

**NEW ZEALAND PROGRESS REPORT ON CETACEAN RESEARCH, APRIL 1998 TO APRIL 1999, WITH  
STATISTICAL DATA FOR THE CALENDAR YEAR 1998**

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This report summarises information obtained from: Auckland, Massey, Otago and Museum of New Zealand, Department of Conservation, Ministry of Fisheries and private 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                             |
| Blainville's beaked whale | <i>Mesoplodon densirostris</i> | NZ            | 4.3                             |
| Bottlenose dolphins       | <i>Tursiops truncatus</i>      | NZ            | 2.1, 2.2, 3.1, 4.3, 9           |
| Common dolphin            | <i>Delphinus delphis</i>       | NZ            | 4.3, 8                          |
| Cuvier's beaked whale     | <i>Ziphius cavirostris</i>     | NZ            | 4.3                             |
| Dusky dolphin             | <i>Lagenorhynchus obscurus</i> | NZ            | 4.2                             |
| Gray's beaked whale       | <i>Mesoplodon grayi</i>        | NZ            | 4.3                             |
| Hector's beaked whale     | <i>Mesoplodon hectori</i>      | SW Pacific    | 4.3                             |
| Hector's dolphins         | <i>Cephalorhynchus hectori</i> | NZ            | 2.1, 2.2, 3.1, 4.1, 4.2, 4.3, 9 |
| Humpback whale            | <i>Megaptera novaeangliae</i>  | Area V        | 3.1, 4.1                        |
| Killer whale              | <i>Orcinus orca</i>            | NZ            | 4.3                             |
| Long-finned pilot whale   | <i>Globicephala melas</i>      | NZ            | 4.3, 8                          |
| Pygmy right whale         | <i>Caperea marginata</i>       | NZ            | 4.3                             |
| Pygmy sperm whale         | <i>Kogia breviceps</i>         | NZ            | 4.3, 8                          |
| Southern right whale      | <i>Eubalaena australis</i>     | NZ            | 3.1,                            |
| Sperm whale               | <i>Physeter macrocephalus</i>  | NZ            | 2.1, 2.2, 3.1, 9                |
| Strap-toothed whale       | <i>Mesoplodon layardii</i>     | NZ            | 4.3                             |
| Tasman's beaked whale     | <i>Tasmacetus shepherdi</i>    | NZ            | 4.3                             |

**2. Sightings data**

**2.1 Field work**

**2.1.1 Systematic**

The Otago Marine Mammal Research group routinely conducts intensive surveys from small boats, to facilitate photo-ID of sperm whales (since 1990), Hector's dolphins (since 1984) and bottlenose dolphins (since 1990), for studies of their ecology, behaviour and habitat utilisation.

Since 1997/98 Otago researchers S. Dawson, E. Slooten and S. DuFresne (MSc student) have undertaken two line-transect surveys for Hector's dolphins. The vessel used is a 15m sailing catamaran equipped with a collapsible sighting platform for 3 observers, and re-powered so that it can cruise at 10 knots. Surveys completed so far cover the Canterbury, Otago and Southland coasts from Motunau to (and including) Te Waewae Bay. Calibration trials were conducted in the 1998/99 summer to estimate g(0) and the effect of responsive movement by the dolphins. These surveys used a helicopter to make sightings 1.5km in front of the boat and document their movement until seen by the boat's observers. Analyses of these data are underway. Progress reports have been lodged with the Department of Conservation.

**2.1.2 Opportunistic, platforms of opportunity**

Incidental sightings of all cetacean species in the Tasman Sea, NZ waters and South Pacific are collected by M. Cawthorn. He is also compiling and plotting historical observations of whales over modern bathymetric and oceanographic features to assess the influence of these parameters on seasonal distribution and abundance of whales.

## 2.2 Analyses/development of techniques

A team of researchers from Otago University (L. 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. The data were collected using a hand-held directional hydrophone from a rigid-hulled inflatable boat at Kaikoura. Gates and Haslett are continuing work on a computer model to determine the number of whales that are detected from two or more hydrophone stations in order to estimate whale density.

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 collaborating on population models to assess the impact of gillnetting on Hector's dolphins around NZ. Modelling work so far includes estimation of carrying capacity using population estimates and fishing effort data, predictions of future distribution and abundance, and estimates of extinction probability under different management regimes. Fear, Taylor and Slooten (in press) have constructed a spatially-structured, deterministic model. Burkhart and Slooten have developed stochastic models with a similar structure. These models are helping to determine which populations are likely to decline if current levels of gillnetting continue, and which populations are able to sustain the level of gillnetting in the local area. While gillnetting effort is substantially reduced in the Banks Peninsula Marine Mammal Sanctuary, gillnetting continues in most parts of NZ waters.

A downward-looking stereo-photogrammetric system has been developed at Otago University, by K. Schneider and A. Chong, in order to measure bowriding bottlenose dolphins. This system is based on two non-metric, electronically triggered cameras. A video camera mounted in the centre of the system, with remote display on deck, allows the user to trigger the shutters at the most appropriate times. Calibrations show that, after allowing for refraction, the system can easily achieve repeated measurements of the same object differ by less than 1–2%. Preliminary studies with the system show that the bottlenose dolphins of Doubtful sound are large, with adults over 3.5m in total length.

M. Cawthorn continues to refine the biopsy system developed in conjunction with Paxarms Ltd., Timaru, NZ. Existing equipment is modified to suit specific user requirements, ranging from biopsies of large whales on the high seas to small cetaceans such as bottlenose dolphins at Monkey Mia, western Australia. Sample retention has been greatly improved by minor modifications to cutting head components. Velocity and flight characteristics of biopsy darts, particularly of tethered retrievable systems, is being improved.

## 3. Marking data

### 3.1 Field work

#### 3.1.1 Natural marking data

| Species              | Feature                    | Area/stock                     | Calendar year/season no. photographed | Catalogued (Y/N) | Catalogue total | Contact person /insititute                         |
|----------------------|----------------------------|--------------------------------|---------------------------------------|------------------|-----------------|--|
| Bottlenose dolphin   | dorsal fins                | NZ                             | 1993–1998                             | Yes              | 300+            | R. Constantine/ Auckland Univ.                     |
| Bottlenose dolphin   | fin/ body scars            | Doubtful Sound                 | 1990–1999                             | Yes              | 97              | S. Dawson/ Otago Univ.                             |
| Hector's dolphin     | fin/ body scars            | East South I.<br>West South I. | 1984–1998<br>1994–1997                | Yes<br>Yes       | 467<br>238      | L. Slooten/ Otago Univ.<br>L. Slooten/ Otago Univ. |
| Humpback whale       | flukes                     | Area V                         | 1991–1998                             | Yes              | 150             | C. S. Baker/ Auckland Univ.                        |
| Orca                 | fins/ eye-patches/ saddles | NZ                             | 1993–1998                             | Yes              | 50+             | I. Visser/ Auckland Univ.                          |
| Southern right whale | callosities/ lip lines     | NZ sub-antarctic               | 1995–1998                             | Yes              | 350+            | N. Patenaude/ Auckland Univ.                       |
| Sperm whale          | fluke                      | Kaikoura                       | 1990–1999                             | Yes              | 136             | S. Dawson/ Otago Univ.                             |

### 3.2 Analyses/development of techniques

None

#### 4. Tissue/biological samples collected

##### 4.1 Biopsy samples

| Species              | Area             | 1998 collection | Archived | No. analysed | Total holdings | Contact person / institution               |
|----------------------|------------------|-----------------|----------|--------------|----------------|--|
| Hector' dolphins     | NZ               | 59              | Yes      | 47 to date   | 180            | F. Pichler, C. S.Baker / Auckland Univ.    |
| Humpback whales      | Area V           | 19              | Yes      | 60 to date   | 80             | C. S. Baker/ Auckland Univ.                |
| Southern right whale | NZ sub-antarctic | 150             | Yes      | 30 to date   | 300            | N. Patenaude, C. S. Baker / Auckland Univ. |

##### 4.2 Samples from directed catches or bycatches:

| Species          | Area/stock | Calendar year total | Archived | Tissue types  | Contact person / institution                              |
|------------------|------------|---------------------|----------|---|---|
| Dusky dolphin    | S. Island  | 1                   | Yes      | Blubber and fixed tissues, skulls or complete skeletons | C.S. Baker / Auckland Univ.; A. van Helden / Museum of NZ |
| Hector's dolphin | S. Island  | 13                  | Yes      | Blubber and fixed tissues, skulls or complete skeletons | P. Duignan / Massey Univ.; A. van Helden / Museum of NZ   |

No directed catches taken.

##### 4.3 Samples from stranded animals:

| Species                   | Period total | Archived (Y/N) | Samples  | Contact person / institution                                    |
|---------------------------|--------------|----------------|--|---|
| Andrew's beaked whale     | 1            | Yes            | Blubber  | P.Duignan / Massey University                                   |
| Andrew's beaked whale     | 1            | Yes            | Skulls, complete skeletons                           | A. van Helden / Museum of NZ                                    |
| Blainville's beaked whale | 1            | Yes            | Skulls, complete skeletons                           | A. van Helden / Museum of NZ                                    |
| Bottlenose dolphin        | 2            | Yes            | Skulls, complete skeletons                           | A. van Helden / Museum of NZ                                    |
| Common dolphin            | 2            | Yes            | Blubber, fixed tissues, Skulls or complete skeletons | P.Duignan / Massey University; A. van Helden / Museum of NZ     |
| Cuvier's beaked whale     | 1            | Yes            | Skulls, complete skeletons                           | A. van Helden / Museum of NZ                                    |
| Gray's beaked whale       | 3            | Yes            | Skulls, complete skeletons                           | A. van Helden / Museum of NZ                                    |
| Hector's beaked whale     | 1            | Yes            | Blubber, fixed tissues                               | P. Duignan / Massey University                                  |
| Hector's dolphin          | 2            | Yes            | Blubber, fixed tissues                               | P.Duignan / Massey University; C. S. Baker, Auckland University |
| Killer whale              | 1            | Yes            | Blubber, fixed tissues                               | P.Duignan / Massey University                                   |
| Long-finned pilot whale   | 30           | Yes            | Blubber  | P.Duignan / Massey University                                   |
| Pygmy right whale         | 2            | Yes            | Skulls, complete skeletons                           | A. van Helden / Museum of NZ                                    |
| Pygmy sperm whale         | 8            | Yes            | Skulls, complete skeletons                           | A. van Helden / Museum of NZ                                    |
| Strap-toothed whale       | 1            | Yes            | Skulls, complete skeletons                           | A. van Helden / Museum of NZ                                    |
| Tasman's beaked whale     | 1            | Yes            | Skulls, complete skeletons                           | A. van Helden / Museum of NZ                                    |

##### 4.4 Analyses/development of techniques:

Auckland University has been involved in the development of species identification by molecular methods and the maintenance of a reference DNA database.

#### 5. Pollution studies

Under the supervision of H. Reid, the Department of Environmental Toxicology at the Institute of Environmental Science and Research Ltd, Lower Hutt, continues to analyse the tissues of cetaceans that have been beachcast or taken as by-catch for contaminant levels, particularly chlorinated hydrocarbons.

#### 6. Statistics for large cetaceans

##### 6.1 Direct catches for the 1998 calendar year

None

##### 6.2 Other non-natural mortality for the 1998 calendar year

None

## 7. Statistics for small cetaceans

### 7.1 For the calendar year 1998

|                  |               | Directed catch |            | Incidental mortality |            |                       | Live -capture |
|------------------|---------------|----------------|------------|----------------------|------------|-----------------------|---------------|
| Species          | Area/stock    | Reported       | Est. total | Reported             | Est. total | Source                | Reported      |
| Dusky dolphin    | South I.      | 0              | ?          | 1                    | ?          | Bottom trawl          | 0             |
| Hector's dolphin | East South I. | 0              | ?          | 14                   | ?          | Gillnet/inshore trawl | 0             |

## 8. Strandings

A. van Helden (Museum of NZ) reported the total number of reported strandings for 1998 is 62 incidents involving 419 animals. This excludes those animals that have been reported but for which stranding data forms have not been sent to the Museum of NZ. At least 20 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 3.2%, Balaenopteridae 3.2%, Ziphiidae 21%, Delphinidae 48.4% and Physeteridae 24.2%. The representation in number of animals for the different families that stranded in this period are: Balaenidae 0.5%, Balaenopteridae 0.5%, Ziphiidae 5.2%, Delphinidae 89.7% and Physeteridae 4%. The species with the highest incidents of strandings were common dolphin, long-finned pilot whales and pygmy sperm whales with 8 recorded incidents of stranding for each. The largest number of animals of a species to strand is 344 for long-finned pilot whales, 82.1% of the total number of animals stranded. A stranding at Dough-boy Bay on Stewart Island is responsible for 288 of these. The total number of animals refloated in this period is 33, 9 of which restranded and died, therefore 24 are presumed to have survived, being 72.7% of those refloated.

## 9. Other studies and analyses

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. Senior Lecturer, C. S. Baker and postdoctoral fellows Dr. G. Lento work on conservation genetics of cetaceans and pinnipeds. They and postdoctoral fellow Dr. B. Congdon conducted molecular genetic identification of whale and dolphin meat on commercial markets of Japan and Korea. Postdoctoral fellow Dr. L. Medrano and honorary research fellow, R. Robles-Saavedra conducted studies of the molecular evolution and population genetics of whales, dolphins and manatees. 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).

Otago University researchers are continuing their sperm whale research at Kaikoura. A new focus of research is the impact of whale watch tourism at Kaikoura. S. Dawson, E. Slooten, N. Jaquet and C. Richter (PhD student) are continuing acoustic and photographic surveys to quantify distribution and abundance, and stereo-photogrammetry to assess population structure. Studies of fine scale distribution, movements and associations of sperm whales at Kaikoura are underway. L. Douglas (MSc student) is continuing her work on acoustic censusing using click counting methods. The vocalisations of individually identified sperm whales are also being recorded during entire dive cycles to investigate the role of "buzzes" and "surface clicks", and to assess variability between individuals.

The Otago University research team continues its long-term research on Hector's dolphin. The main current research activity is line transect surveys of Hector's dolphins, conducted from a 15m catamaran. Ongoing field activities also include collection of reproductive data from dissections of beachcast and gillnet-caught dolphins.

Studies of bottlenose dolphins in Fiordland continue. K. Schneider has completed his PhD (Otago University) on the ecology and behaviour of bottlenose dolphins in Doubtful Sound, which are at the southern limit of this species. His studies focussed on a resident group of about 74 dolphins in Doubtful Sound, documenting movement patterns, abundance, associations and behaviour. Abundance appears to have increased by 10-15% since Otago University research began in 1990. Movement within the fiord is strongly related to seasons, with dolphins avoiding the inner arms in winter, and favouring them in summer. These inner areas show more pronounced temperature fluctuations than the main fiord: they are colder in winter, occasionally forming a thin ice cover, and warmer in summer. Detailed analyses of associations show much more stability than other populations (e.g. Sarasota Bay, Shark Bay, Moray Firth, Texas). Social organisation is matrifocal, and season by season analyses of association show that females rise in status or popularity (as measured by number of associates) when pregnant or nursing, and decline thereafter. Detailed analyses of behavioural events, using sequence analysis, has been used to develop a behavioural key, which should help avoid the subjectivity inherent in

assigning behavioural states to dolphin groups. P. Haase (MSc student, Otago University) is continuing K. Schneider's work on the bottlenose dolphins of Doubtful Sound. She is currently researching population demographics, movement patterns, associations among individuals and individuals' social behaviour. Digital video is used for individual identification and continuous focal animal sampling is used to study individuals' behaviour. Because of the isolated nature of Doubtful Sound, this work will yield a base of the natural behaviour of free-ranging bottlenose dolphins, unaffected by high tourism impacts.

## 10. Literature cited

None

## 11. Publications

### 11.1 Published literature

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