AUSTRALIA. PROGRESS REPORT ON CETACEAN RESEARCH, JANUARY 1998 TO DECEMBER 1998, WITH STATISTICAL DATA FOR THE CALENDAR YEAR 1998 Compiled by Milena Rafic and Geoff Larmour

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This report summarises information obtained from: Australian Biological Resources Study (ARRS), ACT; Australian Dolphin Research Foundation, SA; Australian Fisheries Management Authority (AFMA), ACT; Australocaus Research, NSW; Centre for Whale Research (W A) Inc, W A; Dolphin Research Institute, VIC; Eubalaena Pty Ud, SA; Great. Barrier Reef Marine Park Authority (GBRMPA), QLD; James Cook University (JCU), QLD; Marequus Pty Ud, VIC; Museum of Tropical Queensland, QLD; Museum of Victoria (MoV), VIC; Dr D. J. Needham & S. D. Anstee, SA; New South Wales Fisheries- Fisheries Research Institute, NSW; New South Wales National Parks and Wildlife Service (NSW NPWS), NSW; Oceania Research Project, QLD; Organisation for Rescue and Research of Cetaceans in Australia (ORRCA), NSW; Pacific Whale Foundation (PWF), QLD and Hawaii; Queensland Environmental Protection Agency (Q.EPA), QLD; Queensland Fisheries Management Authority (QFMA), QLD; Queensland Museum, QLD; Royal Melbourne Institute of Technology University (RMIT), VIC; Sea World, QLD; University of Queensland - Centre for Conservation Biology (CCB), QLD; University of Queensland - Australian Genome Research Facility (AGRF), QLD; University of Sydney (Uni Syd), NSW; University of Tasmania (Uni Tas), TAS; Western Australia Museum, WA; Western Australian Department of Conservation and Land Managernoot (CALM), W A;

Note abbreviations used for Australian States/Territories: Australian Capital Territory (ACT), New South Wales (NSW), Northern Territory (NT), Queensland (QLD), South Australia (SA), Tasmania (T AS), Victoria (VIC), Western Australia (W A).

1. Species and stocks studied

Common name	Scientific name	Area/stock(s)	Items referred to
MYSTICETI			
Humpback whale	*Megaptera novaeangliae*	Group IV	2.1.1, 2.1.2, 2.2, 3.1.1, 3.2, 4.3, 5, 6.2, 8, 9, 11.1, 11.2
		Group V	2.1.1, 2.1.2, 2.2, 3.1.1, 3.2, 6.2, 6.3, 8, 9, 11.1, 11.2
		Southern Ocean	2.1.2, 3.1.1, 11.1, 11.2
Southern right whale	*Eubalaena australis*	SA	2.1.1, 2.2, 3.1.1, 9, 11.1
		Southern WA	2.1.1, 2.1.2, 3.1.1, 9, 11.1
		Queensland	2.1.2
		NSW	2.1.1
Minke whale (dwarf form)	*Balaenoptera acutorostrata bonaerensis*	Northern Great Barrier Reef, Qld	2.1.2, 2.2, 3.1.1, 9, 11.2
		WA	2.1.2
Blue whale	*Balaenoptera musculus*	Western Victoria	2.1.1, 3.1.1, 10, 11.1
ODONTOCETI			
Indo-Pacific humpback dolphin	*Sousa chinensis*	Queensland	2.1.2, 2.2, 3.1.1, 3.2, 4.1, 4.3, 4.4, 7.1, 8, 9
		WA	2.1.2, 2.2, 4.1, 4.4
		Victoria	11.1
Bottlenose dolphin	*Tursiops truncatus*	Port Phillip Bay, VIC	2.1.1, 2.1.2., 3.1.1, 3.2, 11.1, 11.2
			2.1.1, 2.2, 5
		SA	2.1.2, 2.2, 3.1.1, 3.2, 4.1, 4.3, 4.4,
		Queensland	7.1, 8, 11.1
			2.1.2, 2.2, 4.1, 4.3, 4.4, 5, 7.1, 8, 9
		WA	2.1.1, 3.1.1, 4.1, 7.1, 8, 9
			4.3, 7.1, 8
		NSW	
		Tasmania	
Bottlenose dolphin (inshore morph)	*Tursiops cf. aduncus*	east coast of Australia (Qld)	3.1.1, 11.1
		SA	2.1.1, 2.1.2, 2.2, 5
Killer whale	*Orcinus orca*	Eden, NSW south coast	2.1.2
		Southern Ocean	7.1, 11.1
		WA	9
Irrawaddy dolphin	*Orcaella brevirostris*	Queensland	4.3, 8, 9, 11.1
		WA	2.1.2
ANTARCTIC CETACEAN SP	Mysticeti and Odontoceti	Southern Ocean and Antarctica	2.1.1, 2.1.2, 3.1.1, 9, 11.1, 11.2

Stranding, sampling details and opportunistic sightings of species not the subject of systematic studies are listed in sections 2.1.2, 4..3, 5, 7.1 and 8 (ie. Minke, fin, sperm, pygmy sperm, melon-headed, false killer, long finned and short finned pilot whales, beaked whale (*Mesoplodon* sp), Pantropical spotted, common, spotted, and striped dolphins).

2. Sightings data

2.1 *Field work*

2.1.1 SYSTEMATIC

Humpback whales

The Oceania Research Project conducted humpback whale surveys in Hervey Bay, over 60 working days from August to October 1998. A total of 919 humpbacks were sighted and 5220 photographs obtained. An analysis of photography is in progress for the period 1994/1998.

Surveys, conducted by Pacific Whale Foundation (PWF), consisted of small boat efforts in the Whitsunday Islands, Hervey Bay and Eden. Focus was on collecting photographs of ventral fluke and lateral body colouration patterns, documenting the location (determined by GPS), size and composition, date and time of observation, general activity and sea surface temperature of each group observed. The Eden surveys were part of a long-term project, 'Habitat Use Patterns of Humpback Whales near Eden', underway since 1996. The project involves assessing degree of interchange between Eden and other areas of known northern aggregations along the east coast; and determining susceptibility of identified whales to human impacts.

Observations of the northern migration of humpback whales along the east Australian coast were made between June 4 and August 5 as part of a long-term study (Queensland Museum). 795 northbound and 6 southbound whales were seen.

Centre for Whale Research (WA) conducted several humpback whale surveys in 1998. All of these studies were conducted within State waters and under a State permit. From August 18-October 04, 1998 they surveyed in the Exmouth region including West of Ningaloo Reef, islands north of the Exmouth Gulf and inside the Exmouth Gulf. The 1998 photo-identifications are yet to be developed hence the number of flukes obtained are unknown.

Cape Byron Whale Research Project is an ongoing research project, which has been underway since 1995, and is a collaborative effort between the NSW NPWS and Southern Cross University. The project involves positioning and tracking of humpback whales as they migrate past the NSW coast; vessel transects from Cape Byron to the continental shelf to determine humpback whale distribution; and photo-identification to identify individual animals using fluke and lateral body colouration and markings.

Southern right whales

The Head of the Great Australian Bight (31 °30'S, 131°08'E) is one of the largest and most consistent aggregation areas for right whales on the Australian coast. A long-term shore-based survey is run at the Head of the Bight aggregation area with daily visual census of the number of right whales within the aggregation area, including number of calves of the year (Eubalaena P/L). Three field trips were made between July and October undertaking observations, identification photography and surveys. Right whales were present within the aggregation area on every surveyed day between 30 June and 2 October 1998 with maximum numbers sighted during August. A minimum of 37 calves per sighting trip was recorded in the aggregation area in 1998, significantly more than in any previous surveyed year. The number of individual whales within the aggregation area ranged from a low of 22 animals on the 1 October to a maximum of at least 103 animals on the 19 August.

Another South Australian study (D. J. Needham & S. D. Anstee) made 2 aerial surveys of the Head of the Bight. A total of 51 adults and 41 calves were observed on 24 August, and 48 adults and 37 calves were seen on 11 September.

Aerial surveys for southern right whales were undertaken off the southern Australian coast in 1998 (W A Museum). As in past years they involved flights 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- cows about to give birth at an average of three years, others less predictably. Two 'short' flights, on 13-15 August and 6-8 October, between C Leeuwin and Twilight Cove, WA, maintained a series of flights on the southern WA coast since 1976. A 'long' flight, on 7-11 September between C Leeuwin, WA and Ceduna, SA continued a series extended along the South Australian coast from 1993. On all flights, counts and identifying photographs were obtained, but with an emphasis on the former on the 'short' flights and on the latter on the 'long'

flight. Numbers recorded were considerably higher than in any previous year, with a comparable total of 338 animals recorded in 1998, including 108 calves - the first year in which the total has exceeded 300 and has included more than 100 calves.

Dolphins

The Dolphin Research Institute (Vic) conducted intensive surveys on the bottlenose dolphin population in southern Port Phillip Bay during January and February of 1998. The Institute collected dorsal fin photographs for photo-identification, completed the third year of observations for an investigation into the impacts of dolphin swim tours and completed the second year of an investigation of dolphin abundance in an area proposed as a sanctuary zone. Shore based observations, primarily concerned with dolphin movements and behaviours were also collected. In total, 534 hours were spent in the field. Of these, 347 hours were spent at two shore-based sites and 187 hours were boat based. Overall, there were 161 sightings of bottlenose dolphins recorded in the southern part of the Bay during the summer. During October 1998 the Institute expanded the investigation into the impacts of dolphin swim tours. As part of this process, the research platform was moved from the Institute's vessel to the tour vessels. At the end of December, a total of 54 hours of data had been collected. This study will continue until the end of the swim season at the end of May 1999.

Another study also observed *Tursiops Truncatus* in the southern end of Port Phillip Bay, Victoria, (RMIT). Data were gained from land-based observations and recorded behaviour of the population over an annual cycle. The most common group size was 2-5 dolphins and calves were observed in every season. The majority of adult-calf groups were observed in autumn and least in spring.

Boat based surveys in the Port Adelaide area, were conducted by the Australian Dolphin Research Foundation, SA. Approximately 80 surveys are done per year, with an on average survey of 5 hours, approx 20 dolphins sighted. 252 animals have been photo-identified since 1987.

Searches for inshore and offshore bottlenose and Indo-Pacific humpback dolphins (uQ-CCB), were carried out on the east coast of Australia, including Hervey Bay, the Great Sandy Strait, Moreton Bay and to 6nm seaward. Searches were also carried out on the west coast of Australia, including Exmouth Gulf and the ocean coast. Line transect search method was not employed.

Other species

NSW NPWS supported the Cape Solander Survey, a preliminary land-based sightings survey for period 1/6/98-3/7/98. Sighting estimates include 298 humpbacks; 2 Southern right whales; and a number of unidentified dolphins and small whales.

In late February 1998 a 15m yacht was used to search for blue whales in Discovery Bay, western Victoria, (Australocetus) in an area where an IWC survey had found numbers of pygmy blue whales in December 1995 (Kato et aI1996). Over a two-day period of good weather, 4 blue whales were located. Extended bouts of surface feeding behaviour were observed and filmed. Two whales were photo-identified. One possible blue whale sound was recorded by hydrophone. Potential prey were netted and identified, including euphausiids, probably *Nyctiphanes australis*. An aerial survey was conducted on 8 December 1998, flying from Mt Gambier. The survey covered Discovery Bay in a box pattern across the continental shelf, with legs 4km apart. Three blue whales were sighted.

Table 2.1.1a Blue whale sightings off the eastern southern coast (Vic and SA).

Date	Survey method	No. blue whales sighted	Location
25 February 1998	Boat	2	38°21.5'S, 141°16.0'E
26 February 1998	Boat	2	38°16.6'S, 140°52.7'E
8 December 1998	Aerial	1	38°39.1'S, 141°16.5'E
8 December 1998	Aerial	1	38°39.46'S, 141°18.95'E
8 December 1998	Aerial	1	38°37.6'S, 141°18.0'E

The Southern Ocean Pelagic Ecosystem Monitoring Program – Cetacean component, was again conducted using Australian Antarctic Division resupply ships (see also section 2.1.2). A total of 7 voyages were conducted within the 1998 calendar year (Marequus, P/L) returning a total of 220 cetacean sightings.

1997/98 season (within 1998 calendar year)

Voyage 5 - Hobart, Tas. return via Mawson, Davis and Marine Science (20/1/98 -19/2/98)
Voyage 6 - Hobart, Tas. to sub Antarctic (143.00E 55.00S) and return for Marine Science (oceanographic survey) (22/2/98 -27/3/98)
Voyage 7 - Hobart, Tas. and return via Davis, Casey and Macquarie Island (29/3/98 -1/5/98)
1998/99 season (within 1998 calendar year)
Voyage 1 -Winter polynya study. Conducted from Tas. into ice, premature return (15/7.31/7/98)
Voyage 2 - Hobart, Tas. and return via Mawson, Prydz Bay, Casey and Macquarie Island (12/9 -16/11/98)
Voyage 3.1 - Hobart, Tas. to Macquarie Island and return (22/10 -13/11/98)
Voyage 4 -Hobart, Tas. to Fremantle, WA, via Casey, Davis, Samson Island, Prydz Bay (29/10 -27/12/98)

Table 2.1.1b Southern Ocean Cetacean Ecosystem Program sightings, 1998

Species	No. sightings
humpback	33
minke	86
sei	4
blue	5
fin	3
hourglass dolphin	3
like minke	7
orca	10
sperm	10
pilot whale	6
southern right	3
bottlenose dolphin	2
all unidentified and 'like' categories	48
TOTAL	220

2.1.2 OPPORTUNISTIC, PLATFORMS OF OPPORTUNITY

During the humpback whale acoustic study (M. Noad -Uni Syd), a southern right whale was sighted at Pt Lookout, Qld, on July 24: the first confirmed sighting of a southern right whale in Qld waters. The only other reported sighting was in the mid-1950s when the whalers of Tangalooma reported seeing a southern right whale off Moreton Island. Photographs were taken and a note reporting this sighting is currently in preparation. Further sightings were subsequently reported off Pt Lookout and Cape Moreton between August 8 and 10. From these data it appears that there were at least two pods in the area over this period -one apparently a sub-adult and the other a cow with calf. These whales were presumably part of the southern Australian right whale population.

The commercial dive charter boat *Undersea Explorer* was used as a platform of opportunity in a continuing study on dwarf minke whales in northern Australian waters (Museum of Tropical Qld). Five trips, each of 6 days duration, were completed on June 27-July 31, 1998. Routine records of sighting effort, position, weather and sea conditions were kept. During encounters with dwarf minke whales, group size and behaviour of whales were noted in relation to numbers and behaviour of swimmers. Underwater and surface observations, supported by underwater video and underwater/surface photographs were made for recognition of individuals and documentation of behaviour. Gender determination was also attempted and, during one encounter, a series of underwater stereo pair photographs was taken to attempt size determination using photogrammetric techniques. During 16 encounters, a hydrophone array was deployed by Ph.D candidate Mr Jason Gedamke (University of California, Santa Cruz) to record vocalisations of the whales. Incidental sightings of other cetaceans were also documented.

The Dolphin Research Institute, Vic, is in the process of developing a community dolphin sighting network that will target other areas of Port Phillip Bay apart from the southern end. There are also plans to expand this network to cover other Victorian waters. The Institute is already receiving regular sightings from other Bay users including both commercial and recreational interests. There are plans to further develop this network during 1999. The Institute has also begun to expand its fin identification project to include Westernport Bay.

In 1998 Australian Fisheries Management Authority (AFMA) observers covered:
* All cruises to the Macquarie Island Development Fishery and the Heard Island and McDonald Islands Fishery;
* Thirty-three longline sets (52,025 hooks) in the East Coast Tuna and Billfish Fishery;
* Forty-two trawls for blue grenadier off the west coast of Tasmania; and

- Two hundred and forty-five trawls for orange roughy and oreos on the South Tasman Rise

No interactions between cetaceans and the fishing vessels and/or fishing gear were observed on any of these cruises. Opportunistic cetacean sightings were made by AFMA Fisheries observers from commercial fishing vessels between 1/1/98 and 31/12/98.

Table 2.1.2a Sightings made by AFMA observers, 1998.

Species	Date	Location	Number	Fishing vessel type	Comments
Long-finned pilot whales	6/2/98	53° 53'S 159° 05'E	50	Trawler	Large pod moving north
False killer whales	9/2/98	53° 52'S 159° 05'E	20	Trawler	One calf at least seen with pod
Sperm whale	16/2/98	47° 14'S 148° 43'E	1	Trawler	Near seamounts, visible for 10 mins
humpbacks	29/6/98	47° 14'S 148° 43'E	10 to 20	Longliner	Swimming north
Minke	5/12/98	52° 22'S 160° 35'E	1	Trawler	Brief sighting

The Australian Dolphin Research Foundation, SA, participates on cruises on Gulf St Vincent on a tall ship once per year. Number and location of all *Tursiops* and *Delphinus* sighted are recorded.

On August 15 and 16, 1998, a research vessel (PWF) opportunistically observed a group of seven killer whales in the general area of Eden, NSW. The group consisted of one large male, one juvenile male, four females and a calf. After initially milling in one area, a variety of behaviours such as breaching, tail slapping and head rises was observed. After a few hours, the group proceeded to head offshore, travelling in a south-east direction. On the following day the group of killer whales was again observed about two miles offshore near the Green Cape Lighthouse. The group was doing a large amount of diving and swimming in a circular pattern. There were reports from fishing vessels earlier in the day of a possible attack by the killer whales on a humpback whale calf. During the hour that the whales were observed, what appeared to be a piece of humpback whale calf floating in the water was found The piece appeared to be a portion of a calf's lower jaw and ventral pleats.

The Cape Byron Humpback Research Project, NSW, recorded an opportunistic sighting of 8 killer whales off Ballina, NSW, on 1 October 1998.

Several groups supply the Centre for Whale Research, W A, with very useful records of their opportunistic whale sightings. These include boats involved in various industries, such as oil exploration, fishing and tourism.

Table 2.1.2b Opportunistic cetacean sightings off WA

Sighting Platform	Common Name	Location	Latitude & Longitude	# Whales (Pods)
Fishing Vessel *Rachel*	humpback whale	Kimberley		105 (56)
Charter Vessel *Sail-A-Way*	humpback whale	Dampier Arch		17 (10)
Research Vessel *Mega*	dwarf minke whale	N. Exmouth		3 (3)
Research Vessel *Mega*	Irrawaddy dolphin	Exmouth Gulf		2 (1)
Research Vessel *Mega*	false killer whale	Exmouth Gulf		70 (1)

The 'Aurora Australis' is used as a platform of opportunity for Southern Ocean cetacean sightings research (Marequus P/L). Results are given in Table 2.1.1b. Voyages are nominated as Phase I or II depending upon the focus of marine research and area to be traversed:
Phase I -Long term monitoring program for cetacean sightings on marine science voyages utilising experienced Australian and international cetacean observers and observers 'in training'.
Phase II -Implement compatible and more intensive cetacean sightings and biological research on marine science voyages of specific interest (eg. sea ice, oceanography and krill survey studies) where the opportunity for collaborative multidisciplinary research is maximised. Focus these programs at times of year and in areas where important questions exist regarding cetacean distribution, abundance, biology or interactions with specific areas of the ecosystem (eg. winter sea ice, summer ice edge).

Cetacean sightings reported to the NSW NPWS *Atlas of Wildlife* during 1998 were:

Species	No. sightings	Total animals	Sighting dates
Common dolphin	2	46	between 01/01/98 and 31/01/98 & 01/05/98

It should be noted that some sightings were recorded on consecutive days and the total number of individual animals may include resightings of some individuals.

2.2 Analyses/development of techniques

Humpback Whales

Surveys of the Kimberley region humpback (Area IV) calving area (C & M Jenner, Centre for Whale Research) have shown a higher relative abundance of calves later in the season (Table 2.2a).

Table 2.2a. Humpback whale Area IV - sightings and effort summary 1997 (Centre for Whale Research).

Dates	Location	# N.miles surveyed	Total # whales	# Adults	# Sub adults	# Calves	#Photo-id (% of total)	Obs hours	Whls /hour	#Songs recorded
3/8 – 15/8/98	Fremantle-Exmouth	311.80	87	85	0	2	8 (9)	55.06	1.58	0
18/8 – 4/10/98	Exmouth	1279.30	562*	477	2	83	365 (65)	200.05	2.87	2
13/10 – 11/11/98	Exmouth-Fremantle	**	3	2	0	1	3 (100)	**	**	0
TOTAL			652	564	2	86	376	255.11		2

*558 is the number whales observed during the 2 weekly surveys not including incidental sightings.
**During the transit from Exmouth to Fremantle, there was no dedicated survey due to low crew numbers and sailing days. Hence the figures represent incidental sightings only.

The survey in the Exmouth region in 1998 showed that this area is a critical resting area used by southbound humpback whales, particularly cow/calf pairs (Jenner, Jenner & McCabe, 1999; in press). Higher densities of whales (whls/hour) were observed in the Exmouth study area than in any of our previous survey sites from 1990-97.

PWF 1998 sightings data and observation hours are summarised in table 2.2b below.

Table 2.2b. Humpback whale Area V - sightings and effort summary 1998 (PWF).

Place	Dates	No hours on water	No pods/whales
Whitsunday Islands	22 June – 6 August	123.5	65/127
Hervey Bay	12 August – 8 October	238	265/574
Eden	12 October– 14 November	150	81/181

Results from the ongoing Qld Museum survey for 1998 include: 179.6 northbound whales were seen per 100 hours, compared with 153.9 and 122.0 in 1996 and 1994 respectively. The rate on increase in the Group V stock for the years 1984-1998 (1993, 1995 and 1997 not included) is estimated to be 11.55% (95%CI+-l%). The population was estimated to be 3660+-480at the conclusion of the 1998 field study.

Acoustic studies on humpback whales, (M. Noad/F. MacKnight -Uni Syd/Uni Qld), used techniques as for previous seasons. All songs were recorded on to Digital Audio Tape (DAT). The song pattern was transcribed during or after recording. Transcription was aural and aided by a continuous real-time spectrographic display on a desktop computer. Phrases were individually identified and time was noted at the end of each phrase. Subjective notes were also compiled about each singer's individual characteristics. The measurement of aspects of the song for a quantitative analysis of differences within and among individuals is currently being undertaken. Future work with the data collected will include a quantitative analysis of song pattern both as a function of time and as a possible source of individual variation.

Southern right whales

Analyses of data obtained from visual observations of southern right whales at the Head of the Bight are presented in Burnell in press (see 11.1).

Significant positive increase rates continue to be obtained for a number of combinations of time series, animal classes and subareas (WA Museum). For the area as a whole (extended in 1993 to obviate possible effects of coastwise movement) a significant rate of increase was obtained, for fall animals', of 12.63% (95% CI 5.19-20.07, $p<0.019$). It excludes data for 1996 and 1997, where there may have been some undercounting. Including those two years gives a rate of 10.67% (95% CI 4.29-17.06, $p<0.0106$). Both rates are higher than expected given southern hemisphere rates obtained elsewhere of ca 7%, but both time series are still somewhat small (4-6 years) and both are affected by the very high number of sightings in 1998. Some 100 identifying photographs were

obtained. Work is now under way to implement a recently-developed computerised system to compare the ca 600 photographs available from 1980-1995 with those (ca 300) from 1996-98. Population size for that part of the 'Australian' population visiting the area surveyed is now estimated at some 1000 animals.

Dolphins

The RMIT study noted the probability of sighting dolphins in the Port Phillip Bay study area was influenced by season: greatest in summer (98%) and least in winter (33%). The mean length of time dolphins stayed in the study area was greatest during autumn (56 mins) and least during winter (28 mins). The most common group size was 2-5 dolphins. Dolphins were observed to spend most of their time (59.9%) travelling in the study area, followed by feeding (32.1 %) and least time in social; behaviour (8%). Calves were observed in every season. The majority of adult-calf groups were observed in autumn and least in spring. Results were presented at the Australian Mammalogy Society Conference in July in Perth.

Analysis of photo-id, habitat use and miscellaneous behaviour observation continues for South Australia (Australian Dolphin Research Foundation, SA).

Analysis of relative sighting data for bottlenose and Indo-Pacific dolphins, corrected for search effort, is in progress (UQ-CCB).

Dwarf minke whales

There were 40 encounters with dwarf minke whales during the field season (Museum of Tropical Qld). Approximately 70% of open water encounters, in which the vessel was stopped and drifted, resulted in voluntary approaches by the whales. Mean encounter duration was 1.4 hours, with significantly longer encounter times in open water (mean 1.8 hr, range 0.01- 6.3 hours) than on the reef (mean 0.7 hr, range 0.01-2.3 hours). Group size was also significantly larger in open water (1-25 whales in open water; 1-2 whales on the reef). These data are consistent with observations made in the 1997 field season. We documented for the first time that additional whales approached the vessel during an extended encounter in open water, suggesting an aggregation effect of the vessel and/or the initial group of whales. We also recorded for the first time a suite of behaviours which Jones & Swartz (1984) used to characterise 'friendly' behaviour of grey whales. Calves were noted in less than 5% of encounters during 1998, representing less than 2% of individual whales recorded.

Detailed study of colour pattern variation is in progress, using 48 characters with 183 character states. General colour pattern information is based on 70 animals from Australia, with limited comparative material (published data from South Africa, New Zealand & New Caledonia; unpublished photographs from New Zealand & Brazil). In 17 Australian animals for which detailed colour pattern was documented on both sides there was consistent asymmetry in the rostral saddle, extent of white on the mandible and around the eyes, ventral extension of the nape streak, shape of the thorax patch and extent of the flipper oval. This information, with details of flipper colour pattern and general scar patterns, is being used to code whales for individual recognition. The colour patterns are being compared with those of *B. bonaerensis* and northern hemisphere *B. acutorostrata.* The use of colour pattern as a phylogenetic character in balaenopterid whales is also being assessed. Initial results indicate 2 clear synapomorphies linking *B. bonaerensis,* dwarf and northern hemisphere minke whales. There are 3 apparently derived characters uniquely linking northern hemisphere and dwarf minke whales, but polarity of these characters is equivocal.

Analyses are still incomplete, but within season re-sighting rate is presently less than 1 % of individuals seen in 1998. This contrasts strikingly with studies of *B. acutorostrata* at mid-latitudes of the northern hemisphere where within season re-sighting rates range from 36-78%. No individuals from the 1996 or 1997 field seasons have been recognised yet in the 1998 sightings.

Vocalisations were recorded in 13 of the encounters, resulting in 10 hours of high quality tape. Consistent vocalisations from dwarf minke whales around the vessel were recorded in 3 encounters. Jason Gedamke is using these data, with previous recordings from 1997, to characterise the vocalisations of dwarf minke whales. In a separate study, Mr Gedatnke deployed hydrophones in a fixed pattern off Lizard Island to acoustically track minke whales.

Experiential data, based on questionnaires and interviews, were collected by Dr Birtles and Ms Fleur O'Neill, as part of a larger study on wildlife experiences of divers on the Great Barrier Reef. Dr Birtles supervised 2 Masters students (Ms O'Neill, Ms Y. Matsukura) and one Honours student (Mr M. Curnock) whose projects included documentation of visitor experiences with dwarf minke whales (see 11.2).

3. Marking data

3.1 *Field work*

3.1.1 **NATURAL MARKING DATA**

Table 3.1.1 Natural marking data

Species	Feature	Area/stock	No. photogr'd	Catalogued (Y/N)	Catalogue total	Contact person/institute
humpback whale	Fluke	Whitsunday Islands	88	Y	1600 (Group V)	Pacific Whale Foundation
humpback whale	Lateral body patterns	Whitsunday Islands	7	Y	1600 (Group V)	Pacific Whale Foundation
humpback whale	Fluke	Hervey Bay	256	Y	1600 (Group V)	Pacific Whale Foundation
humpback whale	Lateral body patterns	Hervey Bay	80	Y	1600 (Group V)	Pacific Whale Foundation
humpback whale	Fluke	Hervey Bay	919	N	Group V	The Oceania Project
humpback whale	Left and right dorsals	Hervey Bay	919	N	Group V	The Oceania Project
humpback whale	left and right lateral body marks	Hervey Bay	919	N	Group V	The Oceania Project
southern right whale	callosity	southern Australia	approx. 60/1998	in progress	380	S. Burnell, Uni of Sydney
blue whale	Lateral pigment patterns	western Victoria	February 1998 2	N	2	Peter Gill
bottlenose dolphin	Dorsal fin	Port Phillip Bay	65	Y	65	A Goldsworthy, DRI
Indo–Pacific humpback dolphin	dorsal surface and fin	east coast Australia	77*	Y	124	Dr Peter Hale, Centre for Conservation Biology, University of Qld.
humpback whale	Fluke	Group IV NW Australia	Unknown*	Y	1017**	Centre for Whale Research
southern right whale	Head callosities	Sthn Australian coast, between C Leeuwin, WA and Ceduna, SA	ca 100 in 1998	N	ca 900 (includes possible resights)	.J L Bannister, c/- WA Museum.
humpback whale	Fluke, plus some dorsal fin/lateral body	Group IV (WA coast, mainly off Perth but some off C Naturaliste)	ca 230	N	ca 900 (includes possible resights).	J L Bannister, c/- WA Museum
humpback whale	Fluke	Byron Bay Group V	94	N		David Paton, NSW NPWS, (02) 6627 0200

***includes 45 from calendar year 1997 not previously counted**

**** This figure accounts for the catalogues 1990-1997.**

Humpback Whales

As seen in Table 2.2a, Centre for Whale Research, WA, has photo-identified 376 whales but the number of flukes obtained is unknown as the film is still to be developed). Full analysis of the 1998 data, photo-id, migratory paths and utilisation of different areas by age class is currently under-way. The 1997 black/white photographs have been printed and have been compared within season and are yet to be compared between seasons (1990-1996 and 1998).

Photo ID of humpback whales off the Perth coast during commercial whale watch season was undertaken by C. Burton (report pending) and staff from W A CALM. Data supplied to Dr J. Bannister (W A Museum).

One humpback whale fluke photo identification from Antarctic given to Carole Carlson for archiving in the Antarctic Humpback Whale Photo Id catalogue at the College of the Atlantic, Maine, USA (Marequus P/L).

Dolphins

Over 300 bottlenose dolphin dorsal fin photographs were collected during 1998, most during January and February. The Dolphin Research Institute, VIC, has collected >2,000 photographs of dorsal fins over the past 6 summers. The Institute is still in the process of identifying individuals.

James Cook University is continuing a long standing photo-identification project of bottlenose dolphins in Moreton Bay, Qld. More than 300 new photos have been added. Identification matches are being performed by a Ph.D student with many results expected to be presented in next year's report.

Other whales

Analyses of natural marking data obtained from visual observations of southern right whales at the Head of the Bight (Eubaleana P/L) are presented in Burnell (in press). Directed aerial photographic flights undertaken off Victoria, Tasmania and eastern South Australia produced further identifications of individual right whales.

There is no catalogue of recognised dwarf minke whale individuals. In 1999 the Museum of Tropical Queensland will start production of a catalogue on CD-ROM, using digital video and photographs held at the Museum and James Cook University.

3.1.2. **ARTIFICIAL MARKING DATA**

Rehabilitated dolphins were freeze branded on release from Sea World, Qld (number not reported).

3.1.3 **TELEMETRY DATA**

NA for 1998

3.2 *Analyses/development of techniques*

The Queensland Environmental Protection Agency/Pacific Whale Foundation catalogue of humpback whale photo-identifications from 1987 to 1996 was utilised to estimate the abundance of humpbacks found within the Hervey Bay Marine Park. This analysis was conducted by Milani Chaloupka (Q.EPA) and the findings are presented in the paper, Chaloupka, M., Osmond, M. and Kaufman, G. in press (see 11.1).

The 1997 Centre for Whale Research (W A) black/white photo-identifications have been printed and compared manually for intra-season resights. This information will be incorporated in a comprehensive paper presently being prepared which will describe, as far as possible, the temporal and geographic distribution of humpback whales migrating from Antarctic feeding grounds to the Kimberley calving grounds (Jenner, Jenner & McCabe, 1999). The paper will include both historical whaling data and recent information collected by the Centre for Whale Research and other research bodies. During the summer and winter of 1998, the 1997 photo-id's (497 images, including flukes and lateral bodies) were scanned into a digital format ready for a digital matching system following funding from Woodside Energy. In 1999, Commonwealth funding will allow the Centre for Whale Research 1998 and 1990-1996 season's data to be digitised as well as those data archived at the West Australian Museum.

Analysis of marking data from studies of bottlenose and Indo-Pacific humpback dolphins is in progress (UQCCB).

The Dolphin Research Institute (VIC) is still in the process of developing a digital shape analysis system for the identification of dolphins. This project is being carried out in conjunction with Melbourne University Geomatics Department.

4. Tissue/biological samples collected

4.1 *Biopsy samples*

Table 4.1 Biopsy samples (Including data from 1997 not previously counted)

Species	Area/Stock	1997 Cal year	1998 Cal year	Archived (Y/N)	No. analysed	Total holdings	Contact person/institute
inshore bottlenose	East Australia	0		N/A	N/A	76	Dr Peter Hale, CCB, University of Qld.
inshore bottlenose	West Australia	21		y	21	21	Dr Peter Hale, CCB, University of Qld.

Table 4.1 (cont.)

Species	Area/Stock	1997 Cal year	1998 Cal year	Archived (Y/N)	No. analysed	Total holdings	Contact person/institute
offshore bottlenose	East Australia	14		Y	14	55	Dr Peter Hale, CCB, University of Qld.
Indo-Pacific humpback dolphin	East Australia	5		Y	5	17	Dr Peter Hale, CCB, University of Qld.
Indo-Pacific humpback dolphin	West Australia	3		Y	3	3	Dr Peter Hale, CCB, University of Qld.
bottlenose dolphin	Shark Bay, WA		193	Y	Nil	214	M. Kruetzen and Dr Bill Sherwin, Uni NSW.
humpback whale	Byron Bay Group V		6	Y	0	6 x sloughed skin samples	Dave Paton, NPWS, Lismore, NSW (02) 66270 200

4.2 Samples from directed catches or bycatches

NA for 1998

4.3 Samples from stranded animals

Table 4.3a Samples from stranded animals

Species	Area/stock	1998 Calendar	Archived (Y/N)	Tissue type(s)*	Contact person/institute
Irrawaddy dolphin	Townsville	1	N	Skull	Qld Museum
Irrawaddy dolphin	Whitsundays	1	N	Skull	Qld Museum
Indo–Pacific humpback dolphin	Cairns	1	N	Complete skeleton	Qld Museum
bottlenose dolphin	Cooktown	1	N	Complete skeleton	Buried at Cooktown, to be retrieved by Sandy Clague, (Q.EPA)
bottlenose dolphin	South Stradbroke Island, Qld	1	N	Muscle, blubber (frozen), skin (in DMSO)	Mr Trevor Long, Sea World
bottlenose dolphin	The Spit, Main Beach, Qld	1	N	Liver, kidney, muscle, blubber (frozen), skin (in DMSO)	Mr Trevor Long, Sea World
bottlenose dolphin	Southern Tasmania	2	Y	Skin, blubber, muscle, liver, kidney, pancreas, heart, spleen, reproductive organs, lung, stomach & contents	Karen Evans, University of Tasmania
common dolphin	Southern Tasmania	35	Y	Skin, blubber, muscle, stomach & contents, skull incl. teeth	Karen Evans, University of Tasmania
sperm whale	Southern/ Indian Ocean	110	Y	Skin, blubber, muscle, stomach & contents, jaws incl. teeth	Karen Evans, University of Tasmania
long finned pilot whale	Southern Ocean	64	Y	Skin, blubber, muscle, stomach & contents, jaws incl. teeth, reproductive organs	Karen Evans, University of Tasmania
Mesoplodon sp.	Southern Ocean	1	Y	Skin, blubber, muscle	Karen Evans, University of Tasmania
bottlenose dolphin	WA	1	?	Tissue, Peduncle	Dr N. Milne, UWA
striped dolphin	WA	1	N	Tissue	CALM WA
short-finned Pilot whale	WA	1	?	Peduncle	Dr N. Milne, UWA
fin whale	WA	1	?	Tissue, tail fluke	Dr N. Milne, UWA CALM WA
sperm whale					Mr Geoffrey Dutton, Dept of

					Veterinary Anatomy, University of Sydney
humpback whale	Byron Bay Group V	2	Y	Samples taken from beachwashed blubber specimens	Dave Paton, NSW NPWS, Lismore (02) 6627 0200

Table 4.3b Samples from stranded animals - data from 1997 not previously counted.

Species	Area/stock	1997 Calend. year	Archived (Y/N)	Tissue type(s)	Contact person/institute
Inshore bottlenose dolphin	West Australia	2	2	Skin	Dr Peter Hale, CCB, University of Qld.
Inshore bottlenose dolphin	East Australia	4	4	Skin	Dr Peter Hale, CCB, University of Qld.
Offshore bottlenose dolphin	East Australia	2	2	Skin	Dr Peter Hale, CCB, University of Qld.
bottlenose spp	East Australia	3	3	Skin	Dr Peter Hale, CCB, University of Qld.
Indo-Pacific humpback dolphin	East Australia	2	2	Skin	Dr Peter Hale, CCB, University of Qld.

4.4 *Analyses/development of techniques*

UQ-CCB studies on bottlenose and Indo-Pacific humpback dolphins are looking at species structure in bottlenose and regional population structure of inshore bottlenose, offshore bottlenose and Indo-Pacific humpback dolphins.

A pilot study on the fatty acid composition of blubber using samples collected from three *P. macrocephalus* mass strandings was conducted as part of an Honours thesis by Jennifer Budard of the Institute of Antarctic and Southern Ocean Studies. Karen Evans is presently conducting analysis of the diet of *P. macrocephalus* as part of a PhD. It is hoped that the results of this study will be published in mid-1999. All skin samples from the *P. macrocephalus* strandings have been sent to the Southwest Fisheries Centre (US) to contribute to a global genetic study as part of the ongoing worldwide assessment of this species by the International Whaling Commission. Preliminary analysis of this study is complete and it is hoped that the results will be published by mid-1999 (Uni Tas).

An Honours thesis on the functional anatomy of the cetacean peduncle is being prepared for submission (W A CALM).

A project on 'Kinship and alliance formation in male dolphins', underway since 1997, is being conducted by the University ofNSW (reported by NSW NPWS). The project involves taking small tissue samples from wild dolphins to investigate family relationships and genetic relatedness between different social groups and areas.
'Reproduction in Marine Man1mals' is another ongoing project, since 1997, being conducted by the University of Sydney. It involves using post mortem blubber biopsies to develop a method to gauge the reproductive status of wild cetaceans with minimal intervention.

Serum samples collected from captive animals (Sea World, Brisbane; Pet Porpoise Pool, Coffs Harbour) have been sent to the Netherlands for analysis to detect possible morbillivirus strains (UQ -AGRF). Results should be noted in next year's report.

5. Pollution studies

Australian Dolphin Research Foundation, SA, is conducting preliminary work relating toxin load (pcBs and heavy metals) to known home ranges of dead animals.
University of Tasmania is planning to undertake analysis of all blubber, liver and kidney samples for organochlorine pollutants (pCBs, DDT and its derivatives) and heavy metals (Cu, Pb, Zn, Cd and Hg) in the first half of 1999. This is hoped to be done as a collaborative project with a specialised laboratory.

W A CALM is using samples opportunistically collected from stranded fin and humpback whales, striped and bottlenose dolphin (see table 4.3), to analyse for heavy metal and PCB contamination.

6. Statistics for large cetaceans

6.1 *direct catches (commercial, aboriginal and scientific permits) for the calendar year 1997*

No direct catches are permitted in Australia.

6.2 Other non-natural mortality for the calendar year 1998

Table 6.2 Non-natural incidents/mortality

Species	Area/stock	Males	Females	Total	Cause	Methodology
*humpback whale	Hervey Bay (Group V)	Unknown	Unknown	1	N (Released alive)	Small boat observation and assistance
humpback whale	Gold Coast (Group V)	Unknown	Unknown	1	Shark net (Released alive)	Released by Sea World
humpback whale	Laureton (Group V)			1	entangled	released
humpback whale	Group IV	Unknown	Unknown	3	Entangled in lobster pot lines	All successfully released by local fishermen

***Details submitted by Pacific Whale Foundation:** A sub-adult humpback whale was observed (18/8/98) in Hervey Bay with thick rope looped around its flukes, and another 7 metres of rope that trailed loose behind the whale as it swam. The animal displayed a variety of normal behaviours including breaching, pectoral fin slapping and fast swimming, and appeared uninhibited by the rope or the deep cuts in its tail. On 19 August, an attempt was made to cut the rope and disentangle the whale, using a long pole with a knife attached at the end. On two attempts, successful contact was made with the rope. At this time, the rope was not cut to the point where it came loose from the whale. However, the whale was then sighted again in Hervey Bay on 31 August with no signs of the rope attached to its tail, but still with extensive wounds and cuts around its tail.

7. Statistics for small cetaceans

7.1 For the calendar year 1998

Table 7 Statistics for small cetaceans

		Incidental mortality			Live-capture
Species	**Area/stock**	**Reported**	**Est. total**	**Source***	**Reported**
common dolphin	Gold Coast	4		Shark net	
Indo–Pacific humpback dolphin	Sunshine Coast	1		Shark net	
Indo–Pacific humpback dolphin	Sunshine Coast	1		Undetermined human–related	
bottlenose dolphin	Gold Coast	1		Shark net	
bottlenose dolphin	Cooktown	1		Tangled netting	
Unidentified dolphin	Gold Coast	1		Tangled netting	
Unidentified dolphin	Moreton Bay	1		Boat strike	
Unknown	Coral Sea	8		Purse seine	
common and bottlenose dolphins	NSW	7		Gillnet (shark mesh net)	
Unidentified dolphins	Southern shark fishery, south-east non-trawl	13		Gillnet	
Killer whale	Southern shark fishery, south-east non-trawl	1**		Drop-line gear	
bottlenose dolphin	WA	0	0	Entrapped during construction of salt evaporation ponds	13 (10 adult, 3 calves)
bottlenose dolphin	WA	1		Ingested fish hooks	0
unidentified dolphins	Sydney; Gosford; Central Coast/SE Australia	5	?	Shark netting	nil
common dolphin	Sydney & Newcastle/ SE Australia	2	?	Shark Netting	nil
common dolphin	offshore Central Coast NSW	1	?	?	nil

*eg. fishery type ** animal was released alive

K. Evans -University of Tasmania

An adult male *Tursiops truncatus* (242cm) was caught in the cage net of an aquaculture establishment farming Atlantic salmon on 15/1/98. The dolphin was found dead on the estuary floor near a large tear in the cage net. Water was found in the lungs on examination, suggesting the animal drowned. Bruises and fresh cuts on the external surface of the animal also support this. All organs appeared normal and no fatal injuries were present.

8. Strandings

Table 8 Strandings data

Species	No/Sex	Date	Location/Stock	No resc'd	No died	Cause of stranding/death	Comments
Inshore bottlenose	4	1997	East Australia				Beachcast
Offshore bottlenose	2	1997	East Australia				Beachcast
Bottlenose spp	3	1997	East Australia				Beachcast
humpback dolphin	2	1997	East Australia				Beachcast
Common dolphin	1	1998	Central coast			Offshore in net	Very decomposed
Unidentified xiphiid	1	1998	Pivot Beach, Portland, Vic				4.8m, buried for further investigation
humpback whale	4	1998				1 – shark net 3 – undetermined	
Pygmy sperm whale	1	1998				1 – undetermined	
Melon-headed whale	3	1998				2 – disease 1 – undetermined	
Unconfirmed wh spp	1	1998				1 – undetermined	
Common dolphin	4	1998				4 – Shark net	
Irrawaddy dolphin	2	1998				2 – undetermined	
Indo-Pacific humpback dolphin	6	1998				2 – disease 1 – shark net 3 – undetermined	
Bottlenose dolphin	13	1998				2 – disease 1 – shark attack 2 – shark net 1 – tangled in net 7 – undetermined	
Unidentified dolphin	6	1998				1 – boat strike 1 – tangled in net 4 – undetermined	
Bottlenose dolphin	1M	15/1/98	Hideaway Bay, Huon Estuary, Tas		1	Drowning	Caught in salmon cage net
Short-fin pilot whale	1M, 2F	16/1/98	Seal Rocks, NSW				F - 3.58/3.07m M – 2.17m transported; stabilised locally; euthanased buried at MSRA
Common dolphin	7M/6F	19/1/98	The Neck, Bruny Island, Tas		13	Unknown	
Bottlenose dolphin	1	21/1/98	Angourie, NSW				
Bottlenose dolphin	1F	23/1/98	Halls Head, Mandurah, WA		1	Unknown	1.25m length Found dead
Common dolphin	44	27/1/98	Ralph's Bay, South Arm, Tas	25	5M/14F	Drowning	3 foetuses were aborted
Bottlenose dolphin	1F	2/98	Rosebud, Vic				
Sperm whale	66	3/2/98	Ocean Beach, Strahan, Tas	3	2 juv M/59F and 2 F calves	Stranding cause unknown	At least one rescued juvenile male was later found dead; one foetus was aborted
Short fin pilot whale	1F	11/2/98	Tims Thicket, WA		1		1.78m, decomposing
Pantropical spotted dolphin	1M	11/2/98	Stockton Beach, NSW		1		2.00m
Sperm whale spp	1	18/2/98	Yuragir NP, NSW		1		euthanased in situ

ITable 8 Strandings data (cont.)

Species	No/Sex	Date	Location/Stock	No resc'd	No died	Cause of stranding/death	Comments
Sperm whale	25F/1 F calf/4M sub-adult/1M juv	19/2/98	Greens Beach, Marrawah, Tas		31	Stranding cause unknown	4 foetuses were aborted
Sperm whale (neonate)	1	23/2/98	Iluka				euthanased
Sperm whale	11	1/3/98	Black River Beach, Stanley, Tas	1M sub-adult	10F	Stranding cause unknown	1 aborted foetus
Pygmy sperm	1	1/3/98	Port Macquarie, NSW				
Bottlenose dolphin	1 calf	10/3/98	Koombana Bay, WA		1		New born calf, 1.0m
Bottlenose dolphin	1 calf	17/3/98	Port Kennedy, WA		1		New born, 1.01m decomposing,
Bottlenose dolphin	1	22/3/98	Cottesloe, WA		1		2.3m, Advanced decomposition.
Sperm whale (neonate)	1F	22/3/98	Buckley's Beach, NCNR, NSW				3.47m, buried in situ
Bottlenose dolphin	1M	24/3/98	Careening Bay, Garden Island, WA		1		1.0m, Advanced decomposition.
Bottlenose dolphin	1	26/3/98	Mandurah, WA		1		2.57m, Decomposed.
Dolphin ?	1	27/3/98	Bondi Beach, NSW		1		removed
Sperm whale (neonate)	1M	5/4/98	Terrigal, NSW		1		transported; stabilised locally; died; buried MSRA, 3.058m
Long-fin pilot whale	1	11/4/98	Nelson Bay, Vic				<2m
Striped dolphin	6	19/4/98	Coodamurrup Beach, WA	4			2.05/1.84m Died while receiving treatment.
Offshore bottlenose	1F	21/4/98	South Stradbroke Is, Qld		1	histology pending	Good body condition
Bottlenose dolphin	1	24/4/98	City Beach, WA		1		1.5m, Advanced decomposition.
Bottlenose dolphin	1M	27/4/98	Garden Island, WA		1	Ingested gang of fish hooks	2.55m, Advanced decomposition.
Bottlenose dolphin	1M	15/5/98	May's Beach, Tas		1	Unknown	
Bottlenose dolphin	1	19/5/98	South Ballina, NSW				Incinerated after post-mortem
Striped dolphin	1	5/6/98	South Gates Bch, Geraldton, WA		1		2.5m, Advanced decomposition.
Long finned pilot whale	1M	8/6/98	Wilson's Beach, Tas		1	Unknown	
Tursiops truncatus	1	8/6/98	Port Stephens, NSW		1		Removed, buried BHD
Inshore bottlenose dolphin	1F	27/6/98	The Spit, Main Beach, Qld			Chronic pancreatitis from fluke infestation	Bacterial pyelonephritis
dolphin ?	1	14/7/98	Hawkesbury River, NSW		1		Removed, buried MSRA
Bottlenose dolphin	1M, juv	8/98	Frankston, Vic				
humpback whale	1F	10/8/98	South Gates Bch, Geraldton, WA		1		New born calf, 4.6m
Bottlenose dolphin	1	25/8/98	Broken Head, NSW				Buried in situ
Fin whale	1F	26/8/98	Mandurah, WA		1		15.4m, Live stranded, died on beach.
humpback	1	31/8/98	Eden, NSW		1		decomposed in situ

Table 8 Strandings data (cont.)

Species	No/Sex	Date	Location/Stock	No resc'd	No died	Cause of stranding/death	Comments
humpback whale	1F	2/9/98	South Gates Bch, Geraldton, WA		1		4.0m, Live stranded, euthanased.
Striped dolphin	1F	3/9/98	Quindilup, WA		1		1.85m, Euthanased.
Melon-head	1	7/9/98	Scotts Head, NSW		1		Rehab at PPP; died; AUS MUS
Pygmy Sperm	1	23/9/98	Yuraygir NP, NSW		1		euthanased in situ
Long finned pilot whale	Accurate total unknown due to large area of stranding	17/10/98	Marion Bay Blackmans Bay Eaglehawk Neck Lagoon Bay Rheban Bay Orford Maria Island Tasmania	72 25 8 4 5 3	24 19 6 1 63 2*		Large stranding across many localities. High no. of restrandings; *animals dead prior to strand, possibly from another stranding site
humpback	1	22/10/98	Nth Woolgoolga, NSW		1		Removed, buried?
humpback whale	1M	6/11/98	Quinns Beach, WA		1		15m, Advanced decomposition.
Bottlenose dolphin	1F	10/11/98	Port Melbourne, Vic		1		2.67m, poor condition
Mesoplodon sp	1M	19/11/98	Bolton's Bay, Tas		1	Unknown but many large shark bites	Head of animal collected by Tas NPWS for identification
Pygmy sperm whale	1F	19/11/98	One Mile Beach, Forster, NSW		1		2.86m, removed; buried MSRA
Long finned pilot whale	16	12/98	Sea Elephant Bay, King Island, Tas	16			Animals were part of larger pod (~60) prior to stranding
Bottlenose dolphin	1M	12/98	Brighton, Vic				
Common dolphin	1F	12/98	Blairgowrie, Bass Strait				
Common dolphin	1M	17/12/98	The Entrance Beach, NSW		1		2.38m

**summary numbers and details only, no locations or dates supplied

Contact details for State and Territory organisations that deal with stranding situations have been listed in last year's report to the IWC.

9. Other studies and analyses

Extensive analysis of 25 years of monthly sea ice extent for the Ross Sea area has been completed using modern time series decomposition techniques by Milani Chaloupka (Q.EPA).

Underwater acoustic recordings were made of humpback whale song and social sounds off Pt Lookout (southern Qld) over two periods in June and July, during the northern migration (M. Noad -Uni Syd). Recordings were made using a moored hydrophone buoy radio-linked to a shore station. The primary objective of the study was to document the pattern of the humpback whales' song as part of a four-year project examining song changes between and within migratory seasons. These changes are part of a broader study examining the role of song as a vocal behaviour during migration. (Much of the behavioural data for this study was collected in 1997.) Following a brief analysis of the data collected in 1997, a coarse correlation was established between singing activity and numbers of passing migrating whales at Peregian Beach (southeast Qld) during the southern migration. This correlation has been outlined in a report to the Qld Dept of Environment and Heritage (Noad *et al,* 1998b) which provided some funding for the 1997 fieldwork. The conclusions of this aspect of the study were cautious however. They indicated that although a correlation existed it would not be possible to conduct acoustic stand-alone surveys of humpback whales in other areas without first conducting combined visual and acoustic surveys to ground-truth

any conclusions that may be made about the number of whales in the area. It was also noted that although the correlation between singing activity and numbers of passing whales was reasonably high during much of the southern migration, the correlation was poorer at the beginning and end of the southern migratory season.

Observations of dwarf minke whales in association with a vessel and swimmers/divers were continued by the Museum of Tropical Qld in 1998 to determine the best procedures for the commercial swim-with-minke whale operations presently undertaken on the northern Great Barrier Reef. A preliminary Code of Practice, based on the 1996 and 1997 field seasons, was presented in IWC document SC/50/WWl (see 11.2).

Work continued on maintaining photo-ill catalogue and inter-catalogue comparisons to detect movements of individual southern right whales around the Australian coastline. Opportunistic aerial flight network produced a limited number of right whale identifications from south-eastern Australia and further work was undertaken on computer assisted matching techniques (S. Burnell, Eubalaena Pty. Ltd.).

Analyses have been made on the hirtherto unpublished marine mammal data collected during Mawson's 1929-30 and 1930-31 expeditions to the present Australian Antarctic Territory (G. Ross, ABRS). Of special interest are dedicated observations of whales made by both scientific staff and ship's officers, which comprise the first and only sightings surveys for the length of the AA T before or in the year that pelagic whaling began in this region.

The Centre for Whale Research W A, will continue surveys in 1998 to contribute to long-term data collection by addressing recent population trends (use by particular age classes), productivity (calving intervals etc.), stock identity (photo-id and song recordings) and by assessing the value of the Exmouth Gulf as an important resting ground for cows and calves.

Table 9 Other Cetacean Research in Progress (WA CALM)

Common name	Principal Researcher	Subject
Bottlenose dolphin	Rebecca Donaldson	Ecology of Bottlenose Dolphins in Cockburn Sound (PhD thesis)
Bottlenose dolphin	M. Heithaus	Importance of benthic fish communities to Bottlenose dolphin diet. (Shark Bay. PhD thesis)
Bottlenose dolphin	M. Kruetzen	Genetic study of Bottlenose Dolphins along WA coastline (PhD thesis)
Bottlenose dolphin	Dr A. Samuels	Behavioural ecology of juvenile dolphins in Shark Bay
Bottlenose dolphin	Dr J. Mann	Behaviour and communication in Bottlenose dolphins in Shark Bay
Southern Right whale	Dr J. Bannister	Aerial survey of WA south coast stocks.
humpback whale	Rob McCaughley	Effects of compressed air blasts from seismic surveys on cetaceans.
Killer whale	Joanne Tilbury	Distribution of Killer whales along WA coastline

Licensed Commercial Whale Watching in Western Australia (for Southern Right and humpback whales) for the 1997 season.
Total Number licenses issued: 47 (Metropolitan Perth waters), 40 (Country-based licences).
Total Passengers carried: 23,906 (Metropolitan Perth waters), 11,435 (Country-based licences).

Results of analyses from 'BROKE', a large-scale multidisciplinary survey conducted in 1996, will be published in 1999 in Deep Sea Research. Methodology and analyses from this survey and the long term Southern Ocean cetacean program will be presented to the IWC Standing Working Group on Environment workshop in March 1999. It will also be used for retrospective analyses by the IWC, and will contribute towards the development of standardised multidisciplinary methods for the IWC/CCAMLR/SO Globec collaborative research programs in the Southern Ocean in 1999/2000 and 2000/2001 (D. Thiele, Marequus Pty Ltd).

Work on ecology of *Orcaella, Sousa* and *Tursiops* is continuing in northern Australian waters (p. Corkeron, James Cook University).

NSW NPWS licences a number of projects conducted in its waters:
Dolphin within research project - - an ongoing research project which has been underway since 1994. The project IS beIng conducted by the Dolphin Society and involves examining human responses to interactions with non captive dolphins.

Aspects of Humpback whale watch - a new research project commenced in 1998. The project is being conducted by a PhD student at: James Cook University. The project involves comparing whale-watching operations in NSW and QLD waters; evaluating operators' knowledge and understanding of humpback whales, regulations and guidelines; and evaluating whales' response to vessel movement.

Social structure and dynamics of bottlenose dolphins, Jervis Bay and Port Stephens - an ongoing research project which has been underway since 1997. The project is being conducted by the Marine Mammal Research Group of Macquarie University. 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 for differences and similarities observed.

10. Literature cited

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