New Zealand Progress report on cetacean research, April 2007 to March 2008, with statistical data for the calendar year 2007

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1. SPECIES AND STOCKS STUDIED

IWC common name	IWC recommended scientific name	Area/stock(s)	Items referred to
Andrew's beaked whale	*Mesoplodon bowdoini*	NZ	4.3, 8
Blue whale	*Balaenoptera musculus*	NZ	2.1.2, 3.1.1, 6.1
Bottlenose dolphin	*Tursiops truncatus*	NZ	2.1.1, 2.1.2, 3.1.1, 4.3, 4.4, 8, 9
Bryde's whale	*Balaenoptera edeni*	NZ	2.1.1, 2.1.2, 3.1.1, 4.3, 4.4, 6.1, 8, 9
Common dolphin	*Delphinus delphis*	NZ	2.1.1, 2.1.2, 3.1.1, 4.3, 4.4, 5, 7.3.2, 8, 9
Common minke whale	*Balaenoptera acutorostra*	NZ	8
Cuvier's beaked whale	*Ziphius cavirostris*	NZ	4.3, 8
Dusky dolphin	*Lagenorhynchus obscurus*	NZ	2.1.1, 2.1.2, 2.2, 3.1.1, 3.2, 4.3, 5, 8
Dwarf sperm whale	*Kogia sima*	NZ	2.1.1
Gray's beaked whale	*Mesoplodon grayi*	NZ	4.3, 8
Hector's dolphin	*Cephalorynchus hectori hectori*	NZ	2.1.1, 2.1.2, 3.1.1, 4.3, 4.4, 5, 7.3.2, 8, 9
Humpback whale	*Megaptera novaeangliae*	NZ, Tonga	2.1.1, 2.1.2, 3.1.1, 4.1, 4.3, 4.4, 8
Killer whale	*Orcinus orca*	NZ	2.1.2, 4.3, 8
Long finned pilot whale	*Globicephala melas*	NZ	3.1.1, 4.3, 4.4, 8
Maui's dolphin	*Cephalorynchus hectori maui*	NZ	2.1.1, 4.3, 4.4, 9

Pan-tropical spotted dolphin	*Stenella attenuata*	South Pacific	2.1.1
Pygmy right whale	*Caperea marginata*	NZ	4.3, 8
Pygmy sperm whale	*Kogia breviceps*	NZ	4.3, 8
Rough toothed dolphin	*Steno bredanensis*	South Pacific	2.1.1, 4.4
Sei whale	*Balaenoptera borealis*	NZ	6.1
Short finned pilot whale	*Globicephala macrorhynchus*	NZ	2.1.1, 3.1.1, 4.4
Southern right whale	*Eubalaena australis*	NZ	4.1, 9
Southern right whale dolphin	*Lissodelphis peronii*	NZ	4.3, 8
Spectacled porpoise	*Australophocaena dioptrica*	NZ	4.3, 8
Sperm whale	*Physeter macrocephalus*	NZ	2.1.1, 3.1.1, 4.3, 8, 9
Spinner dolphin	*Stenella longirostris*	South Pacific	2.1.1, 4.4

2. SIGHTINGS DATA

2.1 Field work

2.1.1 Systematic

Target species	Date	Area	No. of sightings	Contact person/institute and references
Bottlenose dolphin	11/2/08 – 20/3/08	South Westland, NZ	4 group sightings	D. Neale (DOC)
Bottlenose dolphin	2007 and 2008	Fiordland	250 sightings approx.	R. Currey (OU)
Hector's dolphin	Jan/Feb 2008	Porpoise Bay	18	T. Webster , W. Rayment (OU)
Hector's dolphin	Dec 2007-March 2008	Banks Peninsula	250 sightings of groups, total 2138 individuals	E. Slooten, S. Dawson (OU)
Hector's dolphin	May 2008	Moeraki – Oamaru, east coast South Island	3 groups, total 8 individuals	E. Slooten, J. Upton (OU)
Hector's dolphin	11/2/08 – 20/3/08	South Westland, NZ	c.200 dolphins	D. Neale (DOC)
Humpback whale	23/6 – 3/7/07	Cook Strait	25	N.Gibbs (DOC)
Maui's dolphin	Oct 2007	West Coast, North Island	13 groups	W. Rayment (OU); S. DuFresne (DEL)
Maui's dolphin	March 2008	West Coast, North Island	23	T. Webster (OU); C. Edwards (DOC)
Maui's dolphin	Jan/February 2008	Manukau Harbour	0	C.Edwards (DOC)
Maui's dolphin	2007 and 2008	West Coast, North Island	28 sightings approx.	S. Scali (OU)
Sperm whale	2007 and 2008	Kaikoura	150 sightings approx.	M. vd Linge (OU)

J. Rodda (OU) is analysing 24 consecutive months of research on Hector's dolphin at Te Waewae Bay, Southland. A photo-ID catalogue is being compiled that will be used to analyse spatial and temporal movements of the dolphin distribution, density, and fine scale habitat usage. A final report is scheduled to be submitted in 2009.

T. Webster and W. Rayment (OU) carried out photo-identification surveys of Hector's dolphins in Porpoise Bay, Southland, during January and February 2008. Mark-recapture techniques were used to obtain an abundance estimate for Hector's dolphins that used the Bay during this time. Eighteen photo-ID surveys were undertaken during which 16 marked dolphins were identified. A total of 1224 digital photographs were taken of dorsal fins, of which 768 were of suitable quality for analyses. A mark rate of 33% was obtained from these photographs. Chapman's version of the Lincoln-Petersen estimator was used to calculate an abundance estimate of 49 (95% CI 44-55) individuals. This estimate was similar to abundance estimates obtained in 1997/98 (Bejder & Dawson 2001) and 2002/03 (Green 2003). There is no evidence to suggest any trend in population size between 1997 and 2008.

T. Webster (OU) and C. Edwards (DOC) completed a series of alongshore aerial surveys on the west coast of the North Island to examine the distribution of Maui's dolphin in relation to the southern boundary of the current protected area. Thirteen surveys were carried out between the Manukau Harbour in the north and Cape Egmont in the south. During these surveys 23 groups of Maui's dolphins were sighted between Manukau Heads and just south of the Mokau River. The southernmost sighting was approximately 10.4 nautical miles (n.mi.) north of the southern boundary of the protected area.

W. Rayment (OU), S. DuFresne (DEL), T. Webster (OU), D. Clement, (OU) and S. Scali (OU) conducted aerial line-transect surveys of Maui's dolphin distribution in October 2007 on the northern west coast of the North Island. A total of 13 Maui's dolphin sightings were made while on survey effort. These sightings comprised nine single animals and four pairs (mean group size = 1.31, SD = 0.48). All sightings except one were made inside the 4 n.mi. offshore boundary of the current protected area. The one sighting outside the protected area was 4.05 n.mi. from the coastline. In addition to the survey sightings, four sightings of Maui's dolphins (three singles and one pair) were made while "off effort" between transect lines. All of these sightings were made inside the 4 n.mi. boundary of the current protected area.

C. Edwards (DOC) undertook 32 days of survey in January and February 2008 using boat and land-based methods for Maui's dolphins in the Manukau Harbour, New Zealand. A land based survey platform on Cornwallis Peninsula gave a 150° arc of visibility over the upper Manukau Harbour and its main channels. Boat based surveys took place on the upper harbour channels and the area west of Cornwallis Peninsula/ Kauri Point up to the harbour entrance. A combined total of 229 hours of survey were completed. No Maui's dolphins were observed. Observations were made of killer whales on 24th February.

S. Scali, S. Dawson and E. Slooten (OU) are using passive acoustic methods (PODs) to study habitat use of North Island Hector's dolphin. This subspecies, also known as Maui's dolphin, is partially protected from gillnet entanglement. A protected area on the open coast includes almost all of the range of the subspecies. However, the harbours are not included in the protected area (except for the entrance to one of the harbours, the Manukau Harbour). Multiple sightings and acoustic detections of Maui's dolphins in the Manukau Harbour over a three year period show that Maui's dolphins use the harbour on a regular basis. Maui's dolphins range further into the harbour than the protected area. Sightings have been made in at least 3 of the 5 harbours within their range on the North Island west coast. Research has demonstrated that T-PODs are an effective research tool for studying Maui's dolphin movements. Sound recordings using a hydrophone and T-POD simultaneously validate T-POD acoustic detections in the North Island harbours as being Maui's dolphin. Matching sightings and acoustic detections using T-PODs for Maui's and Hector's dolphins further validate the effectiveness of T-PODs. In the last year, the number of PODs in the Manukau Harbour has been increased from 4 to 6, to provide more detailed information about habitat use in that harbour. POD work has also begun in several other harbours, including the Kaipara, Raglan and Kawhia Harbours. In addition, further calibration work with the pods is being carried out, including deploying them together with a hydrophone in presence of other species of dolphins like common and bottlenose.

P. Ensor participated in a research cruise in the eastern Barents Sea for the Institute of Marine Research, Bergen, Norway (the NILS2007 cruise) and acted as cruiseleader on the IWC-SOWER 2007-08 Antarctic cruise.

R. Currey, S. Dawson and E. Slooten (OU) are continuing research on the conservation biology of bottlenose dolphins in Doubtful Sound, Fiordland. Based on recent intensive photo-ID work, there are between 55 and 57 individuals in the population. There has been a decline of 34-39% among adult and sub-adult members of the population over the last 12 years. Preliminary modelling of survival rates for adults and calves suggests that a decrease in calf survival is a key factor in this population decline. R. Currey, L. Rowe, S. Dawson and E. Slooten (OU) began research on the abundance and population structure of bottlenose dolphins in Dusky Sound, Fiordland. Recent intensive photo-ID work has determined that there are between 100 and 104 individuals in the population.

K. Stockin (MU-A) submitted doctoral research undertaken on the ecology and conservation of New Zealand common dolphins. In collaboration with David Lusseau (DAL) they published research on the behavioural ecology of common dolphins and impacts associated with dolphin tourism. K. Stockin (MU-A), in collaboration with colleagues at the Coastal-Marine Research Group (MU-A), continue to investigate the ecology of common dolphins in the Hauraki Gulf in relation to anthropogenic impacts.

V. Petrella, in association with K. Stockin and D. Brunton (MU-A), began a doctorate study investigating the vocal repertoire of common dolphins in the Hauraki Gulf. The study aims to investigate the repertoire of New Zealand common dolphins and investigate differences in the repertoire in relation to foraging strategy and the presence of associated species.

E. Martinez, M. Orams and D. Brunton (MU-A) have completed the final year of a three-year field study examining 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 dolphin population; and assess whether these can be mitigated by

appropriate changes to the dolphin-watching permit conditions. The research utilises theodolite tracking and three-minute focal group scan sampling methodology from land and vessel based platforms.

M. van der Linde, S. Dawson and E. Slooten (OU) are working on an ongoing research programme into the abundance and distribution of sperm whales at Kaikoura. Since April 2007, 9 new individuals have been photo-ID'd and added to an existing catalogue, resulting in an updated photographic catalogue containing a total of 236 individuals. Field effort will be incorporated into the existing photographic mark-recapture model of abundance estimation, in order to improve on the accuracy of estimating sperm whale abundance. 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 and movements of individual whales

W.J. Markowitz (MU), T.M. Markowitz (UC), S. DuFresne (DUF), S. Deutsch (TAMU), M. Srinivasan (TAMU) and B. Würsig (TAMU) conducted research vessel surveys on 82 days, over a total of 442 hours. Focal follow group behavioural data, information on interactions with tour vessels, and photo-identification records were collected during 242 encounters with dusky dolphin groups. S. DuFresne (DUF), W.J. Markowitz (MU), and T.M. Markowitz (UC) conducted systematic small vessel surveys of the area south of Kaikoura from the Haumuri Bluffs to the Waiau River. Additional focal follow data and photo-identification were collected during encounters with Hector's dolphin groups (15 groups on 8 days). Common dolphins interacting with the dusky dolphins and occurring in independent groups were also documented, as were killer whales (on two days), a blue whale, and a southern right whale passing through the area. D. Lundquist (OU), Sierra Deutsch (TAMU), and M. Srinivasan (TAMU), conducted shore-based monitoring on 69 days, with a total of 348 hours of research effort. During this time, 191 dusky dolphin groups and all vessels interacting with the groups were tracked using a surveyor's theodolite linked to a laptop computer.

N.Gibbs (DOC) with the support of many volunteers and ex-whalers, undertook a land and vessel-based survey of humpback whales in Cook Strait for two weeks in June and July. This was the fourth year of a dedicated humpback whale survey in NZ since whaling finished in 1964. From 111 hours of land based observation, 16 pods of 25 humpback whales were observed. Six photo-IDs and 10 genetic samples were obtained.

D Neale (DOC) and colleagues repeated an autumn 2004 survey of Hector's dolphins in South Westland (by Russell *et al.* 2005) during the 2008 summer, to assess the off-shore and along-shore distribution of the species in this locality. An initial analysis of the results indicate that Hector's dolphins occurred much closer to shore than in the earlier survey, and were concentrated in several specific locations along the 80 miles of coastline covered. Photo-IDs of Hector's dolphin and also of bottlenose dolphins photographed during the surveys will be assessed as part of the final report due later in the year.

R. Constantine (UA) continues to investigate the effects of commercial and recreational dolphin-watch vessels and swimmers on the behaviour of bottlenose dolphins in the Bay of Islands. The current focus of the research, initiated in December 2007, is to investigate the effectiveness of changes made by the Department of Conservation to the commercial dolphin-watch operators' permits to try and minimise disturbance to this population. Focal group follows are being used to determine behavioural changes by the dolphins, duration of vessel presence and the type of vessels interacting with the dolphins. Swimmer placement and dolphin responses are being collected to determine the effect of swim attempts. These methods are consistent with those used in past research to enable effective comparisons over time.

R. Constantine and A. Alexander (UA) are continuing research on the demographics and habitat use of bottlenose dolphins in the Auckland/Northland region. Photo-ID, GPS location and data on group demographics are being collected to investigate micro-scale habitat use by different age-sex classes of dolphins using the Bay of Islands and Hauraki Gulf. A GIS incorporating environmental parameters, group structure and behaviour will be used to understand the use of these areas.

S. Behrens and R. Constantine (UA) began conducting aerial surveys in November 2007 to plot the distribution of Bryde's whales in the northern Hauraki Gulf with a focus on the major shipping routes. Photo-ID, location and behavioural data continue to be collected from a whale-watch vessel in the Hauraki Gulf region of Auckland. These data will be used to create a GIS of Bryde's whale distribution, environmental parameters that influence their distribution and how this coincides with vessel use of the region. Aspects of this research will add to the 12 years of study based out of UA on the population structure and habitat use of Bryde's whales.

M. Oremus (UA), A. Wheeler (DOC) and V. Iese conducted preliminary cetacean surveys (n = 12) around two islands of the Archipelago of Tuvalu: Funafuti and Nukufetau, in April 2007. These were the first surveys of a 2-3 years NZAID-DOC program which aimed at providing capacity-building to Tuvalu as well as reliable scientific information on the occurrence and distribution of cetaceans in its coastal waters. Research effort resulted in 11 encounters with cetaceans, representing at least 3 species: spinner dolphin, pan-tropical spotted dolphin and dwarf sperm whale (plus one unidentified species). Photo-identification and biopsy surveys resulted in the identification of 44 distinctively marked spinner dolphins and the collection of 21 skin samples (20 on spinner dolphins and 1 on pan-tropical spotted dolphin).

M. Oremus (UA) conducted one week of fieldwork in May-June 2007 at Savaii, Samoa, with local government personnel of the Division of Environment and Conservation of Samoa. Five boat-based surveys were conducted

to provide training in biopsy sampling and to assess the feasibility of whale and dolphin watching tourism in the waters of Samoa. Biopsy samples were collected on spinner dolphins (n = 11), rough-toothed dolphins (n = 3) and short-finned pilot whales (n = 1).

K. Russell, C.S. Baker, R. Constantine, K. Stevens (UA), M. Donoghue (DOC) and E. Garland (UQ) conducted humpback whale research in the Vava'u group of Tongan islands from 2-21 September 2007. Methods included the collection of photo-ID, biopsy samples for DNA analysis, and the collection of acoustic data. There were 20 days on the water (177 hours of effort). A total of 56 encounters with whales (average 2.8 encounters per day): 11 mother/calf pairs, 10 mother/calf and escort groups, 23 multi-whale groups and 12 singletons. A total of 47 individuals were identified by fluke photos, of which 12 matched to previous years. Four of the 12 whales were re-sighted across multiple years including one whale first photo-identified in 1991. Sixty-three tissue samples were collected, sexed (29% female, 71% male) and sequenced for the mitochondrial DNA (mtDNA) region. Four whales biopsied in 2007 had been biopsied in previous years; 18 whales had photo-ID and tissue samples collected. 10.5 hours of song recordings were made and these are being analysed at UQ. 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.

2.1.2 Opportunistic, platforms of opportunity

Primary species	Area	Data type/method	Collected by	Platform	Location of archive (if applicable)	Contact person/institute and refs
Blue whale	Northern Ross Sea	Photo-ID; sightings	Crew/scientists	R.V. Tangaroa	NIWA	S. Baird, S. Hanchet (NIWA)
Bryde's whale	Hauraki Gulf	Location, group sizes, dorsal fin photos	KS (MU-A)	Eco-tour vessel	MU-A	Karen Stockin (MU-A)
Bryde's whale	Hauraki Gulf	Photo-ID; sightings	crew	whalewatching vessel	UA	R. Constantine, S. Behrens (UA)
Common dolphin	Hauraki Gulf	Location, group sizes, dorsal fin photos	KS (MU-A)	Eco-tour vessel	MU-A	Karen Stockin (MU-A)
Dusky dolphin	Kaikoura	Photo-ID, sightings, behavior, vessel interactions	Dedicated observers	Dolphin tour vessel	MU-A	W.J. Markowitz (MU),; T.M. Markowitz (UC)
Dusky dolphin	Kaikoura	sightings	Crew	dolphin-watching Vessel	Encounter Kaikoura	D. Buurrman (EK), A.Dahood (TAMU)
Hector's dolphin	Banks Peninsula	Location, group sizes, dorsal fin photos	EM (MU-A)	Eco-tour vessel	MU-A	E. Martinez (MU-A)
Humpback whale	Northern Ross Sea	Photo-ID; sightings	Crew/scientists	R.V. Tangaroa	NIWA	S. Baird, S. Hanchet (NIWA)
Humpback whale	Kaikoura	Photo-ID	Dennis Buurman	Dolphin watching vessel	DOC	N. Gibbs (DOC)

A. & D. Englehaupt (DWE) collected opportunistic data on all dolphin groups (bottlenose, common, dusky, Hector's) encountered during Dolphin Watch Ecotours trips in the Marlborough Sounds throughout the year. Locations, estimated group sizes and presence of calves were collected for all groups and photo-ID's and behavioural states were collected when possible. Opportunistic data was collected on all dolphin groups encountered during Dolphin Watch Ecotours trips throughout the year. Locations, estimated group sizes and presence of calves were collected for all groups and photo-ID's and behavioural states were collected when possible.

E. Martinez (MU-A) undertook opportunistic surveys on board dolphin-watching/swimming vessels in Akaroa Harbour for her PhD research. Data collection focused on the behavioural ecology of Hector's dolphins in the presence of vessels and/or swimmers in Akaroa Harbour. Individual photo-ID of Hector's dolphins encountered around dolphin-watching and dolphin-swimming operations were also opportunistically collected.

W.J. Markowitz (MU), T.M. Markowitz (UC), S. Deutsch (TAMU), M. Srinivasan (TAMU) and D. Lundquist (OU) collected data from tour vessels on 39 days over a period of 112 hours. Photo-identification, GPS tracks, dolphin-tour interactions, and focal group behavioural data were collected during 43 group follows onboard dolphin tour vessels. Encounter Kaikoura (EK) skippers and naturalists have been recording dusky dolphin

sightings (e.g. location, group size, and sometimes behaviour) since 1994. They also note the presence of "visiting" cetaceans, such as killer whales in the general area. Data collection occurs during most tours and will continue into the foreseeable future.

2.2 Analyses/development of techniques

D. Lundquist (OU), W.J. Markowitz (MU), T.M. Markowitz (UC), B. Würsig (TAMU) are applying a multi-platform approach to examining dolphin-tour interactions. S. DuFresne (DUF) is examining dusky dolphin distribution and numbers further south than has previously been systematically surveyed (e.g. from the Haumuri Bluffs to the Waiau River). An analysis of long-term dusky dolphin occurrence patterns by A. Dahood (TAMU), using the first 12 years of sightings information collected by EK skippers will be presented to the Whalewatching subcommittee (e.g. Dahood *et al*. 2008 SC/60/WW2).

3. MARKING DATA

3.1 Field work

3.1.1 Natural marking data

Species	Feature	Area/stock	No. photo-id'd	Catalogue (Y/N)	Catalogue total	Contact person/institute; refs
Blue whale	Dorsal fin	Scott seamount - northern Ross Sea	2	N	2	S. Baird, S. Hanchet (NIWA)
Bottlenose dolphin	Dorsal fin	Hauraki Gulf	~170	Y	>200	G. de Tezanos Pinto (UA) & J. Berghan
Bottlenose dolphin	Dorsal fin	South Westland, NZ	tba	Y	tba	D Neale (DOC)
Bottlenose dolphin	Dorsal fin	Bay of Islands	tba	Y	439	R. Constantine (UA)
Bryde's whale	Dorsal fin	Hauraki Gulf	tba	Y	72	R. Constantine & S. Behrens (UA)
Common dolphin	Dorsal fin	Hauraki Gulf	40	Y	>600	K. Stockin (MU-A)
Dusky Dolphins	Dorsal fin	Kaikoura	tba	Y	2,494	T. Markowitz (UC)
Dusky Dolphins	Dorsal fin	Marlborough Sounds	tba	Y	>600	T. Markowitz (UC)
Hector's dolphin	Dorsal fin, body markings	Banks Peninsula	tba	Y	877	T. Webster (OU)
Hector's dolphin	Dorsal fin, body	Porpoise Bay	16	Y	16	T. Webster (OU)
Hector's Dolphin	Dorsal fin	Te Waewae Bay, Southland	70	Y	250	R. Cole/ (DOC)
Hector's Dolphin	Dorsal fin/Body marking	Banks Peninsula	tba	Y	tba	E. Martinez (MU-A)
Hector's dolphin	Dorsal fin	South Westland, NZ	tba	Y	tba	D Neale (DOC)
Humpback whale	Dorsal fin	Scott seamount - northern Ross Sea	2	N	2	S. Baird, S. Hanchet (NIWA)
Humpback whale	Fluke	New Zealand	7	Y	50	N. Gibbs (DOC)
Pilot whales	Dorsal fin	South Westland, NZ	tba	N	0	D Neale (DOC)
Sperm whales	Fluke	Kaikoura	9	Y	236	M. van der Linde (OU)

tba: to be announced

S. Hanchet, S. Baird and colleagues (NIWA) collected opportunistic photographic observations of humpback, and blue whales were made during the 2008 New Zealand IPY-CAML survey of the Ross Sea, Antarctica. The photographs will be submitted to the regional sightings database during 2008-09.

G. de Tezanos Pinto (UA) (in collaboration with J. Berghan, K. Algie, N. Wiseman and K. Stockin (MU-A)), is currently curating the Hauraki Gulf Bottlenose Dolphin photo-ID Catalogue. This includes individual photo-IDs collected opportunistically in the Hauraki Gulf since 2000. Photographs from 2003-2007 have been analysed and unique individuals will be added into the Hauraki Gulf catalogue and sighting database. This research aims to

improve abundance estimates for the Northland population, provide a better understanding of demographic parameters, habitat usage and social organization of bottlenose dolphins in the Hauraki Gulf.

W.J. Markowitz (MU), T.M. Markowitz (UC), S. Deutsch (TAMU), M. Srinivasan (TAMU) and D. Lundquist (OU) collected a total of 47,849 photographs of dusky dolphin dorsal fins for individual identification during the year. Cataloguing work is ongoing, but at present the catalogue for dusky dolphins at Kaikoura numbers 2,494 with over 600 dusky dolphins catalogued in the Marlborough Sounds. Comparison of photo records shows seasonal movements of individuals between the two areas.

There are other photo-ID catalogues held and maintained by researchers in NZ. Only the catalogues that have been actively maintained, added to, and reported on in 2007/08 have been reported here. For a more detailed list of existing catalogues please consult previous National Progress Reports and individual researchers.

3.1.2. Artificial marking data

None.

3.1.3 Telemetry data

None.

3.2 Analyses/development of techniques

Dusky dolphin photo-identification analyses are being updated by T.M. Markowitz (UC), W.J. Markowitz (MU), H. Pearson (TAMU), J. Weir (TAMU) and S. Deutsch (TAMU). These include abundance estimates, seasonal residency and migration patterns, and examination of social structure. High speed, high resolution digital photography combined with real time focal behavioural observations are being further developed by W.J. Markowitz (MU) to examine association and grouping patterns in greater detail.

4. TISSUE/BIOLOGICAL SAMPLES COLLECTED

4.1 Biopsy samples (summary only)

Species	Area/stock	Calendar year/ season - no. collected	Archived (Y/N)	No. analysed	Total holdings	Contact person/institute
Humpback whale	New Zealand	Skin, blubber	Y	10	42	N. Gibbs (DOC)
Humpback whale	Tonga	2007-2008/63	Y	63	>400	R. Constantine, Scott Baker (UA)
Southern right whale	NZ - mainland	2007-08/5	Y	6	32 (Mainland)	R. Constantine, Scott Baker (UA)
Southern right whale	NZ – Auckland Islands	2007-08/234	Y	0	768 (Auckland Is.)	R. Constantine, Scott Baker (UA)

4.2 Samples from directed catches (commercial, aboriginal and scientific permits) or bycatches

None.

4.3 Samples from stranded animals

Species	Area/stock	Tissue type(s)*	No. collected	Archived (Y/N)	No. analysed	Contact person/institute
Andrew's beaked whale	NZ	Skin and blubber	4	Y	4	R. Constantine (UA)
Bottlenose dolphin	NZ	Skin and blubber	6	Y	6	R. Constantine (UA)
Bryde's whale	NZ	Stomach contents	1	Y	0	E. Beatson (AUT)
Bryde's whale	NZ	Skin and blubber	1	Y	1	R. Constantine (UA)
Common dolphin	NZ	Stomach contents, skin, blubber	1	Y	0	E. Beatson (AUT)
Common dolphin	NZ	Skin and blubber	10	Y	0	K. Stockin (MU-A)
Common dolphin	NZ	Skulls	5	Y	0	K. Stockin (MU-A)
Common dolphin	NZ	Teeth	8	Y	0	K. Stockin (MU-A)

Common dolphin	NZ	Stomachs	4	Y	2	K. Stockin (MU-A)
Common dolphin	NZ	Reproductive tracts	4	Y	4	K. Stockin (MU-A)
Common dolphin	NZ	Skin and blubber	12	Y	12	R. Constantine (UA)
Cuvier's beaked whale	NZ	Skin and blubber	1	Y	1	R. Constantine (UA)
Dusky dolphin	NZ	Skin and blubber	5	Y	5	R. Constantine (UA)
Gray's beaked whale	NZ	Stomach contents, skin, blubber, muscle, liver	5	Y	0	E. Beatson (AUT)
Gray's beaked whale	NZ	Skin and blubber	8	Y	8	R. Constantine (UA)
Hector's dolphin	NZ	Skin and blubber	8	Y	8	R. Constantine (UA)
Humpback whale	NZ	Skin and blubber	1	Y	1	R. Constantine (UA)
Killer whale	NZ	Stomach contents, skin, blubber, teeth	2	Y	2	R. Constantine (UA)
Killer whale	NZ	Skin and blubber	4	Y	4	R. Constantine (UA)
Long-finned pilot whale	NZ	Stomach contents	11	Y	11	E. Beatson (AUT)
Long-finned pilot whale	NZ	Skin, blubber, muscle, liver, teeth, parasites	11	Y	0	E. Beatson (AUT)
Long-finned pilot whale	NZ	Skin and blubber	1	Y	1	R. Constantine (UA)
Maui's dolphin	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	Stomach contents	3	Y	1	E. Beatson (AUT)
Pygmy sperm whale	NZ	Skin and blubber	9	Y	9	R. Constantine (UA)
Southern minke whale	NZ	Skin and blubber	4	Y	4	R. Constantine (UA)
Southern right whale dolphin	NZ	Skin and blubber	2	Y	2	R. Constantine (UA)
Spectacled porpoise	NZ	Skin and blubber	1	Y	1	R. Constantine (UA)
Sperm whale	NZ	Skin and blubber	6	Y	6	R. Constantine (UA)
unknown	NZ	Skin and blubber	7	Y	7	R. Constantine (UA)

4.4 Analyses/development of techniques

K. Stockin (MU-A) in collaboration with Wendi Roe (MU-P) currently undertake necropsies on all beachcast and bycaught common dolphins. 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.

K. Stockin (MU-A) in collaboration with M. Orams, D. Brunton, D. Raubenheimer (MU-A), continue to investigate abundance of common dolphins in the Hauraki Gulf. Population models are currently being applied to generate abundance estimates and assess trends using a 7 year photo-identification dataset.

G. de Tezanos Pinto and C.S. Baker in collaboration with R. Constantine, J. Berghan, F. Mourao, and S. Wells (AU) continue investigation on the dynamics and abundance of bottlenose dolphins using the Bay of Islands. Analysis of group size, composition, frequent users and resighting rates were conducted over two comparative time-periods to understand the dynamics of this population. Trends of abundance were investigated using both closed and open population models over two comparative time-periods to predict trends in abundance over the years.

C.S. Baker and R. Constantine (UA) continue to analyse samples of unknown species. 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 1400 samples from 35 species, including one porpoise, 9 mysticete, 15 odontocete and 11 beaked whale species. This archive is curated by C.S. Baker and R. Constantine (UA).

M. Oremus and C.S. Baker (UA) completed research on the population structure, genetic diversity and social systems of spinner dolphins, rough-toothed dolphins, long-finned and short-finned pilot whales from French Polynesia and New Zealand. Analyses were conducted on tissue samples using mtDNA and microsatellite loci, and photo-identification and mass-stranding data (n = 375 stranding samples and n = 243 biopsy samples). Distinct communities of spinner dolphins around French Polynesia were found to have restricted gene-flow but high levels of insular mtDNA genetic diversity. There was no evidence of a bottleneck suggesting a pattern of metapopulation structure with insular communities. Long-finned pilot whale samples from the North Atlantic and Southern Hemisphere indicated severely restricted gene flow, with a few shared haplotypes but overall low mtDNA diversity, suggesting a recent expansion for this species. Examination of maternal relatedness between stranded pilot whales in New Zealand (n = 275) showed that groups are sometimes composed of unrelated maternal lineages. This discounts kinship as the only factor causing large mass-strandings. Rough-toothed dolphins in French Polynesia were found to have local communities with fine-scale population genetic structure. These communities showed a low level of mtDNA haplotype diversity suggesting the potential influence of a matrilineal social structure.

M. Oremus, R. Constantine and C.S. Baker (UA) completed the analyses of 277 DNA samples of long-finned pilot whales from Tasmania, in collaboration with R. Gales from the Department of Primary Industries and Water (Tasmania, Australia). These were compared to 341 samples from NZ. The analyses aimed at investigating the regional population structure and social dynamic of mass stranding. Strong population differentiation was found between NZ and Tasmania showing that they should be considered independent management units. The analysis of kinship within Tasmanian mass strandings confirms previous analyses from New Zealand, suggesting disruption of kinship bonds during large strandings. This could help to explain the behavioural distress of stranded individuals and the tendency of many whales to re-strand after being re-floated.

D. Heimeier and C.S. Baker (UA) recently completed research on the diversity on MHC at two loci, DQA and DQB, in Hector's and Maui's dolphins and long-finned pilot whales. MHC diversity in the Maui's dolphin was surprisingly high at the DQB locus, due to three divergent alleles retained compared to the six alleles found in the South Island Hector's dolphin. Genetic drift was found to be a major force in shaping this genetic diversity, although evidence of balancing selection on an evolutionary timescale was found as well. The MHC diversity in the long-finned pilot whale at both loci was higher than what has been reported for a cetacean population so far, but compared to terrestrial mammal populations still lower than what could be expected. The most likely explanation for a reduced MHC diversity might be a combined effect of population expansion and a reduced pathogen exposure in the pelagic environment. The evidence of balancing selection on an evolutionary timescale was present, but influence in the contemporary generations could not be established.

R. Hamner, C.S. Baker and S. Lavery (UA) recently completed research on the population structure, gene flow and dispersal of South Island Hector's dolphins (n = 335) using tissue samples from biopsied and stranded animals. Long-term restrictions in gene flow between the East, West and South coast populations were supported analyses using mitochondrial DNA and 13 bi-parentally inherited microsatellite markers. Six potential intra-region migrants were identified, all between adjacent local populations. There is a trend for male biased dispersal on the West and East Coast populations. Hector's dolphin populations from Te WaeWae and Toetoe Bays (southern South Island) show significant population differentiation based on mtDNA and microsatellites.

C. Olavarría and C.S. Baker (UA) recently completed research on the population structure of humpback whale breeding grounds across the South Pacific and eastern Indian Oceans, with an interest in the origins of whales in eastern Polynesia. Analyses were conducted on an extensive collection of mtDNA sequences (n = 1,112; 470 base pair) obtained from living whales on six breeding grounds: New Caledonia, Tonga, Cook Islands, French Polynesia (Society Islands), Colombia and Western Australia. The thesis also reports on a similar investigation of a population of humpback whales migrates along the western South American coast, with breeding grounds mainly off Colombia and Ecuador and feeding areas off the western coast of the Antarctic Peninsula and in the channels and fjords of southern Chile. Finally, the thesis reports on the genetic diversity of New Zealand humpback whales, comparing mitochondrial DNA control region sequences with those from breeding grounds across the South Pacific and eastern Indian Oceans.

N. Wiseman and C.S. Baker (UA) examined the genetic identity of Bryde's whales in the Hauraki Gulf, northeast coast of New Zealand using samples collected from beachcast individuals and with a small remote biopsy dart (n = 49). Despite an 'inshore' pattern of habitat use, all individuals were identified as corresponding to the form described for the offshore waters of the western North Pacific, *Balaenoptera brydei*. Seventy-two Bryde's whales (including seven calves, five of these dependent) were individually identified using photographs of whales' dorsal fins, accounting for 353 documented sightings between October 1996 and February 2006. The Hauraki Gulf seems to be an important area for both breeding/calving and feeding, year-round.

5. POLLUTION STUDIES

K. Stockin (MU-A) and colleagues examined trace elements, PCBs and organochlorine (OC) pesticides in common dolphins. Pollutant levels were determined in tissues collected from stranded and bycaught animals from New Zealand waters between 1999 and 2005. The concentrations of mercury (Hg), selenium (Se), chromium (Cr), zinc (Zn), nickel (Ni), cadmium (Cd), cobalt (Co), manganese (Mn), iron (Fe), copper (Cu), tin (Sn), lead (Pb), arsenic (As) and silver (Ag) were determined in blubber, liver and kidney tissue. PCBs (45 congeners) and a range of OC pesticides including dieldrin, hexachlorocyclohexane (HCH) and dichlorodiphenyltrichloroethane (DDT) and its metabolites DDE and DDD were determined in blubber samples. Cr and Ni were not detected in any of the samples and concentrations of Co, Sn and Pb were generally low. Concentrations of Hg ranged from 0.17 to 110 mg/kg wet weight. Organochlorine pesticides dieldrin, HCB, o,p′-DDT and p,p′-DDE were present. Sum DDT concentrations in the blubber ranged from 17 to 337 and 654 to 4430 µg/kg wet weight in females and males, respectively. Similarly, Σ45CB concentrations ranged from 49 to 386 and 268 to 1634 µg/kg wet weight in females and males, respectively. The mean transmission of ΣDDTs and ICES7CBs between a genetically determined mother–offspring pair was calculated at 46% and 42%, respectively. Concentrations of organochlorine pesticides determined in the present study are within similar range to those previously reported for Hector's dolphins.

K. Stockin (MU-A) and collaborators are currently investigating PCB and OC levels in dusky dolphin and Hectors dolphin.

6. STATISTICS FOR LARGE CETACEANS

6.1 Corrections to earlier years' statistics for large whales

Some incorrect statistics were presented to the Conservation Committee last year relating to ship strike data in paper IWC/59/CC10 - agenda Item 6. This data set has since been re-investigated and the revised data is now available. In paper IWC/59/CC10, the following statement was made: "*A review has been undertaken of data of Balaenopteridae whale deaths due to ship strike in the Hauraki Gulf 1997 – 2007. Of the 25 large baleen whale deaths identified, 23 were Bryde's whales, in addition to one sei whale and one pygmy blue whale*". This statement should be retracted and replaced with the following: "*Up to 18 whales, including confirmed, probable and possible cases may have been killed by vessels in the Hauraki Gulf 1997 - 2007. Of the 18 large baleen whale deaths identified, 16 were Bryde's whales (2 confirmed, 13 suspected and 1 possible vessel strike fatality), in addition to one sei whale (confirmed) and one baleen whale of unknown species (suspected)*".

6.2 Direct catches of large whales (commercial, aboriginal and scientific permits) for the calendar year 2007

None.

6.3 Anthropogenic mortality of large whales for the calendar year 2007

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

None.

6.3.2 Fishery bycatch of large whales

None.

7. STATISTICS FOR SMALL CETACEANS

7.1 Corrections to earlier years' statistics for small cetaceans

None.

7.2 Direct catches of small cetaceans for the calendar year 2007

None,

7.3 Anthropogenic mortality of small cetaceans for the calendar year 2007

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

None.

7.3.2 Fishery bycatch of small cetaceans

Species	Sex	No.	Date	Location	Fate	Targeted fish species	Gear	How observed?	Source or contact
Hector's dolphins	?	1	13/02/08	MFish stat area 022	Dead	*Shark spp.*	GNS	Govt. observer	S. Rowe (DOC)
Pilot whale	?	1	01/01/08	MFish mgmt area AKW	Rele ased alive	*Shark spp.*	GNS	Govt. observer	S. Rowe (DOC)
Common dolphin	?	5	05/04/07	MFish mgmt area CHA	Dead	*Jack Mackerel*	TM	Govt. observer	S. Rowe (DOC)
Common dolphin	?	22	??/12/07	MFish mgmt area 7	Dead	*Jack Mackerel*	TM	Govt. Observer & Industry Observer	S. Rowe (DOC)

8. STRANDINGS

A. van Helden (TP) maintains the NZ National Stranding Database. The total number of reported strandings for this period is 83 incidents involving 144 animals. This excludes those animals that have been reported but for which stranding data forms had 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: *Neobalaenidae* 3.6%, *Balaenopteridae* 6%, *Ziphiidae* 14.5%, *Delphinidae* 55.4%, *Physeteridae* 7.2%, *Kogiidae* 9.6%, *Phocoenidae 1.2%*. The representation in number of animals for the different families that stranded in this period are: *Neobalaenidae* 0.02%, *Balaenopteridae* 1.1%, *Ziphiidae* 3.2%, *Delphinidae* 85.4% and *Physeteridae* 4.4%. The species with the highest incidents of strandings were common dolphins *Delphinus delphis*, with 16 incidents. The largest number of animals of a species to strand was 37 for long-finned Pilot whales G*lobicephala melas*. The total number of animals refloated for this period was 48, 7 of which restranded and died, therefore 41 are presumed to have survived. This year had very few large mass stranding events, the largest was 34 long-finned pilot whales *G. melas,* the only other notable mass stranding was of 18 bottlenose dolphins *Tursiops truncates*.

Species:	No. of strandings	No. of animals	No. refloated	No. restranded	No. animals rescued
Andrew's beaked whale	1	3	0	0	0
Bottlenose dolphin	9	26	20	1	19
Brydes whale	1	1	0	0	0
Common dolphin	16	17	1	1	0
Common minke whale	3	3	0	0	0
Cuviers beaked whale	2	2	0	0	0
Dusky dolphin	4	5	1	1	0
Gray's beaked whale	7	12	2	0	2
Hector's dolphin	7	7	0	0	0
Humpback whale	1	1	0	0	0
Killer whale	4	4	0	0	0
Mesoplodon sp	2	2	0	0	0
Pilot whale	4	37	21	1	20
Pygmy right whale	3	3	0	0	0
Pygmy sperm whale	8	8	3	3	0
Southern right whale dolphin	2	2	0	0	0
Spectacled porpoise	1	1	0	0	0
Sperm whale	6	6	0	0	0
Unknown	2	4	0	0	0
Total:	83	144	48	7	41

E. Beatson, S. O'Shea and colleagues (AUT) continue to investigate strandings of cetaceans in NZ. Specifically, they continue to collect stomach and tissue samples of teuthophagous whales to investigate diet through a combination of stomach content and stable isotope analyses.

C. Schweder-Goad (BOP) has geographically referenced all reported cetacean strandings in New Zealand (1846-2007) for DOC and TePapa

K. Stockin (MU-A) and Wendi Roe (MU-P) continue to investigate strandings of common dolphins around New Zealand.

9. OTHER STUDIES AND ANALYSES

B. Miller, S. Dawson, and E. Slooten (OU) are carrying out research on the acoustic behaviour of sperm whales at Kaikoura. Passive acoustic arrays are being developed and used to determine the whales' underwater movements. This research programme includes the design, implementation, and deployment of a portable passive sonar system for 3D tracking of vocalising cetaceans. The system is being used in the Kaikoura canyon to measure acoustics and behaviour of diving sperm whales. B. Miller and S.M. Dawson (OU) have developed a passive sonar array for localising sperm whales in 3D. The system is being used from a 6m boat in the Kaikoura canyon to measure acoustics and behavior of diving sperm whales. Three free floating hydrophones at depths of 20-30m are deployed in addition to a 100m deep boat based stereo hydrophone array. Each whale audio track is time-aligned using custom software written in Matlab. The whale audio track from each hydrophone is analysed for sperm whale clicks using the program Ishmael (MobySoft).

M. Pinkerton, S. Hanchet and colleagues (NIWA) are developing an ecosystem model of the Ross Sea as part of a Foundation for Research, Science and Technology 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. This includes the modelling of whale populations in the Ross Sea, Antarctica. In particular: (1) energetic and population model of type-C killer whale (orca); (2) estimation of seasonal occurrence of baleen whales in Ross Sea region based on IWC sighting data; (3) estimation of trophic overlap of whales and Antarctic toothfish (*Dissostichus mawsoni*) in Ross Sea.

T. Webster (OU) is completing research on the Hector's dolphin population at Banks Peninsula for her MSc thesis. An underwater pole-camera setup has been used to determine the gender of marked individuals as well as group composition. Gender determination of marked individuals was increased by 450 % when using the pole-camera method. Research has shown a strong tendency for small groups of individuals to segregate by sex and that the population has a sex ratio of approximately 1:1. A small sample (n=7) of nursery groups were also found to segregate by sex and only contained females or females with calves. A laser photogrammetric system mounted on a digital camera was trialed which enables dorsal fin dimensions to be obtained in the field, resulting in a mean CV of 3.71% for dorsal fin base length and 3.76 % for fin height. Dorsal fin base length was found to be a better predictor of total length (females r^2=0.732, males r^2=0.678). Using Von Bertalanffy growth curves fin length was used to estimate total length to within an average of 7% (males) and 8% (females) of the actual value. Broad age categories (juvenile, intermediate and adult) were also assigned to all of the individuals measured using the laser photogrammetric technique, which shows promise for stage structured modelling. The spatial and temporal distribution of mother and calf pairs was also investigated. Average group size was significantly smaller in nursery groups (2.65) than groups without calves (3.57) (Wilcoxon: Z=-6.716, p<0.0001). Mother-calf groups used inshore areas of Banks Peninsula differently to non-calf groups (G=177.34, v=14, p<0.001). This research has identified potential nursery areas or preferred areas, as well as regions that appear to be avoided or used only occasionally, which has implications for the management of this species.

W. Rayment (OU) is completing research on distribution and ranging of Hector's dolphins for a PhD thesis, as detailed in previous reports. Aerial surveys of Hector's dolphin distribution have been completed at Banks Peninsula and in the Buller region of the west coast. At Banks Peninsula, Hector's dolphins were sighted up to 19 n.mi. offshore. On average, 19% of dolphins were outside the 4 n.mi. boundary of the Banks Peninsula Marine Mammal Sanctuary (BPMMS) in summer, and 56 % in winter. On the west coast all dolphins were sighted within 6 n.mi. of the coast. Photo-ID has been continued at Banks Peninsula to study alongshore movements of Hector's dolphins. The mean kernel density estimate of alongshore home range for the 20 most frequently sighted dolphins was 49.69 km, and 15% of dolphins in the sample had home ranges which extended beyond the northern boundary of the BPMMS. Acoustic monitoring of Hector's dolphins was trialled with T-PODs. T-PODs detected dolphins reliably within 100 m and had a maximum detection range of 430 m. T-PODs were deployed around Banks Peninsula to study inshore habitat use by Hector's dolphins. There was a significant difference between detection rates in summer and winter, although winter use of inshore habitats was higher than expected. Recommendations are made for improvements to the design of the BPMMS.

B. Bollard-Breen and colleagues (AUT) currently hold the contract for verifying public sightings of Maui's dolphins and developing a spatial database of public sightings of Maui's dolphins from 2000 to present. This means that every time a member of the public sees a Maui's dolphin and then calls the Maui's hotline, contact is made with the observer to verify whether or not it was the correct species and how reliable the sighting is.

Sighting information is then transferred into GIS and provided to WWF-NZ and the Department of Conservation.

L. Rowe (OU) conducted laser photogrammetry of the dorsal fins of bottlenose dolphins in Doubtful Sound and Dusky Sound in spring 2007 and summer 2008. In Doubtful Sound the dorsal fins of adult males were larger than those of females, and were more scarred and nicked. The severity of epidermal lesions was higher for females. A logistic regression model using dorsal fin surface area, the proportion of fin covered in scarring, and the number of nicks was used to determine the gender of bottlenose dolphins from Doubtful Sound with 93% accuracy. This model was applied to dorsal fin photographs of bottlenose dolphins from Dusky Sound to predict their genders and produced the first demographic information for the population

B. Madon (UA) continues joint modelling of two sources of live-recapture data applied to the South Pacific Humpback whale population to estimate population size. A technique for combining photo- and genetic-identification techniques in population assessment is being developed. The proposed model is a likelihood-based model that would allow the use of the capture of animals by two live-recapture data: genetics and photo-identification. The idea is to join the likelihood using the genetic data, the one using the photo-identification data and the one using the data of individuals that have been simultaneously captured by genetics and photo-identification. But because there is an overlap between the two datasets (whales can have been captured separately by genetic and photo-identification without the researchers knowing if the individuals have ever been captured simultaneously by the 2 methods), we have to introduce the probability of being in both data sets.

L. Meynier (MU-P) and K. Stockin (MU-A) examined the stomach contents of 53 common dolphins: 42 stranded and 11 bycaught dolphins sampled between 1997 and 2006 were investigated. Prevalent prey items include arrow squid (*Nototodarus* spp.), jack mackerel (*Trachurus* spp.) and anchovy (*Engraulis australis*). Common dolphins commercially by-caught within neritic waters fed on both neritic and oceanic prey, suggestion inshore/offshore movements of over a diel temporal scale. Results of all stomach content analyses are currently in press.

K. Stockin (MU-A) and colleagues continue research on the life history and skull morphometrics of common dolphins sampled from around NZ.

K. Stockin (MU-A) in association with collaborators Wendi Roe (MU-P) and colleagues undertook a radiographic assessment of the pectoral flippers of a dead Bryde's whale retrieved from the Hauraki Gulf. Radiographs revealed that the specimen was immature, as evidenced by open physes, incompletely ossified epiphyses and incompletely ossified cuboidal bones of the carpus. Fractures evident in the distal right antebrachium of left flipper were considered atypical of acute blunt trauma.

E. Hutchison and E. Slooten (OU) are investigating the diet of Hector's dolphin. Species and sizes of prey currently eaten throughout New Zealand have been identified from stomach contents of recently stranded specimens. Stable isotope analysis of archived individuals from throughout the Canterbury region will now be used to compare Hector's diet before and after the creation of the Banks Peninsula Marine Mammal sanctuary.

S. Dawson, E. Slooten and S. Scali (OU) used passive echolocation detectors (T-PODs) at three sites in Akaroa harbour to monitor dolphin presence through the period 16 February 2007 to 18 February 2008. The three sites represent inner, mid and outer harbour habitats, and are areas in which amateur gillnetting takes place. Each echolocation detector successfully collected data over 336-359 days (Average = 350). Dolphins used the outer harbour site consistently throughout the year with dolphins were detected on every day but one while T-PODs were operating. Dolphins were detected on 90% of days in the mid harbour site with a weak seasonal pattern with more detections in summer, but even in winter, dolphins were detected on most days. The inner harbour site shows a more strongly seasonal pattern with detections on almost every day during summer, but are also present on many days in winter. This area is routinely used by flounder gillnetters. Dolphins were detected on 41% of the days during the period when such gillnetting is legal. T-PODs are very conservative indicators of dolphin habitat use, mostly because they monitor a very small area (average = 200m radius, max = 400m). Therefore lack of detection does not imply that dolphins are not present. The results for Robinson's Bay show clearly that the concession of allowing unattended amateur gillnetting in winter is unsafe. Dolphins use this area routinely in winter, and are at risk of entanglement when they do so.

E. Slooten (OU) used a stochastic population model to evaluate the effectiveness of four options for managing Hector's dolphin bycatch. The catch rate in commercial gillnets was used in a population viability analysis to estimate past and future population sizes but estimates of bycatch in trawls and recreation gillnets were not available and therefore not included. Total population size today (7,873, CV 0.16) was estimated at 27% of population size in 1970 (29,316, CV 0.16), before a major expansion of commercial gillnetting. The model indicates that current management, which includes two protected areas, is not sufficient to halt population declines. Hector's dolphin populations are predicted to continue declining to 5,475 (CV 0.20) by 2050. Modelling showed that creating four more strategically placed protected areas would allow population recovery towards 1970 levels, with an estimated 47% probability of reaching 50% of 1970 population size by 2050. Reducing fisheries mortality to levels approaching zero shows the strongest promise of meeting national and

international guidelines for managing dolphin bycatch, with a 59% probability of reaching 50% of 1970 population size by 2050.

Recent modelling work by Davies *et al*. (2008) estimated 110-150 Hector's dolphins are killed each year in the commercial gillnet fishery alone plus an unknown number in trawl fisheries and recreational gillnets. This result has major implications for management but we note the caveat that the work is still subject to formal science peer-review. Davies' results are consistent with the most recent published risk analysis for Hector's dolphin (Slooten 2007). These two analyses used different methods but came to very similar conclusions. The risk of population decline under current management was estimated at 86% by Slooten (2007) and at 82% by Davies *et al*. (2008). The risk of decline drops to around 14% if gillnetting is restricted to areas with >100m water depth (i.e. Option 3 in the draft Threat Management Plan (DOC & MFish 2007)) or 2% if dolphins are completely protected from fisheries mortality. By 2050 populations are predicted to decline to 5,475 (Slooten 2007) or 5,631 (Davies et al. 2008) if current management continues and recover to 14,650 (Davies et al. 2008) or 15,411 (Slooten 2007) if fisheries mortalities are reduced to zero. Likewise, Davies et al.'s (2008) estimate of current population depletion compared to 1970 population size (34%) is very similar to Slooten's (2007) estimate (27%). Both analyses indicate Hector's dolphin is Endangered (reduction to <50% over 3 generations, 39 years for Hector's dolphin, IUCN 2001, 2007).

E Slooten and S Dawson (OU) estimated Potential Biological Removals (PBRs) for Hector's dolphins as an indication of the level of bycatch which, if exceeded, is likely to cause population decline. PBRs were less than one individual per year for most populations and the total for the whole species is less than 10 per year. Current estimated bycatch is on the order of 10-35 times higher than these PBRs. This is consistent with several Population Viability Analyses indicating that Hector's dolphin populations have been declining rapidly.

S. Childerhouse (OU), C.S. Baker (UA), G. Dunshea (AAD) and colleagues undertook a three week survey of southern right whales at the Auckland Islands in winter 2007. A systematic survey of Port Ross and the northern end of the Auckland Islands counted more than 200 SRWs. Tow hundred and forty three biopsies and over 350 photo-IDs were collected. These will be matched with the existing material collected from the Auckland Islands in 1995-98, 2006, and more recently around mainland NZ.

The 9th Annual Meeting of the SPWRC was held at the University of Auckland 5-8 February, 2007. Over thirty 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.

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