hydrophone from a rigid-hulled inflatable boat at Kaikoura. Gates and Haslett are nearing completion of a computer model to determine the number of whales that are detected from two or more hydrophone stations in order to estimate whale density. L. Douglas (Otago Univ.) continues to work on models for estimating sperm whale abundance using recordings made with an omnidirectional hydrophone. She has estimated the core parameters and developed an equation to estimate sperm whale abundance using the 'click counting' censusing method. She is now in the process of testing the precision of abundance estimates resulting from this equation.

Otago University researchers P. Haase and D. Lusseau have continued their work on bottlenose dolphins in Fiordland, NZ. Studies of behaviour, associations and demographics are providing data on the behaviour and ecology of bottlenose dolphins and the potential effect of tourism. D. Lusseau is focussing his investigation on the effects of tourism activities on bottlenose dolphins in Fiordland working both in Doubtful and Milford sounds. This research involves the study of variations in behaviour, vocalisation pattern, group structure, surfacing pattern, and distribution and from a research boat and observation sites on land.

A downward-looking stereo-photogrammetric system developed at Otago University (Bräger et al. 2000; Bräger and Chong *in press*) was used to measure lengths bowriding bottlenose and Hector's dolphins.

E. Secchi is completing a comparative study of Franciscana (*Pontoporia blainvillei*) and Hector's dolphins in order to evaluate the best management options for those populations of that are subject to unsustainable incidental catches in gillnet fisheries. Information on the fishing dynamics, catch rates and population dynamics of both species and have been obtained in order to answer the following questions: 1) Are the levels of Hector's dolphins and Franciscanas bycatch in gillnet fisheries below their PBRs?; 2) Are the life histories of the two species and their response potential significantly different in terms of management? Management options will consider the uncertainty of biological data and the differences in the socio-economic realities of the regions where the species are distributed.

The laboratory of Molecular Ecology and Systematics at the Auckland University is involved in studies of genetic variation and systematic relationships among endangered and commercially exploited species, including whales, dolphins, sea lions, fur seals and marine fish. C. S. Baker and G. Lento work on conservation genetics of cetaceans and pinnipeds. PhD students in the laboratory are conducting research on the genetic variation and population structure of Hector's dolphins (F. Pichler), the molecular systematics of beaked whales (M. Dalebout), the behaviour and ecology of bottlenose dolphins in the Bay of Islands (R. Constantine), the genetic and demographics structure of southern right whale populations (N. Patenaude) and the evolution of the Major Histocompatibility Complex in whales (H. Ng).

R. Constantine (Univ. of Auckland) continues work on Bottlenose dolphins in the Bay of Islands including photo-identification, boat-based surveys, and the collection of behavioural data on habitat use and the effects of tourism on. A total of 377 individual bottlenose dolphins have been identified in between Dec 1993 and Dec 1999. There is an 82% resight rate of individuals suggesting a relatively closed population for which the Bay of Islands forms an important part of their home range. Photographs taken in other areas along the coast show at least some of this population range from Doubtless Bay to Tauranga, a distance of approximately 450km. Data collected on swim with dolphin programmes indicates that bottlenose dolphin response to swimmers is affected by the method of swimmer placement. Research on the effects of swim-with-dolphin tourism conducted in 1994–95 by R. Constantine was compared to data collected in 1997–98. This showed a significant increase in avoidance responses to swimmers, and showed a significant change in response to swimmer placement over time.

## 10. Literature cited

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## 11. Publications

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