Cetacean research in New Zealand 2006/07

Simon Childerhouse (Comp.)

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Simon Childerhouse (Comp.)

Marine Conservation Team, Department of Conservation, PO Box 10420, Wellington 6143, New Zealand

Present address: Australian Antarctic Division, Kingston, Tasmania 7050, Australia. Email: simon.childerhouse@aad.gov.au

A B S T R A C T

This report summarises cetacean (i.e. whale and dolphin) research undertaken in New Zealand over the period from April 2006 to March 2007, with statistical information for the 2006 calendar year. It covers research undertaken by a wide range of researchers including government, university, and non-governmental agencies and individuals. Information presented includes details of species studied, strandings, summaries of collections and catalogues, research projects undertaken, samples collected, and publications resulting from research. Data are included from 21 species, from 20 different institutions and agencies and over 40 researchers. Although this is a comprehensive collection of research for 2006/07, it does not include all cetacean research carried out in New Zealand over the period, as some researchers did not provide a report of their work to the New Zealand Department of Conservation. This report provides a published record of the New Zealand National Progress Report on Cetacean Research for 2006/07, which was presented to the Scientific Committee of the International Whaling Commission.

Keywords: cetacean, research, marine mammal, International Whaling Commission

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1. Introduction

This report follows on from previous reports that have summarised cetacean research in New Zealand over the period 1997–2005 (Childerhouse 2002, 2004, 2005, 2006, 2010). It provides information about cetacean research in New Zealand from April 2006 to March 2007. For a full description of the format and explanation of the sections in the report, please refer to Childerhouse & Donoghue (2002). This, and previous reports, are published records of the New Zealand National Progress Report on Cetacean Research which is presented annually to the Scientific Committee of the International Whaling Commission (IWC).

The IWC is the international agency responsible for the 'conservation of whale stocks and the orderly development of the whaling industry' and has 88 member nations including New Zealand. New Zealand has been a member of the IWC since 1948 (Fredheim 2001). One of the obligations of member nations is the provision annually to the IWC of a National Progress Report on Cetacean Research. This report includes details such as the number and location of cetaceans taken commercially or incidentally in fishing operations, numbers of stranded cetaceans, and status of ongoing research projects. One of the original aims of these reports was to provide data on the commercial catch of large whales to facilitate the management of whaling. However, over time, National Progress Reports have been modified to include the reporting of additional information such as levels of bycatch and other data on dolphins. Prior to 1997, National Progress Reports were published in their entirety in IWC volumes, but since then only a small summary of the full report has been published.

The National Progress Reports have been compiled annually by the New Zealand Department of Conservation (DOC) based on reports from researchers. Although a considerable amount of effort has been made to contact all researchers who have undertaken cetacean research in New Zealand, and encourage them to provide details of their research, this has not always been completely successful. As such, this report covers most of the work undertaken in New Zealand in 2006/07; but some research, which has not been reported to the Government, does not appear. However, overall, only a small proportion of the active cetacean research in New Zealand has not been included in this document.

The aim of compiling and publishing these reports is to make the information accessible and useful as a tool in the management and protection of cetaceans in New Zealand. These reports are a useful resource for summarising New Zealand-based research projects and for identifying researchers who are working on species or projects. Obviously, research is ongoing and these reports will continue to be published in the future.

This report summarises information from a number of organisations. Details of these organisations, and their contact addresses and people, are provided in Table 1.

TABLE 1. DETAILS OF ORGANISATIONS INVOLVED IN CETACEAN RESEARCH IN NEW ZEALAND IN 2006/07.

NAME OF AGENCY/INSTITUTE	ABBREVIATION	CONTACT EMAIL ADDRESS
Auckland University of Technology	AUT	steve.oshea@aut.ac.nz
Australian Antarctic Division	AAD	Glenn.Dunshea@aad.gov.au
Bay of Plenty Polytechnic	BOP	caroline.schweder@boppoly.ac.nz
Cawthorn & Associates	CA	cawthorn@xtra.co.nz
Cook Strait whale project	CS	ngibbs@doc.govt.nz
Dalhousie University	DAL	d.lusseau@dal.ca
Department of Conservation	DOC	lchilvers@doc.govt.nz
Dolphin Watch Ecotours	DWE	info@naturetours.co.nz
DuFresne Ecology Ltd	DEL	sam@dufresne.co.nz
Marine Wildlife Research	MWR	rob@mwr.co.nz
Massey University—Albany	MU-A	K.A.Stockin@massey.ac.nz
Massey University—Palmerston North	MU-P	W.D.Roe@massey.ac.nz
Museum of New Zealand/Te Papa Tongarewa	TP	AntonVH@tepapa.govt.nz
National Institute of Water and Atmospheric Research	NIWA	m.pinkerton@niwa.co.nz
Opération Cétacés	OC	op.cetaces@lagoon.nc
Orca Research Trust	ORT	ingrid@orca.org.nz
Paxarms NZ Ltd	PAX	paxarms@paxarms.co.nz
South Pacific Whale Research Consortium	SPWRC	nan@whaleresearch.org
Texas A&M University	TAMU	wuersig@sbcglobal.net
University of Auckland	UA	r.constantine@auckland.ac.nz
University of Otago	OU	liz.slooten@stonebow.otago.ac.nz

2. Species and stocks studied

The cetacean species and stocks studied in New Zealand in 2006/07 are listed in Table 2.

TABLE 2. CETACEAN SPECIES AND STOCKS STUDIED IN NEW ZEALAND IN 2006/07.

IWC COMMON NAME	IWC RECOMMENDED SCIENTIFIC NAME	AREA/STOCK(S)	RELEVANT SECTIONS IN TEXT
Antarctic minke whale	*Balaenoptera bonarensis*	NZ	5.1, 5.2
Bottlenose dolphin	*Tursiops truncatus*	NZ	3.1.1, 3.1.2, 4.1.1, 5.1, 5.2, 5.3, 5.4, 9, 10
Bryde's whale	*Balaenoptera edeni*	NZ	3.1.2, 4.1.1, 5.1, 5.2, 7.3.1, 9
Common dolphin	*Delphinus delphis*	NZ	3.1.2, 5.1, 5.2, 8.3.2, 9, 10
Cuvier's beaked whale	*Ziphius cavirostris*	NZ	5.1, 5.2, 8
Dusky dolphin	*Lagenorhynchus obscurus*	NZ	3.1.1, 3.1.2, 4.1.1, 8.3.2, 9, 10
Dwarf minke whale	*Balaenoptera acutorostrata*	NZ	9
Gray's beaked whale	*Mesoplodon grayi*	NZ	5.1, 5.2, 9
Hector's dolphin	*Cephalorynchus hectori hectori*	NZ	3.1.1, 3.1.2, 4.1.1, 5.1, 5.2, 5.4, 8.3.2, 9, 10
Humpback whale	*Megaptera novaeangliae*	NZ, Tonga, New Caledonia	3.1.1, 4.1.1, 5.1, 5.3, 9, 10
Killer whale	*Orcinus orca*	NZ	32.1.1, 3.1.2, 4.1.1, 9, 10
Long-finned pilot whale	*Globicephala melas*	NZ	5.1, 5.2, 5.4, 9
Maui's dolphin	*Cephalorynchus hectori maui*	NZ	3.1.1, 3.1.2, 4.1.1. 5.4
Melon headed whale	*Peponocephala electra*	NZ	5.1, 5.2
Pygmy blue whale	*Balaenoptera musculus brevicauda*	NZ	5.1, 5.2
Pygmy right whale	*Caperea marginata*	NZ	5.1, 54.2, 9
Pygmy sperm whale	*Kogia breviceps*	NZ	54.2, 7.3.1, 9
Short-finned pilot whale	*Globicephala macrorhynchus*	NZ	5.1, 5.2
Southern right whale	*Eubalaena australis*	NZ	4.1.1, 5.1, 5.2, 10
Sperm whale	*Physeter macrocephalus*	NZ	3.1.1, 4.1.1, 5.1, 5.2, 9, 10
Straptoothed whale	*Mesoplodon layardi*	NZ	5.1, 5.2, 9

3. Sightings data

3.1 FIELD WORK

3.1.1 Systematic

D. Lusseau (DAL), in collaboration with the Marine Mammal Research Group at OU and other groups, continued to investigate the dynamics of the social relationships of bottlenose dolphins in Doubtful Sound, Fiordland. D. Lusseau (OU) published further work on the impact of dolphin watching on bottlenose dolphins in Doubtful Sound.

A. Schaffar and C. Garrigue (OC) completed the second field season of a 3-year research project investigating the potential effects of whale-watching boats on the behaviour of humpback whales wintering in the Southern Lagoon of New Caledonia. This project is assessing the temporal and spatial use of this area by humpback whales and boats (recreational and commercial), working towards the implementation of whale-watching regulations based on scientific data. Land-based surveys were conducted using a theodolite, and resulted in 67 independent tracking sessions of humpback whales. On average, humpback whales were in the presence of three or more boats during 105 minutes each day. Boats spent an average of 63 minutes with each group of whales. Photo-ID data indicated that humpback whales are likely to be exposed to boats repeatedly within and between seasons, raising the issue of a potential cumulative impact.

S. Scali, E. Slooten and S. Dawson (OU) continued research on Maui's dolphins' use of the harbours on the North Island west coast. Porpoise detector devices (Timing-Porpoise Detectors—T-PODs) were used to make acoustic detections of Maui's dolphins, and sightings were made from vessels and cliff-top observation posts. Consistent sightings and acoustic detections of Maui's dolphins in the Manukau Harbour over a 2.5-year period have shown that they use the harbour on a regular basis, including the inner part where commercial and amateur gillnetting continues. The entrance is protected from gillnetting, along with the open coast from Northland to Taranaki, in a protected area created by MFish to reduce dolphin bycatch in fisheries. Maui's dolphins have been sighted in at least three of the five harbours within their range on the North Island west coast. None of the three harbour areas are protected, and the dolphins that enter these harbours are therefore potentially exposed to commercial and recreational gillnet fisheries.

R. Currey, S. Dawson and E. Slooten (OU) continued research on the conservation, biology and behaviour of bottlenose dolphins resident in Doubtful Sound, Fiordland. Recent intensive photo-ID work indicated that the population comprised between 55 and 57 individuals, and that a considerable population decline had occurred over recent years. A long-term dataset will be used to estimate survival rates since the study began in 1990. A further focus of the research is to assess critical habitats based on spatial patterns in dolphin distribution and behaviour.

C. Schweder and colleagues (BOP) conducted humpback whale research in the Vava'u island group in Tonga in 2006. Forty-three pods of humpback whales were encountered (97 individual whales). Of all pods encountered, 19% (n = 8)

were cow-calf pairs, 14% ($n = 6$) were cow-calf-escorts, 37% ($n = 16$) were pods of two or more whales, and the remaining 30% ($n = 13$) were solitary whales. Twenty-one whales were individually identified by photo-ID and will be added to the Tonga catalogue. Data analysis, including reconciling the photo-IDs with other catalogues was carried out in collaboration with other members of the SPWRC.

UA and SPWRC conducted humpback whale research in the Vava'u island group in Tonga between 11 September and 2 October 2006. Methods included the collection of images for photo-ID, biopsy samples and sloughed skin for DNA analysis, and acoustic data. During the 2006 field season, 17 days were spent on the water (129 hours), with a total of 56 encounters with whales: 11 mother/calf pairs, 10 mother/calf and escort groups, 23 multi-whale groups and 12 singletons. A total of 52 individuals were identified by fluke photos. To date, six of these have been matched with photos from previous years. Fourteen hours of song were recorded. Whales recorded in Tonga have also been recorded well to the west and east; suggesting that Tonga forms a kind of crossroads for humpback whales in the South Pacific. Data analysis, including reconciling the photo-IDs with other catalogues, and extracting DNA from the skin samples, is currently underway in collaboration with other members of the SPWRC.

E. Martinez M. Orams and D. Brunton (MU-A) completed the second year of a 3-year field study looking at the impacts of vessel activity on the behaviour of Hector's Dolphins in Akaroa Harbour, Banks Peninsula. This study aims to determine and quantify the current level of vessel activity; identify whether such impacts are significant for the local Hector's dolphin population; and assess whether these can be mitigated by appropriate changes to the dolphin-watching permit conditions. The research utilises theodolite tracking and 3-minute focal group scan sampling methodology from land- and vessel-based platforms.

E. Burgess and M. Orams (MU-A) completed field work in the Hauraki Gulf examining common dolphin foraging ecology. W. Schrader and M. Orams (MU-A) began pilot field work in Auckland and Northland waters examining the behavioural ecology of common dolphins. This research will form part of a PhD study comparing behavioural ecology and population dynamics of neighbouring study sites.

A. Dahood and B. Würsig (TAMU) conducted land-based theodolite observations of dusky dolphins at Kaikoura from January to December 2006. Systematic sunrise and sunset observations were conducted from three cliff-top stations to observe and describe dusky dolphin habitat use and movement patterns. Two hundred and twenty-seven observation sessions were conducted over 156 days, during which 127 hours were spent scanning for small groups of dolphins (<150 individuals) and 485 hours were spent attempting to track large groups (>150 individuals). In total, 694 small groups and 173 large groups were located. Results show that, in summer, dusky dolphins were typically seen in large groups moving between the Ota Matu Station and Mikonui Beach. In winter, the largest groups of the year were recorded, and they tended to be farther offshore than during other seasons. Spring and autumn patterns were highly variable, but small scattered groups were most common in spring.

J. Weir and B. Würsig (TAMU) conducted boat-based surveys off Kaikoura from January to May 2006. Photo-ID and focal follows were used to quantify the distribution, behaviour, and composition of dusky dolphin nursery groups.

Surveys were conducted over 33 days during which 28 nursery groups, 18 mating groups, 85 non-mating groups, and 28 large dusky dolphin groups were recorded. Results show that nursery groups prefer shallow water, spend most of their time resting, and have a median group size of 14 individuals.

H. Pearson and B. Würsig (TAMU) conducted boat-based surveys of dusky dolphins in Admiralty Bay, Marlborough Sounds, from May to October 2006. Photo-ID and focal follows were used to examine abundance, distribution, and social strategies of the dolphins, and to describe interactions between the dolphins and mussel farms. Systematic surveys were conducted for 100 hours over 62 days. One hundred and fifty focal follows totalling 160 observation hours were conducted over 60 days. Results show that mean group size was seven individuals; feeding groups were larger than resting, social, and travelling groups; and groups spent more time resting and travelling and less time feeding and socialising than expected by chance. Dolphins entered mussel farms during 5% (n = 8) of focal follows and were observed spending less than 1% of their time inside mussel farms.

R. Vaughn and B. Würsig (TAMU) conducted boat-based surveys in Admiralty Bay, Marlborough Sounds from May to August 2006. Focal follows and underwater video were used to describe dusky dolphin feeding tactics and predator associations; to investigate how dusky dolphins influence feeding efficiency of other predators; and to determine how other predators, dolphin group sizes, and area of prey balls influence dolphin feeding efficiency. Systematic surveys were conducted for 63 hours over 40 days, during which 51 dusky dolphin groups were encountered. Seventy-two focal follows totalling 94 observation hours were conducted over 44 days. The results of these surveys show that dolphin feeding bouts were very mobile and short in duration (mean = 3 min); locations changed from early to late winter; and mean group size during feeding was eight dolphins. Stationary feeding bouts were seldom observed (7% of the time), but observed prey balls were typically small (mean = 5 m^2). Fluttering shearwaters (*Puffinus gavia*) were the main predators observed feeding with dusky dolphins, and were present for 88% of feeding bouts; however, gannets (*Morrus serrator*) were present for 24% of feeding bouts, and fur seals (*Arctocephalus forsteri*) were present for 18% of feeding bouts.

M. Srinivasan and B. Würsig (TAMU) conducted theodolite observations of dusky dolphins in Admiralty Bay, Marlborough Sounds, from June to August 2006. Dolphin movements and habitat use were assessed by tracking individual groups, with periodic scans between tracking. Twenty-two groups of dusky dolphins were tracked, and 33 dolphin groups were observed during 25 scans over 15 field days. An average of 1.7 scans/day were carried out, with an average of 1.3 groups observed during each scan. Group size ranged from 1 to 9 individuals, with an average of 3.95.

S. Deutsch and B. Würsig (TAMU) commenced boat-based observations of dusky dolphin nursery groups off Kaikoura in October 2006. Data from focal follows, photo-ID, and underwater video are being used to describe the dolphins' social development and social learning. A total of 25 surveys were conducted, during which 55 nursery groups were encountered. This research will continue until June 2007.

M. van der Linde, S. Dawson and E. Slooten (OU) continued work on an ongoing study of the abundance and distribution of sperm whales at Kaikoura. Photo-IDs for 23 new individuals were added to an existing catalogue in 2006/07,

with the updated photographic catalogue containing records for 227 individuals. A measure of field effort will be incorporated into an existing photographic mark-recapture model of abundance estimation, in order to improve on the accuracy of sperm whale abundance estimates. A GIS model will be used to investigate distribution of individual sperm whales; in particular, spatial and temporal variation in habitat utilisation and relative range.

R. Mattlin (MWR), S. DuFresne (DEL), D. Clement (OU) and M. Cawthorn (CA) completed the first year of a series of aerial line-transect surveys of Hector's dolphins in Cloudy and Clifford Bays, Marlborough. This study is being carried out through NIWA, and is designed to assess seasonal abundance and distribution of Hector's dolphins in this area. The 3-year study will provide baseline data with which to assess potential impacts of a proposed marine farm. The study is a requirement under the farm's resource consent monitoring conditions.

G. de Tezanos Pinto and C.S. Baker (UA) continued work on the genetic diversity and population structure of bottlenose dolphins in New Zealand. This research aims to model trends in abundance for the Northland population; to investigate the population structure and genetic diversity of the species in coastal New Zealand waters; and their relationship to other bottlenose dolphin populations around the world. From January 2006 until March 2007, a total of 16 daily surveys were undertaken in the Bay of Islands. Twenty-five groups of bottlenose dolphins were encountered, including 60 previously photo-identified individuals and nine new individuals that were added to the photo-ID catalogue. The primary aims of these surveys were to collect individual photo-ID data and biopsy samples from this population of bottlenose dolphins.

In November 2006, J. Rodda (OU) finished 24 consecutive months research on Hector's dolphins at Te Waewae Bay, Southland. A photo-ID catalogue is being compiled that will be used to analyse spatial and temporal changes in dolphin distribution, density, and fine-scale habitat use.

W. Rayment and T. Webster (OU) continued compilation of a photo-ID catalogue of Hector's dolphins around Banks Peninsula during 2006/07. This work is to be used as part of an ongoing long-term study of the biology of Hector's dolphins, and anthropogenic impacts on them.

P. Ensor participated as a team leader during the 2006 NILS cruise in the North Atlantic, and also acted as cruise leader on the 2006/07 IWC-SOWER cruise, Area III of the Antarctic.

S. Childerhouse and N. Gibbs (DOC), with the support of many volunteers, undertook a land- and vessel-based survey of humpback whales in Cook Strait for two weeks in June 2006. This was the third dedicated humpback whale survey in New Zealand since whaling finished in 1964. Ex-whalers were the primary land-based spotters. During 128 hours of land-based observation, ten pods of 15 humpback whales were observed. Three photo-IDs and eight genetic samples were obtained.

I.N. Visser (ORT) continued research on killer whales around New Zealand. This research has been ongoing since 1992 and, to date, 132 individuals have been photo identified. This work has been the basis for estimating population abundance, range, and social structure; the possibility of three New Zealand sub-populations; and the identification of both Type B and Type C Antarctic killer whales visiting New Zealand waters. Observations have identified 27 prey species.

The longest resighting period for a female New Zealand killer whale so far is 29 years (n = 27 resightings, 1977–2006) and this whale is still reproductively viable at 40–42 years old. From c. 1922 to 2006, 44 killer whale strandings involving at least 80 animals have been recorded in New Zealand. Threats to New Zealand killer whales include fisheries interactions, pollutants (including noise pollution), habitat degradation (including aquaculture and proposed marine turbines for energy production), boat strikes and lack of appropriate operating procedures at stranding rescues. Additional research on killer whales has been undertaken in Papua New Guinea and Antarctica.

D. Breen and colleagues (DOC) continued aerial surveys of Maui's dolphins on the west coast of the North Island, including alongshore between New Plymouth and North Cape, cross-shelf between Manukau and Raglan to 10 n.m., and cross-shelf to 5 n.m. in the New Plymouth region between Oakura and the southern set net closure area.

3.1.2 Opportunistic, platforms of opportunity

R. Currey and E. Slooten (OU) conducted a 6-day survey of Dusky Sound, Fiordland on the charter vessel *Breaksea Girl*. Photo identification of resident bottlenose dolphins was undertaken to establish a catalogue. One common dolphin was observed with the bottlenose dolphin group.

E. Martinez (MU-A) continued to undertake opportunistic vessel-based surveys onboard dolphin-watching/swimming vessels in Akaroa Harbour for her PhD research (142 trips in 2005/06 and 229 in 2006/07). The aim of these surveys is to collect data on the behavioural ecology of Hector's dolphins in the presence of vessels and/or swimmers in Akaroa Harbour. Hector's dolphins encountered around dolphin-watching and dolphin-swimming operations are photographed for photo-ID.

A. and D. Englehaupt (DWE) collected opportunistic data on all dolphin groups (bottlenose, common, dusky, Hector's) and for killer whales encountered during Dolphin Watch Ecotours trips in the Marlborough Sounds throughout the year. Details of locations, estimated group sizes and presence of calves were recorded for all groups, along with, when possible, photo-IDs and descriptions of behavioural states.

N. Wiseman and S. Baker (UA) continued investigating the genetic identity and ecology of Bryde's whales in the Hauraki Gulf. The primary aims of the research are to investigate the seasonal abundance and presence/absence of individual whales and whether the Hauraki Gulf Bryde's whale population is reproductively isolated from adjacent populations. This is being investigated by collecting biopsy samples from Bryde's whales in the Hauraki Gulf. Nine samples were collected between April 2006 and March 2007. As fieldwork other than biopsy collection was completed by March 2006, no new individuals were added to the photo-ID catalogue. Results suggest that encounter rates with Bryde's whales are higher during winter.

N. Wiseman (UA), G. de Tezanos Pinto (UA) and K. Stockin (MU-A) continued surveys of the outer Hauraki Gulf area to obtain individual photo-IDs to provide information on population structure, demography and habitat use for Bryde's whales, bottlenose dolphins and common dolphins. Skin samples were also collected from Bryde's whales and bottlenose dolphins to continue genetic analyses of these species.

G. de Tezanos Pinto (UA) conducted six surveys during 2006 onboard permitted marine mammal tour vessels in the Bay of Islands. The primary objective of these surveys was to collect individual photo-ID data on bottlenose dolphins in the area, including data on mother-calf associations, group size and composition, location and behaviour. Individual photo-IDs were opportunistically collected from other species, including Killer and Bryde's whales.

G. de Tezanos Pinto curated the Hauraki Gulf Bottlenose Dolphin Catalogue during 2006/07, in collaboration with J. Berghan, K. Algie, N. Wiseman and K. Stockin. This catalogue includes photo-IDs collected opportunistically in the Hauraki Gulf since 2000. Photographs from 2003–2006 are currently being analysed, and unique individuals will be added to the Hauraki Gulf catalogue and sightings database. This research aims to improve abundance estimates for the Northland population, and provide a better understanding of demographic parameters, habitat usage and social organisation of bottlenose dolphins in the Hauraki Gulf.

3.2 ANALYSES/DEVELOPMENT OF TECHNIQUES

None.

4. Marking data

4.1 FIELD WORK

4.1.1 Natural marking data

Details of photo-ID catalogues held and maintained by researchers in New Zealand are provided in this section. Only the catalogues that have been actively maintained, added to and reported on in 2006/07 have been reported here. There are other photo-ID catalogues held and maintained by researchers in New Zealand. For a more detailed list of existing catalogues, please consult previous National Progress Reports and individual researchers. Table 3 provides details of photo-ID catalogues of cetaceans held and maintained by researchers in New Zealand in 2006/07.

4.1.2 Artificial marking data

None.

4.1.3 Telemetry data

None.

4.2 ANALYSES/DEVELOPMENT OF TECHNIQUES

None.

TABLE 3. DETAILS OF PHOTO-ID CATALOGUES FOR CETACEANS HELD AND MAINTAINED BY RESEARCHERS IN NEW ZEALAND IN 2006/07.

SPECIES	FEATURE	AREA/ STOCK	NO. OF INDIVIDUALS IN CATALOGUE	CATALOGUE Y/N	CATALOGUE TOTAL	CONTACT PERSON/S (INSTITUTION)
Bottlenose dolphin	Dorsal fin	Marlborough Sounds	500	Y	170	A. Englehaupt (DWE)
Bottlenose dolphin	Dorsal fin	Hauraki Gulf	150	Y	?	G. de Tezanos Pinto (UA) & J. Berghan
Bottlenose dolphin	Dorsal fin	Bay of Islands	60	Y	435	G. de Tezanos Pinto (UA)
Bottlenose dolphin	Dorsal fin	Doubtful Sound/Patea	60	Y	64	R. Currey (OU)
Bryde's whale	Dorsal fin	Hauraki Gulf	0	Y	72	N. Wiseman (UA)
Common dolphin	Dorsal fin	Marlborough Sounds	150	Y	30	A. Englehaupt (DWE)
Dusky dolphin	Dorsal fin/ body	Kaikoura (nursery groups)	82	Y	260	J. Weir (TAMU)
Dusky dolphin	Dorsal fin/ body	Kaikoura (nursery groups)	?	Y	>260	S. Deutsch (TAMU)
Dusky dolphin	Dorsal fin/ body	Marlborough Sounds	>100	Y	>600	H. Pearson (TAMU)
Dusky dolphin	Dorsal fin	Marlborough Sounds	850	Y	450	A. Englehaupt (DWE)
Hector's dolphin	Dorsal fin/ body	Banks Peninsula	223	Y	849	T. Webster (OU)
Hector's Dolphin	Dorsal fin/ body marking	Banks Peninsula	?	Y	?	E. Martinez (MU-A)
Hector's dolphin	Dorsal fin	Marlborough Sounds	100	Y	20	A. Englehaupt (DWE)
Hector's dolphin	Dorsal fin	Te Waewae Bay, Southland	70	Y	250	R. Cole (DOC)
Humpback whale	Tail Fluke	New Zealand	8	Y	41	N. Gibbs (DOC)
Killer whale	Dorsal fin	Marlborough Sounds	15	Y	?	A. Englehaupt (DWE) & I.N. Visser (ORT)
Killer whale	Dorsal fin/ eye patches	New Zealand	7	Y	132	I.N. Visser (ORT)
Killer whale	Dorsal fin/ eye patches	Antarctica	7	Y	132	I.N. Visser (ORT)
Right Whale	Side/back	Marlborough Sounds	1	Y	?	A. Englehaupt (DWE) & H. McConnell (DOC)
Southern right whale	Head callosites	Auckland Islands	>330	Y	>200	S. Childerhouse (DOC) & G. Dunshea (AAD)
Sperm whale	Tail fluke	Kaikoura	23	Y	227	M. van der Linde & L. Slooten (OU)

5. Tissue/biological samples collected

5.1 BIOPSY SAMPLES (SUMMARY ONLY)

Details of biopsy samples of cetaceans collected in 2006/07 are provided in Table 4.

TABLE 4. BIOPSY SAMPLES OF CETACEANS COLLECTED IN 2006/07.

SPECIES	AREA/ STOCK	NO. SAMPLES COLLECTED IN 2006/07	ARCHIVED Y/N	NO. ANALYSED	TOTAL HOLDINGS	CONTACT PERSON/S (INSTITUTION)
Bottlenose dolphin	Northland & Hauraki Gulf	12	Y	12	151	C.S. Baker (UA)
Bryde's whale	Hauraki Gulf	9	Y	29	29	C.S. Baker (UA)
Humpback whale	NZ	9	Y	9	32	C.S. Baker (UA)
Southern right whale	NZ mainland	8	Y	8	26	C.S. Baker (UA) & G. Dunshea (AAD)
Southern right whale	Auckland Islands	142	Y	142	>300	C.S. Baker (UA)

5.2 SAMPLES FROM DIRECTED CATCHES (COMMERCIAL, ABORIGINAL AND SCIENTIFIC PERMITS) OR BYCATCHES

None.

5.3 SAMPLES FROM STRANDED ANIMALS

Details of samples collected from stranded animals in 2006/07 are provided in Table 5. Several samples were primarily identified to species level by genetic analysis with comparison to reference sequences held at www.dna-surveillance.auckland.ac.nz. For the remaining samples, genetic analysis confirmed morphological identification made by DOC field staff or A. van Helden (TP). The tissue and DNA archive held at UA currently contains approximately 1300 samples from 35 species, including 1 porpoise, 9 mysticete, 15 odontocete and 11 beaked whale species. This archive is curated by C.S. Baker and R. Constantine (UA).

TABLE 5. SAMPLES COLLECTED FROM STRANDED CETACEANS IN 2006/07.

SPECIES	AREA/ STOCK	TISSUE TYPE(S)	NO. SAMPLES COLLECTED	ARCHIVED Y/N	NO. ANALYSED	CONTACT PERSON/S (INSTITUTION)
Bottlenose dolphin	NZ	Skin and blubber	3	Y	3	R. Constantine (UA)
Bryde's whale	NZ	Skin and blubber	3	Y	3	R. Constantine (UA)
Common dolphin	NZ	Skin and blubber	6	Y	6	R. Constantine (UA)
Cuvier's beaked whale	NZ	Skin and blubber	3	Y	3	R. Constantine (UA)
Gray's beaked whale	NZ	Skin and blubber	7	Y	7	R. Constantine (UA)
Hector's dolphin	NZ	Skin and blubber	14	Y	14	R. Constantine (UA)
Humpback whale	NZ	Skin and blubber	1	Y	1	R. Constantine (UA)
Long-finned pilot whale	NZ	Skin and blubber	2	Y	2	R. Constantine (UA)
Melon-headed whale	NZ	Skin and blubber	1	Y	1	R. Constantine (UA)
Pygmy blue whale	NZ	Skin and blubber	1	Y	1	R. Constantine (UA)
Pygmy right whale	NZ	Skin and blubber	1	Y	1	R. Constantine (UA)
Pygmy sperm whale	NZ	Skin and blubber	11	Y	11	R. Constantine (UA)
Short-finned pilot whale	NZ	Skin and blubber	81	Y	81	R. Constantine (UA)
Southern minke whale	NZ	Skin and blubber	1	Y	1	R. Constantine (UA)
Southern right whale	NZ	Skin and blubber	1	Y	1	R. Constantine (UA)
Sperm whale	NZ	Skin and blubber	2	Y	2	R. Constantine (UA)
Straptooth whale	NZ	Skin and blubber	5	Y	5	R. Constantine (UA)
Unknown	NZ	Skin and blubber	11	Y	11	R. Constantine (UA)
Unknown beaked	NZ	Skin and blubber	2	Y	2	R. Constantine (UA)

5.4 ANALYSES/DEVELOPMENT OF TECHNIQUES

W. Roe (MU-P) currently holds a contract with DOC to undertake necropsies on all beachcast Hector's and Maui's dolphins. A total of 23 animals were necropsied in 2006/07. Cause of mortality and general health status are assessed at gross post mortem, and tissue samples are collected and stored for subsequent histological, toxicological, bacteriological or molecular biological testing. Skeletons are sent to TP; genetic samples are collected and sent to UA; stomach contents are sent to L. Slooten (OU) (for Hector's) or K. Russell (DOC) (for Maui's); and morphometric, reproductive and age class data are entered into the Huia wildlife database maintained by the New Zealand Wildlife Health Centre (NZWHC) at Massey University, Palmerston North. Where specific diseases are diagnosed, more detailed investigations are instigated where funding is available. The NZWHC also collaborates with common dolphin research being carried out by K. Stockin (MU-A), providing gross post mortem and diagnostic histopathology services when required. During 2006/07, opportunistic necropsies were also carried out on neonatal pilot whales and several beaked whales. Research on these species is not presently funded, but when fresh beachcast animals are found and transported to MU-P, it is possible that NZWHC has provided a necropsy service.

M. Oremus (UA) continued genetic analyses on long-finned pilot whale samples collected from around New Zealand. The aim of these analyses is to investigate the population structure and social organisation of this species in its Southern Hemisphere range. Further analyses are also conducted on mass stranding datasets in order to elucidate the social dynamics of these events. Collaboration with the Department of Primary Industries and Water from Tasmania continued during 2006/07. The analysis of 201 samples from Tasmania will be completed and

compared with results from New Zealand. This work has the potential to provide detailed information on the population structure of long-finned pilot whales in this region. A study of the worldwide phylogeography and genetic diversity of long-finned and short-finned pilot whales was also undertaken using new and previously published sequences of the mitochondrial DNA control region (n = 568). Since April 2005, at total of 84 new skin samples from long-finned pilot whales stranded around New Zealand have been collected in collaboration with DOC. The tissue archive held at UA now contains 492 samples of this species.

N. Wiseman (UA) completed the extraction, sexing and sequencing (D-loop region of the mtDNA) and genotyping of all stranded cetacean samples and biopsy samples held at UA.

D. Heimeier (UA) investigated nucleotide diversity at two genes (DQA and DQB) of the Major Histocompatibility Complex (MHC) in populations of Hector's and Maui's dolphins (n = 223) as well as in individuals from five mass-stranding events of long-finned pilot whales (n = 230) around New Zealand. Besides characterising MHC diversity in these populations, the evolution of DQB genes within various cetacean species was also being investigated. The results are being compiled as part of a PhD thesis and will be available later in 2007.

G. de Tezanos Pinto and C.S. Baker, in collaboration with R. Constantine, J. Berghan, F. Mourao, S. Wells and A. Ryding (UA), continued investigation of abundance trends of bottlenose dolphins using the Bay of Islands. Both closed and open population models have been used to generate abundance estimates and trends over 13 years of studies. Further analyses and individual based models are currently being used to identify critical factors and to understand the long-term persistence of this population.

P. and T. Austin (PAX) continued development of the Paxarms biopsy system for use with dolphins, whales and seals. Recent developments have included modification of the system (for Woods Hole Oceanographic Institute) so that it can deliver 60 ml of anesthetic to whales to slow them down for removal of entangled material. Further modifications are being made to allow for tissue sample collection for toxicology research.

6. Pollution studies

None.

7. Statistics for large cetaceans

7.1 CORRECTIONS TO EARLIER YEARS' STATISTICS FOR LARGE WHALES

None.

7.2 DIRECT CATCHES OF LARGE WHALES (COMMERCIAL, ABORIGINAL AND SCIENTIFIC PERMITS) FOR THE CALENDAR YEAR 2006

None.

7.3 ANTHROPOGENIC MORTALITY OF LARGE WHALES FOR THE CALENDAR YEAR 2006

7.3.1 Observed or reported ship strikes of large whales (including non-fatal events)

Details of observed or reported ship strikes of large whales in calendar year 2006 are provided in Table 6.

7.3.2 Fishery bycatch of large whales

Details of observed or reported bycatch of large whales in calendar year 2006 are provided in Table 7.

TABLE 6. OBSERVED OR REPORTED SHIP STRIKES OF LARGE WHALES FOR CALENDAR YEAR 2006.

WHALE SPECIES	SEX	NO.	DATE	LOCATION	VESSEL TYPE	SPEED	FATE	HOW OBSERVED	CONTACT PERSONS (INSTITUTION)
Pygmy sperm whale	U*	1	28 Dec 2006	Mahia Peninsula	U	U	D*	DOC	K. McLeod (DOC)
Bryde's whale	U	1	31 Dec 2006	Hauraki Gulf	U	U	D	DOC	K. McLeod (DOC)

* U = Unknown, D = died.

TABLE 7. OBSERVED OR REPORTED BYCATCH OF LARGE WHALES FOR CALENDAR YEAR 2006.

WHALE SPECIES	SEX	NO.	DATE	LOCATION	FATE	TARGETED FISH SPECIES	GEAR	HOW OBSERVED	SOURCE OR CONTACT (INSTITUTION)
Unidentified whale	U*	1	?? Dec 2006	West Coast, South Island	D*	*Macruronus*	TM	F*	S. Rowe (DOC)

* U = unknown, D = died, F = record collected by onboard fisheries monitor.

8. Statistics for small cetaceans

8.1 CORRECTIONS TO EARLIER YEARS' STATISTICS FOR SMALL CETACEANS

None.

8.2 DIRECT CATCHES OF SMALL CETACEANS FOR THE CALENDAR YEAR 2006

None.

8.3 ANTHROPOGENIC MORTALITY OF SMALL CETACEANS FOR THE CALENDAR YEAR 2006

8.3.1 Observed or reported ship strikes of small cetaceans (including non-fatal events)

None.

8.3.2 Fishery bycatch of small cetaceans

Details of small cetaceans (e.g. dolphins) caught in fisheries in calendar year 2006 are provided in Table 8. Note: these bycatch reports represent only those individuals that were reported to DOC or the Ministry of Fisheries and were confirmed as fisheries bycatch from government observers in fisheries or from autopsies of beach cast specimens. There is no estimate of total bycatch in New Zealand and the individuals reported here represent a minimum.

TABLE 8. DETAILS OF SMALL CETACEANS CAUGHT IN FISHERIES IN CALENDAR YEAR 2006.

SPECIES	SEX	NO.	DATE	LOCATION	FATE	TARGETED FISH SPECIES	GEAR	HOW OBSERVED	SOURCE OR CONTACT (INSTITUTION)
Common dolphin	U*	3	??/10/06	Taranaki	Dead	*Trachurus*	Midwater trawls (not specified)	F*	S. Rowe (DOC)
Dusky dolphin	F	1	??/03/06	Banks Peninsula	Dead	*Trachurus*	Midwater trawls (not specified)	F	S. Baird (NIWA)
Dusky dolphin	U	1	??/11/06	Marlborough	Dead	U	Set gillnets (anchored)	F	S. Rowe (DOC)
Hector's dolphin	M	1	06/12/06	Marlborough	Dead	U	Set gillnets (anchored)	F	H. McConnell (DOC)
Hector's dolphin	U	3	03/04/06	Marlborough	Dead	U	Bream trawls/ midwater trawls (not specified)	F	H. McConnell (DOC)

* U = unknown, F = record collected by onboard fisheries monitor.

9. Strandings

A. van Helden (TP) continued to maintain the New Zealand National Stranding Database. The total number of reported strandings for the period April 2006 to March 2007 was 98 incidents involving 355 animals. This excludes those animals that have been reported but for which stranding data forms had not been received by TP before the end of March 2007. At least 15 different species were recorded in the database for this period. The proportion of incidents for the different families that stranded in this period are: *Neobalaenidae* (1%), *Balaenopteridae* (6.1%), *Ziphiidae* (25.5%), *Delphinidae* (50%), *Physeteridae* (including *Kogiidae*) (16.3%). The proportion of animals for the different families that stranded in this period are: *Neobalaenidae* (0.3%), *Balaenopteridae* (1.7%), *Ziphiidae* (7%), *Delphinidae* (85.4%) and *Physeteridae* (5.4%). The species with the highest number of strandings was common dolphins with 15 incidents. The largest number of animals of a species to strand was 261 for long-finned pilot whales. The total number of animals refloated for this period was 60. Twenty-three of these restranded and died; 37 are therefore presumed to have survived. Details of the number and species of stranded cetaceans in 2006/07 are provided in Table 9.

S. O'Shea and colleagues (AUT) continued to investigate strandings of cetaceans in New Zealand. In particular, they continued to collect stomach samples of teuthophagous whales to investigate their diet.

C. Schweder (BOP) worked on geographically referencing and analysing the New Zealand Whale Stranding database for DOC and TP.

TABLE 9. DETAILS AND NUMBER OF STRANDED CETACEANS IN 2006/07.

SPECIES	NO. STRANDINGS	NO. ANIMALS	NO. ANIMALS REFLOATED	NO. ANIMALS RESTRANDED	NO. ANIMALS RESCUED
Baleen whale	1	1	0	0	0
Beaked whale	1	1	0	0	0
Bottlenose dolphins	6	6	1	0	1
Bryde's whale	3	3	0	0	0
Common dolphin	15	19	5	0	5
Cuvier's beaked whale	4	4	0	0	0
Dusky dolphin	2	4	1	0	1
Dwarf minke whale	1	1	0	0	0
Gray's beaked whale	12	12	0	0	0
Hector's dolphin	11	12	0	0	0
Humpback whale	1	1	0	0	0
Killer whale	1	1	0	0	0
Long-finned pilot whale	14	261	51	21	30
Mesoplodon sp.	2	2	0	0	0
Pygmy right whale	1	1	0	0	0
Pygmy sperm whale	12	15	0	0	0
Sperm whale	4	4	0	0	0
Straptoothed whale	6	6	2	2	0
Unknown	1	1	0	0	0
Total	98	355	60	23	37

10. Other studies and analyses

B. Madon (UA) worked on a model for estimating the size of the South Pacific humpback whale population. A technique for combining two live-recapture datasets is being developed. The proposed likelihood-based model would use data from two live-recapture techniques: genetics and photo-identification. The idea is to join the likelihood using the genetic data with the likelihood using the photo-identification data and the likelihood using the data of individuals that have been simultaneously captured by genetics and photo-identification. But because there is an overlap between the first two datasets (some whales will have been both photo-identified and genetically sampled, but the researchers will not know know which), the probability of individuals being in both datasets has to be addressed.

There is an existing moratorium on new commercial dolphin viewing/swimming permits at Kaikoura, South Island. In anticipation of this moratorium expiring in November 2009, DOC commissioned a research programme to investigate effects of current and potential future tourism activity on dusky dolphins at Kaikoura. In particular, the research programme aims to:

- Quantify and document the type, level and operational extent of existing dusky dolphin tourism activity
- Determine the effect of existing tourism activity on the behaviour and welfare of dusky dolphins
- Assess the likely effects of any future expansion in commercial dusky dolphin viewing/swimming effort at Kaikoura

The research commenced in January 2007 and is due to be completed by June 2009. It is being carried out by a team comprising T. Markowitz, B. Würsig, S. DuFresne and M. Orams.

T. Webster (OU) continued work on the Hector's dolphin photo-ID catalogue at Banks Peninsula and collecting additional data on group composition and spatial and temporal distribution of mother-calf pairs. An underwater pole camera setup was being used to identify the sex of individuals. A new laser system mounted on a digital camera was also being trialled. It is hoped that this will enable fin measurements to be obtained non-invasively in the field. Using allometric relationships based on measurements from stranded animals, estimates of body length and age will then be obtained.

M. Pinkerton, S. Hanchet and colleagues (NIWA) worked on developing an ecosystem model of the Ross Sea as part of a Foundation for Research Science and Technology (FRST) contract (CO1X0505). The aim of the work is to understand food-web relationships between organisms in the Ross Sea, their response to environmental drivers and anthropogenic influences, and the key factors influencing the sustainability of the ecosystem. A carbon budget trophic model for the Ross Sea is currently under development. The model consists of eight main trophic groups including top predators, middle predators, zooplankton, phytoplankton, bacteria, sea lice biota, benthic fauna and detritus. Each of these is further subdivided into three to five smaller component groups, making 28 components in all. This includes separate compartments for top and

middle predator groups such as toothed whales, baleen whales, seals, birds and Antarctic toothfish (*Dissostichus mawsoni*). The focus, to date, has been on the consequences for ecosystem function of removing a proportion of the toothfish biomass. Natural predators of toothfish in the Ross Sea may include sperm whales, type-C killer whales, Weddell seals and large squids. Preliminary budget considerations suggest that Antarctic toothfish are unlikely to be a major component of the overall diets of these predators. However, there may be important localised effects, where the consumption of toothfish is important in particular locations, at particular times of the year, or by particular parts of the predator population, even though the total consumption of toothfish by all individuals of a species may be relatively low. We cannot currently evaluate localised effects of fishing on toothfish predators.

B. Miller, S. Dawson, and E. Slooten (OU) researched the acoustic behaviour of sperm whales at Kaikoura. Passive acoustic arrays were developed and used to determine the whales' underwater movements. This research programme has included 3D localisation of whales during diving, acoustic length and growth rate estimates based on inter-pulse-interval of sperm whale vocalisations, and acoustic identification using wavelets and software-based classification.

L. Rowe (OU) began field work for an MSc thesis in January 2007, in conjunction with R. Currey. Parallel laser pointers were mounted within a block that is attached to a photo-ID camera. The lasers are calibrated to 100 mm apart and projected onto bottlenose dolphin dorsal fins, and digital photos taken. Measurements are then made from the photos using the laser dots as a scale. The research aims to investigate fin size, sexual dimorphism, percentage area marked on fins and marking rates.

B. Lloyd, P. Fisher, and L. Boren (DOC) continued research on cetaceans and aquaculture. Field work was carried out for 13 months from February 2006 to March 2007 in Admiralty Bay and Current Basin in the Marlborough Sounds. This work was mainly focused on dusky dolphins, but bottlenose, common and Hector's dolphins, and killer whales were also studied as opportunities arose. While the main focus of the study was to devise methods for investigating the impact of mussel farms on marine wildlife, the methods being developed will also be applicable to tourism impact studies, fisheries monitoring and general wildlife population status and behaviour research. During 2006/07, distance sampling from boat surveys was carried out to determine numbers of dolphins in Admiralty Bay, their seasonal use of the Bay and habitat use. Photo-ID images were collected and photo catalogues prepared. These were compared with images from other researchers. Other methods used included passive acoustic dolphin detectors (T-PODs), which were moored in the bay and allowed monitoring of dolphin presence and behaviour remotely during both day and night. Land-based monitoring was also carried out—traditional theodolite tracking incorporated with a digital video camera. This method allows for tracking of individuals within a group and detailed analysis of individual behaviour. It also allows the user to calculate distances between the target species and tour boats, etc. and can be employed to monitor marine reserves and dolphin behaviour around mussel farms. All data from this project have been collected and analysis is underway; results and conclusions will be presented over the upcoming year.

E. Slooten (OU) completed a Population Viability Analysis for Hector's dolphin populations around New Zealand. This analysis confirmed the IUCN classification of the species as Endangered and the North Island subspecies (Maui's dolphin) as Critically Endangered. The analysis used the latest abundance estimates from a recent series of line transect surveys carried out by OU, and the latest estimate of bycatch in commercial gillnet fisheries from an observer programme. No quantitative estimates were available for bycatch in recreational gillnets or trawl fisheries. Because these two additional sources of mortality could not be included, the analysis produced relatively optimistic predictions. In 1970, before a major expansion of commercial gillnetting, Hector's dolphin populations were at least twice their current size, and some populations were about ten times their current size. If fishing impacts continue at the current level, Hector's dolphin populations are likely to be still heavily depleted in 2100, with most populations continuing to be less than half of their 1970 size. Current management, which includes two protected areas, is not sufficient to halt population declines. Creating four more strategically placed protected areas would substantially reduce the risk of further population declines and fragmentation. Even then, by 2050, four populations would still remain at very low levels (< 50 individuals). Mortality of Hector's dolphins resulting from interactions with fisheries would need to be reduced to levels approaching zero (as recommended in the New Zealand Marine Mammal Action Plan) to achieve national and international goals for managing marine mammal populations. This could be done by using only selective fishing methods, known not to cause dolphin mortality, in areas where Hector's dolphins are found. If this measure was implemented, it would allow almost all Hector's dolphin populations to recover to at least 50 individuals by 2050.

J. Jackson, in collaboration with C.S. Baker, A. Rodrigo and A. Drummond (UA), used population demographic models and haplotypic population estimates to investigate the relationship between demographic and genetic estimates of cetacean abundance. Humpback mitochondrial control region data amplified by members of SPWRC have also been analysed in order to refine estimates of mutation rate, diversity and migration rates between breeding populations across humpbacks worldwide, and a paper on this topic is currently in preparation. Jackson's post-doctoral position at the University of Auckland will end in May 2007, at which point she will take up a position at Oregon State University with Professor C.S. Baker.

D. Cairney (NIWA) and S. DuFresne (DEL) initiated a NIWA study to assess usage by Hector's dolphins of a proposed marine farm site in Jackson's Bay, south Westland. The study utilises T-PODs and is a requirement under the resource consent monitoring conditions.

H. McConnell (DOC) coordinated the collection of opportunistic sightings of southern right whales around the New Zealand mainland provided by researchers, the public and DOC staff. In addition to opportunistic sightings, genetic sample collection was also being undertaken to determine whether individuals seen around the two main islands of New Zealand are genetically or geographically isolated from New Zealand's subantarctic populations. One genetic sample was collected in the 2006/07 season.

D. Steel, E. Carroll, N. Patenaude and C.S. Baker (UA) continued molecular identification of southern right whales around New Zealand. No between-year matches of genotypes have been found among samples from any of the four study

years. Nine adults were sampled in 2003/04 and four adults in 2005/06 around mainland New Zealand. These 13 whales represented six mitochondrial (mt) DNA haplotypes, all of which are found in southern right whales sampled around the Auckland Islands. Sample size for whales sampled around the New Zealand mainland was too small for a robust analysis of population differentiation.

N. Patenaude (MU-A) continued photographic matching of southern right whales from around mainland New Zealand. There have been several within-season but no between-season resights from photo-identification. There have also been no resights of whales seen around the mainland and the subantarctic breeding areas.

The 9th Annual Meeting of the South Pacific Whale Research Consortium (SPWRC) was held at the University of Auckland from 29 January to 2 February, 2006. Over 30 participants attended, including researchers and wildlife managers from throughout the region. As usual, much of the meeting was devoted to the consideration of data collected during synoptic humpback whale research programmes, including the matching of fluke catalogues and genetic analyses. Several new matches were made between existing catalogues, demonstrating a significant degree of interchange between over-wintering grounds.

E. Fordyce (OU) continued work with J.G. Mead (National Museum of Natural History, Smithsonian Institution) on osteology of the bottlenose dolphin based on museum specimens. Other research has involved higher systematics of odontocetes and mysticetes, especially the initial radiation of the Neoceti, and also osteological cladistics of Delphinidae in collaboration with I. Moreno (Grupo de Estudos de Mamíferos Aquáticos do Rio Grande do Sul—GEMARS, Brazil; currently visiting researcher, University of Otago).

E. Beatson, S. O'Shea and colleagues (AUT) continued to investigate strandings of cetaceans in New Zealand. Research conducted at AUT currently focuses on collecting and archiving of stomach contents of stranded teuthophagus whales from New Zealand waters and reconstructing life histories of the primary prey species. Based on analysis of diet, it is speculated that the diet of teuthophagus whales will be affected by any change in either the diversity or size-class composition of regionally occurring cephalopod taxa, and that temporal trends in prey species diversity or size-class composition will become apparent.

F. Gomez-Villota (AUT) completed his MAppSc thesis entitled 'Sperm whale diet in New Zealand'. The cephalopod prey from the stomach contents of 16 sperm whales stranded on the New Zealand coast between the early 1990s and 2004 have been described, and comprise at least 36 species in 17 families. Twenty-four species are likely to be consumed in New Zealand waters, and a further nine and three species are considered to be preyed upon in South Tasmanian and Antarctic waters, respectively. An apparent shift in the diet of sperm whales in New Zealand since the 1960s probably reflects changes in the abundance of important prey species.

E. Beatson (AUT) recently submitted her BAppSc (Hons) dissertation on the diet of pygmy sperm whales stranded on New Zealand beaches. The stomach contents of 25 pygmy sperm whales stranded between 1991 and 2006 were examined. Diet includes fish and crustaceans, but is mainly cephalopods. Cephalopod prey is attributed to 23 species from 13 families, dominated by juveniles of Histioteuthididae and Cranchiidae. The diet of the pygmy sperm whale differs substantially from that of the sperm whale, in terms of diversity and size-class composition.

E. Beatson and S. O'Shea (AUT) continued to investigate the diet of stranded pilot whales. Stomach contents of long-finned pilot whales have been reported for the first time, based on ten whales that were part of a mass stranding event on Farewell Spit, Golden Bay, in December 2005. Stomach contents collected from a further 11 pilot whales involved in a mass stranding event near Marsden Point, Ruakaka in November 2006, are currently being investigated. Of the 21 pilot whale stomachs examined thus far, 10 were empty and the remaining 11 contained small numbers of cephalopod beaks attributed to six species from six families.

K. Stockin, and colleagues (MU) continued research on the diet, morphometrics and behaviour of common dolphins from around New Zealand.

In winter 2006, S. Childerhouse (OU), G. Dunshea (AAD) and colleagues undertook a 3-week survey of southern right whales (SRWS) at the Auckland Islands. A systematic survey of Port Ross and the northern end of the Auckland Islands counted a total of 208 SRWs, including 34 cow-calf pairs. This equates to a density of approximately 4 whales/km^2 in the survey area. An identical count in 1997 yielded 146 SRWs (including 18 cow-calf pairs). A total of 142 biopsies and more than 300 photo-IDs were collected. These will be matched with the existing material collected from the Auckland Islands in 1995–98 and, more recently, from around mainland New Zealand.

11. Acknowledgements

This project would not have been possible without the support of researchers who have provided summaries of their work over the last year. It is a tribute to researchers that the high quality and quantity of work is reflected in this document. I would like to thank all those who made the effort to contribute and hope that we can continue with the high standard in the future.

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Appendix 1

ASSOCIATED LITERATURE 2006/07

This is a summary of published, 'in press' and unpublished reports relating to cetacean research in 2006/07, as compiled for the New Zealand National Progress Report on Cetacean Research and presented to the Scientific Committee of the International Whaling Commission.

Published or 'in press' papers (as at March 2007)

Beatson, E.L. in press: The diet of pygmy sperm whales, *Kogia breviceps*, stranded in New Zealand: implications for conservation. *Reviews in Fish Biology & Fisheries.*

Beatson, E.L.; O'Shea, S; Ogle, M. 2007: The diet of long-finned pilot whales, *Globicephala melas*, stranded in New Zealand: implications for conservation. *New Zealand Journal of Zoology 34(1)*: 51–56.

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Higham, J.E.S.; Lusseau D. in press: Defining critical habitats: the spatio-ecological approach to managing tourist-wildlife interactions. In: Higham, J.E.S. (Ed.): Critical issues in ecotourism: paradoxes, problems and pathways. Butterworth-Heinemann Elsevier Publications: Oxford.

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