AUSTRALIA. PROGRESS REPORT ON CETACEAN RESEARCH, JANUARY 2000 TO DECEMBER 2000, WITH STATISTICAL DATA FOR THE CALENDAR YEAR 2000

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This report uses abbreviations for all Australian 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).

This report summarises information obtained from: Museum of Tropical Queensland, Townsville – QLD; Department of Tropical Environmental Sciences and Geography, James Cook University, Townsville – QLD; Pacific Whale Foundation, Hawaii, USA; Queensland Parks and Wildlife Service, Brisbane – QLD; Shark Control Program, Brisbane – QLD; Seaworld Enterprises, Surfers Paradise – QLD; Queensland Museum, Brisbane – QLD; Southern Cross Centre for Whale Research, Noosa – QLD; the Oceania Project – NSW; Australian Marine Mammal Research Centre, Faculty of Veterinary Science, University of Sydney – NSW; National Parks and Wildlife Service (NPWS) – NSW; NSW Fisheries – NSW; Taronga Zoo (TZ), Sydney – NSW; the Australian Museum (AM), Sydney – NSW; the Cape Byron Whale Research Project – NSW; the Australian Fisheries Management Authority (AFMA), Canberra – ACT; Department of Natural Resources and Environment – VIC; Royal Melbourne Institute of Technology, Melbourne – VIC; Dolphin Research Institute – VIC; the Southern Ocean Cetacean Ecosystem Program (SOCEP) – VIC; Marequus Pty Ltd – VIC; School of Ecology and Environment, Deakin University, Warrnambool – VIC; Australocetus Research, Bushfield – VIC; the Museum of Victoria, Melbourne – VIC; Southern Oceans Orca Database (SOOD) – TAS; University of Tasmania – TAS; the Australian Antarctic Division (AAD) – TAS; Antarctic Wildlife Research Unit, University of Tasmania – TAS; Department of Primary Industries, Water and Environment, Hobart – TAS; South Australian Museum, Adelaide – SA; Southern Right Whale Aerial Survey, Glenside – SA; Western Australian Museum, Perth – WA; Centre for Marine Science and Technology, Curtin University, Perth – WA, Centre for Whale Research, Perth – WA.

1. Species and stocks studied

Common name	Scientific name	Area/stock(s)	Items referred to
MYSTICETI			
Southern right whale	*Eubalaena australis*	V East Australian Coast Southern Australian coastline Head of the Bight (SA)	2.1; 2.1.1; 3.1.1; 3.1.3; 6.2; 9 2.1.1., 3.1.1 2.1.1
Humpback whale	*Megaptera novaeangliae*	East Australian Coast, QLD 5, Shelley Beach, NSW SA Coast WA Coast, off Exmouth	2.1.1; 2.1.2; 2.2; 3.1.1; 3.2; 4.1; 4.4; 5; 10; 11.1; 11.2 2.1.1, 4.3 4.3 9
Common minke whale	*Balaenoptera acutorostrata*	Eden District	4.3, 4.4
Dwarf minke whale	*Balaenoptera acutorostrata sensu lato*	Cairns section, Great Barrier Reef Marine Park	2.1.2; 2.2; 3.1.1; 3.2; 4; 10; 11.1; 11.2
Bryde's whale	*Balaenoptera edeni*	QLD Coast Merimbula, NSW SA Coast	4.3; 6.2 4.1, 4.4 4.3
Blue whale	*Balaenoptera musculus*	Southern Australia WA Coast, off Perth and C. Naturaliste WA Coast, off Rottnest Island & Exmouth	2.1.1; 3.1.1; 9 2.1.1, 3.1.1, 4.1 9
ODONTOCETI			
Sperm whale	*Physeter macrocephalus*	QLD Coast SA Coast Indian Ocean/Southern Ocean/Tasman Sea	4.3 4.3 4.4
Pygmy sperm whale	*Kogia breviceps*	QLD coast Hawkesbury Rv, NSW	4.3 4.3
Indo-Pacific Humpback dolphin	*Sousa chinensis*	QLD Coast	4.3
Bottlenose dolphin	*Tursiops aduncus*	QLD Coast Stanwell Park, Port Stephens NSW Port Phillip Bay VIC SA Coast	4.3; 7.1; 11.1; 11.2 2, 2.1.1, 3, 4.3 2.1 4.2, 4.3, 7.1
Indian Ocean bottlenose dolphin	*Tursiops aduncus*	QLD Coast	4.3
Pantropical spotted dolphin	*Stenella attenuata*	QLD Coast	4.3; 7.1
Long-snouted spinner dolphin	*Stenella longirostris*	QLD Coast	4.3
Common dolphin	*Delphinus delphis*	Port Phillip Bay, VIC QLD Coast SA Coast	2.1 4.2; 4.3; 7.1 4.2, 4.3, 7.1
Melon-headed whale	*Peponocephala electra*	Minni to Sandon Beach, NSW	4.3
False killer whale	*Pseudorca crassidens*	SA Coast	4.3
Killer whale	*Orcinus orca*	Southern Ocean	2.1.2, 3.1.1
Irrawaddy dolphin	*Orcaella brevirostris*	QLD Coast	4.3; 7.1; 9; 11.2
Unidentified dolphin		QLD Coast	4.3; 7.1
Dolphin	*Delphinidae*	SA Coast	4.3
Unidentified cetacean		SA Coast	4.3

2. Sightings data

2.1 Field work

2.1.1 SYSTEMATIC

Southern right whale

Western Australia Museum (Perth WA): Aerial surveys off the southern Australian coast WA/SA

An annual programme of aerial surveys for southern right whales continued as planned off the southern Australian coast in 2000. As in past years flights took place close inshore between C Leeuwin, Western Australia, and Ceduna, South Australia where the majority of the 'Australian' population seems to approach the coast in winter/spring. Two 'short' flights, on 25-27 July and 9-11 October, between C Leeuwin and Twilight Cove, WA, maintained the series of annual flights on the southern WA coast since 1976. A 'long' flight, on 8-12 September between C Leeuwin, WA and Ceduna, SA continued the series extended along the South Australian coast from 1993; an additional leg, on the west coast between C Leeuwin and Perth, was flown on 8 September. Counts and identifying photographs were obtained, but with an emphasis on the latter on the 'short' flights and on the former on the 'long' flight. Usual concentrations, mainly but not exclusively, of cows accompanied by calves of the year, were encountered at Doubtful I Bay (WA), in and east of Israelite Bay (WA), and at Head of the Bight (SA). There were more sightings than in recent years west of Albany (WA). Concentrations of 'unaccompanied' animals (adults unaccompanied by calves, often interacting) were found at Yokinup Bay (WA), and west of Twilight Cove (WA); there were more animals in the cove itself than in recent years. Overall numbers recorded were fewer than in 1999 with a total on the 'long' flight (C Leeuwin WA-Ceduna SA) of 253 animals, including 72 calves.

Significant positive increase rates continue to be obtained for a number of combinations of time series, animal classes and subareas. For the area as a whole (extended in 1993 to obviate possible effects of coastwise movement) the increase rate obtained, for 'all animals', was 5.45%, but it is not significant at the 5% level (95% CI 0.11-10.79, p=0.1111). It excludes data for 1996 and 1997, where there may have been some undercounting. Including those two years gives a rate of 5.49% (95% CI 1.15-9.83, p=0.0450); both time series are still somewhat small (6-8 years). Some 81 identifying photographs available from 1980-1995 with those (ca 450) from 1996-2000. Population size for that part of the 'Australian' population visiting the area surveyed is estimated to be 1100-1200 animals.

Southern Right Whale Aerial Survey (Dr D.J. Needham & Associates), Head of the Bight SA

On 30 August 2000, at 1500hrs, the survey sighted 32 adults and 28 calves. On 31 August, at 0900hrs, 29 adults and 24 calves were sighted. This resulted in no additions to Dr Needham's catalogue.

Humpback whale

The Oceania Research Project (QLD): surveys in Hervey Bay QLD

The Oceania Project conducted a humpback whale survey in the Hervey Bay Whale Management & Monitoring Area (specifically the area within and bounded by Rooneys Point, Fairway Buoy, Coongul Creek and west coast of Fraser Island) in 2000. The fieldwork is for a long term study of abundance, distribution and behaviour of the humpbacks in Hervey Bay being undertaken in conjunction and collaboration with the Queensland Environment Protection Agency.

Effort involved 10 weeks of fieldwork, 60 working days - August 6th to October 13th 2000. Survey conducted from 15 metre vessel, 6 days each week 7am to 5pm Sunday to Thursday and 7am to 1pm Friday. There were 805 Humpbacks sightings and 4896 photographs were obtained, 11 hours of DV video and 2 hours of DAT whale song recordings.

Systematic observation of pods including numbers, composition & behaviour. Photography of ventral flukes, lateral body colouration patterns and left and right dorsals were obtained as well as video of their behaviour and samples of whale song. Documentation includes GPS positions, time, date, behaviour and observation notes. A comprehensive Field Report is submitted to Queensland Environment Protection Agency titled " The Oceania Research Project - A ten year study (1992-2001) of the Abundance, Distribution and Behaviour of Humpback Whales in the Hervey Bay Marine Park, Queensland Australia - Field Report Year 9 -2000".

Greg Kaufmann - Humpback whale fluke photo-identification

Non-invasive boat-based research to photographically identify humpback whales (*Megaptera novaeangliae*) was undertaken from 4 August 2000 until 13 October 2000 in Hervey Bay, Queensland. The research effort focused on collecting photographs of ventral fluke and lateral body colouration patterns (Kaufman et al., 1986; 1993) for all pods (groups) of humpback whales encountered.

Photographs of the left and right views of the lateral body, ventral surface of the tail flukes and genital areas (when presented) were taken to identify individuals. For each pod encountered, the following data was recorded: date,

time, location (determined by GPS, Map Datum: WGS 84), group size and composition (eg, calf, adult, sub-adult), general activity of the whales, and sea surface temperature. In addition, field notes included film roll, film frame number and content (eg: fluke, lateral body, etc.) of each photograph taken. All photographs are subsequently catalogued and recorded according to roll number, time, location, date, pod composition, size, and sex (if determined) for each exposed frame.

Surface water temperature was measured near 278 of the 296 observed pods in the study area. Sea surface temperatures were cooler in August (as compared to '99 data), with the remainder of the season comparable to '99. This information will be combined with our previous temperature data and animal identifications to further clarify the possible correlation between surface water temperature and migration timing for individual animals.
Humpback whale song was recorded on 6 occasions. A total of 180 minutes of song was recorded. The table above details the location of recorded singers (refer to: ACT INFO- SG, for singer). Analysis of song is ongoing through university graduate student Libby Eyre, of New South Wales.

During 2001 we will be scanning and placing our entire Australia and South Pacific humpback whale photo-identification catalogues on a digital photo-database system developed by the Centre for Whale Studies and the West Australian Museum.

Michael Noad - Humpback Whale Acoustics Study
A brief season of acoustic recordings of migrating humpback whales off Peregian Beach (26°30'S, 153°07'E), SE Queensland, 30th Sep.– 21st Oct. 2000.

Cape Byron Whale Research Project: land and vessel-based research off Cape Byron NSW
A study of the migration patterns, distribution, abundance, and behaviour of humpback whales (*Megaptera novaeangliae*) was undertaken from and off Cape Byron, northern New South Wales during 2000 by the Southern Cross Centre for Whale Research (Noosa QLD), under NPWS Lic No A1701 and Environment Australia permit no. 96/00853, p1998/057.
The research project was divided into two aspects:

i. Land based survey using a theodolite interfaced with a lap top computer to position and track whales as they migrate past the coast; and
ii. Photo-identification from a small vessel to identify individual animals from fluke and lateral body colouration patterns and markings. Note skin samples were collected opportunistically from sloughed skin for DNA analysis.

The bulk of the research project was conducted between the dates of 17 June and 9 July 2000 which coincides with the recorded peak catch by the Byron Bay whaling station which closed in 1962.

Land Based Research Effort: In the period 17 June to 9 July 2000, 150 hours of theodolite survey were undertaken. 193 pods were observed. This included a total of 336 humpback whales in pods of an average size of 1.74 whales/pod (between 1 and 5 whales per pod). Note: it was not possible to determine the total number of whales in pods observed some distance off shore (ie. pods observed over 5 nautical miles off shore under average sea conditions). The number of whales tracked by theodolite will be an underestimate of actual number of whales.

Vessel Based Research Effort: Survey Period: In the period 17 June to 9 July 2000, during 98 hours and 1 minute of photo-identification from a small vessel (31 hours 22 mins with whales), researchers sighted a total of 107 whales in 49 pods, at an average pod size of 2.18 whales/pod. Humpback whale ID-photographs are in the process of being selected. They will be logged and submitted to the South Pacific Humpback whale catalogue compiled by the South Pacific Whale Research Consortium managed by the Auckland University (with a copy being made for Environment Australia for their records). Matching of fluke photographs with those in the catalogue has not been undertaken. Full assessment and record of life histories of known animals is still under way.

A total of 108 sloughed skin samples were collected during 2000. Note mutable samples were collected from some pods. Genetic samples are currently stored at Southern Cross University for DNA analysis. A faeces sample from a humpback whale was also collected and is stored at Southern Cross University for analysis.

Cape Solander Survey: land-based sighting survey, Cape Solander NSW
NPWS supports a land-based sighting survey of Humpback whales on their northern migration.

<u>Dwarf minke whale</u>

Vessel-based observations, Cairns section of Great Barrier Reef Marine Park QLD

Dr P.W. Arnold & Dr R.A. Birtles conducted observations were from *Undersea Explorer*, a 25m long commercial live-aboard dive vessel, during six weeks (June 11 - July 21, 2000). There were 41 primary encounters with about 200 dwarf minke whales; in one of these encounters an Antarctic minke whale was also seen. Surface and underwater observations were routinely made during the encounters, concentrating on recognition of individual whales and documentation of whale-swimmer interactions. In an abbreviated field season, Mr J. Gedamke (University of California, Santa Cruz) recorded about 18 hours for analysis of dwarf minke whale vocalisations during encounters on eight separate days.

Additional species observed were spinner dolphin and humpback whale.

Blue whale

Deakin University (Warrnambool VIC) / Australocetus Research: Aerial surveys
Sixteen aerial surveys were conducted since 31 May 2000. This includes the 2000/2001 field season. On 12 flights, whales were sighted. A total of 133 whales were sighted in 82 sightings.

Western Australian Museum (Perth WA): Aerial surveys off Rottnest Island WA
A series of monthly survey flights for blue whales was planned from January 1999, in an area *ca* 20nm west of Rottnest Island, Western Australia where up to five blue whales per day had been sighted on the Japan/IWC sightings cruise in December 1995. Contrary to expectations, only one blue whale was seen on the surveys (conducted under the field leadership of CLK Burton) between February 1999 and January 2000, though only 8 flights were completed through vagaries of weather, availability of aircraft and of observers. However, in February 2000 a total of 15 blue whales were recorded on two flights. With the small number of sightings, no conclusions on seasonal distribution or abundance of blue whales were possible. Continuation of the programme in 2000-2001 gave more positive results. On one flight in February 2001, 14 blue whales were seen, and during 30 days of boat-based operations in the same area, in January-March 2001, there were 75 blue whale sightings, including 5 calves, although some are likely to have been repeat sightings. The largest daily count from the boat was 12, including one calf. The boat-based operations (undertaken by C and M-N Jenner, Centre of Whale Research, WA) are designed to provide identification photographs of individuals, and skin samples for genetic studies. In January-March 2001 photographic identification of at least 23 animals was attempted, and 22 genetic samples (many of them sloughed skin) were obtained.

Parallel acoustic studies have been conducted in the area (by R McCauley, Centre for Marine Science and Technology, Curtin University, WA), mainly using automatic 'loggers' which record underwater sounds over a period, but also from hydrophones deployed opportunistically during the boat-based operations. Even in the absence of blue whale sightings, many records of sounds probably attributable to blue whales were obtained during February-April 2000, but possibly originating from animals outside visual range of the boat or aircraft. Boat-based opportunistic sound recording continued during 2001, with 76 records obtained from early January to mid-March.

The results so far suggest that the occurrence of blue whales in the area is most probably linked to the presence of their food (small planktonic shrimp-like crustaceans), itself dependent on oceanographic conditions, which in this area at least can be very variable. At the time of year of the major occurrence so far of blue whales in the area (mid-late summer) most if not all the sightings are likely to have been pygmy blues. Funding for continued aerial surveys and limited boatwork (to include opportunistic acoustics), has been provided to March 2002.

Bottlenose dolphin

National Parks & Wildlife Service & Macquarie University (NSW): Cetaceans in and around Port Stephens NSW
Continuation of 'Impacts of Vessels on Bottlenose Dolphins (NPWS Lic No A2607)', a research project initiated in 1999. The project is a collaborative effort between NPWS and Macquarie University. It involves collecting baseline scientific data on cetaceans in and around Port Stephens; assessing the impacts of both commercial and recreational vessels on cetaceans in and around Port Stephens; and photo-identification to identify individual animals using fluke and lateral body coloration and markings.

Macquarie University: social structure and dynamics of bottlenose dolphins, Jervis Bay and Port Stephens – NSW
A PhD student has been conducting this ongoing research project, under Lic no A2126, since 1997. The project involves investigating bottlenose dolphin group size, composition and stability in relation to behaviour, kinship and gender; assessing genetic relatedness within same-sex individuals and between sexes; investigating individual site fidelity and habitat use; and comparing the social behaviour of bottlenose dolphins between Jervis Bay and Port Stephens and identifying possible ecological and social factors explaining observed differences and similarities. In 118 sightings, 699 animals have been counted.

Southern Ocean Cetacean Environment Program - Marequus Pty Ltd

SOCEP participated in two Australian National Antarctic Research Expedition voyages Voyage 4 and Voyage 6 in the 1999/2000 Antarctic season which fell within the 2000 calendar year. A summary table of sightings is available from SOCEP.

Reproduction in Marine Mammals – University of Sydney NSW

An ongoing research project under Lic No. B1691 has been underway since 1997. The project is being conducted by the University of Sydney and involves using post mortem blubber biopsies to develop a method to gauge the reproductive status of wild cetaceans with minimal intervention.

2.1.2 OPPORTUNISTIC, PLATFORMS OF OPPORTUNITY

Australian Fisheries Management Authority (AFMA) observers:
The following figures represent opportunistic sightings made by AFMA fisheries observers, from commercial fishing vessels between 1 January 2000 and 31 December 2000.

Species	Date	Location	Number	Vessel type	Interaction with fishing gear	Comments
Orca whale	20/09/2000	52° S 74° E	4	Trawler	No	3 adults, 1 calf
Orca whale	27/09/2000	52° S 74° E	4	Trawler	No	2 adults, 2 calves
Orca whale	6/10/2000	52° S 74° E	4	Trawler	No	3 adults, 1 calf
Sperm whale	13/09/2000	52° S 74° E	1	Trawler	No	1 adult of about 15 meters
Orca whale	19/10/2000	52° S 74° E	>20	Trawler	No	Too many to count.
Humpback whale	2/10/2000	33° S 44° E	2	Trawler	No	This was in international water prior to entry to HIMI. Possibly 2 others 1 mile distant
Unknown whale	13/10/2000	45°'S 42° E	1	Trawler	No	Sighted in international waters. Too distant to identify - only spout sighted

AFMA fisheries observers were present on board:

- All commercial fishing trips to the Heard Island and McDonald Islands Fishery;
- All commercial fishing trips to the Macquarie Island Fishery;
- One fishing trip to the Antarctic sub-continent (CCAMLR Statistical Division 58.4.2), which included transiting CCAMLR Statistical Division 58.4.1;
- Some fishing voyages to the Indian Ocean high seas by Australian vessels;
- One trawl fishing operation on the South Tasman Rise, external to the Australian EEZ; and
- Vessels trawl fishing for blue grenadier off the west coast of Tasmania.

Royal Melbourne Institute of Technology (VIC): bottlenose dolphin research in Port Phillip Bay VIC
Under research permit number 10000605, 10001150: Opportunistic collection of teeth and tissue samples from bottlenose dolphins which are found dead due to natural or accidental causes and collection of faecal plume samples in order to investigate geographic variation in inshore and offshore populations.
Under research permit number 10000699: Observations to determine the ecological parameters that affect the distribution, abundance and behaviour of the bottlenose dolphin in Port Phillip Bay and to assess the impact of "dolphin swim tours". This research includes documentation of sound production in the presence and absence of swim tours to determine whether an acoustic response is made in relation to swim tours.

Deakin University (VIC): observation of bottlenose dolphins VIC
Under Research Permit number 10000710: Observation and photography of bottlenose dolphins to analyse the influence of environmental variables on the behaviour of bottlenose dolphins.

Dolphin Research Institute (VIC): observation of bottlenose dolphins in southern Port Phillip Bay VIC
Under Research Permit numbers 10000681, 10000683, and 10001108**:** Observation and photography of Bottlenose Dolphins to obtain baseline data on movements, behaviour, population size (including determination of the resident population) in southern Port Phillip Bay and the collection of tissue specimens from cetaceans found dead from natural or accidental causes.

Greenpeace International opportunistic sightings for cetaceans in the Indian Ocean Sanctuary
12 April to 26 April 2000 cetacean sightings on board MV 'Arctic Sunrise' from Mauritius to Singapore. 10 species

seen. Details in: Observations of Cetaceans in the Indian Ocean Sanctuary, Mauritius to Singapore, April 2000. Paper SC/52/016 submitted to the Scientific Committee of the International Whaling Commission (unpublished).

Antarctic Wildlife Research Unit, University of Tasmania TAS
Opportunistic sightings of killer whales are still being collated for the Southern Oceans Orca Database, particularly from waters around sub-Antarctic Macquarie Island. Specific sighting sheets were filled in by ANARE expeditioners and a number of hours of video footage of killer whale behaviour is also available. For the period January to December 2000, a total of 55 sightings were made with a peak in November. Another 5 sightings in the SOO Database include reports from commercial longline and reef fishers operating in Tasmanian and Victorian waters. Photos are also being collected of seals with killer whale or shark bites – a total of 10 were collected for the Year 2000.

Department of Primary Industries, Water and Environment reports the following opportunistic sightings of cetaceans from Tasmania during 2000.

Common name	Number of sightings	Range	Common name	Number of sightings	Range
Humpback Whale	18	1-16	Whale	2	1
Southern Right Whale	24	1-4	Common Dolphin	1	1
Sperm Whale	1	5	Bottlenose Dolphin	5	6-15
Long-finned Pilot Whale	3	10-20	Dolphin	6	1-6
Killer Whale	3	1-3			

2.2 Analyses/development of techniques

Southern Cross Centre for Whale Research, Noosa – QLD
Newcastle University in conjunction with the Cape Byron Whale Research Project is currently developing a GIS package to analyse movements of marine mammals. This package has been trialled on humpback whale movements and on dolphin and vessel movement. The following is an abstract of a paper which is currently being developed in relation to the GIS package.

> *Temporal GIS for Marine Mammal Research. By Eric Kniest & David Paton*
> Classic GIS systems are insufficient in dealing with temporal data, such as that collected when positioning whale or dolphin pods, which are constantly on the move. As part of the Cape Byron Whale Research Project a temporal GIS system called ŒCyclops GIS, is being developed to make better use of such data collected by theodolite tracking systems. This temporal GIS system can make the study of marine mammal behaviour, such as the interaction with other mammals or vessels, easier and much more efficient. For example the behaviour of a whale pod can be closely examined as a vessel approaches over a period of time. Changes in the pod's behaviour, speed and course can be monitored at timed intervals, along with the critical distance between subjects. This GIS system adds a valuable additional function to the theodolite tracking system ŒCyclops,. ŒCyclops GIS, also contains most of the main features of traditional GIS systems without the complex user interface and set-up procedures, since most data is directly imported from ŒCyclops. Both ŒCyclops, and ŒCyclops GIS, have been developed as part of a continuing marine mammal research program and are freely available for researchers.

Dr R.A. Birtles and Dr P.W. Arnold - Dwarf minke whales – QLD
In a collaborative study with Birtles and Arnold, Mr Andrew Dunstan modified the techniques of Spitz, Herman & Pack (2000) to measure minke whales using underwater videogrammetry. Repeated measurements were taken on a minimum of 12 dwarf minke whales and one Antarctic minke whale. Variability was high in the initial recordings and the technique is being refined to give more consistent readings.

The Oceania Research Project - Surveys in Hervey Bay – QLD
Analysis of photography has been completed for 1996,1997 and 1998 and analysis for 1994/95/99/00 is in progress. Analysis includes identification of resights within and between season and review of pod composition. Development of a web based fluke catalogue is in process. A dataset for the period 1996/2001 is being prepared as a basis for mark/recapture estimates of abundance. The Oceania Research Project maintains records of photography between 1994 and 2000. In 2000, 805 whales were sighted and 3528 photographs obtained.

Greg Kaufmann - Humpback whale fluke photo-identification – QLD
Due to calm sea conditions the filed effort was greater than the previous year. As a direct result a greater number of whales were observed 699 in 200 as compared to 432 in 1999. A greater number of mother and calf pairs were observed than in previous years, 144 calves in 2000 verse 56 in 1999.

Over 346 hours were spent on the water during 41 days of field effort. In the 159 hours spent observing whales (46.48% of field effort), with slightly over 17 animals observed each day. During the course of study, 296 pods were documented, consisting of (at least) 420 adults, 124 sub-adults, 144 calves and 11 whales of undetermined age/size class. The average pod size for this area was 2.36 whales.

A comparison between this and previous seasons field effort (1997-99) shows a general increase in the number of days and time spent in the field (30 days-1997, 31 days-1998, 35 days-1999, 41 days - 2000). In 2000 nearly 347 hours were spent searching for whales – a 70-hour increase over the effort spent in 1999. Results show that the number of whales observed varied during the four seasons, despite a steadily increasing field effort.

In Harvey Bay, between August and September 2000, researchers spent 346.87 hours on the water, 160.11 of which were with whales (46.16%). They sighted 699 whales in 296 pods. The ratio of the number of whales observed per number of hours spent on the water was 2.01. Surface water temperature data associated with age and class of whales observed continues to suggest a connection between sea surface temperature and the timing of migration for females. Females with newborn calves were observed in Hervey Bay almost three weeks earlier than in 1999 (20 August 2000 verse 06 September 1999).

Michael Noad - Humpback Whale Acoustics Study
Continued analysis of visual and acoustic data collected in 1997 at Peregian Beach for PhD thesis. Development of technique and indices for stand-alone acoustic population estimates for humpback whales. This technique would be particularly useful where visual surveys are impractical or limited, eg. for stocks migrating across open ocean or stocks around island groups without high vantage points. Also conducting analysis of swimming speeds for singing and non-singing animals.

Macquarie University (NSW)
Techniques for biopsy darting and analysis of genetic relatedness have been further developed by a PhD student (Luciana Moller). Moller completed her dissertation in May 2001.
Newcastle University in conjunction with the Cape Byron Whale Research Project is currently developing a GIS package to analyse movements of marine mammals.

Dolphin Research Institute (VIC)
Out of 26 boat surveys conducted, Bottlenose dolphins were sighted on 21 days with multiple sightings being made on four days.

3. Marking data

3.1 Field work

3.1.1 NATURAL MARKING DATA

Species	Feature	Area/Stock	Calendar year/season/no. photographed	Catalogued (Y/N)	Catalogue total	Contact person / institute
Humpback whale	Fluke	Hervey Bay Group V	2000/winter/805	in development	3528	The Oceania Project
Humpback whale	Left & right dorsal	Hervey Bay Group V	2000/winter/805	in development	3528	The Oceania Project
Humpback whale	Left & right lateral body markings	Hervey Bay Group V	2000/winter/805	in development	3528	The Oceania Project
Humpback whale	Fluke	Hervey Bay	293	Y	2100 (Group V)	Pacific Whale Foundation
Humpback whale	Left & right dorsal	Hervey Bay	118	Y	2100 (Group V)	Pacific Whale Foundation
Humpback whale	Left & right lateral body markings	Hervey Bay	118	Y	2100 (Group V)	Pacific Whale Foundation
Humpback whale	Fluke	5	2000	-	-	Paton, SCCWR (data still being analysed)
Southern right whale	Head callosities	Southern Australian coastline	81 (probable minimum)	N	ca600	Bannister, WA Museum
Blue whale	Flank pigment	Bonney upwelling	2	Y	15	Peter Gill, Australocetus
Blue whale	Lateral body	Off C Rottnest I, WA	23 (to be confirmed)	N	-	Bannister, WA Museum
Dwarf minke whale						
Killer whale	Left and right	Macquarie	2	N	13	Morrice, Southern

	dorsal, and lateral markings	Island, Southern Ocean				Oceans Orca Database
Bottlenose dolphin	Dorsal fin	Port Stephens/ Jervis Bay	2000 / 122	Y		Moller/Allen, GSE Macquarie University
Bottlenose dolphin	Dorsal Fin	Port Phillip Bay	2000/ 1000 photographs from 54 individuals	Y	712	Dolphin Research Institute

Dr R.A. Birtles and Dr P.W. Arnold - Dwarf minke whales
During the 2000 field season, recognition of individual whales based on scar and colour pattern variations was a priority. Underwater observations totalled approximately 90 hours; 15 hours of digital videotape and over 2000 underwater photographs were taken for analysis.

3.1.2. ARTIFICIAL MARKING DATA

1999 data not included in earlier reports (South Australian Museum):
Three live bottlenose dolphins stranded in April 1999. All 3 animals were tagged at the base of the dorsal fin. One of these animals died, the other two were refloated. One of these animals was found dead one week later, the third animal has not been resighted.

3.1.3 TELEMETRY DATA

Nothing to submit.

3.2 Analyses/development of techniques

Dr R.A. Birtles and Dr P.W. Arnold - Dwarf minke whales
Analysis of the data is still in progress. To date, about 100 individual dwarf minke whales were recognised during the 2000 field season. Three dwarf minke whales first identified in 1999 were re-sighted in the 2000 season. There were within-season re-sightings of about 20 individual dwarf minke whales during the six week season. Maximum time between sightings was 19 days and maximum distance between sightings was 60 km.

Greg Kaufmann - Humpback whale fluke photo-identification
From the 8,964 images, all the individual whales identified by fluke and lateral body markings have been catalogued and the associated field data stored in a Microsoft Excel "Boat Log" file. Each identified whale was then assigned to a temporary catalogue, and all images within that catalogue were checked for within-season resightings. At the end of within-season analysis, the best image of each whale was selected and assigned a temporary unique code for that year. This process created a Season ID Catalogue that contains images of all the individual whales identified within the 2000 season.

The resight analysis of the 2000 data resulted in 411individual whales being identified by fluke and lateral body pigmentations and distinguishing marks. This includes 293 whales being identified by their fluke pattern alone and 118 animals identified by their lateral body pigmentation. Identifying photographs were obtained of 53 mother/calf pairs. Using a photographic match of fluke and lateral body pigmentation to genital slit, 25 individual whales were photographically sexed. Of the 25 total sex identifications, seven were calves (three females, four males). Of the remaining 18 individuals, 10 were determined to be male and 15 to be female.

During the study, 103 whales identified in Hervey Bay were observed on more than one occasion. These multiple sightings ranged from whales being observed in more than one pod during the same day (53 whales or 51% of the 411 identified whales) to whales that were observed across many days (50 whales or 49% of the identified whales). The resight time spans ranged from 1 to 14 days. The average resight span for all the resighted whales was 3.3 days (+/- 1.1 SD). By deleting the whales resighted the same day, the corrected average resight span is 6.7 days (+/- 1.2SD.

Analysis of the data will continue by comparing the identified whales from 2000 to our Australian fluke ID catalogue that contains over 2100 individual animals identified along the east coast of Australia.

4. Tissue/biological samples collected

4.1 Biopsy samples

Species	Area/stock	Calendar year/ season/ no. collected	Archived (Y/N)	No. analysed	Total holdings	Contact person/institute

Humpback whale	Hervey Bay/Group V (East Australian Coast)	2000/140	Y	-	Slough Skin	The Oceania Research Project QLD
Humpback whale	Area V	108	Y	12	Need to confirm with SCU	Southern Cross University QLD
Dwarf minke whales	Northern Great Barrier Reef	2000/36	N	-	slough skin	Dr R.A. Birtles and Dr P.W. Arnold
Blue whale	Off Western Australia	28	N	0	37	Bannister, WA Museum
Bottlenose dolphin	Port Stephens/ Jervis Bay	2000	Y	-		Moller, GSE Macquarie University
Common dolphins	South East Queensland	2000/4	Y	-	Skin	Blanchard, Sea World QLD
Bryde's whale	Merimbula, NSW	1	Y	1	1	Australian Museum

Other Samples – eg. slough skin / skin scrape
Nothing to submit.

4.2 Samples from directed catches or bycatches
Samples from bycatch

Species	Area /stock	Calendar year/ season total	Archived (Y/N)	Tissue type(s)*	Contact person/institute
Short-beaked common dolphin	SA coastline	2000/7	Y	Genetic tissues, reproductives, stomach and intestines, liver, kidney, muscle , blubber (toxic contaminants)	C. Kemper / SA Museum
Bottlenose dolphin	SA coastline	2000/2	Y	Genetic tissues, reproductives, stomach and intestines, liver, kidney, muscle, blubber (toxic contaminants)	C. Kemper / SA Museum
previous years:					
Short-beaked common dolphin	SA coastline	1999 / 8	Y	Genetic tissues, reproductives, stomach and intestines, liver, kidney, muscle , blubber (toxic contaminants)	C. Kemper / SA Museum
Bottlenose dolphin	SA coastline	1999 / 4	Y	Genetic tissues, reproductives, stomach and intestines, liver, kidney, muscle, blubber (toxic contaminants)	C. Kemper / SA Museum
Short-beaked common dolphin	SA coastline	1998 / 5	Y	Liver, kidney, muscle, blubber, skin, blood, reproductive organs and stomach and intestines	C. Kemper / SA Museum
Bottlenose dolphin	SA coastline	1998 / 7	Y	Liver, kidney, muscle, blubber, skin, blood, reproductive organs and stomach and intestines	C. Kemper / SA Museum
Minke whale	*Balaenoptera acutorostrata*	1998/1	Y	Liver, kidney, muscle, blubber, skin, blood, reproductive organs and stomach and intestines	C. Kemper / SA Museum

*eg. liver, skin, blubber etc.
** South Australian Museum data – not included in earlier reports – includes possible/probable entanglement (eg. 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); entangled in tuna farm anti-predator net; entanglement in other types of net or line; accidental or intentional injury by humans.

4.3 Samples from stranded animals

Species	Area/stock	Calendar year/ season total	Archived (Y/N)	Tissue type(s)*	Contact person/institute
South Australia					
Short-beaked common dolphin	SA coastline	2000/22	Y	Genetic tissues, reproductives, stomach and intestines, liver, kidney, muscle, blubber (toxic contaminants)	C. Kemper / SA Museum
Bottlenose dolphin	SA coastline	2000/5	Y	Genetic tissues, reproductives, stomach and intestines, liver, kidney, muscle, blubber (toxic contaminants)	C. Kemper / SA Museum
Dolphin	SA coastline	2000/1		none	C. Kemper / SA

					Museum
False killer whale	SA coastline	2000/1	Y	Genetic tissues, reproductives, stomach and intestines, liver, kidney, muscle, blubber (toxic contaminants)	C. Kemper / SA Museum
Bryde's whale	SA coastline	2000/1	Y	Genetic tissues, reproductives, stomach and intestines, muscle, (toxic contaminants)	C. Kemper / SA Museum
Humpback whale	SA coastline	2000/1	Y	Genetic tissues, reproductives, liver, kidney, muscle, blubber (toxic contaminants)	C. Kemper / SA Museum
previous years:					
Short-beaked common dolphin	SA coastline	1999 / 24	Y	Genetic tissues, reproductives, stomach and intestines, liver, kidney, muscle, blubber (toxic contaminants)	C. Kemper / SA Museum
Bottlenose dolphin	SA coastline	1999 / 19	Y	Genetic tissues, reproductives, stomach and intestines, liver, kidney, muscle, blubber (toxic contaminants)	C. Kemper / SA Museum
Sperm whale	SA coastline	1999 / 1	Y	None	C. Kemper / SA Museum
Killer whale	SA coastline	1999 / 2	Y	Genetic tissues, reproductives, stomach and intestines, liver, kidney, muscle, blubber (toxic contaminants)	C. Kemper / SA Museum
Dwarf sperm whale	SA coastline	1999 / 1 (+ foetus)	Y	Genetic tissues, reproductives, stomach and intestines, liver, kidney, muscle, blubber (toxic contaminants)	C. Kemper / SA Museum
Fin whale	SA coastline	1999 / 1	Y	Genetic tissues, reproductives, liver, kidney, muscle, blubber (toxic contaminants)	C. Kemper / SA Museum
Dolphin	SA coastline	1999 / 2	Y	None	C. Kemper / SA Museum
Queensland					
Bryde's whale	Cairns	2000/1	Y/W1230	AN, AS, AA, AT	Jenny Haines / QPWS
Common dolphin	Gold Coast	2000/1	Y/W1195	AN	Haines / QPWS
Dolphin	Cairns	2000/1	Y/W1144	AN, AT	Haines / QPWS
Pygmy sperm whale	Mossman – Lizard Island	2000/1	Y/W1272	AN	Haines / QPWS
Irrawaddy dolphin	Townsville	2000/1	Y/W1208	AN	Haines / QPWS
Irrawaddy dolphin	Cairns	2000/1	Y/W1241	AN	Haines / QPWS
Indo-Pacific humpback dolphin	Townsville	2000/1	Y/W1136	AN, AS, AT	Haines / QPWS
Indo-Pacific humpback dolphin	Townsville	2000/1	Y/W1150	AN	Haines / QPWS
Indo-Pacific humpback dolphin	Townsville	2000/1	Y/W1215	AN	Haines / QPWS
Indo-Pacific humpback dolphin	Townsville	2000/1	Y/W1251	AN	Haines / QPWS
Indo-Pacific humpback dolphin	Townsville	2000/1	Y/W1163	AN	Haines / QPWS
Indo-Pacific humpback dolphin	Stradbroke Island	2000/1	Y/W1169	AN	Haines / QPWS
Bottlenose dolphin	Gold Coast	2000/1	Y/W1157	AN	Haines / QPWS
Bottlenose dolphin	Fraser Island	2000/1	Y/W1207	AN	Haines / QPWS
Bottlenose dolphin	Moreton Island	2000/1	Y/W1271	AN	Haines / QPWS
Bottlenose dolphin	Moreton Island	2000/1	Y/W1180	AN, AP	Haines / QPWS
Bottlenose dolphin	Yeepoon	2000/1	Y/W1266	AN	Haines / QPWS
Short-finned pilot whale	Iluka, NSW	2000/1	Y/ SW	skin, liver blubber, kidney, muscle	Sea World

AS = Skeletal material AA = Anthropogenic items in the gut AT = Tissues - general for histology AP = Parasites

AN = Necropsy is performed whenever it is considered possible to establish the cause of death. Samples are taken for pathological and histological tests from major organs such as liver, kidney, skin, blubber and intestine.

* Skeletal material (skull and/or postcranial) was collected from all specimens lodged with SA Museum.

Species	Area/stock	Calendar year/ season total	Archived (Y/N)	Tissue type(s)*	Contact person/institute
New South Wales					
Melon-headed whale	Minni to Sandon Beach, NSW	1	Y	Muscle, Skin	Denis O'Meally, Australian Museum
Minke whale	Eden District	1	Y	Muscle	O'Meally, Australian Museum

Humpback whale	Shelley Beach, NSW	1	Y	Skin	O'Meally, Australian Museum
Bottlenose dolphin	Stanwell Park, NSW	1	Y	Skin	O'Meally, Australian Museum
Pygmy sperm whale	Hawkesbury Rv, NSW	2	Y	Liver, Kidney, Skin, Umbilicus	O'Meally, Australian Museum

* Skeletal material (skull and/or postcranial) was collected from all specimens lodged with SA Museum in 1998/99 (not included in earlier reports).

4.3 Analyses/development of techniques

The Oceania Research Project - Surveys in Hervey Bay
The Oceania Project has entered into collaboration with Professor Peter Baverstock of Southern Cross University. The research aim of the collaboration is to establish a database integrating photo ID and genetic data as a basis for future research projects, particularly to track movements of individual humpbacks and to assess the degree of mixing between populations in the South Pacific.
The tissue samples obtained by The Oceania Project are being analysed by The Centre for Animal Conservation Genetics using the standardised set of microsatellite loci listed by ANZECC (Corkeron 1999). The genotypes of each individual will be cross-matched to The Oceania Project's existing Photo ID database allowing future studies the flexibility of both genetic and photographic approaches to tracking the movement of individuals.

Southern Cross Centre for Whale Research, Noosa QLD
In association with the SCCWR, Southern Cross University has established a specialist cetacean genetics laboratory, which is operating in close cooperation with the Auckland University Genetic Laboratory, coordinated by Dr Scott Baker. This specialist laboratory is currently analysing Humpback whale DNA samples for a population estimate of the Area V population. This is the only laboratory of its type in Australia, currently using an agreed standard protocol for analysis so results can be compared with other research on whale populations throughout the world.

The Evolutionary Biology Unit received tissue samples of two animals from the NSW NPWS, Eden District, on 11 Jan 2001. One animal was identified by NPWS as a baleen whale, possibly a minke, *Balaenoptera acutorostrata*. The other was skin tissue obtained from the bottom of a recreational boat and was believed to be that of a whale or a shark. A 310 base pair (bp) region of the mitochondrial Cytochrome *b* gene was sequenced and compared to similar sequences lodged in publicly available international nucleotide databases. This analysis confirmed that the samples were that of a minke whale, and Bryde's or tropical whale, *Balaenoptera edeni*, respectively.

See Evans 2001. Cetacean strandings in the Southern Ocean Sanctuary. Report to Environment Australia, submitted June 2001. Abstract:

No stranding events were reported to the University of Tasmania during the period 1 June 2000 to 30 May 2001. Further studies into the age structure and pollutants burdens of animals involved in the three sperm whale (*Physeter macrocephalus*) mass strandings of 1998 were conducted. Age structure studies also involved investigations into minimising variation in age estimation both during preparation of tooth sections and the reading of these sections. Ages of animals ranged from 0.75 growth layer groups (GLGs) to 64 GLGs. The age structures of the three stranding groups were not significantly different, however the age structure of males and females were different. Greater precision of age estimates was obtained through variations in preparation techniques to those published in the past: etching involved higher concentrations of acid and shorter etching periods. Reading methods involving digital imaging of tooth sections also increased precision in final age estimates. Cross reading experiments suggest a need for further investigation into variation in age estimates between readers. Blubber samples were analysed for the pollutants p, p' DDT, p, p' DDE, p, p' DDD, ΣDDT, αBHC, βBHC, γBHC (lindane) δBHC and the 7 PCB congeners 28, 52, 101, 118, 138, 153 and 180. Maximum concentrations of the pollutants lindane ΣBHC, p, p' DDT, p, p' DDD, ΣDDT and ΣPCB were highest in females, while males contained higher concentrations of p, p' DDE. However, concentrations of pollutants between males and females were not significantly different except in the case of the PCB congener 52. Between the three stranding groups this was the only compound found to be statistically different. Different pollutants were found to have varying associations with age, total length, blubber thickness and fat content, suggesting differing intake, metabolism, deposition and excretion of pollutants between sexes. Different pollutants were also found to have varying associations with lipids throughout the blubber layer. Concentrations of the DDTs were consistently higher in the lowest blubber strata while PCB concentrations were higher in the uppermost blubber strata. Concentrations are generally lower than those in this species in the Northern Hemisphere, but were comparable or exceeded those in the Northern Hemisphere in a number of cases. Concentrations appear to have increased in this species in the Southern Hemisphere over the past decade but definite conclusions are hindered by a lack of comparable data. Associated projects conducted by the Southwest Fisheries Science Centre, La Jolla, USA, the Peruvian Centre for Cetacean Research, Lima, Peru, the University of Auckland, Auckland, New Zealand and the Antarctic Wildlife Research Unit, Hobart, Australia are detailed.

5. Pollution studies

The Oceania Research Project - Surveys in Hervey Bay QLD
During the 2000 humpback season The Oceania Project undertook Chlorophyll A sampling for a long term water

quality monitoring program, in the Whale Management and Monitoring Area of the Hervey Bay Marine Park, being conducted in conjunction with the Environment Division of the Queensland Environment Protection Agency. Weekly triplicate samples were obtained from 6 structured geographical areas within Hervey Bay during the period August 6th to October 13th 2000.
Sampling for the program commenced in 1993 and outcomes of the first five years - 1993/1997 - is provided in: "Queensland Department of Environment & Heritage, Environmental Technical Report No 23: Hervey Bay Report - Chlorophyll-a Sampling by The Oceania Project, Andrew Moss and Julie Kocovski, ISSN 1037-4671 RE271, July 1998".

Kirsten Dobbs – Great Barrier Reef Marine Park Authority QLD
The pollutant loading of marine mammals is being investigated. This investigation screens for pollutants including heavy metals, organochlorines, hcb, lindane, heptachlor, aldrin, DDT and metabolites, PCBs, chlordane, dioxins.

South Australian Museum
The Museum routinely collects samples from almost all stranded or entangled animals. During 2000 the tissues from 25 Short-beaked common dolphins, 6 South Australian bottlenose dolphins 1 False killer whale, 1 Bryde's whale, (muscle only), 1 humpback whale, were collected. These samples have not yet been analysed. Greenpeace had the blubber samples of 4 bottlenose dolphins collected in South Australia analyses for dioxins. Their results were made public in a media release on the subject during early 2001. [During 1999 the tissues of 15 South Australian bottlenose dolphins were analysed for PCBs, mercury and cadmium by the EPA of the South Australian Government (Environment Protection Agency 2000). Mercury levels were extremely high (up to 1570 mg/kg wet weight) in some animals. PCB (Arochlor 1260) was found to be moderately high (up to 19.5 mg/kg wet weight) in some animals.]

6. Statistics for large cetaceans
6.1 Direct catches (commercial, aboriginal and scientific permits) for the calendar year 2000
Not applicable for Australia.

6.2 Other non-natural mortality for the calendar year 2000

Australian Fisheries Management Authority logbooks
During the calender year 2000, seven AFMA logbooks provided for the reporting of cetaceans. (This has increased to ten logbooks in the calender year 2001.) This table presents a summary of incidental mortalities/interactions reported in AFMA logbooks for the calendar year 2000.

Species	Fishing gear used	Date	Location	Number	Status
Orca whale	Longline	24/01/2000	27°S 158°E	1	Alive and vigorous
Brown whale	Longline	7/12/2000	30°S 161°E	1	Alive and vigorous
Pilot whale	Longline	5/12/2000	29°S 114°E	1	Unknown
Other whale	Longline	28/01/2000	32°S 113°E	1	Alive and vigorous
Other whale	Longline	7/12/2000	30°S 161°E	1	Alive and vigorous
Dolphin	Gillnet	11/06/2000	35°S 138°E	1	Dead
Dolphin	Gillnet	18/06/2000	36°S 139°E	1	Dead
Dolphin	Gillnet	12/10/2000	40°S 144°E	1	Dead

New South Wales: 3 Humpback whales entangled in nets, all released.

Species	Area/stock	Males	Females	Total	Cause	Methodology
False Killer Whale	Southeastern Australia			1	Incidental	Shark net
Whale (unid)	Southeastern Australia		1	1	Incidental	Shark net

Queensland Marine Wildlife Stranding and Mortality Database (Haines)

Species	**Area/Stock**	**Males**	**Females**	**Total**	**Cause**	**Methodology**
Bryde's whale	Cairns	?		1	Plastic in gut	Autopsy

6.3 Earlier years' statistics
Nothing to submit.

7. Statistics for small cetaceans
7.1 For the calendar year 2000

		Directed catch		Incidental mortality			Live-capture
Species	Area/stock	Reported	Est. total	Reported	Est. total	Source*	Reported
	Queensland						
Short-beaked common dolphin	Gold Coast				1	tangled in float line (QPWS)	Dead
Short-beaked common dolphin	Gold Coast				1	Fishing net QDPI SCP	Dead
Short-beaked common dolphin	Gold Coast				1	Fishing net QDPI SCP	Dead
Irrawaddy dolphin	Townsville				1	Fishing net QDPI SCP	Dead
Irrawaddy dolphin	Cairns				1	Fishing net QDPI SCP	Dead
Indo-Pacific humpback dolphin	Sunshine Coast				1	Fishing net QDPI SCP	Dead
Pantropical spotted dolphin	Gold Coast				1	Fishing net QDPI SCP	Dead
Spinner dolphin	Gold Coast				1	Fishing net QDPI SCP	Dead
Bottlenose dolphin	Gold Coast				1	tangled in float line QDPI SCP	Dead
Bottlenose dolphin	Gold Coast				1	Fishing net QDPI SCP	Dead
Bottlenose dolphin	Gold Coast				1	QDPI SCP	Released Alive
Dolphin	Gold Coast				1	QDPI SCP	Released Alive
Dolphin	Gold Coast				1	QDPI SCP	Dead
	New South Wales						
Bottlenose dolphin	SE Australia			1		Shark net	
Dolphin (unid)	SE Australia			1	1	gillnet	
Bottlenose dolphin	SE Australia			1	1	gillnet	
	South Australia						
Short-beaked common dolphin	SA coastline	-	-	2	Unknown	Tuna farm anti-predator net	-
Short-beaked common dolphin	SA coastline	-	-	4	Unknown	Probable entanglement	-

7.2 Earlier years' statistics

		Directed catch		Incidental mortality			Live-capture
Species	Area/stock	Reported	Est. total	Reported	Est. total	Source*	Reported
	South Australia 1998						
Short-beaked common dolphin	SA coastline	-	-	1	Unknown	Tuna farm anti-predator net	-
Short-beaked common dolphin	SA coastline	-	-	1	Unknown	Shot	-
Short-beaked common dolphin	SA coastline	-	-	3	Unknown	Possible/probable entanglement	-
Bottlenose dolphin	SA coastline	-	-	1	Unknown	Tuna farm anti-predator net	-
Bottlenose dolphin	SA coastline	-	-	3	Unknown	Shot	-

Bottlenose dolphin	SA coastline	-	-	2	Unknown	Possible/probable entanglement	
Minke whale	SA coastline			1	Unknown	Possible boat strike	
	South Australia 1999						
Short-beaked common dolphin	SA coastline	-	-	1	Unknown	Tuna farm anti-predator net	-
Short-beaked common dolphin	SA coastline	-	-	1	Unknown	Propeller strike	-
Short-beaked common dolphin	SA coastline	-	-	1	Unknown	Shot but this may not have been cause of death	-
Short-beaked common dolphin	SA coastline	-	-	5	Unknown	Probable/possible entanglement	-
Bottlenose dolphin	SA coastline	-	-	1	Unknown	Tuna farm anti-predator net	-
Bottlenose dolphin	SA coastline	-	-	1	Unknown	Stabbed	-
Bottlenose dolphin	SA coastline	-	-	2	Unknown	Probable/possible entanglement	
Dolphin	SA coastline			1	Unknown	Tuna farm anti-predator net	

8. Strandings

New South Wales

Common name	No./Sex/ Size	Area/Stock	Date	Live/Dead stranding	Outcome/Comment	Tissue samples taken?
Bottlenose dolphin	1	Raymond Terrace	22/01/00	Dead		Yes
Bottlenose dolphin	1	Nambucca	2/3/00	Alive	Euthanased	Yes
Risso's dolphin	2	Terrigal	11/3/00	Alive	released	
Sperm whale	1	Currarong Beach	27/3/00	Dead	Remains buried	No
Short finned pilot whale	1	Bundualung National Park	12/4/00	Alive	Died after extensive rehabilitation at Sea World	Yes
Bottlenose dolphin	1		21/04/00			
Common dolphin	1		7/05/00			
Humpback whale	1		27/05/00			
Humpback whale	1		2/06/00			
Humpback whale	1	Port Macquarie	9/6/00	Caught in net	Released	
Humpback whale	1	Warringah	9/7/00	Entangled in fishing net	Released	
Humpback whale	1		25/07/00			
Bottlenose dolphin	1		25/07/00			
Humpback whale	1		29/07/00			
Humpback whale	1	Shelley Headland, Yuraygir	31/7/00	dead		Tissue samples
Bottlenose dolphin	1	Brunswick River	7/8/00	Live	Released	
Humpback whale	1	Great lakes	19/9/00	Live-entangled	released	
Common dolphin	1		23/09/00			
Humpback whale	1		7/10/00			
Bottlenose dolphin	1	Wollongong	24/10/00	Dead-shark nets		
Bottlenose dolphin	1	Gosford	9/11/00	Alive	Died	Yes
Humpback whale	1		11/11/00			
Bottlenose dolphin	1	Boambee Beach	13/11/00	Dead		No
Bottlenose dolphin	1		7/12/00			
Bottlenose dolphin	1		9/12/00			

Bottlenose dolphin	1	Seven Mile Beach	28/12/00	Dead		No
Common dolphin	1	Callala Beach	27/12/00	Alive	Died	Yes (cancer of testes)

* Frequently, the Australian Museum is notified by the NSW NPWS as to the locality of stranding events, and when available, Museum officers attend the stranding and collect genetic samples or skeletal material. Where distance prevents Museum officers from attending a stranding, often NPWS officers are able to collect samples, which are subsequently stored at the Museum. The volunteer organisation ORRCA has also recently donated their tissue collection, which is derived principally from stranded animals, to the Australian Museum.

Queensland

Queensland Marine Wildlife Stranding and Mortality Database – contact Jenny Haines

The Queensland Parks and Wildlife Service oversees the collection of stranded cetaceans in the state and maintains the Queensland Marine Wildlife Stranding and Mortality Database. The database summarises all records of sick, injured or dead marine wildlife reported to the Queensland Parks and Wildlife Service (QPWS). An annual report is compiled for Cetaceans and pinnipeds. Most reports of individual strandings are supplied by QPWS and GBRMPA staff, including those via the state wide stranding hotline number 1300 360 898. Other reports are received directly via members of the public including organisations such as Sea World and Underwater World. In addition to the general reporting, the database contained all records from the QDPI Shark Control Program.

Queensland Museum – contact Dr Robert Patterson

The Museum collects skeletal material from cetaceans found in Queensland for preparation.

Museum of Tropical Queensland, Townsville – contact Dr P.W. Arnold

The Queensland Environmental Protection Agency oversees the collection of stranded cetaceans in the state. Heads from cetaceans stranded in the central and northern Great Barrier Reef region have been deposited in the Museum of Tropical Queensland for extraction and preparation of skulls.

Victoria: Museum of Victoria (MoV)

Species	No./Sex/ Size	Area/Stock	Date	Live/Dead stranding	Outcome/Comment	Samples/Measure ments taken?
Sperm whale	11 metres	-	-	-	-	-
Beaked whale?	-	-	-	-	-	-

South Australia: South Australian Museum stranding database 2000:

Species	No./Sex/ Size	Area/Stock	Date	Live/Dead stranding	Outcome/Comment	Samples/Measure ments taken?
False killer whale	1/ F/ 1.94	0.75 km E Douglas Point	6 Jan	dead	possible still-born, lungs hadn't been used	yes
Bryde's whale	1/ U/ 10.2	1.5 km SE Black Point, York Pen.	17 Jan	dead	found floating, with sharks eating it. Towed to beach. Large whale seen alive off Port Price in late Dec1999 early Jan 2000	yes
Bottlenose dolphin	1/ M/ 2.33	0.5 km N Balgowan shops	22 Jan	dead	found on rocks at high tide	yes
Bottlenose dolphin	1/ U/ U	Port Lincoln	early 2000			no
Bottlenose dolphin	1/ M/ 2.18	0.5 km NE Port Julia (township)	11 Feb	dead	heart disease	yes
Common dolphin	1/ U/ U	3.25 km NE Victor Harbour (PO)	17 Feb	dead	found floating, only torso found, body appears cut	no
Common dolphin	1/ F/ 2.03	Boston Point Lighthouse,	25 Feb	dead		yes
Common dolphin	1/ U/ U	North Shields (township)	25 Feb	dead	mummified , only dried flesh skin and bones	no
Common dolphin	1/ M/ 2.14	E Boston Point Lighthouse	28 Feb	dead	fish bones in oesophagus, food in stomach. One 22 bullet found on 24 Oct 2000 while scrubbing up skeleton.	yes
Common dolphin	1/ F/ 2.0	0.1 km NW Southend	6 Mar	live	seen alive on 6 March, locals tried to refloat, found dead 7 March. Cause of death unknown	yes
Unidentified dolphin	1/ U/ 3-4	N just north of Port Gibbon	10 Mar	dead	described as a very large dolphin	no

Common dolphin	1/ F/ 2.04	1 km NE North Shields (township)	27 Mar	dead	fish bones in oesophagus	yes
Bottlenose dolphin	1/ M/ 1.12	2 km NE Whyalla (PO)	29 Mar	dead	found floating	yes
Common dolphin	1/ M/ 1.884	10 km NE Port Lincoln (PO)	11 Apr	dead	Nose and side fin entangled in tuna farm anti-predator net, at 3 metre depth. Net diameter, 132m, drop 20m, mesh size 8", ply 4mm, colour, green	yes
Common dolphin	1/ F/ 1.73	SE North Shields (township)	12 Apr	dead	found floating, 2mm diam. string wrapped once around upper jaw, starting to embed into skin. Some parts of the intestines were deep red, Query gastroenteritis?	yes
Common dolphin	1/ M/ 1.95	North Shields (township)	13 Apr	dead	found floating	yes
Bottlenose dolphin	1/ M/ 2.38	0.5 km N Louth Bay (township)	13 Apr	dead		no
Common dolphin	1/ U/ 1.95	1.5 km ENE of North Shields (township)	13 Apr	dead	found floating	no
Common dolphin	1/ F/ 1.33	5 km SE Venus Bay (township)	15 Apr	dead	possible shark attack	no
Common dolphin	1/ M/ 1.27	2.3 km SE Victor Harbour (PO)	22 Apr	dead	found floating	yes
Common dolphin	1/ U/ 2.03	4km N Port Lincoln (PO)	1 May (body) 10 May (head)	dead	body and head arrived several weeks apart	yes
Common dolphin	1/ F/ 1.87	6.8 km SE Port Lincoln (PO)	1 Jun	dead	found floating around a tuna lease. 1 male foetus, 265mm total length	yes
Common dolphin	1/ U/ U	Kirton Point, Port Lincoln	2 Jun	dead	found floating, 0.2 km offshore	no
Common dolphin	1/ M/ 1.945	2.7 km ESE Port Lincoln (PO)	2 Jun	dead	found floating, 0.2 km offshore. Generalised septicaemia?	yes
Common dolphin	1/ M/ 1.7	11 km NNW Kadina (PO)	13 Jun	dead	found on high tide mark, stomach and oesophagus empty	yes
Common dolphin	1/ U/ 1.54	Cape Donnington Beach, Lincoln National Park	16 Jun	dead		no
Common dolphin	1/ U/ U	Cape Donnington Beach, Lincoln National Park	16 Jun	dead		no
Common dolphin	1/ M/ 1.5	10 km NE Port Lincoln (PO)	19 Jun	dead	found floating near tuna farm nets, and brought to shore by tuna boat.	yes
Sperm whale	1/ U/ U	second boat ramp, northern end Long Beach Cons Park, Robe	20 Jun	dead	found floating	no
Common dolphin	1/ F/ 1.22	2.5 km SE Middleton (PO)	1 Jul	dead		yes
Common dolphin	1/ M/ 1.575	10 km NE Port Lincoln (PO)	2 Jul	dead	found entangled in predator net of tuna farm. Net diam 40m, drop 20m, mesh 10" ply 3mm., depth 3m., nose and flipper entangled. Healthy animal before death	yes
Common dolphin	1/ F/ U	2.5 km SW Kingscote (township)	4 Jul	live	beached, taken out a long way in a boat, given vitamins and refloated. Beached again 1 km north and rebeached 2 more times.	no
Bottlenose dolphin	1/ M/ U	Louth Bay (township)	6 Jul			no

Common dolphin	1/ U/ U	12 km ESE Port Lincoln (PO)	13 Jul	dead	incomplete specimen, rear postcranials missing	yes
Common dolphin	1/ U/ U	12.4 km ESE Port Lincoln (PO)	13 Jul	dead	incomplete specimen, found some fishing line and pieces of net in the seaweed with the specimen	no
Common dolphin	1/ M/ 1.19	0.5 km NE Rapid bay (PO)	19 Jul	dead	kidney haemorrhage	yes
Common dolphin	1/ M/ 1.29	9.65 km S Port Noarlunga (PO)	20 Jul	dead	found at high water mark. Evidence of haemorrhage on stomach and upper duodenum: enterotoxaemia	yes
Common dolphin	1/ F/ 1.91	0.2 km N Port Stanvac jetty	20 Jul	dead	hyperoenterotoxaemia. 1 male foetus 350mm total length	yes
Humpback whale	1/ F/ 3.88	7.4 km NW Elliston (township)	27 Jul	dead	found at high water mark. "Faecal-like substance" coming from anus (tar-like)	yes buffer
Common dolphin	1/ F/ 1.87 (from lower jaw)	9.1 km ESE Port Lincoln (PO),	31 Jul	dead	found washed up on high tide onto a rocky ledge. No food in oesophagus but some in stomach	yes
Common dolphin	1/ M/ 2.175	14 km NW Kingscote (PO)	2 Aug	dead		yes
Common dolphin	1/ F/ 1.565	7.05 km Port Noarlunga (PO)	25 Aug	dead		yes
Bottlenose dolphin	1/ M/ 2.16	3.9 km NE Largs Bay (PO)	26 Aug	dead	fishing hook and sinker in mouth, possible bacterial septicaemia due to infection from fish hook	yes
Common dolphin	1/ M/ 1.88	12 km ESE Port Lincoln (PO)	13 Sep	dead	nothing found in oesophagus, stomach contains small amount of content	yes
Common dolphin	1/ M/ 1.97	0.5 km S Pine Point (towards Black Point)	1 Oct	dead	cause of death = diseased, large lymph node, abscesses around neck, spleen diseased	yes
Bottlenose dolphin	1/ M/ 1.955	19.6 km NW Coffin Bay (PO)	6 Oct	dead	the skin was fairly intact but the whole insides were completely unidentifiable	yes
Bottlenose dolphin (possible offshore)	1/ F/ 1.7	2.5 km SSE Tumby Bay (PO)	7 Oct	dead	reasonably fresh but emaciated, no air bubbles in anterior lobes of lung	yes
Common dolphin	1/ F/ 1.54	0.7 km SE Middleton (PO)	16 Oct	dead		yes
Dolphin	1/ U/ U	5 km SE Franklin Islands	27 Oct	dead	collected by Sth.Aust Research Development Inst. from stomach of a female white pointer shark (3.37 m length)	no
Unidentified dolphin	1/ F/ 0.95	Port Gawler	late Nov	live	returned to the water by fisherman	no
Common dolphin	1/ M/ 2.28	3.6 km NE North Shields (township)	11 Dec	dead		yes
Bottlenose dolphin	1/ M/ 2.24	6.75 km SW of Brighton Jetty	11 Dec	dead	found floating. 0.5 km out to sea directly out from the northern end of Hallet Cove beach	yes
Bottlenose dolphin	1/ U/ U	0.1 km S Oyster Point (Stansbury)	12 Dec	dead		yes
Unidentified dolphin	1/ U/ U	Corny Point	19 Dec	live	injured dolphin seen alive in the water	no

The South Australian Museum also recorded all cetacean stranding events for 1998/99, which were not included in earlier reports.

The database details 51 stranding events for the calendar year 1999. On 36 occasions, samples and measurements were taken. Full details are held by Dr Catherine Kemper of the Museum. In summary, 70 bottlenose dolphins were

stranded in 21 events; 29 common dolphins on 19 occasions, 1 sperm whale, 4 unidentified dolphins, 2 pygmy sperm whales, 2 killer whales, 1 dwarf sperm whale, and 1 fin whale.
The database details 48 stranding events for the calendar year 1998. On 32 occasions, samples and measurements were taken. Full details are held by Dr Catherine Kemper of the Museum. In summary, 22 bottlenose dolphins were stranded in 22 events; 14 common dolphins on 14 occasions, 1 strap-toothed whale, 7 unidentified dolphins in 4 strandings, 1 pygmy sperm whale, 1 minke whale, 2 southern right whales separately, 1 unidentified beaked whale, and 1 pilot whale.

9. Other studies and analyses

Queensland:
Dr R.A. Birtles and Dr P.W. Arnold - Dwarf minke whales – QLD
Ms Isabel Beasley (Tropical Environmental Studies, James Cook University), Peter Arnold and Dr George Heinsohn (James Cook University) are comparing skull morphology in Irrawaddy dolphins from Australia and southeast Asian countries. This study indicates consistent differences between Australian animals (collected in Queensland, Northern Territory, Western Australia) and specimens from India, Myanmar, Thailand, Cambodia, Malaysia, Singapore, Indonesia and Vietnam. The southeast Asian samples contained specimens from both freshwater and marine habitats.

Greg Kaufmann - Humpback whale fluke photo-identification – QLD
On 27 and 28 September a Southern right whale (*Eubalaena australis*) mother and calf were encountered in Hervey Bay Marine Park. A mother and calf humpback whale was observed to affiliate briefly with the right mother calf pair on 27 September. The association lasted less than minutes.

The female right whale appeared to be 15-18 meters in length, while the calf was 7-9 meters. Over the two days, photographs (five rolls, 180 images) were obtained opportunistically of the head callosities used to identify right whales. We have been in contact with a number right whale researchers to determine if the mother has been resighted in other study areas along Australia's coastline.

Michael Noad - Humpback Whale Acoustics Study – QLD
(Development of technique for acoustic stand-alone population surveys of humpback whales – see section 2.2.)

Baden Lanes - Queensland Shark Control Program – QLD
'Reduction of incidental captures of marine mammals by inshore set-nets': The overall aim of the project is to significantly reduce the incidental capture of vulnerable and endangered marine mammals by inshore set-nets, while ensuring continued economic viability of both commercial inshore fisheries and coastal tourism (by maintaining current levels of bather safety through existing shark control programs). It is proposed to develop and evaluate an acoustic "warning" beacon to be attached to set-nets, suitable for Australian conditions and the species of mammals likely to be at risk.

Deakin University (Warrnambool VIC) – School of Ecology and Environment/ Australocetus Research – VIC
The ecology of blue whales in the Bonney upwelling feeding ground has been further investigated by the continuing use of remote sensing technology (weather charts, AVHRR SST, SeaWifs ocean colour) and moored temperature sensors, in order to relate the occurrence of blue whales and krill surface swarms to physical and biological oceanographic features. In areas where surface upwelling is evident, there is a clear relationship between feeding blue whales, krill and the upwelling front. In other areas where the upwelling is most likely present but does not surface, the relationship is less clear. Further observations of blue whale feeding behaviour have been made.

South Australian Museum (Adelaide SA):
Taxonomy of bottlenose dolphins (C. Kemper, P. Hale and G. Ross)
Statistical analysis has begun on the morphological differences between inshore (cf *aduncus*) and offshore (cf *truncatus*) in South Australia. Initial results show that the two groups are distinguishable using multivariate statistics and possibly some descriptive features. These results will be presented at the 14th Marine Mammal Meeting in Vancouver in November 2001. This study is ongoing. During 1999, several specimens of offshore bottlenose dolphins stranded or were washed up and these were important additions to the study of bottlenose taxonomy in South Australia. The unusual mass stranding of about 49 bottlenose dolphins on Kangaroo Island was attended by the Museum and body length measurements taken of most of the animals before they were refloated. There appeared to be a mix of inshore and offshore types in the stranding. Unfortunately, no genetic material was collected. A paper on the stranding was given at the 1999 Australian Mammal Society meeting (Kemper and Bossley 1999).

Biology of the pygmy right whale (C. Kemper)

A paper has been accepted by *Marine Mammal Science* on the geographic distribution of *Caperea marginata* in Australia and New Zealand. This study is ongoing. A paper was published on a technique to estimate body length from skull and skeleton measurements. A poster was presented at the Marine Mammal Society meeting in Maui (late 1999) on geographic trends in size classes in the Australasian region. The poster suggests that calves may be born north of 40 degrees latitude.

Cause of death of South Australian cetaceans (C. Kemper, A. Flaherty, S. Gibbs, M. Long and M Hill)
A poster was presented at the marine mammal-human interactions conference at Phillip Island in May 2001. Excluding animals where the cause of death was unknown, 48% of the animals were related to human interactions. Entanglements and probable entanglements featured largely in this latter category. Only two reports of entanglement in tuna feedlots were received during 2000 and their carcasses were collected for SAM. There have been 19 intentional killings of dolphins since 1985.

Diet of bottlenose dolphins in South Australia
This is a continuation of the work presented in the report to EA on marine mammal deaths in tuna farms at Port Lincoln, SA (Kemper and Gibbs 1997). Stomach contents are being collected from all carcasses but there is no funding to identify the items. The large number of dolphin carcasses from the Port Lincoln region are providing good material for such a study. The suspicion is that some of these deaths are associated with pilchard fishing in the area. Studying the stomach contents of these carcasses could provide useful data to confirm or deny such a hypothesis.

New South Wales:
Collection of song from Area V humpback whales. From Coffs Harbour, 16-21 July 2000 and 10-13 October 2000 as part of a long term study into Area V song structure by Libby Eyre.

Western Australia:
Curtin University, WA Museum, Centre for Whale Research
Some 5000 acoustic records were made in an area frequented by blue whales during late summer 2000. The site was the Rottnest trench region, west of Perth. Recordings were made from drifting packages, small boats near to blue whales, and a bottom set logger sampling 90 s records every 10 minutes for 33.5 days, from a receiver at 450 m depth. Almost all recordings had a distinctive call which is being attributed to pygmy blue whales. Several other call types were also recorded. This data set was analysed in early 2001 and has been written up in a preliminary paper (McCauley et al 2000) and draft report (McCauley et al 2001).

Over August-November 2000 two recordings systems were operated out of Exmouth to monitor the passage of singing humpback whales. One receiver was adjacent to Ningaloo reef in 80 m of water. Recordings were made over 10 days in August and 10 days in October. A second package, which ran for 35 days, was located approximately 25 n mile WNW of NW Cape, in 200 m water depth. This ran over October-November. Humpback singing and blue whale vocalisations were recorded. This data set is awaiting analysis.

10. Literature cited

Chaloupka, M.Y., Osmond, M.G. & Kaufman, G.D. 1999. Estimating seasonal abundance trends and survival rates of humpback whales in Hervey Bay (east coast Australia). *Marine Ecology Progress Series*, 184: 291-301.

Environment Protection Agency of South Australia. 2000. Special survey of the Port River. Heavy metals and PCBs in dolphins, sediment and fish. Special Monitoring Report. Environment Protection Agency, Department for Environment, Heritage and Aboriginal Affairs, Adelaide, SA.

Gilbert, J. D., Kemper, C. M., Hill, M. & Byard, R. W. 2000. Forensic studies of a stabbed infant bottlenose dolphin. *Journal of Clinical Forensic Medicine* 7:150–151.

Kaufman, G.D., Lagerquist, B.A., Forestell, P.H., and Osmond, M. G. 1993. Humpback Whales of Australia: A Catalogue of Individual Whales Identified by Fluke Photographs. *Queensland Department of Environment and Heritage, Brisbane, Australia*

Kaufman, G.D., Smultea, M.A., and Forestell, P.H. 1986. Use of lateral body pigmentation patterns for photographic identification of east Australian (Area V) humpback whales. *Cetus*, 7: 5-13.

Kemper, C. M. and Gibbs, S. E. 1997. A study of life history parameters of dolphins and seals entangled in tuna farms near Port Lincoln, and comparisons with information from other South Australian carcasses. Report to Environment Australia, May 1997.

Kemper, C. M and Bossley, M. 1999. Australian Mammal Society Newsletter November 1999.

Long, M., Reid, R. J. and Kemper, C. M. 1997. Cadmium accumulation and toxicity in the bottlenose dolphin *Tursiops truncatus*, the common dolphin *Delphinus delphis*, and some dolphin prey species in South Australia. *Australian Mammalogy* 20:25-33.

Spitz, S.S., Herman, L.M. & Pack, A.A. 2000. Measuring sizes of humpback whales (*Megaptera novaeangliae*) by underwater videogrammetry. *Mar. Mammal Sci. 16*: 664-676.

11. Publications

11.1 Published or 'In Press' papers only

Allen, S., Moller, L. and Harcourt, R. 2000. Port Stephens bottlenose dolphin population survey II. Report to the NSW National Parks and Wildlife Service. 20pp.

Bannister, J.L. 2001. Status of southern right whales (*Eubalaena australis*) off Australia. *J. Cetacean Res. Manage.* (Special Issue) 2:103-110.

Chilvers, B.L., Corkeron, P.J., Blanshard, W., Long, T. and Martin, A.R. (in press) A new VHF tag and attachment technique for small cetaceans. *Aquatic Mammals*.

Chilvers, B.L., and Corkeron, P.J. Trawling and bottlenose dolphins social structure. (in press) Proceedings of the Royal Society of London, B.

Evans, K., Kemper, C. and Hill, M. (2001) First records of the spectacled porpoise *Phocoena dioptrica* in continental Australian waters. *Marine Mammal Science* 17 (1):161–170.

Evans, K. and Robertson, K. 2001. A note on the preparation of sperm whale (*Physeter macrocephalus*) teeth for age determination. *Journal of Cetacean Research and Management* 3(1): TBA.

Forestell, P., Paton, D. & Hodda, P. 2000. Multiple sightings of an all-white humpback whale along the east coast of Australia, 1991-1999. *Proceedings Humpback Whale Conference 2000*. Queensland Museum.

Garrigue, C., Forestell, P., Greaves, J., Gill, P., Naessig, P., Patenaude, N.M. & Baker, C.S. 2000. Migratory movements of humpback whales (*Megaptera novaeangliae*) between New Caledonia, East Australia and New Zealand. *Journal of Cetacean Research and Management* 2(2):111-115.

Gilbert, J. D., Kemper, C. M., Hill, M. and Byard, R. W. 2000. Forensic studies of a stabbed infant bottlenose dolphin. *Journal of Clinical Forensic Medicine* 7:150–151.

Kemper, C. 1998. Research and education on whales and dolphins at the South Australian Museum. *Marine Life Society South Australia Journal* 9: 26–27.

Kemper, C. M. and Leppard, P. 1999. Estimating body length of pygmy right whales (*Caperea marginata*) from measurements of the skeleton and baleen. *Marine Mammal Science* 15 (3). 683–700.

Kemper, C. M. and Samson, C. R. 1999. Southern right whale remains from 19th century whaling at Fowler Bay, South Australia. *Records of the South Australian Museum* 32 (2): 155–172.

Kemper, C., Long, M. and Gibbs, S. 2000. Exciting new whale records for South Australia! *South Australian Regional Ripples* 7 (1): 6.

Kemper, C. and Gibbs, S. 2000. Dolphin mortalities in tuna feedlots near Port Lincoln, South Australia: an update. *Waves* 7 (3):3.

Kniest, E. & Paton, D. 2000. Real time tracking of humpback whales. *Proceedings Humpback Whale Conference 2000*. Queensland Museum.

McCauley, R.D., Jenner, C., Bannister, J.L., Cato, D.H., Duncan, A. 2000. Blue whale calling in the Rottnest trench, Western Australia, and low frequency sea noise. *Australian Acoustical Society, Conference Proceedings*, Nov 2000 Joondalup, Perth.

McCauley, R.D., Jenner, C., Bannister J.L., Burton, C.L.K., Cato, D.H., Duncan, A. 2001. Blue whale calling in the Rottnest trench - 2000, Western Australia. Prepared for Environment Australia, from Centre for Marine Science and Technology, Curtin University, R2001-6, 55 pp. 51 fig.

Mesnick, S. L., Evans, K., Taylor, B.L., Hyde, J., Escorza-Treviño, S. & Dizon, A.E. 2001. Sperm whale social structure: why it takes a village to raise a child. *In* F. B. M. de Wall and P. L. Tyack (eds). *Animal social complexity. Intelligence, culture and individualized societies*. Harvard University Press.

Nicol, S., Pauly, T., Bindoff, N., Wright, S., Thiele, D., Woehler, E., Hosie, G., Strutton, P. 2000. Ocean circulation off east Antarctica affects ecosystem structure and sea-ice extent. *Nature* 406: 504 - 507.

Nicholls, A. O., Shaugnessy, P. O. Ross, G. A., Reynolds, W. & Briggs, S. V. 2000. Analysis of counts of humpback whales (*Megaptera novaengliae*) from Cape Solander, New South Wales. Report to NPWS. CSIRO, Wildlife and Ecology, Canberra.

Noad, M.J., Cato, D. H., Bryden, M.M. , Jenner, M-N., and Jenner, K.C.S. 2000. Cultural revolution in whale songs. *Nature*, 408(6812): 537.

Noad, M.J. 2000. A southern right whale *Eubalaena australis* (Desmoulins, 1822) in southern Queensland waters. *Memoirs of the Queensland Museum*, 45(2): 556.

Patterson, R.A, Cato, D.H, Janetzki, H.A, Williams, S.C. 2000. An adult dwarf minke whale *Balaenoptera acutorostrata* Lacepede, 1804 from Fraser Island, Queensland. *Memoirs of the Queensland Museum*, 45(2): 557-568.

Scarpaci, C., Bigger, S.W, Saville, T.A., Nugegoda, D. 1999. Incidental but Rare Sighting of the Common Dolphin *Delphinus delphis* in Port Phillip Bay, Victoria, Australia. *The Victorian Naturalist* 166 (2): 220-222.

Scarpaci, C., Bigger, S.W, Saville, T.A., Nugegoda, D. 2000. The Bottlenose Dolphin, *Tursiops truncatus* in the Southern End of Port Phillip Bay: Behavioural Characteristics in Spring and Summer. *The Victorian Naturalist* 117 (1): 230.235.

Thiele, D., Chester, E.T., Gill, P. C. 2000. Cetacean distribution off Eastern Antarctica (80° - 150°e) during the austral summer of 1995/96. *Deep Sea Research* II (47): 2543 - 2572.

Van Bressem, M., Van Waerebeek, K., Jepson, P., Antonio Raga, J., Di Beneditto, A.P., Siciliano, S. Ramos, R., Kant, W., Peddemors, V., Kinoshita, R., Ross, P., López-Fernandez, A., Evans, K., Crespo, E. & Barrett, T. 2001. An insight into the epidemiology of dolphin morbillivirus worldwide. *Veterinary Microbiology* 81: 287-304.

Vetter, W., Scholtz, E., Gaus, C., Müller, J.F. & Haynes, D. 2001. Further evidence for bioaccumulative natural halogenated compounds in marine mammals from Australia. *Proceedings of the Southern Hemisphere Marine Mammal Conference 2001; Marine Mammal/Human interactions*. May – June 2001, Phillip Island, Victoria.

Vetter, W., Scholtz, E., Luckas, B., Gaus, C., Müller, J.F. and Haynes, D. (in press). Anthropogenic and natural organohalogens compounds in blubber of dolphins and dugong (dugong dugon) from Australia. *Archives of Environmental Contamination and Toxicology.*

Vetter, W., Scholtz, E., Luckas, B., Gaus, C., Müller, J.F. & Haynes, D. 2000. Anthropogenic and natural persistent, bioaccumulative organohalogen compounds in (Dugong dugon) and a bottle nose dolphin (Tursiops truncatus) from Australia. *Organohalogen Compounds* 46, 310 – 313.

11.2 Unpublished literature

Bannister, J.L. 2001. Southern right whale aerial survey and photo-identification, southern Australia, 2000 calving season. Report to Environment Australia, 20pp (Unpublished). [available from Environment Australia]

Beasley, I., Arnold, P.W. & Heinsohn, G. 2000 (MS, under review). Geographical variation in skull morphology of the Irrawaddy dolphin *Orcaella brevirostris* (Owen in Gray, 1866).

Birtles, R.A. & Arnold, P.W. 2000 (presently being revised to submit for publication). Commercial swim programs with dwarf minke whales *Balaenoptera acutorostrata sensu lato* on the northern Great Barrier Reef, Australia: a case study. SC/52/WW13. Unpublished document presented at 52nd Annual Meeting of International Whaling Commission, Adelaide, June 2000. 11pp.

Chilvers, B.L. 2001. Behavioural ecology of bottlenose dolphins (Tursiops aduncus) in S.E. Queensland, Australia: Adaptations to ecological and anthropogenic influences. PhD thesis, James Cook University.

K. Evans, M. Morrice, M. Hindell and D. Thiele. In review. Three mass strandings of sperm whales (*Physeter macrocephalus*) in southern Australian waters. *Marine Mammal Science*.

Evans, K., Hindell, M., Hince, G., Morrice, M., Griffiths, A., Thiele, D. 2001. Organochlorine pollution in sperm whales, *Physeter macrocephalus* in southern Australian waters. Southern Hemisphere Marine Mammal Conference, Phillip Island, Victoria, Australia May 29 - June 1, 2001 (poster presentation).

Evans, K. 2001. Pollution and marine mammals in the Southern Hemisphere: potential or present threat? Southern Hemisphere Marine Mammal Conference, Phillip Island, Victoria, Australia May 29 - June 1, 2001 (oral presentation).

Forestell, P.H., Paton, D., and Hodda, P. 2000. Multiple Sightings of an All-White Humpback Whale along the East Coast of Australia, 1991- 1999. Presented at the Queensland Museum Humpback Whale 2000 Conference. 29 August - 1 September, Brisbane, Australia.

Gedamke, J., Costa, D.P. & Dunstan, A. (MS, under review). Localisation and visual verification of a complex minke whale vocalisation.

Gill, P.C. 2000a. A blue whale feeding ground off southern Australia: preliminary findings. Paper SC/52/OS 9 submitted to the Scientific Committee of the International Whaling Commission (unpublished – available from IWC).

Gill, P.C. 2000b. A review of recent and current great whale research in the South Pacific. Paper SC/52/O 28 submitted to the Scientific Committee of the International Whaling Commission (unpublished– available from IWC).

Greenpeace International. 2000. Observations of Cetaceans in the Indian Ocean Sanctuary, Mauritius to Singapore, April 2000. Paper SC/52/016 submitted to the Scientific Committee of the International Whaling Commission.

Haines, J., and Limpus, C. J. 2000. Marine Wildlife Stranding and mortality database annual report, 2000 - Cetacean and pinnipeds.

Kaufman, G.D. 2001. Humpback Whale Fluke Identification Project - Hervey Bay Region: 2000 Season. Annual Report to Queensland Department of Environment and Heritage, Maryborough, QLD, Australia.

Kaufman, G.D., Naessig, P. 2000. Observations of humpback whales feeding off Eden, NSW, Australia. Presented at the Queensland Museum Humpback Whale 2000 Conference. 29 August - 1 September, Brisbane, Australia.

Kaufman, G.D., Naessig, P., Forestell, P.H., and Chaloupka, C. 2000. Estimates of Group Size and Rates of Interchange between Humpback Whales in the Whitsunday Islands and Hervey Bay, Queensland. Proceedings of the Queensland Museum Humpback Whale 2000 Conference. 29 August -1 September, Brisbane, Australia.

Kemper, C. 1999. Overview of dolphin behaviour and interaction with at-sea aquaculture cages. Marine Animal Interaction Working Group Workshop 25–26 May 1998. Primary Industries and Resources South Australia.

Kemper, C. M. and Gibbs, S.E. 1998. Dolphin and sea lion entanglements in tuna farms in South Australia, 1994-1996. Submitted to 'For information only', Reports of the International Whaling Commission 1998.

Naessig, P. 1999. Levels and Origin of Predatory Scarring on Humpback Whales in East Australian Waters. Presented at the 13th Biennial Conference on the Biology of Marine Mammals, Maui, Hawaii, November 29-

December 3, 1999.

Noad, M.J. and Cato, D.H. (in prep.) A combined visual and acoustic survey of humpback whales off southeast Queensland.

Smith, L. 2000. Assessing interpretation as a technique for managing human-dwarf minke whale interactions on the Great Barrier Reef. Unpublished Master of Tourism thesis, James Cook University.

Thiele, D., Chester, E. T., Gill, P. C. 2000. Ecological research and baleen whale management: a case study from the Southern Ocean, International Whaling Commission Scientific Committee June 2000, Adelaide, SC/52/E9 (paper).

White, C. 1999. Molecular systematics of the common dolphin, *Delphinus delphis*. Honours Thesis, Department of Genetics, The University of Adelaide, South Australia. [Available from the Genetics Department of the University of Adelaide, North Terrace, Adelaide South Australia 5005.]