

## NEW ZEALAND PROGRESS REPORT ON CETACEAN RESEARCH, APRIL 2002 TO MARCH 2003, WITH STATISTICAL DATA FOR THE CALENDAR YEAR 2002

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This report summarises information obtained from: Auckland, Massey, and Otago Universities, Auckland University of Technology, Te Papa Tongarewa Museum of New Zealand, Department of Conservation, Ministry of Fisheries, National Institute of Water & Atmospheric Research Ltd (NIWA), and independent researchers.

### 1. Species and stocks studied

Common name	Scientific name	Area/stock(s)	Items referred to
Beaked whales	Family <i>Ziphiidae</i>	NZ	9
Bottlenose dolphins	<i>Tursiops truncatus</i>	NZ	2.1.1, 2.1.2, 3.1.1, 4.1, 4.3, 4.4, 8, 9
Bryde's whale	<i>Balaenoptera edeni</i>	NZ	2.1.1, 3.1.1, 4.3
Common dolphin	<i>Delphinus delphis</i>	NZ	2.1.2, 3.1.1, 4.2, 7.1, 8, 9
Cuvier's beaked whale	<i>Ziphius cavirostris</i>	NZ	4.3, 8
Dusky dolphin	<i>Lagenorhynchus obscurus</i>	NZ	2.1.1, 3.1.1, 4.3, 8, 9
Dwarf minke whale	<i>Balaenoptera acutorostrata</i>	Tonga	4.1, 9
Gray's beaked whale	<i>Mesoplodon grayi</i>	NZ	4.3, 8
Hector's dolphin	<i>Cephalorhynchus hectori hectori</i>	NZ	2.1.1, 3.1.1, 4.1, 4.2, 4.3, 7.1, 8, 9
Humpback whale	<i>Megaptera novaeangliae</i>	Area V	3.1.1, 4.1, 8, 9
Killer whale	<i>Orcinus orca</i>	NZ	3.1.1, 4.3, 7.1, 8, 9
Longman's beaked whale	<i>Indopacetus pacificus</i>	NZ	9
Maui's dolphin	<i>Cephalorhynchus hectori maui</i>	North Island, NZ	2.1.1, 3.1.1, 4.1, 4.2, 4.3, 4.4, 7.1, 9
Minke whale	<i>Balaenoptera acutorostrata</i>	Area V	4.3
Perrin's beaked whale	<i>Mesoplodon perrini</i>	NZ	9
Pilot whale	<i>Globicephala melaena</i>	NZ	3.1.1, 4.3, 7.1, 8, 9
Pygmy right whale	<i>Caperea marginata</i>	NZ	8
Pygmy sperm whale	<i>Kogia breviceps</i>	S. Hemisphere	4.3, 8
Shepherd's beaked whale	<i>Tasmacetus shepherdi</i>	NZ	4.3, 8
Southern bottlenose whale	<i>Hyperoodons planifrons</i>	NZ	8
Southern right dolphin	<i>Lissodelphis peronii</i>	NZ	4.3
Southern right whale	<i>Eubalaena australis</i>	NZ	3.1.1,
Sperm whale	<i>Physeter macrocephalus</i>	NZ	2.1.1, 3.1.1, 4.3, 8
Strap-toothed whale	<i>Mesoplodon layardi</i>	NZ	8
Spinner dolphin	<i>Stenella longirostris</i>	Tonga	4.1, 9
Striped dolphin	<i>Stenella caeruleoalba</i>	NZ	4.3

### 2. Sightings data

#### 2.1 Field work

##### 2.1.1 SYSTEMATIC

The final year of a three-year aerial survey of Bryde's whales was conducted off New Zealand's north-eastern coast between Cape Colville and North Cape by A. Baker (Dept of Conservation). Flights were undertaken along a predetermined track at monthly intervals, and whale sightings were logged on a GPS.

E. Slooten, S. Dawson, W. Rayment (Otago Univ.) continued aerial surveys to estimate the proportion of the Hector's dolphin population found within the four nautical mile offshore boundary of the Banks Peninsula Marine Mammal Sanctuary. This was a line-transect survey, with lines running at a 45-degree angle from the coastline, out to 15 nautical miles offshore. Preliminary analysis indicates that in mid-summer approximately

20% of the population is found offshore of the sanctuary boundaries. The survey has been repeated in winter to quantify seasonal changes in distribution, and in the effectiveness of the sanctuary.

B. Wursig (P.I.) (Texas A&M Univ.) continues research on dusky dolphins. Surveys were conducted on 50 days between January 2002 and May 2002 within 25 kilometres of the head of the Kaikoura Canyon, Kaikoura. Dolphins were encountered on approximately 95% of days. Group sizes ranged from 4 to about 2,000 dolphins. April and May had the largest groups. Surveys for dusky dolphins were conducted on 42 days in Admiralty Bay in the Marlborough Sounds from June 2002 through August 2002. A total of 253 groups were encountered, with a mean group size of 6.1 dolphins. Surveys for dusky dolphins were also undertaken from January 2003 through the end of this report period, 31 March 2003. Data are not yet analyzed but dolphins were surveyed on about 45 days in those three months, with contact of about 95% on those good weather days.

D. Lusseau, O. Boisseau, D. Rundgren & S. Maersk Lusseau (Otago Univ.) studied the population size, residency pattern, behavioural ecology, feeding ecology, acoustic behaviour and offshore distribution of bottlenose dolphins in Fiordland. From March 2002 to March 2003 they spent 108 days in Doubtful and Milford sounds looking for bottlenose dolphins, with effort concentrated evenly between both fiords. Dolphins were sighted on 72 days. During this period, three large scale offshore surveys were conducted, incorporating 100 days of effort throughout all of the fiords. In Milford Sound and Doubtful Sound the focus of research was the impact of tourism activities upon the dolphins and also vocalisation patterns. A further study was conducted in Doubtful Sound addressing the feeding ecology of the dolphins. Work in the other fiords concerned coastal distribution and movement patterns of bottlenose dolphins, both within and between fiords.

E. Secchi (Otago Univ.) has been collecting data on the recreational set net fishery through fishing diaries distributed to amateur fishers and by beach surveys. The aim is to assess the extent of the overlap between the distribution of Hector's dolphin and fisheries (on a spatial and temporal basis) along the northeast coast of the Buller Region of the South Island. Data on commercial set net fishing effort and distribution was obtained from records supplied by the Ministry of Fisheries (Wellington). Since March 2000, seasonal patterns of dolphin's distribution and density have been studied through systematic boat surveys. Two different sampling designs (one set of transects parallel to coast and another set of transects perpendicular to coast) were used to test for differences in dolphin's distribution and density according to distance from shore on a seasonal basis. Almost 2,000km of surveys have been completed. The information on potential overlap between fisheries and Hector's will be used to estimate the "expected" by-catch of these dolphins along the West Coast. The numbers will be used as inputs to model the effect of by-catch on the Hector's dolphins population off West Coast.

K. Russell (Auckland Univ.) continues research on Maui's dolphin. A total of twelve days of fieldwork were undertaken off the west coast of the North Island this summer season. During this time 24 groups Maui's dolphins were encountered. Group size ranged from one to seven. Only one calf and three juveniles were encountered. A total of 23 biopsy samples were collected. Several new dolphins were added to the North Island photo-ID catalogue, and many were re-sighted over the season. No beach cast dolphins were reported this season.

P. Ensor participated as a teamleader during the 2002 NILS cruise, and acted as cruiseleader on the 2002-2003 IWC-SOWER circumpolar cruise, Area V.

S. DuFresne (Otago Univ.) has completed 3 years of a long-term photo-ID study of Hector's dolphins within the Banks Peninsula Marine Mammal Sanctuary. Effort for the period January 2000 to September 2002 totalled 152 field days, resulting in 3700 kilometers of sighting effort and nearly 1500 sightings. Data analysis is focussing on survival estimates and is expected to be completed in late 2003. W. Rayment (Otago Univ.) commenced a three-year study examining movements and fine scale habitat use by Hector's dolphins at Banks Peninsula. The project will involve aerial surveys to further investigate seasonal changes in offshore distribution, photo-ID to investigate alongshore movements of individuals and acoustic monitoring using click detectors (PODs) to investigate fine scale habitat use.

D. Clement (Otago Univ.) concluded fine-scale (spatial and temporal) distribution surveys of Hector's dolphins and the investigation of localised population movements within the Banks Peninsula Sanctuary and Westport in 2002. An on-going evaluation aiming to compare the changing oceanography of the study areas with seasonal and inter-annual fluctuations in relative distribution and densities of dolphins will be completed in 2003.

Researchers from Otago University (S. Dawson and E. Slooten) continued their research on sperm whales off Kaikoura investigating abundance, residency and the effects of tourism.

E.Green (Otago Univ.) is investigating the effects of tourism on Hector's dolphins in Porpoise Bay. The two-year study is also investigating population size, range and habitat utilisation of the summer resident group. Potential impacts from the sole boat operator and beach swimmers were measured with the use of a theodolite, and behavioural assessments made in the presence and absence of boats and swimmers. Photo-ID and surveys for alongshore range of the dolphins were carried out by boat. Results to date indicate an adult population size of 40 dolphins and a range that extends at least 40 km along the coast. Further results will be available this year, and will be compared with a previous study carried out five years earlier.

Researchers from Otago University (S. Dawson, E. Slooten, W. Rayment and H. Nollens) completed two aerial surveys to investigate the offshore distribution of Hector's dolphins at Banks Peninsula. Transect lines were flown from the coast to 15 nautical miles offshore. In the summer survey, nearly 80% of dolphin groups were sighted within the four nautical mile Marine Mammal Sanctuary boundary. In the winter, only 35% were sighted within the same area suggesting that the majority of Hector's dolphins move offshore in winter and outside the protection of the Marine Mammal Sanctuary. Otago University (W. Rayment, D. Clement, and E. Secchi) and Dept. of Conservation (D. Neale) researchers completed the first part of aerial surveys to investigate the offshore distribution of Hector's dolphins in the Buller region of the South Island's west coast. Transect lines were flown from the coast to 15 nautical miles offshore. The surveys revealed that Hector's dolphins have a nearshore distribution in March with 99% of groups seen within 5 nautical miles of the coast. A winter survey will be undertaken in July 2003.

### 2.1.2 OPPORTUNISTIC, PLATFORMS OF OPPORTUNITY

J. Berghan has been collecting photo-IDs of bottlenose dolphins in the Hauraki Gulf. In addition, ongoing photo-ID research on bottlenose dolphins continues in the Bay of Islands using the dolphin-tour boats and independent vessels by A. Fleming (Dept. of Conservation), R. Constantine (Auckland Univ.) and J. Berghan.

K. Stockin and M. Orams (Massey Univ.) are investigating the relationship of ecotourism and common dolphin in the Hauraki Gulf. The primary aims of the research are to compare the behavioural ecology of dolphins targeted by tourist operators by assessing behavioural states of dolphins before, during and after tourist encounters. The study aims to assess the discreteness of the Hauraki Gulf population to that of adjacent populations by monitoring parameters relating to behavioural ecology, habitat use and population biology. The outcomes from the study will be useful in designing appropriate management strategies to minimise disturbance of common dolphins from other recreational boat traffic in the Hauraki Gulf.

### 2.2 Analyses/development of techniques

None.

## 3. Marking data

### 3.1 Field work

#### 3.1.1 NATURAL MARKING DATA

Species	Feature	Area/stock	Calendar year/season	Catalogued	Catalogue total	Contact person/institute
Bottlenose dolphin	Fin/body	Doubtful Sound	1990-2003	Yes	>83	O. Boisseau/ Otago Univ.
Bottlenose dolphin	Fin/body	Milford Sound	2000-2003	Yes	50	O. Boisseau/ Otago Univ.
Bottlenose dolphin	Fin/body	Fiordland	2000-2003	Yes	~200	O. Boisseau/ Otago Univ.
Bottlenose dolphin	Fin/body	Bay of Islands	1993-2003	Yes	397	R. Constantine, G. de Tezanos Pinto / Auckland Univ.
Bottlenose dolphin	Fin/body	Hauraki Gulf	2000-2003	Yes	102	J. Berghan
Brydes whale	Fin/body	Hauraki Gulf	2002	Yes	>20	C.S. Baker/ Auckland Univ.
Common dolphin	Fin/body	Whitianga/ Whakatane	1998-2002	Yes	408	D. Neumann/ Massey Univ.
Dusky dolphin	Fin/body	Kaikoura & Admiralty Bay	1997-2003	Yes	>4000	Tim Markowitz, Texas A&M University
Hector's dolphin	Fin/body	East South I. W. South I.	1984-2003 1994-97, 2001-2003	Yes	515	S. DuFresne, E. Slooten/ Otago univ.

Cont.

Humpback whale	Fluke	Area V	1991-2003	Yes	452	C. S. Baker/ Auckland Univ.
Humpback whale	Fluke	New Zealand	1995-2003	Yes	11	R. Constantine/ Auckland Univ.
Killer whale	Fins/saddles/eye patches	New Zealand	1993-2003	Yes	117	I. Visser/ The Orca Project
Killer whale	Fins/saddles/eye patches	Antarctica	2000-2003	Yes	15	I. Visser/ The Orca Project
Killer whale	Fins/saddles/eye patches	Area V	2001	Yes	11	C. Olavarria/ Auckland Univ.
Maui's dolphin	Fin/body	North I.	1998-2003	Yes	>34	K. Russell/ Auckland Univ.
Pilot whale	Fins/saddles	New Zealand	?-2003	Yes	84	T. O'Callaghan/
Southern right whale	Callosities/ lip lines	Area V	2001	Yes	2	C. Olavarria/ Auckland Univ.
Southern right whale	Callosities/ lip lines	NZ mainland	?-2003	Yes	23	N. Patenaude/ Auckland Univ.
Southern right whale	Callosities/ lip lines	NZ sub-antarctic	1995-99	Yes	402	N. Patenaude/ Auckland Univ.; B. Todd/ Project Tohora
Sperm whale	Fluke	Kaikoura	1990-2003	Yes	190	E. Slooten/ Otago Univ.

**3.1.2. ARTIFICIAL MARKING DATA**

None.

**3.1.3 TELEMETRY DATA**

None.

**3.2 Analyses/development of techniques**

None.

**4. Tissue/biological samples collected****4.1 Biopsy samples (including sloughed skin samples)**

Species	Area/stock	Calendar year/ season no. collected	Archived	No. analysed	Total holdings	Contact person/institute
Bottlenose dolphin	Northland	38	Yes	0	38	G. de Tezanos Pinto/ Auckland Uni.
Bottlenose dolphin	Queen Charlotte Sound	45	Yes	0	45	G. de Tezanos Pinto/ Auckland Uni.
Bottlenose dolphin	Doubtful Sound	15	Yes	15	15	S. Maersk Lusseau/Otago Uni.
Hector's dolphin	Marlborough Sounds & Kaikoura	25	Yes	?	141	K. Russell/ Auckland Univ.
Humpback whale	Tonga	113	Yes	?	?	C. Olavarria, K. Russell/ Auckland Uni.
Maui's dolphin	North Island	23	Yes	23	41	K. Russell/ Auckland Uni
Spinner dolphin	Tonga	1	Yes	?	?	C. Olavarria, K. Russell/ Auckland Uni.

*4.2 Samples from directed catches or bycatches*

Species	Area/stock	Calendar year/ season total	Archived	Tissue type(s)	Contact person/institute
Common dolphin	NZ	2	Yes	Skin, blubber, fixed tissues, skeletons	P. Duignan/ Massey Univ.
Hector's dolphin	South Island	6	Yes	Skin, blubber, fixed tissues, skeletons	P. Duignan/ Massey Univ.; A. van Helden/ Museum of NZ
Maui's dolphin	North Island	2	Yes	Skin, blubber, fixed tissues, skeletons	P. Duignan/ Massey Univ.; A. van Helden/ Museum of NZ

*4.3 Samples from stranded animals*

Species	Area/stock	Calendar year (total)	Archived	Tissue type(s)	Contact person/institution
Bottlenose dolphin	NZ	1	Yes	Skin/blubber	D. Steel/Auckland University
Bryde's whale	NZ	4	Yes	Skin/blubber	D. Steel/Auckland University
Common dolphin	NZ	6	Yes	Skin/blubber	D. Steel/Auckland University
Common dolphin	NZ	4	Yes	Skin, blubber, fixed tissues	P. Duignan/ Massey Univ.
Cuvier's beaked whale	NZ	2	Yes	Skin/blubber	D. Steel/Auckland University
Cuvier's beaked whale	NZ	1	Yes	Skin, blubber, fixed tissues	P. Duignan/ Massey Univ.
Dusky dolphin	NZ	1	Yes	Skin, blubber, fixed tissues	P. Duignan/ Massey Univ.
Gray's beaked whale	NZ	7	Yes	Skin/blubber	D. Steel/Auckland University
Gray's beaked whale	NZ	1	Yes	Skin, blubber, fixed tissues	P. Duignan/ Massey Univ.
Hector's dolphin	South Island	5	Yes	Skin, blubber, fixed tissues, skeletons	P. Duignan/ Massey Univ.; A. van Helden/ Museum of NZ
Killer whale	NZ	1	Yes	Skin/blubber	D. Steel/Auckland University
Long finned pilot whale	NZ	126	Yes	Skin/blubber	D. Steel/Auckland University
Maui's dolphin	North Island	1	Yes	Skin, blubber, fixed tissues, skeletons	P. Duignan/ Massey Univ.; A. van Helden/ Museum of NZ
Minke whale	NZ	1	Yes	Skin/blubber	D. Steel/Auckland University
Minke whale	NZ	2	Yes	Skin, blubber, fixed tissues	P. Duignan/ Massey Univ.
Pilot whale	NZ	4	Yes	Skin, blubber, fixed tissues	P. Duignan/ Massey Univ.
Pygmy sperm whale	NZ	5	Yes	Skin/blubber	D. Steel/Auckland University
Pygmy sperm whale	NZ	10	Yes	Skin, blubber, fixed tissues	P. Duignan/ Massey Univ.
Shepherd's beaked whale	NZ	1	Yes	Skin/blubber	D. Steel/Auckland University
Southern right whale dolphin	NZ	1	Yes	Skin/blubber	D. Steel/Auckland University
Sperm whale	NZ	4	Yes	Skin/blubber	D. Steel/Auckland University
Striped dolphin	NZ	1	Yes	Skin/blubber	D. Steel/Auckland University

*4.4 Analyses/development of techniques*

D. Steel (Auckland Univ.) continues to collect and analyse samples collected as part of an ongoing project to archive tissue and DNA from all New Zealand strandings.

S. Maersk Lusseau and D. Lusseau (Otago Univ.) have collected skin samples from bottlenose dolphins in Doubtful Sound. Samples have been collected using a modified version of Harling et al. technique. Fifteen exfoliated skin samples for C and N have been collected for a stable isotope study.

K. Russell (Auckland Univ.) has continued to collect skin samples from Maui's dolphins. All skin samples (biopsy and beachcast) from previous seasons (total 41) have been extracted, sexed, and sequenced (D-loop region of the mtDNA) and genotyping is current being undertaken.

## 5. Pollution studies

None.

## 6. Statistics for large cetaceans

### 6.1 Direct catches (commercial, aboriginal and scientific permits) for the calendar year 2002

None.

### 6.2 Other non-natural mortality for the calendar year 2002

A large baleen whale was entangled and apparently drowned in a marine farm in Coromandel.

### 6.3 Earlier years' statistics

No amendments.

## 7. Statistics for small cetaceans

### 7.1 For the calendar year 2002

Species	Area/stock	Directed catch		Incidental mortality			Live-capture
		Reported	Est. total	Reported	Est. total	Source	Reported
Common dolphin	New Zealand	Nil	Nil	2 <sup>a, b</sup>	?	Trawl	Nil
Hectors dolphin	South Island, West Coast	Nil	Nil	3 <sup>b</sup>	?	Gillnet	Nil
Hectors dolphin	South Island, East Coast	Nil	Nil	3 <sup>b</sup>	?	Gillnet	Nil
Killer whale	Bay of Plenty	Nil	Nil	1 <sup>c</sup>	?	Long line	Nil
Long finned pilot whale	New Zealand	Nil	Nil	1 <sup>a</sup>	?	Bottom long line	1
Maui's dolphin	North Island, West Coast	Nil	Nil	2 <sup>b</sup>	?	Gillnet	Nil

<sup>a</sup> details provided by R. Blezard, Dept of Conservation and S. Baird, NIWA from data collected by Scientific Observer Programme of Ministry of Fisheries,

<sup>b</sup> details provided by P. Duignan, Massey Univ. from data collected from Carcass Recovery Programme of Dept of Conservation

<sup>c</sup> details provided by R. Suisted, Dept of Conservation

### 7.2 Earlier years' statistics

No Amendments.

## 8. Strandings

A. van Helden (Te Papa Tongarewa/ Museum of New Zealand) maintains the NZ stranding database and the national marine mammal collection. The total number of reported strandings for this period is 86 incidents involving 252 animals. This excludes those animals that have been reported but for which stranding data forms have not been received by the Museum of New Zealand Te Papa Tongarewa before the end of March. At least 18 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: *Neobalaenidae* 2.3%, *Balaenopteridae* 8.1%, *Ziphiidae* 17.4%, *Delphinidae* 54.7%, *Physeteridae* 17.4%. The representation in number of animals for the different families that stranded in this period are: *Neobalaenidae* 0.7%, *Balaenopteridae* 2.7%, *Ziphiidae* 6.6%, *Delphinidae* 82.9% and *Physeteridae* 6.6%. The species with the highest incidents of strandings were Common dolphins with 15 incidents and Long-finned pilot whales also with 15 incidents. The largest number of animals of a species to strand was 179 for Long-finned pilot whales. The total number of animals refloated for this period was 49, 7 of which re-stranded and died, therefore 42 are presumed to have survived. Interestingly there continues to be a high number of strandings of Gray's beaked whales, 10 incidents involving 12 animals and Pygmy sperm whales, 10 incidents involving 11 animals. Total strandings are shown below.

Species strandings	No. of strandings	No. of animals
<i>Balaenoptera sp</i>	1	1
Baleen whale	1	1
Bottlenose dolphin	3	3
Common dolphin	15	17
Cuvier's beaked whale	2	2
Dusky dolphin	5	5
Gray's beaked whale	10	12
Hector's dolphin	7	7
Humpback whale	1	1
Killer whale	1	1
Pilot whale	15	179
Pygmy right whale	2	2
Pygmy sperm whale	10	11
Shepard's beaked whale	1	1
Southern bottlenose whale	1	1
Southern right whale dolphin	1	1
Sperm whale	5	6
Strap-toothed whale	1	1
<b>Total:</b>	<b>86</b>	<b>252</b>

P. Duignan, N. Gibbs, G. Jones and M. Stratton (Massey Univ.) continue to autopsy stranded cetaceans and/or those killed in fishing operations to determine cause of death, disease, and investigate biology.

#### 9. Other studies and analyses

A. Baker, A. Smith (Dept. of Conservation) and F. Pichler (Auckland Univ.) described a new subspecies of Hector's dolphin (*Cephalorhynchus hectori hectori*), Maui's dolphin (*C. hectori maui*) restricted to the west coast of the North Island.

B. Wursig (P.I.) (Texas A&M Univ.) continues research providing information on the effects of dolphin watching and swim-with dolphin activities off Kaikoura. In Admiralty Bay, ongoing studies of habitat use are directly applicable to the presence and proposed further development of the mussel farming industry in and near the Marlborough Sounds. These studies are also helping to unravel the genetic relatedness of dusky dolphins throughout New Zealand.

M. Dalebout (previously at Univ. Auckland) will be taking up a postdoctoral position with H. Whitehead at Dalhousie University to investigate population structure and gene flow in northern bottlenose whales. The following papers have been published: Dalebout *et al.* (2002a) describes a new species of beaked whale, *Mesoplodon perrini*, discovered through phylogenetic analysis of mitochondrial DNA sequences; Dalebout & Baker (2002) further discusses this finding, which prompted clarification of the role of holotypes and genetic evidence in species descriptions (Wakeham-Dawson *et al.* 2002); and, Dalebout *et al.* (2003) describes new specimens of Longman's beaked whale. In addition, Dalebout *et al.* (2002b) presents work resulting from the genetic monitoring of the whalemeat markets in Japan and the Republic of (South) Korea, including an estimate of numbers of protected J-stock minke whales sold annually on these markets. Other publications describe the utility of the DNA-surveillance website ([www.DNA-surveillance.auckland.ac.nz](http://www.DNA-surveillance.auckland.ac.nz)) established at the University of Auckland to enable on-line identification of whales, dolphins and porpoises from mtDNA sequence data (Ross *et al.* 2003; Baker *et al.* 2003).

M. Cawthorn continues to collate incidental sightings of whales from commercial vessels at sea and other offshore sources; transfer the Townsend data from original collation sheets to computer; investigate historical whaling in the south west Pacific and relate these activities to modern bathymetry and other oceanographic data; develop and improve marine mammal escape devices for use in commercial mid-water and bottom trawl fishing gear.

T. O'Callaghan has initiated a long-finned pilot whale photo-identification catalogue. The primary aim of this catalogue is to estimate the long-term survival rates following refloatation of stranded animals. To date, the catalogue contains 84 individually identified animals (53 live, 31 dead). Identification images from stranded and free-swimming animals are added to the catalogue on an opportunistic basis. Additional historical images are continuously being added.

A. Schaffar-Delaney and M. Orams (Massey Univ.) are investigating the reproductive patterns of common dolphins in the Hauraki Gulf, New Zealand. This project aims to assess common dolphin breeding patterns, specifically female reproductive strategies. Data will be recorded from a commercial tourist boat "Dolphin Explorer" and from a small research boat. This project will provide valuable information useful in setting appropriate permit conditions and management strategies, as well as guidelines for dolphin-watching operators.

A. Taylor (A.U.T.) and M. Orams (Massey Univ.) are assessing the impacts of an environmental education programme on a marine mammal tour. Numerous studies have been conducted to assess the effects of eco-tourism on cetaceans, yet relatively few studies have assessed the effects of eco-tourism on the participating tourists. It has been identified that the ultimate goal of an eco-tourism education program is to prompt behaviour change that benefits the environment upon which the eco-tourism is based. This project plans to evaluate the effectiveness of an education program for tourists onboard "Dolphin Explorer", an ecotourism venture based in Auckland. A survey was conducted over the 2001/02 summer period, with eleven trips being randomly selected and all passengers over 15 years of age being approached to complete a two-part self-reply questionnaire ( $n=300$ ). Three indicators were used in the evaluation; increase of knowledge, the changing of attitudes to those that are more environmentally sound, and intentions to change behaviours to those that are more environmentally responsible. A comparison of data collected before the trips, with data collected afterwards, showed that changes did occur as a result of the education programme. In particular, it was found that significant learning occurred ( $z = -3.08, p = 0.001$ ), and chi-square tests revealed that respondents were more likely to behave in an environmentally responsible way subsequent to the trip ( $df = 5, p = 0.000$ ). These results contribute to the evidence that effective environmental programs can help prompt greater environmental awareness and responsibility in tourists and can contribute to ecotourism achieving its lofty aspirations of contributing to conservation objectives.

Researchers at Auckland University and the South Pacific Humpback Whale Consortium continue humpback whale research in Tonga. The work focuses on the collection of ID photographs and biopsy samples. Spatial coverage has mostly focused on the island of Vava'u but has expanded considerably in recent years. In 2002, field work was conducted at three sites, as follows: Vava'u (25 working days), Eua (8 working days) and Ha'apai (8 working days). Sightings of humpback whales were as follows: Eua (20 sightings of 52 whales, with no calves); Ha'apai (47 sightings of 85 whales, including 3 calves); and Vava'u 76 sightings of 159 whales, including 32 calves. Nine individuals were resighted in Eua, and 16 in Vava'u. There were no matches between the two areas. Samples for genetic analysis were obtained as follows: Eua (17 sloughed skin in 10 encounters, representing fewer than 13 individuals); Ha'apai (20 sloughed skin in two encounters, representing fewer than 5 individuals); and Vava'u (70 biopsies and six sloughed skin). A biopsy sample was also obtained from a spinner dolphin. A sample of sloughed skin was obtained from an unidentified whale was determined from genetic analysis to be a dwarf minke whale (*Balaenoptera acutorostrata* sp.). Other species encountered included spinner dolphins, bottlenose dolphins and pilot whales.

I. Visser (Orca Project) continues research on killer whales around New Zealand. Research uses photo-ID and both surface and underwater behavioural observations to investigate ecology and behaviour.

G. de Tezanos Pinto and R. Constantine (Auckland Univ.) continue ongoing research on bottlenose dolphins in the Bay of Islands. The primary aim of this research is to collect ongoing photo-identification data on the bottlenose dolphins that use the Bay of Islands as part of their home range. A total of twenty-six days of fieldwork have been undertaken in the Bay of Islands since March 2002. Three dolphins were added to the Bay of Islands bottlenose dolphin photo-ID catalogue. A digital version of this catalogue contains 553 high-resolution photographs from 397 individuals. This confirms that the Bay of Islands is an important area to this relatively closed population (Constantine 2002). During the research period 45 groups of bottlenose dolphins were encountered with group sizes ranging from five to 30 dolphins. These groups contained a cumulative total of 18 neonates, 60 calves and 19 juveniles. New PhD research on the genetics and demographics of the Northland bottlenose dolphin population was initiated in February 2003 and is being conducted by G. de Tezanos Pinto at the University of Auckland. This research aims to model demographic trends and investigate the genetic structure of bottlenose dolphins in Northland, and their relationship with other coastal populations in New Zealand. J. Berghan and R. Constantine continue research on bottlenose dolphins in the Hauraki Gulf.



Preliminary analysis suggests that of the 102 individuals in the catalogue, at least 40% have a match in the Bay of Islands catalogue.

S. Ferreira and F. Jonker (Dept. of Conservation) are continuing research on Maui's dolphin on the west coast of the North Island. A population estimate based on aerial surveys constrained by availability and perception bias suggests that the population could be as small as 75 individuals (CI=48-130). There is ongoing genetics work in conjunction with Auckland University with the key aspect being the determination of population size using a mark-recapture approach with genetic markers as the marking technique. During 2003 a pilot study was initiated to look at the feasibility of using Porpoise Detection Devices (PODs) to define the use of harbours by Maui dolphins along the west coast of the North Island. The conceptual framework is directed at establishing an 'acoustic fence' using PODs across the width of the harbour mouth entrance with a second "acoustic fence" further inside the harbour. Analysis of time specific data should allow the determination of direction of movement and time spent inside the harbour. The pilot study is focused at calibrating the PODs and determining the feasibility of the concept.

A. Gormley (Otago Univ) assessed the appropriateness of applying mark-recapture techniques and photo-ID of natural markings to the problem of estimating the abundance of sperm whales in Kaikoura, bottlenose dolphins in Doubtful Sound and Hector's dolphins around Banks Peninsula. The current catalogue held by Otago University was used for analysis. In the case of Hector's dolphins, this was also the opportunity to compare the mark-recapture estimate against a previously obtained line-transect estimate.

C. Richter's (Otago University) 4-year study concluded that the current whale-watching effort of sperm whales at Kaikoura was sustainable yet recommended no further permits be granted at this time. Transient whales were found to be much more sensitive to disturbance than residents. The study concluded that resident whales react less and bear the majority of whale-watching activity. Reactions of the residents to whale-watching vessels varied significantly among different individuals. While these whale-watching effects on the resident whales are statistically detectable, there appears to be no serious biological consequence.

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