

AUSTRALIA. PROGRESS REPORT ON CETACEAN RESEARCH, JANUARY 2002 TO DECEMBER 2002, WITH STATISTICAL DATA FOR THE CALENDAR YEAR 2002

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This report summarises information obtained from: Environment Australia, Canberra – ACT; Australian Fisheries Management Authority (AFMA), Canberra – ACT; Commonwealth Scientific and Industrial Research Organisation (CSIRO); New South Wales National Parks and Wildlife Service (NPWS) – NSW; New South Wales Fisheries – NSW; Taronga Zoo, Sydney – NSW; The Australian Museum (AM), Sydney – NSW; Southern Cross Centre for Whale Research (SCCWR), Byron Bay – NSW; Pet Porpoise Pool – NSW; Graduate School of the Environment, Macquarie University, Sydney – NSW; School of Biological Science, University of New South Wales, Sydney – NSW; Oceania Project, Byron Bay – NSW; Northern Territory Parks and Wildlife Commission (PWC) – NT; Environmental Protection Agency (EPA), Brisbane – QLD; Queensland Parks and Wildlife Service (QPWS) – QLD; Queensland Department of Primary Industries Shark Control Program (QDPI SCP), Brisbane – QLD; Great Barrier Reef Marine Park Authority (GBRMPA), Townsville – QLD; Museum of Tropical Queensland, Townsville – QLD; James Cook University, Townsville – QLD; The Ecology Centre, University of Queensland, Brisbane – QLD; Queensland Museum, South Brisbane – QLD; Sea World, Surfers Paradise – QLD; South Australian Museum, Adelaide – SA; Department for the Environment and Heritage, Adelaide – SA; Department of Primary Industries (Fisheries) – SA; Eubalaena Pty Ltd, Tennyson – SA; Applied Marine Mammal Ecology Unit, Australian Antarctic Division (AAD) – TAS; Nature Conservation Branch, Department of Primary Industries, Water and Environment (DPIWE), Hobart – TAS; Whale Ecology Group – Southern Ocean, School of Ecology and Environment, Deakin University, Warrnambool – VIC; Museum of Victoria, Melbourne – VIC; Australocetus Research, Warrnambool – VIC; Dolphin Research Institute (DRI), Hastings – VIC; Western Australian Museum, Perth – WA; Western Australian Humpback Whale Project, Centre for Whale Research (CWR), Fremantle – WA; Department of Conservation and Land Management (CALM) – WA; World Wide Fund for Nature (WWF); Institute of Marine Research, Tromsø – Norway.

Abbreviations are used for all States and Territories: Australian Capital Territory (ACT), New South Wales (NSW), Northern Territory (NT), Queensland (QLD), South Australia (SA), Tasmania (TAS), Victoria (VIC), Western Australia (WA).

1. Species and stocks studied

Common name	Scientific name	Area/stock(s)	Items referred to
MYSTICETI			
Southern right whale	<i>Eubalaena australis</i>	SA, S coast, E Aust, NSW coast, TAS, Macquarie Is	2.1, 2.1.1, 2.1.2, 3.1, 3.1.1, 3.2, 4.1, 4.2, 4.3, 4.4, 6.3, 8, 9, 10, 11.2
Pygmy right whale	<i>Caperea marginata</i>	TAS	2.1.2, 4.3
Humpback whale	<i>Megaptera novaeangliae</i>	NT, Groups B and C, Group V, NSW coast, TAS, VIC, Macquarie Is, Antarctic/Southern Ocean, Fiji	2.1, 2.1.1, 2.1.2, 2.2, 3.1, 3.1.1, 3.2, 4.1, 4.3, 4.4, 5, 8, 9, 10, 11.1, 11.2
Common minke whale	<i>Balaenoptera acutorostrata</i>	Macquarie Is, Antarctic/Southern Ocean	2.1.1
Dwarf minke whale	<i>Balaenoptera acutorostrata</i>	N QLD, VIC	2.1.1, 2.1.2, 2.2, 3.1.1, 3.2, 11.1, 11.2
Bryde's whale	<i>Balaenoptera edeni</i>	SA coast	4.3, 5, 8
Blue whale	<i>Balaenoptera musculus</i>	S Hemisphere, W coast, S Aust, TAS	2.1.1, 2.1.2, 2.2, 3.1, 3.1.3, 9, 11
Pygmy blue whale	<i>Balaenoptera musculus</i>	S coast, N coast, NW Shelf, WA	3.1, 9
Fin whale	<i>Balaenoptera physalus</i>	VIC	2.1.1
Sei whale	<i>Balaenoptera borealis</i>	E Aust, VIC, Antarctic/Southern Ocean	2.1.1, 2.1.2
Unidentified baleen whale sp.		NT	8
ODONTOCETI			
Sperm whale	<i>Physeter macrocephalus</i>	S Hemisphere, NSW coast, E Aust, TAS, VIC, Macquarie Is	2.1.1, 2.1.2, 4.3, 4.4, 5, 6.2, 8, 9, 11
Pygmy sperm whale	<i>Kogia breviceps</i>	NSW coast, QLD coast	4.3, 8
Pygmy / dwarf sperm whale sp.	<i>Kogia</i> sp.	Timor Sea	2.1.1
Long-finned pilot whale	<i>Globicephala melas</i>	S Hemisphere, TAS, Macquarie Is	2.1.2, 4.3, 8

Common name	Scientific name	Area/stock(s)	Items referred to
Short-finned pilot whale	<i>Globicephala macrorhynchus</i>	WA coast, QLD coast	2.1.1, 4.3
Pilot whale sp.	<i>Globicephala</i> sp.	E Aust, SA coast, VIC	2.1.1, 2.1.2, 4.3, 5, 8
Killer whale	<i>Orcinus orca</i>	Aust, E Aust, TAS, Macquarie Is, Antarctic/Southern Ocean	2.1.1, 2.1.2, 2.2, 3.1.1, 3.2, 11.1
False killer whale	<i>Pseudorca crassidens</i>	S Hemisphere, NSW coast	8
Melon-headed whale	<i>Peponocephala electra</i>	Timor Sea, NSW coast	2.1.1, 8
Andrew's beaked whale	<i>Mesoplodon bowdoini</i>	S Hemisphere	4.3, 8
Arnoux's beaked whale	<i>Berardius arnuxii</i>	NSW coast	4.3, 4.4, 8
Blainsville's beaked whale	<i>Mesoplodon densirostris</i>	NSW coast	4.3, 4.4, 8
Cuvier's beaked whale	<i>Ziphius cavirostris</i>	QLD coast	4.3
Gray's beaked whale	<i>Mesoplodon grayi</i>	S Hemisphere, NSW coast, TAS, Macquarie Is	2.1.2, 4.3, 4.4, 8
Strap-toothed beaked whale	<i>Mesoplodon layardii</i>	VIC coast	4.3
Indo-Pacific humpback dolphin	<i>Sousa chinensis</i>	NT, QLD coast	4.3, 7, 7.1, 8, 11.1
Southern right whale dolphin	<i>Lissodelphis peronii</i>	Antarctic/Southern Ocean	2.1.1
Hourglass dolphin	<i>Lagenorhynchus cruciger</i>	Antarctic/Southern Ocean	2.1.1
Common bottlenose dolphin	<i>Tursiops truncatus</i>	E Aust, TAS, SA coast, Timor Sea	2.1, 2.1.1, 2.1.2, 4.1, 4.2, 4.3, 5, 7.1, 8, 9
Indo-Pacific bottlenose dolphin	<i>Tursiops aduncus</i>	VIC, NSW coast, QLD, SA coast, Timor Sea	2.1.1, 3.1.1, 4.1, 4.2, 4.3, 5, 7.1, 7.2, 8, 10, 11.1
Bottlenose dolphin sp.	<i>Tursiops</i> sp.	QLD coast	4.3, 7.1
Risso's dolphin	<i>Grampus griseus</i>	E Aust, TAS	2.1.2, 4.3
Striped dolphin	<i>Stenella caeruleoalba</i>	WA coast, QLD coast	2.1.1, 4.3
Spinner dolphin	<i>Stenella coeruleoalba</i>	E Aust, Timor Sea, Fiji	2.1.1, 2.1.2
Common dolphin	<i>Delphinus delphis</i>	NSW coast, E Aust, QLD coast, SA coast, TAS	2.1.2, 4.2, 4.3, 5, 7.1, 8
Irrawaddy dolphin	<i>Orcaella brevirostris</i>	QLD coast	9, 11.1
Unidentified dolphin sp.	<i>Delphinidae</i> sp.	SA coast, Timor Sea	2.1.1, 4.3, 5, 8

2. Sightings data

2.1 Field work

2.1.1 SYSTEMATIC

Various cetaceans – Southern Ocean

The Southern Ocean Cetacean Ecosystem Program (SOCEP) participated in one Antarctic marine science voyage (Voyage 7: 26 January – 8 March 2002), combining a cetacean visual survey during daylight hours with passive acoustic survey (sonobuoys) all hours, on board the Australian Antarctic research vessel *Aurora Australis*. The primary science activities of the voyage were description and measurements of sea ice, glacier ice and linked oceanographic processes around the Amery Ice Shelf in the Prydz Bay region of East Antarctica. While these regions often contain considerable numbers of Minke and Killer whales, whale numbers were low on this voyage.

Results: 144 cetacean sightings were made on effort, totalling 319 animals: undetermined Minke whale (45 sightings of n=78 individuals), unidentified whale (20, n=25), Humpback whale (18, n=40, plus 2 like Humpback), Common minke whale (16, n=50, plus 9 probably Minke), Killer whale (8, n=37, plus 2 like Killer), unidentified small whale (5, n=6), Hourglass dolphin (4, n=31, plus 2 like Hourglass), unidentified large whale (n=4), Sei whale (3, n=5, plus 3 like Sei), Southern right whale dolphin (3, n=19), like Hourglass dolphin (n=2), unidentified dolphin (1, n=2), unidentified mid-sized whale (n=1), unidentified small cetacean (1, n=2).

Minke whales were the most numerous baleen whale encountered on effort, while Killer whales were the most numerous odontocetes. Sightings of note: 5 February: 19 Humpback groups (many in pairs) and 1 Minke group; 17 February: 7 Minke (or Minke-like) groups and 3 Killer whale groups (one group observed attacking a Minke whale); 23 February: 12 Minke groups (some “like” or “undetermined”).

Humpback whale - Cape Byron, NSW

The Cape Byron Whale Research Project (David Paton, SCCWR) continued in June-July 2002. This study of the migration patterns, distribution, abundance and behaviour of Humpback whales was undertaken both from land and from a small vessel, for visual and acoustic tracking, ID photographs and skin samples.

The land-based component used a theodolite interfaced with a lap top computer to position and track whales as they migrated past the coast, 17 June – 20 July 2002. This coincides with the timing of the peak recorded catch by the Byron Bay whaling station, which operated 1954-1962. The survey period was longer than previous years (up from 2 weeks to 5 weeks). The increase was to determine whether the original survey period was in fact the peak of the Humpback northern migration at Cape Byron, as well as to add to the information in the current data set. The research was collaborative: coordinated by the SCCWR at Southern Cross University and undertaken with Newcastle University, the University of Queensland and the NSW NPWS. Results:

Date	Survey hours	# Pods	# Whales	Av Pod Size	# Observed during standard survey period (22 Jun – 6 Jul)
17 June – 20 July 2002	254hrs 44mins	494 (range 1-34/day)	906	1.83	567 (573 in 2001)*

* Figures are slightly down from 2001 data, however these figures are raw data only and have not been standardised for sightings per effort, nor have sighting conditions yet been taken into consideration.

The vessel-based photo-identification survey was designed to identify individual animals from fluke and lateral body colouration patterns and markings (and the opportunistic collection of sloughed skin for DNA analysis). Results:

Survey Hours	Time with whales	# Pods	# Whales*	# Individuals ID-ed by fluke photo	# Skin samples (sloughed)
185hrs 53mins	82hrs 32 mins (44%)	127	285	169 (59%)	174

* A number of other cetacean species were also observed, including confirmed sightings of Common bottlenose dolphins and Common dolphins.

Acoustic monitoring of whales passing Cape Byron (Dr Mike Noad, University of Queensland, in collaboration with Eric Kniest, University of Newcastle) involved three hydrophone buoys anchored offshore to make multi-channel recordings of Humpback songs. Results: Approximately 78 hours of recordings were collected, more than half using the array of three hydrophones which allowed singers to be tracked past the Cape acoustically. Surveying students from the University of Newcastle collected visual spatial data on the singers and compared these positions with the acoustic positions as part of a final year research project.

Also in NSW, at Cape Solander, the NPWS supported a land-based sighting survey of Humpback whales on their northern migration. No results are available yet.

Humpback whale – Hervey Bay, QLD

The Oceania Project conducted the 11th year of fieldwork of a long-term survey of Humpback whales in Hervey Bay. Boundaries of the survey area are Rooneys Point, Fairway Buoy, Coongul Creek and W coast of Fraser Is within the Whale Management & Monitoring Area of the Hervey Bay Marine Park. The survey, undertaken in conjunction and collaboration with the QLD EPA, was from a 12m vessel for 59 days (10 August – 18 October 2002). Results:

Survey Hours	# Pods*	# Whales	# ID photographs**	Behavioural recordings	# Samples
472hrs	407	947	5004	15hrs DV video 2hrs DAT whalesong	247 sloughed skin 1 faecal

* Systematic observational data of pods included date, time, GPS positions, number of individuals, composition & behaviour.

** Ventral flukes, lateral body colouration patterns and left and right dorsals.

Humpback whale – Peregian Beach, QLD

The Humpback whale acoustic collaboration group (HARC) conducted a pilot study at Peregian Beach, SE QLD, using visual and acoustic tracking integrated in real-time, boat-based photo IDs and biopsies. This will allow the animals to be sexed and may provide valuable life history data when photos are compared with others in E Aust catalogues. Land-based observations occurred from Emu Mt., over 26 full days and 10 part days. Results:

Date	Survey hours	# Pods
14 Sep – 26 Oct 2002	331hrs	459 (0-31 per day)

Fifteen days of boat time were dedicated to on-water observations. The main aim was for acoustics operators and Emu Mt observers to direct the boat to pods of singing and non-singing whales and, once there, for the boat team to collect behavioural information on the pods and take opportunistic identification photos. Results:

Date	Survey time	# Pods	# Whales*	# ID photos	# Biopsies**
14 September – 26 October 2002	15 days	42	91	44 (including 5 singers)	1

* 6 non-singing lone adults, 6 lone singing adults, 4 pods of 2 adults of unknown sex/status, 10 female-calf pairs, 4 pods of 3 adults of unknown sex/status, 4 female, calf, escort trios, 1 female, calf, singer trio, 2 pods of 4 adults of unknown sex/status, 1 female, calf, escort, singer quartet, 2 pods of 5 adults of unknown sex/status.

** 6 biopsy shots were attempted including 5 hits and 1 miss, but only 1 successfully collected a sample of skin. The head of the biopsy dart broke off twice. Of the 5 hits, the whale reacted on 3 occasions (single peduncle slap or tail swish) and did not react on the other 2 occasions.

Humpback whale – N Stradbroke Island, QLD

Robert and Patricia Paterson continued their long-term assessment of the recovering Humpback whale stock in E Australia from Point Lookout (27°, 26°S, 153°, 33°E) on N Stradbroke Island, 24 May – 3 August, which included the peak of the N migration. Weather conditions were exceptionally favourable. Dr Doug Cato (DSTO) estimates that between 1984 and 2002 this stock increased at approximately 10.1% per annum and that the population during the N migration was 4800 +/- 600 (95% CI).

Humpback whale – Perth, WA

Doug Coughran (WA CALM) undertook an aerial survey to assess the relative abundance of Humpback whales in and beyond the area of whale watch vessel activity in waters off Perth. The survey is part of a long-term project to monitor trends and identify whether management strategies are effective or if modifications need to be made to minimise impacts on the whales.

Humpback whale – Lomaiviti Island Group, Fiji

The South Pacific Island Whale and Dolphin Program (David Paton and Nadine Gibbs) undertook a preliminary assessment of the current abundance of Humpback whales in the Lomaiviti Island group of Fiji, 18-29 August 2002. In 9 days of land-based surveys (43.55hrs) and 5 days of non-systematic vessel surveys (9.5hrs on the water), the total time spent observing was 53.05hrs. The mean daily time spent at land-based sites was 4.84hrs (1.0-9.0hrs), and on the water was 1.6hrs (1.0-4.15hrs).

Land-based results: Due to the preliminary nature of the survey and difficulties in performing a structured survey, the level of effort was not consistent for the two areas surveyed. In 29.2hrs on Levuka (Ovalou Is), 1 Humpback was sighted, and in 14.3hrs on Naigani Is, none. Due to the small sample size and therefore limitations on the robustness of the data, no attempt has been made to quantify the significance of the results in either area in relation to effort.

Non-systematic vessel survey results: In 6 surveys totalling 9.5hrs, no Humpback whales were observed. However, on 27 August 2002, a sub-adult Humpback, which was observed from the land station at Levuka, was intercepted 45mins later and photo identified from the survey vessel. During acoustic surveys, 12 recordings were collected. Total duration of recordings was 1.47hrs and the mean duration of sample recordings was 5.4min. Humpback whale song was recorded in 5 recordings (36% of all recordings) on 1 day (believed to be from 1 whale). It was unambiguously identified at species level acoustically, due to the distinctive nature of the song. Delphinid whistles were heard in one (7%) recording made on a different day to the Humpback recording.

Southern right whale – SA

Rebecca Pirzl and Stephen Burnell (School of Ecology and Environment, Deakin University; Eubalaena Pty Ltd) conducted surveys to examine habitat use in coastal calving grounds in August-October at Head of Bight, SA. Photo-identification and census surveys were conducted at Head of Bight, South Australia August-October for a long-term study of the ecology and behaviour of Southern right whales.

Dr DJ Needham conducted two aerial surveys (25 and 29 September 2002) at Head of Bight, SA. On both occasions 15 Southern right whales and 5 calves were seen. A research team of two people, based in Victor Harbour, also carried out fieldwork in Encounter Bay and surrounding area, 21 – 28 August 2002, but no results are available yet.

Southern right whale - Warnambool, VIC

A research team of 2 people carried out fieldwork in Warrnambool with local support from DNRE and Fisheries and the surrounding area, 29 August – 3 September 2002. No results are available yet.

Southern right whale – Southern coastline, WA-SA

John Bannister (WA Museum) continued the annual aerial surveys for Southern right whales off the S coastline between Cape Leeuwin, WA and Ceduna, SA, with three flights – 2 ‘short’ (C Leeuwin-Twilight Cove WA) and one long (C Leeuwin-Ceduna), August-September 2002 (Bannister, 2003). Results: The number seen (378 animals including 107 calves) was higher than in any year since surveys began in 1993, except 2001 (414 including 133 calves). For the first time significant positive increase rates were obtained for all 3 classes (“all” animals, “unaccompanied” animals and cow/calf pairs). For cow/calf pairs the rate was 8.55% ($p=0.006$, 95% CI 3.57, 13.54); power analysis has shown that annual surveys would be needed until 2007 to obtain reliable results. Population size for that part of the “Australian” population visiting the surveyed area is *ca* 1300 animals.

Blue whale – Bonney Upwelling, VIC

Peter Gill and Margie Morrice (Whale Ecology Group – Southern Ocean, Deakin University, and Australocetus Research) conducted a total of 25 aerial surveys during 2002. All were in the Bonney Upwelling Blue whale feeding area between C Otway (VIC) and Robe (SA), except one survey which covered shelf waters to the W and SW of King Is (TAS). Seventeen of these surveys were compliance surveys for Santos Ltd, during a seismic survey program.

Results: From aerial surveys: 76 sightings, $n=102$ Blue whales. From vessels: 10 sightings, $n=14$. Seven of these sightings were from platforms of opportunity (See 2.1.2), while 3 sightings, $n=5$ occurred during satellite tagging attempts using a research vessel. Other species were sighted in or adjacent to the Blue whale feeding area. These include Fin, Sei, Dwarf minke, Humpback, Sperm, Pilot, Killer and unidentified beaked whales. Of these, Sperm, Fin and Sei whales are seen in every season. Fin and Sei whales are thought to feed in this area.

Blue whale – TAS

Simon Mustoe carried out systematic surveys for Blue whales over TAS waters, funded by Esso Australia. These surveys were carried out 18-25 February 2002 along systematic GPS lines. See Mustoe, 2002 (unpublished).

During 2002 DPIWE carried out no systematic surveys of whales in TAS waters. A more systematic framework of aerial whale surveys is planned for 2003 covering the W and NW coasts.

Pygmy blue whale – Perth Canyon, WA

Monthly aerial surveys for Blue whales, probably Pygmy blue whales, continued in April-May 2002, in the area off Perth WA (the Perth Canyon) surveyed since February 1999 (Bannister *et al*, 2003). Encounter rates were generally low (max. sightings per flight 14, in 13 pods); peak abundance was in January-March (77% of the 44 sightings), with few sightings at other times. Monthly surveys over a wider area, from C Naturaliste to Moore River, to include the Perth Canyon, began in November 2001, but sighting numbers have been very low, with most in the Perth Canyon area. Further surveys in the smaller (Perth Canyon) area in February and March 2003 have been more encouraging, with up to 28 sightings (possibly including some repeats) on 1 flight.

Sperm whale – Southern WA

Ocean Alliance, aboard RV *Odysey*, continued the Australian segment of its five-year program to gather baseline data on synthetic contaminants throughout the world’s oceans, using Sperm whales as a bio-indicator species, off the WA coast (legs 2-5, 30 January – 30 March 2003). The objectives of this expedition were to collect biopsy samples, identification photographs and acoustic recordings, while maintaining a visual watch during daylight hours and recording all marine mammal sightings, sea-surface temperature, weather conditions and navigation data.

Results: 28 sightings were made of species other than Sperm whales: Short-finned pilot whale ($n=6$), Common bottlenose dolphin ($n=6$), Blue whale ($n=4$), Striped dolphin ($n=3$), unidentified dolphin species ($n=7$), and unidentified whale species ($n=2$). 155 acoustic events were recorded: Sperm whale ($n=64$), Short-finned pilot whale ($n=6$), and unidentified dolphins ($n=85$).

Bottlenose dolphin – Port Stephens, NSW

A collaborative research project involving NSW NPWS and Macquarie University, on the impacts of vessels on Bottlenose dolphins, continued in 2002. Since 1999, the project has involved vessel surveys to assess dolphin

distribution and abundance, and land-based observations to assess the impact of recreational and commercial vessels on dolphin behaviour, distribution and group dynamics.

Bottlenose dolphin – Jervis Bay and Port Stephens, NSW

Michelle Lemon, PhD candidate at Macquarie University, continued a project studying the social structure and dynamics of Bottlenose dolphins in Jervis Bay and Port Stephens (NSW), which has been underway since 1997. This involves a comparative study of vocalisations to determine geographic variation and call evolution in the acoustic behaviour of two populations of Indo-Pacific bottlenose dolphins. This also assesses the effects of anthropogenic disturbance on the vocal and non-vocal behaviour of the dolphins – to determine whether there are consistent patterns of change in dolphin vocal behaviour when exposed to known sources of human-induced underwater noise. Researchers have also made opportunistic photo identification in both areas, and made randomly stratified distribution surveys of Jervis Bay, in conjunction with Jervis Bay Marine Park.

Bottlenose dolphin – Port Phillip Bay, VIC

The Dolphin Research Institute (DRI) conducted surveys on the Bottlenose dolphin population in S Port Phillip Bay, January - December 2002. During this time, the DRI collected dorsal fin photographs for use in photo-identification of individuals, and continued observations for an investigation into the impacts of dolphin swim tours. Shore-based observations, primarily concerned with dolphin movements and behaviours, were also collected. During 2002, researchers conducted 11 shore-based surveys, 5 surveys from the DRI's vessel, and 63 surveys from tour operator platforms, resulting in approximately 277 field hours. A total of 101 sightings were made.

Bottlenose dolphin – Shark Bay, WA

Dr. Michael Krützen took biopsy samples from 39 individual Bottlenose dolphins in the Shark Bay region, 14 July – 31 August (42 days). Individuals were identified, behavioural data noted and fins photographed prior to each attempt. One sample per individual was obtained, and divided up for genetic, fatty acid and stable isotope analysis.

Bottlenose dolphin – Shark Bay and Redcliff Bay, WA

L. Bedger took behavioural and acoustic recordings of Bottlenose dolphins reactions to anthropogenic stimuli, March - October 2002, Shark Bay. 545hrs of land-based theodolite tracking were carried out on dolphin movement in reaction to boats and noise stimuli; 94 controlled boat approaches to dolphins were tracked from both the theodolite station and an independent research vessel. Vocal responses to the vessel and vessel noise were monitored via four sonobuoys in Redcliff Bay.

Timor Sea – small cetaceans

A systematic survey of the Timor Sea, supported by the governments of Australia, Indonesia and East Timor, and funded by Environment Australia and the Convention on Migratory Species, was conducted by WWF (Australia/ Hong Kong/ Indonesia), 21 October – 4 November 2002. The aim of the survey was to derive population abundance estimates for small cetaceans in the Timor Sea area. Photo-identification and acoustic data were also recorded.

Results: 32 sightings were recorded while on effort. Five species were positively identified (15 Indo-Pacific bottlenose dolphins, 1 Common bottlenose dolphin, 5 Spinner dolphins, 7 Spotted dolphins, 2 Unidentified Dolphin groups, 1 Unidentified Kogia, 1 Melon-headed whale). There are plans to conduct a second survey of the area in 2003, and the final cruise report is pending confirmation of additional survey data.

2.1.2 OPPORTUNISTIC, PLATFORMS OF OPPORTUNITY

Commonwealth waters

In 2002, AFMA fisheries observers aboard commercial fishing vessels off E Aust (225 trips in the E Coast Tuna Fishery, 4 to the SE Trawl Fishery, all trips to both the Heard Is and McDonald Is Fishery and the Macquarie Is Fishery, and some to the Indian Ocean high seas by Australian vessels) recorded cetacean sightings. The following species were recorded, all from longline vessels: Humpback whale (9 sightings, n=28-30, including unconfirmed sightings), Sei whale (1), Southern right whale (2, n=5), Sperm whale (16, n=151-154, including unconfirmed sightings), Killer whale (1, n= 6), Pilot whale (5, n= 90-105, including one note of overnight predation on target fish – yellowfin tuna), unknown whales (2, n= 6), Common dolphin (1, n=50-100), Risso's dolphin (2, n>45), Spinner dolphin (1, n= 80). All reports indicated no recorded interaction between cetaceans and fishing gear.

Northern Territory

The NT Parks and Wildlife Commission confirmed the sighting of at least one mother and calf pair of Humpback

whales between Bathurst Is and Darwin in September 2002 and other pods near Blaze Point and North Perron Is in September and October 2002. This is evidence of a divergence from the species' normal migration route.

Queensland

Dr R.A. Birtles and Dr P.W. Arnold continued observations from *Undersea Explorer*, a 25m commercial live-aboard dive vessel, 9 June-19 July 2002. There were 62 encounters with Dwarf minke whales, of which 33 included an underwater interaction. The total number of whales seen in the encounters was 251-290, of which 157-187 were seen underwater. Surface and underwater observations were routinely made during the encounters, concentrating on recognition of individual whales and documentation of whale-swimmer interactions. Sighting sheets were received from other live-aboard dive vessels running swim-with-whales programs.

Under the terms of the *Hervey Bay Marine Park Zoning Plan 1989*, QPWS implemented a compliance-monitoring program in the Hervey Bay Marine Park. The program involves the collection of data by both QPWS staff and commercial operators conducting whale-watching tours. In recent years, QPWS has collected opportunistic data while on patrol in the Park. Fields of data collected include: time; pod position (latitude and longitude); water temperature and depth; pod configuration - number of adults, sub adults and calves; pod activity/behaviour, i.e. breach, pectoral slap, fluke slap, spy hop, mugging, direction travelling, mother calf feeding, other; and vessels present, commercial and recreational. Also, since 1990, commercial operators have collected daily spatial and temporal pod sightings data. QPWS uses these data to calculate vessel/pod interactions and an encounter ratio, and to monitor the temporal and spatial use of Hervey Bay by commercial whale watching vessels.

South Australia

The SA Museum has not been able to computerize its compiled sightings for the last 7 years. Mike Bossley continues his series of opportunistic sightings of dolphins from tour boats in Gulf St Vincent.

Tasmania

Most sightings (including strandings) are reported to Nature Conservation Branch (NCB) of DPIWE by members of the public. 86 sightings of cetaceans (excluding Common and Bottlenose dolphins) were reported/observed in TAS waters in 2002: Southern right whales (33 events, n=61, with 10 photo or video records), Killer whales (14, n>34, with 3 records), Humpback whales (11, n=22), Blue whales (4, n=5, with records), an unidentified beaked whale (n=1), and 22 observations of unidentified whales (n=44). Off Macquarie Is, 53 sightings were reported: Killer whales (40, n=138, with 3 records), Sperm whales (4, n=8), Long-finned pilot whales (3, n=100), Humpback whales (n=2), unidentified beaked whales (n=2), Southern right whales (1, n=2), Minke whale (n=1).

DPIWE staff undertook 5 aerial and 3 sea-based surveys in response to public reports of sightings in 2002. Aerial surveys totalled 7hrs 9min, May – July. Four of these identified and photographed Southern right whales – Frederick Henry Bay (1 whale on 3 May, 2 on 31 May), E coast (2-3 whales on 15 July) and Bruny Island (1 whale on 18 July). In D'entrecasteaux Channel, observers inconclusively identified 2 Humpback whales and another group of 3 unknown whales. Sea-based surveys totalled over 6hrs 30mins, May-August. Two were of Southern right whales – Norfolk Bay (1 whale not found by sea but identified from land, 4 May) and Orford-Shelley Point (2 whales for 3 days from 2 September) – and one of an inconclusively identified Humpback whale in the D'entrecasteaux Channel (2 July). In addition, DPIWE confirmed identification of whales from public reports from land on 5 occasions.

Victoria

Gill and Morrice (Whale Ecology Group – Southern Ocean, Deakin University, and Australocetus Research) received reports of 6 sightings of Blue whales from Portland lobster fishers, comprising 7 whales, and a further sighting of 2 Blue whales from a charter birdwatching vessel.

The DRI continued building its community dolphin sighting network which has resulted in the recording of regular dolphin sightings from most VIC coastal waters including Port Phillip Bay, Westernport Bay and the Gippsland Lakes. Approximately 396 sightings of cetaceans were reported. Network participants have also sighted other species of cetacean including Common dolphins, Southern right whales, Humpback whales and a Blue whale.

Fiji

The South Pacific Island Whale and Dolphin Program conducted 30mins of aerial surveys, which yielded no confirmed cetacean sightings. Researchers solicited and collated reports from local residents of Humpback whales in the Lomaiviti Is group for the 2002 season. While reports were generally anecdotal and often vague, reliable

observers reported a total of 6 sightings of Humpback whales. These reports ranged in pod composition from single animals; mother, calf and escort; up to pods containing 5 animals. Two of these pods were reported within the period of the dedicated survey. The other sightings ranged from July to October. Sightings of whales, believed to be Humpbacks, in other regions of Fiji (in particular the Lau Group) were also reported throughout the 2002 austral winter and spring period. Anecdotal reports were also received of Pilot whales, Sperm whales, and Killer whales from within Fijian waters, which is consistent with species reported in Paton and Gibbs (2002), while pods of Spinner dolphins were observed in a number of locations in the Lomaviti Is Group.

2.2 Analyses/development of techniques

Sightings and strandings – historical data

During 2002 all available historical data on whale sightings and strandings in TAS waters for the previous 100 years was consolidated and entered into a comprehensive ACCESS database. In addition, accurate location data have been added to all sightings / strandings to allow the future incorporation of the database with a GIS platform. This database has recently been completed and records are being updated and crosschecked to ensure accuracy. Once this process has been completed, a review of all stranding and sighting information in TAS waters will be published.

Sightings data – Killer whale

In 2002, a number of collaborators from the Whale Ecology Group at Deakin University, AAD, SCCWR and the Centre D'études Biologiques De Chize collated unpublished data for Killer whale sightings, strandings, museum specimens and fishery interactions from within Australia's EEZ. The *Southern Oceans Orca Database* held at Deakin University now has 970 records that have been supplied through data agreements by the Commonwealth, State Government agencies, museums, industry, research institutions, non-government organisations and interested individuals. Records include both incidental and on-effort sighting records. The majority of data comes from sightings and surveys conducted on Macquarie Is and in Antarctic waters. The main outcome was a paper, Morrice *et al*, 2002, presented to the 4th International Orca Symposium, France 2002.

Distribution – Blue whale

Gill and Morrice (Whale Ecology Group – Southern Ocean, Deakin University, and Australocetus Research) are undertaking ongoing work to relate Blue whale distribution and behaviour to the physical and biological environment, i.e. the Bonney Upwelling and its ecological links. Spatial analysis of these relationships forms the basis of Peter Gill's PhD thesis, which is being finalised.

Acoustics – Humpback whale

The Cape Byron Whale Research Project continued to develop, in conjunction with Eric Kniest (University of Newcastle), a real-time integrated acoustic and visual tracking system for Humpback whales. An array of three or more hydrophones, linked to a base station via radio, provides sounds produced by the whales (song, social sounds, surface active behaviours). The time of arrival differences of a sound at the individual hydrophones relative to the other hydrophones are measured, and the position of the source calculated, using *Ishmael* software (Dave Mellinger, NOAA). Simultaneously, a theodolite on a nearby hilltop is used to measure the vertical and horizontal angles to the whales which is connected to a notebook computer running *Cyclops* software (Eric Kniest) which maps the whales' positions in real-time. This computer is wireless and linked to a base station computer, which displays the visual and acoustic positions of singers and non-singers together. The acoustic data is also relayed to the hill-top computer so that the theodolite operator can see where the singers are.

A prototype of this networked system was running in the field at Peregrine, QLD in 2002. Significant development has occurred since then with improvements to both *Cyclops* and in the computer network. In 2003 the Cape Byron team hope to have a robust real-time system with acoustic and visual positions available to any computer on the network and an interactive messaging system between the base station and hill computers for enhanced visual detection of singers. A database running under *Cyclops* will also be developed to handle data more efficiently.

Also, further analyses were made on data the SCCWR collected in Independent Samoa in October 2001. These included a refinement of the techniques used in the acoustic census of Humpback whales: received levels of singers were calculated and used to estimate distances to singers (results discussed in 9 below).

Fluke identification – Humpback whale

Dan Burns, a PhD student at Southern Cross University, has developed a relational database to assist in the storage and analysis of fluke ID photographs. This database is to be modified following testing by a number of researchers

while also incorporating further changes suggested by members of the South Pacific Whale Research Consortium.

Preliminary photo matching of whales photographed at Peregrine Beach, QLD against the Pacific Whale Foundation catalogue of Australian Humpback whales (Kaufmann *et al.*, 1993) revealed matches with 5 individuals, including 1 singer that been seen at least twice off the E coast of Australia in the last 16 years.

Photo identification – Humpback whale

The Oceania Project's photography in Hervey Bay for 2002 has been recorded in the field notes log, edited, mounted, notated and archived as slides. Scanning to a digital archive has been completed and formal analysis of the 2002 photography will be finished by the end of May 2003. The Oceania Project now has archives of the 9-12 weeks of annual operations, totalling 4 896hrs of observations of 7 256 Humpback whales in 3 290 pods, including 1 726 resights, from 1992 to 2002. 35 820 slides have been taken, of which 18 814 are digitised on CD, and the collection includes 143hrs of video and 77hrs of DAT audio recordings.

Underwater measurements – Dwarf minke whale

In the N Great Barrier Reef Marine Park, a collaborative study with Drs R.A. Birtles and P.W. Arnold and Mr Andrew Dunstan (*Undersea Explorer*, Port Douglas, QLD) modified the techniques of Spitz, Herman and Pack (2000) to measure Dwarf minke whales using underwater videogrammetry. Results from field seasons 2000, 2001 and 2002 are being prepared for publication.

3. Marking data

3.1 Field work

3.1.1 NATURAL MARKING DATA

3.1.1. Species	Feature	Area/stock	Calendar year no. photographed	Catalogued (Y/N)	Catalogue total	Contact person/institute
Southern right whale	Head callosities	S coast, WA-SA	169 (photographs)	N	2330 (scanned images)	J.L. Bannister / WA Museum
	Left and right rostrum	S Aust, SA/VIC	10	Y	10	N. Patenaude / Macquarie Uni
	Callosities	TAS	6	In progress	N/A	R. Gales / DPIWE
	Head	SA	60+	In progress	> 500	Eubalaena Pty Ltd
Blue whale	Photo	VIC	3	Y	-	P. Gill and M. Morrice / Deakin Uni, Australocetus Research
Blue whale (prob. Pygmy)	Lateral body	WA coast (Geographic Bay)	3	N	Nil	C.L.K. Burton / Western Whale Research
Humpback whale	Photo	Perth, WA	N/A (2002 whale watching season)	Y	-	J. Bannister / WA Museum, C. Burton, D. Coughran / CALM
	Fluke	E Aust.	44	Y	44	M. Noad, J. Smith / Uni Qld
	Lateral dorsal	E Aust.	21 (inc 16 with fluke)	Y	21	M. Noad, J. Smith / Uni Qld
	Fluke	E Aust.	169	Y	517	D. Paton / SCCWR
	Fluke	Fiji	1	Y	1	D. Paton / SCCWR

3.1.1. Species	Feature	Area/stock	Calendar year no. photographed	Catalogued (Y/N)	Catalogue total	Contact person/institute
	Ventral Flukes/ Left & right Dorsal fin/ Lateral Body	Area V (Hervey Bay)	947	Y	2018 (Approx)	T. Franklin / Oceania Project
Humpback whale and other spp	-	WA	N/A (2002 migration season)	Y	-	C. & M. Jenner / CWR
Humpback, Southern right, Blue whales	(underwater photography)	WA	N/A (also passive behavioural observation, acoustic recording)	Y	-	C. Burton / CALM
Dwarf minke whale	Scar and colour patterns, field length measurements	N Great Barrier Reef, QLD	-	-	-	R.A. Birtles / James Cook Uni, P.W. Arnold / Museum of Tropical Queensland
Killer whale	Dorsal fin shape, size	TAS	3	In progress	N/A	R. Gales / DPIWE
Indo-pacific bottlenose dolphin	Dorsal	Port Stephens NSW	~100	Y	155	S. Allen
	Dorsal	Jervis Bay, Port Stephens NSW	50 80	N		M. Lemon
	Dorsal fin	Port Phillip Bay, VIC	~80*	Y	~90	A. Goldsworthy / DRI
	Fin shape and markings	Shark Bay, WA	Mostly resightings	Y	Centralised database	J. Mann / U Georgetown (USA)
Dolphins	-	Port River, SA	-	-	-	M. Bossley (no data available yet)

* DRI collected over 3500 dorsal fin photographs during 2002. The Institute is still in the process of identifying individuals.

3.1.2. ARTIFICIAL MARKING DATA

Nil.

3.1.3. TELEMETRY DATA

3.1.3. Species	Tag type	No. successfully deployed	Maximum time transmitting	Contact person/institute
Pygmy blue whale	Satellite	2 (WA)	Several months (both tags inactive when implanted; one since activated, providing data).	C. Jenner / CWR, N. Gales / AAD
	Satellite	1 (VIC)	7 days	C. Jenner / CWR, N. Gales / AAD
Blue whale	Satellite	0*	-	P. Gill / Deakin Uni, N. Gales / AAD
	Satellite	1	2 months	R. Sears/ Mangan Is. Cet. Study

* See 3.2

3.2 Analyses/development of techniques

Identification – Southern right whales, Killer whales

Aerial photographs of Southern right whales have been taken opportunistically since the late 1970s in TAS waters, where they occur relatively frequently, primarily during winter. Individuals are recognised by the pattern of callosities on top of the head. Currently DPIWE are consolidating historical data by documenting callosities and these data will eventually be included in the whale database described in 2.2 above. Over the last 12 months photographs were taken using a Canon EOS 50 camera with 300mm image stabiliser lens, out the open window of a Cessna 172 travelling between 60 and 70 knots approximately 1000 ft above the water. DPIWE has also begun to collate photographs of Killer whales in TAS waters with the aim of using dorsal fins to identify individuals.

Identification – Humpback whales

Trish and Wally Franklin are PhD Candidates at Southern Cross University, and will focus on the ecology and behaviour of Humpback whales in Hervey Bay utilising data from the Oceania Project (see 2.2 above).

Satellite tags – Blue whales

Collaborators at AAD and CWR have begun the analysis of the three tags successfully deployed on Blue whales off WA. Deakin University / Australocetus Research attempted to attach ARGOS tags to Blue whales off VIC in April 2002. Of 8 whales encountered, only 1 attempt was made, but the tag did not implant successfully. Satellite tags design is still being improved, taking into account weaknesses identified during the unsuccessful attempt.

Sightings – Dwarf minke whales

Analysis of the data collected by Drs R.A. Birtles and Dr P.W. Arnold in the N Great Barrier Reef is still in progress. To date, 17 Dwarf minke whales have been confirmed as within-season re-sightings; maximum interval between re-sightings was 38 days and re-sightings were up to 70km apart. The number of whales re-sighted in 2002 and maximum distances between sightings were similar to previous years but the maximum re-sighting interval was significantly greater than previously documented. Five whales, including 2 of the within-season re-sightings, were confirmed between-year re-sightings; 3 of these were first identified in 1999 (when detailed photo-ID work was started). An additional 5 whales may represent between-year re-sightings but these have not yet been confirmed.

4. Tissue/biological samples collected

4.1 Biopsy samples

4.1. Species	Area/stock	Calendar year no. collected	Archived (Y/N)	No. analysed	Total holdings	Contact person/institute
Southern right	S coastline	10	Y	10	10	N. Patenaude / Macquarie Uni
	Sydney	1	Y	1	2	D. O'Meally / Aust Museum
	Sydney	1	Y	1	2	D. O'Meally / Aust Museum
Humpback whale	E Aust	17 (16 sloughed, 1 biopsy)	Y	0	17	M. Noad, J. Smith / Uni Qld
	Area V (E Aust.)	174	Y	Being analysed	409	M. Anderson / Southern Cross Uni
	AreaV (Hervey Bay)	247	Y	All by May 2003	6 674	W. Franklin / Oceania Project
	Group V (E Aust)	1	N	0	1	W. Blanshard / Sea World, QLD
Sperm whale	WA	37	Y	-	-	R. Clark / Ocean Alliance*
Indo-pacific bottlenose dolphin	Shark Bay WA	39	Y	Nil	430	W. Sherwin, M Krützen / UNSW

4.1. Species	Area/stock	Calendar year no. collected	Archived (Y/N)	No. analysed	Total holdings	Contact person/institute
Common bottlenose dolphin	TAS	1	Y	Whole head – frozen	1	R. Gales / DPIWE**
Common dolphin	TAS	1	Y	Whole animal – frozen	1	R. Gales / DPIWE

* Ocean Alliance, aboard RV *Odyssey*, collected Sperm whale biopsy samples off the WA coast from an 8m platform that aims to minimise the potential disturbance to the whales. The platform allows biopsy samples to be taken while the vessel is parallel to the animal rather than behind, which Ocean Alliance believes increases the probability of obtaining a successful sample. The specific experiments to be conducted on the samples are: genetics, chemistry/toxicology, stable isotopes (skin and blubber), dosing / protein studies, mRNA.

** DPIWE Nature Conservation Branch staff attended seven stranding events in TAS during 2002. Animals were successfully returned to the water in three of these cases, in three cases the animals were dead when staff arrived and in one case the animal died during the rescue attempt. In addition to the stranded animals, 3 small cetaceans died through entanglement in fish farm nets and 9 carcasses of cetaceans were found around the coastline. Samples were taken from fresh carcasses. Autopsies were conducted on all dead stranded animals by veterinarians or NCB staff in order to ascertain the cause of death.

4.2 Samples from directed catches or bycatches

4.2. Species	Area/stock	Calendar year total	Archived (Y/N)	Tissue type(s)	Contact person/institute
Common dolphin	SA coastline	1	Y	Genetic tissues (blood, liver, kidney, muscle, skin), reproductives, stomach and intestines, toxic contaminants (liver, kidney, muscle, blubber)	C. Kemper / SA Museum
Indo-Pacific bottlenose dolphin	SA coastline	1	Y	Genetic tissues (blood, liver, kidney, muscle, skin), reproductives, stomach and intestines, toxic contaminants, (liver, kidney, muscle, blubber)	C. Kemper / SA Museum

4.3 Samples from stranded animals

4.3. Species	Area/stock	Calendar year total	Archived (Y/N)	Tissue type(s)	Contact person/institute
Southern right whale	TAS	1	Y	Muscle, skin, blubber, baleen	R. Gales / DPIWE**
Humpback whale	Group V (E Aust), NSW	1	Y	Skin, blubber	M. Anderson / Southern Cross Uni
	Group V, E Aust (QLD)	1	Y QMJM15 083	Skull, baleen, blubber and larynx	H. Janetzki / QLD Museum
Bryde's whale (possible)	SA coastline	1	Y	Genetic tissues (blood liver kidney muscle skin), reproductives, stomach and intestines, toxic contaminants (liver, kidney, muscle, blubber)	C. Kemper / SA Museum*
Sperm whale	Kioloa, NSW	1	-	-	K. Waples / NSW NPWS
	TAS	1/10	Y	Jaw, skin, muscle, blubber	R. Gales / DPIWE
	TAS	2-10/10	Y	Blubber (7), muscle, skin, stomach contents, jaw (8),	R. Gales / DPIWE (see also Gales and Pemberton, 2002)
	N TAS	6	Y	Intestinal contents and faeces	S. Robinson / AAD

4.3. Species	Area/stock	Calendar year total	Archived (Y/N)	Tissue type(s)	Contact person/institute
Pygmy sperm whale	QLD coast	1	N	N/AL Necropsied	N/A
	QLD coast	1	Y	Lung, liver, brain, heart, eye, skin, blubber and intestine	B. Hill / DPI, Rockhampton
Long finned pilot whale	TAS	1	Y	Kidney, liver, muscle, blubber, liver, mammary glands, skull, stomach contents	R. Gales / DPIWE
Pilot whale	SA coastline	4	Y	Genetic tissues (blood liver kidney muscle skin), reproductives, stomach and intestines, toxic contaminants (liver, kidney, muscle, blubber) from 2 animals	C. Kemper / SA Museum
Short-finned pilot whale	QLD coast	1	Y	Liver, blubber and tooth	Tooth: P. Hale / Uni Qld, other samples: B. Hill / DPI, Rockhampton
Andrew's beaked whale	S Hemisphere (WA)	1	Y – M49602	Blubber and skin	WA Museum
Arnoux's beaked whale	Merimbula, NSW	1	Y	DNA	D. O'Meally / Aust Museum
Blainville's Beaked Whale	Hawke's Nest, NSW	1	Y – M36408	DNA, skull and frozen muscle tissue	D. O'Meally, Sandy Ingleby / Aust Museum
Cuvier's beaked whale	QLD coast	1	Y QMJM15 157	Complete skeleton, larynx and oil	H. Janetzki / Qld Museum
Gray's beaked whale	Merimbula, NSW	1	Y – M36409	DNA, skull and frozen muscle tissue	D. O'Meally, Sandy Ingleby / Aust Museum
	TAS	1/1	Y	Blubber, muscle, skin, skull, liver, kidney	R. Gales / DPIWE
	S Hemisphere (WA)	1	N	Blubber	Ocean Alliance
Strap-toothed beaked whale	SE Aust (VIC)	2	Y	Blubber, liver, kidney	V. Dove / Uni Melbourne*** – samples with Museum of Vic.
Indo-Pacific humpback dolphin	NT	1	Y	Measurements only	Ray Chatto / NT PWC
	QLD coast	1	Y	Skin, blubber and stomach contents	P. Hale / Uni Qld, C. Limpus / EPA, James Cook Uni
	QLD coast	1	Y	Skin, blubber, kidney and stomach contents	B. Hill / DPI, Rockhampton
	QLD coast	1	Y	Skin and skeleton	P. Hale / Uni Qld, C. Limpus / EPA, James Cook Uni
Common bottlenose dolphin	Port Stephens, NSW	1	-	-	K. Waples / NSW NPWS
	QLD coast	1	Y	Lung, liver, kidney, brain and heart	B. Hill / DPI, Rockhampton
	QLD coast	1	Y	Brain, kidney, jejunum, liver, lung, myocardium, spleen and testes	Western Plains Zoo

4.3. Species	Area/stock	Calendar year total	Archived (Y/N)	Tissue type(s)	Contact person/institute
	QLD coast	1	Y	Skin and skull	W. Townsend / DPI, Yeerongpilly
	QLD coast	1	Y	Skin and blubber	P. Hale / Uni Qld, C. Limpus / EPA, James Cook Uni
	QLD coast	1	N	Flesh	R. Whitney / QPWS, Rainbow Beach
	QLD coast	1	N	Skull	I. Thrash / QPWS, Maryborough
	SA coastline	2	Y	Genetic tissues (blood liver kidney muscle skin), reproductives, stomach and intestines, toxic contaminants (liver, kidney, muscle, blubber)	C. Kemper / SA Museum
	Aust (WA)	1	N	Post mortem	Perth Zoo
Indo-Pacific bottlenose dolphin	SA coastline	4	Y	Genetic tissues (blood liver kidney muscle skin), reproductives, stomach and intestines, toxic contaminants (liver, kidney, muscle, blubber)	C. Kemper / SA Museum
	SE Aust (VIC)	4	Y	Blubber, skin, all major organs	V. Dove / Uni Melbourne – samples with Museum of Vic.
Unidentified bottlenose dolphin	SA coastline	3	Y	Genetic tissues (blood liver kidney muscle skin), reproductives, stomach and intestines, toxic contaminants (liver, kidney, muscle, blubber)	C. Kemper / SA Museum
Risso's dolphin	TAS	1	Y	Skeleton, skin	R. Gales / DPIWE
Striped dolphin	QLD coast	2	Y	Brain, liver, lung, testicle, spleen, kidney, intestine, heart	B. Hill / DPI, Rockhampton
Common dolphin	QLD coast	1	Y	Skin and blubber	P. Hale / Uni Qld, C. Limpus / EPA, James Cook Uni
	SA coastline	9	Y	Genetic tissues (blood, liver, kidney, muscle, skin), reproductives, stomach and intestines, toxic contaminants (liver, kidney, muscle, blubber) from 3 animals	C. Kemper / SA Museum
	TAS	1/2	Y	Skull, muscle, blubber	R. Gales / DPIWE
	TAS	2 (juvenile)	N	Lung, liver, kidney	R. Gales / DPIWE
Unidentified dolphin	SA coastline	8	Y	Genetic tissues (skin) toxic contaminants (blubber) from 1 animal	C. Kemper / SA Museum
Unidentified dolphin	SE Aust (VIC)	1	Y	Blubber, skin, all major organs	V. Dove / Uni Melbourne – samples with Museum of Vic.

* Skeletal material (skull and/or postcranial) was collected from all specimens lodged with SA Museum. Complete sets of tissue samples were not collected from all animals because in some cases the state of decomposition made this inappropriate.

** The TAS list includes: Entanglement possible/probable – for example, animals with net marks/injuries and/or that have had flippers or flukes removed, and full stomachs and sometimes food in the oesophagus, suggesting a sudden death; entanglement in fish farm anti-predator net; entanglement in other types of net or line; accidental or intentional injury by humans, e.g. boat strike, shooting, stabbing.

*** Verne Dove, veterinarian student, Uni Melbourne, carried out standard histopathology and toxicology. Further details: A. Goldsworthy, DRI.

4.3. Earlier years' statistics:

4.3 species	Area/stock	Calendar year no. collected	Archived (Y/N)	Tissue type(s)	Contact person/institute
Indo-Pacific bottlenose dolphin	Port Phillip Bay, VIC	4 (2001)	Y	Skin, lung, kidney, ovary, blubber, liver	Dunn / DRI

4.4 Analyses/development of techniques

Biopsy sampling

Thirteen skin biopsy samples obtained from probable Pygmy blue whales in the Perth Canyon area (see 2.1.1 above), in 2000 (9 samples) and 2001 (4 samples) were analysed at the NMFS laboratory, La Jolla CA. Each was sequenced, sexed and genotyped with seven microsatellite markers. Of 12 that were sexed, 7 were male, 5 female. There were no 'resights' within those analysed.

Genetic stock identification

SE Aust: Graduate School of the Environment at Macquarie University, NSW continued its opportunistic but directed biopsy sampling of Southern right whales, to determine the nature or location of stock division within the species in the SE Pacific. Research includes the qualitative ranking of behavioural responses to biopsy darts.

NSW: Geoff Ross, NPWS (Botany Bay) obtained analyses of sloughed skin samples, using molecular techniques to determine sex and identity. Sex determination was carried out according to the protocol of Bérubé & Palsbøll (1996). Identity was determined by sequencing of the mitochondrial control region according to the protocols of Dalebout *et al* (1998). Identifications were carried out at the request of Craig Dickman, NPWS (Merimbula) and Sandy Ingleby, Australian Museum.

QLD: DNA analysis of sloughed skin samples collected by the Oceania Project in Hervey Bay is being undertaken by Megan Anderson, Centre for Animal Conservation Genetics, Southern Cross University, under the supervision of Professor Peter Baverstock. Analysis of total holdings (as per Anderson *et al*, 2001) will be completed by end of May 2003. One Humpback faecal sample was also obtained, by the Master of 'Whalesong', and has been passed onto Nick Gales (AAD) and Simon Jarman (CSIRO) for analysis.

Abundance

Samoa: Analyses continued on the data collected in Independent Samoa in 2001 (Paton *et al.*, 2002). Acoustic data was used to generate a crude estimate of Humpback population size of 74 (95% CI 60-96) (Noad *et al.*, 2002). Further analyses are gradually refining this estimate and recalculating it in terms of whale density.

Fiji: The South Pacific Island Whale and Dolphin Program concluded that the scarcity of whales in Fijian waters today implies that this population remains severely depleted and has yet to recover from commercial whaling. This also appears to be the case among Humpback whales in other portions of Oceania (Garrigue *et al.*, 2002). The preliminary survey (see 2.1.1) was the first documented survey since Dr Dawbin's in the late 1950s, which had indicated that Humpbacks were common in the Lomaiviti Is group during the austral winter and spring. The current study has endeavored, where possible, to replicate the methodology used by Dawbin so that results are comparable.

Although this survey was relatively short in duration (12 days) and hampered by poor visibility as a result of prevailing weather conditions, the Program confirmed the presence of Humpback whales and Spinner dolphins in the Lomaiviti Is group. Fiji is thought to form part of the breeding grounds for Humpback whales, as indicated by recent anecdotal reports of the presence of young calves in Fijian waters. These reports are supported by the historical data. In addition, evidence of singing whales, as documented for the first time during the 2002 survey, suggests courtship

and mating behaviours within Fijian waters. The survey results and anecdotal records together seem to confirm that a number of Humpback whales migrate to or through the Lamaiviti Is group annually.

Life history

In TAS, when fresh specimens were obtained and autopsies conducted (2 Common dolphin, 2-8 Sperm whales), pathological, parasitological and microbiological tests were carried out in order to further assess the cause of death. Analyses conducted on the diet, demographics, body fat condition and organic pollutant burdens of Sperm whales involved in 3 mass strandings in 1998 were completed. The results of these analyses were submitted to the University of Tas as a PhD thesis on the life history of Sperm whales in S Australian waters. K. Evans and M.A. Hindell also submitted manuscripts on Sperm whale diet and age structure to *Marine Biology* and *Journal of Zoology* (London).

5. Pollution studies

South Australia

Samples are routinely collected from almost all stranded or entangled animals. During 2002 the tissues from 4 short-beaked Common dolphins, 9 Bottlenose dolphins (4 Indo-Pacific, 2 Common, 3 unidentified), and 1 animal identified only as 'dolphin', 2 Pilot whales, and 1 (possible) Bryde's whale were collected. These samples have not yet been analysed. An Honours degree project (Adelaide University) has begun on heavy metal levels in SA dolphins.

Tasmania

Blubber samples from stranded Sperm whales (7 samples), Long finned pilot whale (1 sample) and Gray's beaked whale (1 sample) in TAS were sent to the Australian Government Analytical Laboratories to test for dioxins and PCBs. Research results include an analysis of organochlorines / organic pollutant burdens in Sperm whales (Evans, Hindell, Hince, submitted to *Marine Pollution Bulletin*, and a review of all published research on pollutants (Gales *et al.*, 2003).

Queensland

During 2002 season, the Oceania Project undertook the 10th year of Chlorophyll A sampling for a long-term habitat and water quality monitoring program, in the Whale Management and Monitoring Area of Hervey Bay Marine Park. The program is being conducted in conjunction with Andrew Moss of QLD EPA. Weekly triplicate Chlorophyll A samples were obtained from 6 structured geographical areas within the Park, 10 August – 18 October 2002. Outcomes of the first five years of monitoring (1993-1997) were published in Moss and Kocovski, 1998. Moss is preparing a report covering monitoring in Hervey Bay for the ten years 1993-2002.

6. Statistics for large cetaceans

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

Nil to report. Under the *Environment Protection and Biodiversity Conservation Act 1999*, it is an offence to kill, injure, take, trade, keep, move or interfere with whales and other cetaceans.

6.2 Other non-natural mortality for the calendar year 2002

6.2. Species	Area/stock	Males	Females	Total	Cause	Methodology
Humpback whale	WA	-	-	1 (5 others reported entangled but not confirmed dead)	Entanglement – lobster/cray pot line or other nylon rope.	Rescue teams deployed

6.3 Earlier years' statistics

Harcourt and Patenaude (Macquarie University) attended a female Southern right whale carcass off the S coastline in 2001 and concluded that ship strike was the possible cause of death.

7. Statistics for small cetaceans

7.1 For the calendar year 2002

7.1		Directed catch		Incidental mortality			Live-capture
Species	Area/stock	Reported	Est. total	Reported	Est. total	Source	Reported
Pilot whale	E Aust (32 S 153 E)			1	-	AFMA logbook: caught during haul, thin and malnourished.	-
Indo-pacific humpback dolphin	NT	-	-	1	1	NT PWC	-
Unidentified dolphin	Gulf of Carpentaria, QLD	2*	>2	-	-	AFMA	-
Bottlenose dolphin	Gold Coast, QLD	-	-	2	2	QDPI SCP net)**	-
	Sunshine Coast, QLD	-	-	5	5	QDPI SCP net	-
	SE TAS	-	-	1	?	Entangled in salmonid farm net	-
Indo-Pacific bottlenose dolphin	SA coastline	-	-	1	?	Probable entanglement	-
Common dolphin	Sydney, NSW	-	-	1	1	Shark control net	-
	Gold Coast, QLD	-	-	6	6	QDPI SCP net	-
	Sunshine Coast, QLD	-	-	4	4	QDPI SCP net	-
	SA coastline	-	-	2	?	Probable entanglement	-
	SE TAS	-	-	2	?	Entangled in salmonid farm net	-
Indo-Pacific humpback dolphin	Mackay, QLD	-	-	1	1	QDPI SCP net	-
	Sunshine Coast, QLD	-	-	4	4	QDPI SCP net	-

* On 28 November 2002, AFMA officers boarded an Indonesian flagged vessel 150 nm W of Cape York, QLD, and discovered the decapitated head of a dolphin, one speared dolphin carcass and a large amount of dolphin flesh, including some attached to fishing hooks as bait. The master of the vessel was arrested, convicted on three counts under the *Environment Protection and Biodiversity Conservation Act 1999*, and sentenced to three months' imprisonment.

** QDPI SCP = Queensland Department of Primary Industries Shark Control Program. Further information is available from B. Lane.

7.2 Earlier years' statistics

7.2.		Directed catch		Incidental mortality			Live-capture
Species	Area/stock	Reported	Est. total	Reported	Est. total	Source	Reported
Indo-Pacific bottlenose dolphin	VIC	-	-	0 (3 released alive 2001)	-	DRI*	-

* One event was reported, in which a commercial fishing net accidentally captured three dolphins, and released all alive.

8. Strandings

NSW: The Australian Museum: contact Sandy Ingleby (6 College St., Sydney, NSW 2010) for information on stranded cetaceans the Museum collected during the 2002 calendar year: Arnoux's beaked whale, Blainsville's beaked whale, Gray's beaked whale, Bottlenose dolphin, Sperm whale. NSW NPWS notifies the Museum of the locality of strandings and coordinates provision to the Museum of samples and specimens of interest.

NSW: National Parks and Wildlife Service: contact Kelly Waples (Wildlife Management, NPWS, PO Box 1967, Hurstville NSW 2220) for information from the NPWS strandings database. This contains the date, location, outcome, autopsy details (when available) and contact personnel for 11 stranding events in NSW during 2002, involving 14 animals: Sperm whale (n=2), Bottlenose dolphin (n=3), Pygmy sperm whale (n=1), Melon-headed whale (n=1), False killer whale (n=1), Blainsville's beaked whale (n=1), Gray's beaked whale (n=1), Arnoux's

beaked whale (n=1), Humpback whale (n=1), Southern right whale (n=2).

NT: Parks and Wildlife Commission: contact Ray Chatto (PO Box 496, Palmerston NT 0831) for information on strandings in the NT, including an Indo-Pacific humpback dolphin calf near Darwin in March 2002 and an unidentified large baleen whale on Elcho Island in June 2002.

QLD: Parks and Wildlife Service: contact Col Limpus (PO Box 155, Brisbane Albert Street, QLD 4001) for information on the collection of stranded cetaceans in QLD. The EPA oversees the collection of stranded cetaceans in the state and maintains the Queensland Marine Wildlife Stranding and Mortality Database, which summarises all records of sick, injured or dead marine wildlife reported to the Agency. An annual report is compiled for cetaceans and pinnipeds. Most reports of individual strandings are supplied by the Agency and GBRMPA staff, including those via the state-wide stranding hotline telephone number 1300 360 898. Other reports come directly from members of the public, including organisations such as Sea World and Underwater World. In addition to the general reporting, the database contains all mortality records from the QDPI Shark Control Program.

QLD: Museums: contact Robert Patterson (Queensland Museum, PO Box 3300, South Brisbane, QLD 4101) for information on skeletal material collected from cetaceans found in QLD and sent to the Museum for preparation. Contact Peter Arnold (Museum of Tropical Queensland, 70-102 Flinders Street, Townsville, QLD 4810) for information on the heads from stranded cetaceans in the central and northern Great Barrier Reef region, which are deposited in the Museum for extraction and preparation of skulls.

SA: South Australian Museum: contact Catherine Kemper (North Terrace, Adelaide, SA 5000) for more information from the SA Museum cetacean stranding database. In 2002, the Museum added records of 37 stranding/entanglement events in SA to the database. These involved: Bottlenose dolphin (n=10), Common dolphin (n=10), Unidentified dolphin (8, n=9), Pilot whale (n=4), Southern Right whale (n=2), Unidentified baleen whale (n=1).

TAS: Department of Primary Industries, Water and Environment: contact Rosemary Gales (Nature Conservation Branch, DPIWE, GPO Box 44, Hobart, TAS 7001) for strandings data from 18 events involving 31 animals in 2002. Nature Conservation Branch staff attend strandings as soon as possible and take action following the “Tasmanian Whale Action Plan” (NCB, 2002). The dataset contains information on the date, location, responsible person and the action taken, for each event. The following species stranded off TAS in 2002: Sperm whale (1, n=9), Southern right whale (n=1), Pygmy right whale (n=1), Gray’s beaked whale (n=1), Long-finned pilot whale (n=1), unidentified whale (n=1), Risso’s dolphin (n=1), Bottlenose dolphin (3, n=7), Common dolphin (n=5), unidentified dolphin spp (n=3). The TAS Whale Hotline is ph 0427 942 537.

VIC: Dolphin Research Institute: Contact Wendy Dunn (P.O. Box 77, Hastings, VIC 3193) for information on 4 strandings of Indo-Pacific bottlenose dolphins in 2001 (not previously reported) and 3 strandings of larger cetaceans. The DRI maintains records on strandings of small cetaceans in the area encompassing Port Phillip Bay and nearby ocean beaches. All measurements are collected according to the standardised methods.

WA: Department of Conservation and Land Management: contact Peter Mawson and Christine Freegard (Locked Bag 104, Bentley Delivery Centre, WA 6983) for information from the WA strandings data set. This contains information on the sex, maturity and status of 20 stranding events involving 76 animals in 2002: False killer whale (n=58), Humpback whale (n=8), Common bottlenose dolphin (n=6), Gray’s beaked whale (2, n=3), Sperm whale (n=1), Andrew’s beaked whale (n=1), Long-finned pilot whale (n=1).

9. Other studies and analyses

Non-lethal research on whale diet – Blue whale, Humpback whale, Fin whale, Sperm whale

A DNA-based method for identifying species of krill present in faecal samples of cetaceans has been developed (Jarman *et al.*, 2002). This resulted in the identification of *Nyctiphanes australis* from a single Pygmy blue whale faecal sample. The AAD is analysing faecal samples opportunistically collected in 2002 from Blue whales (5 samples), Sperm whales (4 samples) and one Humpback whale, as well as samples from Blue and Fin whales collected previously.

Acoustics – Humpback whale

The pilot study for HARC conducted at Peregrine Beach, SE QLD, 14 September – 26 October 2002, involved researchers from the University of Queensland (Michael Noad, Peter Hale, Josh Smith), Defence Science and

Technology Organisation (Doug Cato), Scripps Institution of Oceanography (Dale Stokes, Grant Deane) and the Woods Hole Institution of Oceanography (Mark Johnson). The project also involves David Paton (SCCWR, in charge of boating operations), and Eric Kniest (University of Newcastle, helping with visual and acoustic tracking of whales).

HARC will examine the interaction between migrating Humpback whales and their acoustic environment. This study will characterise and measure the ambient acoustic environment of the whales, attempt to establish how whales use their own vocalisations and other self-generated sounds to communicate, examine ways in which the whales might use the ambient sound field for navigation, and examine possible effects of various anthropogenic sound sources, particularly ship sound. The study is based on simultaneous real-time acoustic and visual tracking of the whales as they migrate past Peregian Beach. Similar work has been conducted previously at this site (Noad and Cato, 2001; Noad, 2002), but the accuracy of tracking has been improved and visual and acoustic tracking integrated in real-time, providing up to date information on the whereabouts and singing status of all animals in the area.

In 2002 the pilot study collected 81 recordings (180 hours) of Humpback song including 57 recordings made using an array of 3 or 4 hydrophones, which allowed the tracking of at least 66 singers. Further analysis is required to better determine how many passed through the study site as some singers were recorded but not tracked, and some singers within 10km were sampled only. On any given day the numbers of singers that passed during daylight hours ranged from 0 to 8. Additionally, automated sample recordings were made for 2min every 15min around the clock to collect a comprehensive record of the acoustic environment.

Whale watching – integrating various needs

K.A. Stamation, D.B. Croft, K. Waples, S.V. Briggs and P.D. Shaughnessy researched whale watching in NSW, on integrating the needs of whales, tourists, industry and regional communities. This project examines both the human and animal dimensions of the interface between whale-watching tourism and the whales to create a management framework to sustain the whale watching industry in S NSW (Sydney – Eden). This research is being conducted as part of a PhD with the University of NSW and in conjunction with NSW NPWS and the Cooperative Research Centre for Sustainable Tourism, March 2002 – March 2005.

The project aims to determine and model whales' responses to changes in distance between a whale and boat, to direction and speed of approach, and to the type of vessel and engine so as to provide quantitative measures of the effects of whale watching that can be monitored. It will test whether the behaviour of Humpback whales on their southward migration through southern NSW is different from their responses to tour boats in their nursery grounds of Hervey Bay and other areas around the world (e.g. nursery grounds in Hawaii and feeding grounds of Alaska). The responses of Southern right whales to tour boats will also be included, if encountered. Information on the number, location, operating schedules, and types of whale watching vessels operating during the southern migration of humpback whales will be provided.

The project also looks at the need to understand the perspectives and needs of stakeholders (regulatory agencies, and industry), regional communities and tourists. It will profile the attitudes and actions of these groups in the management of whale watching. In addition information is being gathered on the expectations and satisfaction of people who go whale watching (land and boat-based); the use of interpretative packages for whale watchers as an educational tool to influence people's attitudes towards wildlife and conservation generally; and on the effectiveness of different styles of interpretation.

Genetics – Irrawaddy dolphin

Isabel Beasley (Tropical Environmental Studies, James Cook University), Peter Arnold (Museum of Tropical Queensland) and Kelly Robertson (Southwest Fisheries Centre, La Jolla) are comparing Irrawaddy dolphins from Australia and Asian countries, using morphological and molecular data.

Taxonomy – Bottlenose dolphin

Catherine Kemper (SA Museum) and Peter Hale (University of Queensland) are preparing a paper on the taxonomy (skulls and skeletons) of Bottlenose dolphins. Morphological evidence suggests two species, the Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) and Common bottlenose dolphin (*Tursiops truncatus*). Species lists for SA will be changed accordingly. The distribution of *T. aduncus* appears to be centred on the protected waters of the gulfs region of SA and may be isolated from other members of the species in WA and NSW. Hale will soon be analysing more tissues for genetic confirmation of the groups determined by morphology.

Skeleton – Pygmy right whale

Catherine Kemper and Sentiel Rommel (Marine Mammal Lab, FLA) are continuing studies on a description of the unique skeleton of the Pygmy right whale.

Sightings and strandings – Humpback whale

Kemper presented a paper on sightings and strandings of Humpback whales in SA to the Australian Mammal Society in July 2002, which is being prepared for publication. Records are available for all months of the year with most sightings and strandings in June and July. Further research is needed to clarify population affinities of animals seen in SA, as it is possible that they could be from either Group IV or V or both. Genetic samples are available for some carcasses. Kemper *et al.* will also submit a paper on the cause/circumstance of death in various cetaceans within the next few months. It summarises the categories of death (e.g. entanglement, disease, natural mortality, intentional killing) of all known records of dead cetaceans in SA.

Interactions with fishing and aquaculture – Common and Bottlenose dolphin

Harcourt, Kemper and Tedman have begun a large project on the population abundance and structure, life history and feeding ecology of Common and Bottlenose dolphins in SA, particularly Spencer Gulf. Both live animals and carcasses will be studied with a view to determining the potential impact of some human activities on dolphin populations. The study will assess the ability of local dolphins to withstand different levels of mortality.

Habitat use – Southern right whale

Rebecca Pirzl and Stephen Burnell (School of Ecology and Environment, Deakin University; Eubalaena Pty Ltd) conducted surveys to examine habitat use by Southern right whales in coastal calving grounds in August-October at Head of Bight, South Australia and Warrnambool, VIC. Aspects of right whale activity including movement and distribution patterns were surveyed, along with environmental attributes, in order to examine the relationship between distribution and habitat features. Data were collected on 32 days at Head of Bight and 19 days at Warrnambool.

Photo-identification and census surveys were conducted at Head of Bight, SA, August-October for a long term study of the ecology and behaviour of Southern right whales. The project is in its 13th consecutive year and field work in 2002 continued an unbroken time series of data that began in 1991. Photo-identifications of in excess of 60 individuals (excluding calves) were obtained. The study provides information on aspects of the population ecology and reproductive biology of Southern right whales. The maximum number of whales recorded at Head of Bight in 2002 was 71 on 31 August 2002. A minimum of 23 calves was born at Head of Bight in 2002. Four females with calves were recorded at Warrnambool during the survey period.

Behaviour and genetics – Bottlenose dolphin

A number of researchers in WA developed techniques for studying Bottlenose dolphin. Behaviour and communications in Shark Bay, WA: principal researcher Dr J. Mann (Georgetown University, Washington DC, USA). Behavioural ecology of juveniles in Shark Bay, WA: Dr A. Samuels (Rice Conservation Biology Centre, Brookfield Zoo, IL, USA). Behaviour: H. Finn (Murdoch University). Genetics on WA coastline: Dr M. Krützen, Dr B. Sherwin, Dr P. Schupp (University of NSW). Acoustic recordings to study echolocation: J. Pettis (Georgetown University, Washington DC, USA). Impact of boating and human activities: L. Bejder (University of Dalhousie, Canada). Prey choice: Dr L.M. Dill (Simon Fraser University, Canada). Ecology in Cockburn Sound, WA: R. Donaldson (Murdoch University).

Migration patterns – Humpback and Pygmy blue whales

Attaching satellite tags to Humpback and Pygmy blue whales off WA: principal researcher M. Jenner (WA Humpback Whale Project/ Centre for Whale Research).

Methods for abundance estimation – Minke whale

Mark Bravington (CSIRO) undertook an IWC contract on improving abundance estimates from line transect surveys when standard assumptions are violated, with specific application to Antarctic Minke whale surveys. Further methods development is planned for 2003. A preliminary description can be found in Bravington, 2002.

Interactions with tour vessels – Indo-Pacific bottlenose dolphin

DRI (VIC) conducted its third year of observations from tour operator platforms of interactions between dolphin

swim tour vessels and dolphins. See Dunn *et al* (2001).

Whale-watching impacts – Southern Right whale, Humpback whale, dolphins

In WA, researchers investigated the impacts of commercial whalewatching. WA CALM issued 115 whalewatching licences (for Southern right and Humpback whales) for the 2002 season. Commercial operators provided data on the number of passengers and whales seen during the season, which is still being analysed. 79 commercial dolphin watching licences were also issued during 2002. 108 licences for whale watching were issued in the previous 2001 season, and 62 commercial dolphin watching licences, to carry a total of 22,498 passengers.

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