

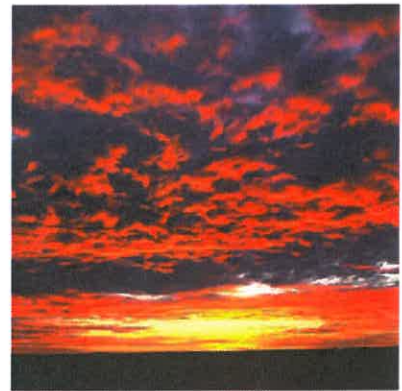
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RPS

## DOLPHIN REVIEW

**Browse LNG Development**







## **DOLPHIN REVIEW**

### **Browse LNG Development**

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## SUMMARY

This report presents a review of the currently available information pertaining to dolphin populations of the West Kimberley region in Western Australia. The review combines information from consultancy reports and published literature with the data collected by RPS on behalf of Woodside Energy Ltd (Woodside), during the Browse Marine Megafauna Surveys (Browse MMFS) in 2009–2011.

RPS has conducted aerial and vessel-based surveys to establish the baseline distribution and abundance of marine mammals along the west coast of the Dampier Peninsula and offshore to Scott Reef in three successive years. The surveys were conducted in support of the environmental approvals process for the proposed Browse Liquefied Natural Gas (LNG) Development within the James Price Point LNG Precinct. RPS scientists surveyed whale, dolphin and dugong populations during the humpback whales' northern migration period from July to October in 2009 and 2010 and from July to September in 2011.

In addition to the Browse MMFS, which was designed primarily to assess humpback whale and dugong populations, opportunistic and targeted surveys have been conducted to better assess the distribution and abundance of dolphins in the same area. Vessel-based surveys were conducted in 2009 with a specific intention to collect baseline data on dolphin populations off James Price Point. Further data on the distribution and abundance of dolphins off James Price Point were collected opportunistically during a Geotechnical Survey in 2010 and during a dugong survey in 2011.

The amount of survey effort expended in the Browse MMFS during 2009–2011 is summarised in Table I.

**Table 1: Survey effort summary for vessel and aerial surveys during the Browse MMFS in 2009, 2010 and 2011**

Year	Survey Name	Number of Surveys	Effort
2009	Vessel Transect Survey (James Price Point)	Three periods: ▪ July–August ▪ August–September ▪ September–October	144.5 hrs over 17 days 1,033 km of transect
	Vessel Transect Survey (Pender Bay)	Three periods: ▪ July–August ▪ August–September ▪ September–October	68 hrs over eight days 647 km of transect
	Nearshore Regional (Dugong) Aerial Survey	One by SKM (March) Two by RPS (July and September)	9,353 km <sup>2</sup> with approximately 20 hrs on transect per survey
	Aerial Humpback Whale Migration Corridor Survey	Eight flights (July–October)	19.1 hrs on transect 4,095 km of transect
	Aerial Reference Site Survey	11–14 flights (July–October)	24.9 hrs on transect 5,336 km on transect
	Scott Reef Offshore Aerial Survey	Three at Scott Reef Six between mainland and Scott Reef (July–October)	21.4 hrs on transect 4,658 km on transect
2010	Geotechnical Survey	One (mid-August to mid-September)	98 hrs over 20 days
	Aerial Humpback Whale Migration Corridor Survey	Ten flights (July–October)	37.6 hrs on transect 6,906 km of transect
	Reference and Scott Reef Aerial Surveys	Ten flights (July–October)	49.8 hrs on transect 10,433 km of transect
2011	Aerial Humpback Whale Migration Corridor Survey	Seven flights (July–September)	16.3 hrs on transect 3,533 km of transect
	Aerial Marine Megafauna	Six flights (July–September)	11.5 hrs on transect 2,533 km of transect

Dolphins were observed in all survey areas and every survey time during the Browse MMFS. Seven dolphin taxonomic groups were recorded during the Browse MMFS:

- unidentified dolphins (*Delphinidae*)
- Australian snubfin dolphin (*Orcaella heinsohni*)
- killer whale (*Orcinus orca*)
- Indo-Pacific humpback dolphin (*Sousa chinensis*)
- unidentified spinner dolphins (*Stenella* spp.)
- unidentified bottlenose dolphins (*Tursiops* spp.)
- Indo-Pacific bottlenose dolphin (*Tursiops aduncus*).

The distribution of dolphins can be divided into bathymetric zones: the Nearshore zone (< 20 m water depth); the Intermediate zone (20–50 m water depth) and the Offshore zone (> 50 m water depth). This zonation also corresponds with different elements of the proposed LNG

development; the coastal elements of the LNG Precinct lie in the Nearshore zone, the Offshore Processing Facility lies in the Offshore zone, with the pipeline traversing the three bathymetric zones.

The dolphin assemblage of the Nearshore zone was numerically dominated by Indo-Pacific bottlenose dolphins. These dolphins are likely to be present in nearshore waters of the region throughout the year. Indo-Pacific humpback dolphins, Australian snubfin dolphins and killer whales were encountered sporadically and considered to be uncommon in the Nearshore zone off James Price Point. While uncommon at James Price Point, Australian snubfin dolphins and Indo-Pacific humpback dolphins are more common in estuaries and embayments in the region, including Roebuck Bay. Spinner dolphins and common bottlenose dolphins are also expected to visit the area periodically. No other dolphin species are likely to frequent the Nearshore zone.

The dolphin assemblage of the Intermediate zone was numerically dominated by spinner dolphins and bottlenose dolphins. Spinner dolphins may be represented by the long-snouted and dwarf subspecies, however, these subspecies cannot be reliably differentiated from a distance in the field and were pooled in the Browse MMFS. It is likely that common bottlenose dolphins and Indo-Pacific bottlenose dolphins are present throughout this zone, with a tendency for the former to frequent deeper waters and for the latter to frequent shallower waters. Killer whales and Indo-Pacific humpback dolphins were recorded occasionally and, although not recorded during the Browse MMFS, pantropical spotted dolphins (*Stenella attenuata*) and short-beaked common dolphins (*Delphinus delphis*) are also expected to visit the Intermediate zone. No other dolphin species are likely to frequent the Intermediate zone.

The dolphin assemblage of the Offshore zone was numerically dominated by bottlenose and spinner dolphins. It is possible that both species of bottlenose dolphin and both subspecies of spinner dolphin occur in the offshore environment. Long-snouted spinner dolphins and common bottlenose dolphins may occur year-round in the Offshore zone, whereas the dwarf spinner and Indo-Pacific bottlenose dolphins are more likely to be transient in the deep offshore water. A number of other species have either been recorded previously in this area or are thought to occur in the deeper waters of the West Kimberley region. The following dolphin species are likely to be encountered in the Offshore zone:

- long-beaked common dolphin (*Delphinus capensis*)
- short-beaked common dolphin (*D. delphis*)
- pygmy killer whale (*Feresa attenuata*)
- short-finned pilot whale (*Globicephala macrorhynchus*)
- Risso's dolphin (*Grampus griseus*)
- Fraser's dolphin (*Lagenodelphis hosei*)
- killer whale (*Orcinus orca*)
- melon-headed whale (*Peponocephala electra*)
- false killer whale (*Pseudorca crassidens*)
- pantropical spotted dolphin (*Stenella attenuata*)
- striped dolphin (*S. coeruleoalba*)
- long-snouted spinner dolphin (*S. l. longirostris*)

- dwarf spinner dolphin (*S. l. roseiventris*)
- Indo-Pacific bottlenose dolphin (*Tursiops aduncus*)
- common bottlenose dolphin (*T. truncatus*).



## ACRONYMS AND ABBREVIATIONS

Acronym	Definition
Browse MMFS	Browse Marine Megafauna Surveys
BSS	Beaufort Sea State
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CWR	Centre for Whale Research
DEC	Department of Environment and Conservation
DSEWPac	Department of Sustainability, Environment, Water, Population and Communities
EPBC Act	The <i>Environment Protection and Biodiversity Conservation Act 1999</i>
GIS	Geographic Information Systems
IUCN	International Union for the Conservation of Nature and Natural Resources
kts	Knots (nautical miles per hour)
LNG	Liquefied Natural Gas
MNES	Matters of National Environmental Significance
n mile	Nautical mile
observer	Marine Fauna Observer
SKM	Sinclair Knight Merz
TO	Traditional Owner

## GLOSSARY

### **Cetacean**

A cetacean is a marine mammal of the order Cetartiodactyla (formerly Cetacea) which includes whales, dolphins and porpoises. All dolphins are listed under the EPBC Act as “Cetacean” to reflect the importance the Australian Government places on the conservation of this taxon.

### **Data Deficient**

The classification given by the International Union for the Conservation of Nature (IUCN) to a taxon where there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status.

### **Delphinidae**

Family of small cetaceans (Odontocetes) to which all dolphins and blackfish (pilot whales, false killer whales, etc) belong.

### **Marine megafauna**

Marine Megafauna (MMF) refers to large marine animals including dolphins, dugongs, sharks, rays, turtles and sea snakes. Only taxa that surface regularly can be spotted from an aircraft or survey vessel and a particular survey may only target a subset of MMF taxa.

### **Migratory species**

Migratory species predictably travel from one place to another, generally seasonally and often over long distances. Migratory is also a conservation status listing under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Not all species listed as Migratory are known to migrate and their migratory patterns may be unknown.

### **Near Threatened**

The classification given by the IUCN to a taxon which has been evaluated against the criteria for assessing Threatened fauna, but does not qualify as Critically Endangered, Endangered or Vulnerable, but is close to qualifying or is likely to qualify for a threatened category in the near future.

### **Least Concern**

The classification given by the IUCN to a taxon which has been evaluated against the criteria for assessing Threatened fauna, but does not qualify as Critically Endangered, Endangered, Vulnerable or Near Threatened. This classification is usually assigned to widespread and abundant taxa.

### **Platform**

The platform refers to a location or position of an observer, for example the bridge deck of a vessel or the window seats of an aircraft.

### **Threatened**

Threatened refers to species that are listed as Endangered or Vulnerable under the EPBC Act.

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## APPENDICES

### APPENDIX I: EPBC Act Protected Matters Search



## 1.0 INTRODUCTION

### 1.1 Browse LNG Development Overview

Woodside Energy Ltd (Woodside), as operator of the proposed Browse Liquefied Natural Gas (LNG) Development, plans to commercialise the Browse Joint Venture's three gas and condensate fields, Brecknock, Calliance and Torosa, 425 km north of Broome off the Kimberley coast.

Gas and liquids from these fields will be extracted using offshore facilities then transported to an onshore LNG plant for processing at the Western Australian Government's Browse LNG Precinct, near James Price Point, about 60 km north of Broome.

The planned onshore LNG and condensate production and export facilities will include three processing trains capable of processing 12 million tonnes of LNG per annum with potential for further expansion to 25 million tonnes of LNG per annum.

### 1.2 Browse Cetacean Surveys

A variety of marine megafauna surveys have been undertaken in support of the environmental approvals process for the proposed Browse LNG Development. These are outlined below.

In 2008, aerial and vessel-based surveys for marine mammals were conducted along the Kimberley coast, and between Browse Island and Scott Reef by the Centre for Whale Research (CWR) (Jenner and Jenner 2009a, 2009b). The surveys confirmed the presence of a diverse megafaunal community in the waters off the Dampier Peninsula and that the area includes part of the migration corridor for humpback whales (*Megaptera novaeangliae*) en route to and from calving grounds north of the James Price Point area.

An aerial survey along the entire west coast of the Dampier Peninsula was undertaken in March 2009 to establish a baseline for the distribution and abundance of dugongs (*Dugong dugon*) (SKM 2009). Dolphins were also recorded as a second priority during this survey. The survey altitude was too high for observers to reliably identify most dolphins to species level; however dolphin distribution and abundance data were collected.

In June 2009, Woodside commissioned RPS to conduct a series of aerial and vessel-based surveys to collect further detailed baseline data on the distribution and abundance of marine megafauna, including humpback whales (RPS 2010a), dugongs (RPS 2010b) and dolphins (RPS 2010c). The marine megafauna studies were continued in 2010 and 2011 to gain a better understanding of the inter-annual variation in the distribution and

abundance of humpback whales, dugongs and dolphins in the proposed development area.

### **I.3 Objectives of this Report**

Woodside commissioned RPS to prepare this report, which summarises the available information on dolphins (Family Delphinidae, Suborder Odontoceti) along the Dampier Peninsula, including the James Price Point area, and offshore to Scott Reef. This review collates publicly available data on dolphins in the West Kimberley region and summarises data on the distribution of dolphins collected during the Browse Marine Megafauna Surveys (Browse MMFS) for Woodside in 2009, 2010 and 2011.

This report emphasises the dolphin species listed as Matters of National Environmental Significance (MNES) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), but also describes all dolphins that are listed more generally as 'Cetaceans' and are potentially present in the region.

## 2.0 METHODS

### 2.1 Desktop Study

The desktop study reviewed and collated current information on the dolphin species (Family Delphinidae) expected to occur off the Dampier Peninsula, drawing on the EPBC Act Protected Matters Search Tool (Appendix I), the SPRAT database (DSEWPaC 2012), scientific literature and reports. Unpublished reports and data held by independent researchers and institutions were generally not accessible for the review. Anecdotal reports of dolphin distribution in the popular press, from non-governmental organisations and tourists were generally excluded from this review as the sightings could not be confirmed.

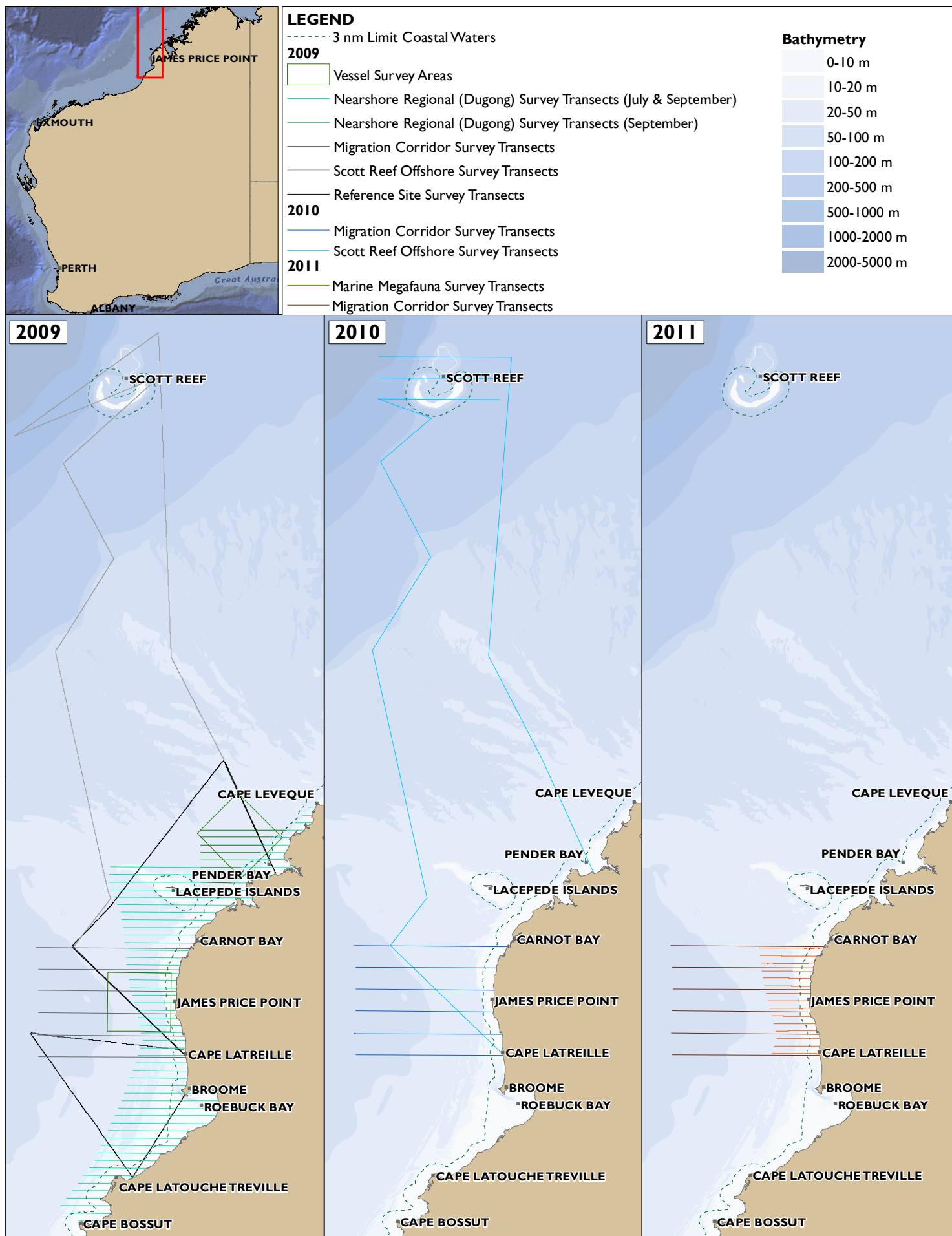
### 2.2 Survey Timing and Location

A program of aerial and vessel-based, marine megafauna surveys was undertaken between 2009 and 2011 off the west coast of the Dampier Peninsula and out to Scott Reef, Western Australia (Figure 1). The surveys were generally conducted during the humpback whale migration period between July and October.

The surveys conducted as part of the Browse MMFS comprised the:

- SKM Dugong Survey— a series of aerial transects covering the west coast of the Dampier Peninsula from Cape Bossut to Cape Leveque (March 2009)
- RPS Megafauna Survey - a series of vessel-based transects off James Price Point and Pender Bay (July to October 2009)
- RPS Nearshore Regional (Dugong Survey) - a series of parallel aerial transects covering the west coast of the Dampier Peninsula from Cape Bossut to Cape Leveque (July and September 2009)
- RPS Reference Site and Scott Reef Surveys - a series of aerial transects between the West Kimberley coast and Scott Reef (July to October 2009 and 2010)
- RPS Geotechnical Megafauna Survey – megafauna observations during a vessel-based geotechnical survey in the nearshore waters off James Price Point (August to September 2010)
- RPS Migration Corridor Surveys - a series of parallel aerial transects adjacent to James Price Point across the humpback whale migration corridor (July to October 2009 and 2010)

- RPS Marine Megafauna Survey - a subset of parallel aerial transects from the 2009 Dugong Survey covering the west coast of the Dampier Peninsula from Cape Latreille to Carnot Bay (July to September 2011)



**Figure 1: Survey Layouts for the Marine Megafauna Surveys undertaken between 2009 and 2011.**

## 2.3 Survey Design

### 2.3.1 Vessel-based Surveys

Vessel-based surveys were the primary source of species-level dolphin data. They provide greater confidence in the identification of the smaller marine megafauna because the observers are closer to the fauna and the platform is moving more slowly.

In July–October 2009, vessel-based surveys were conducted within two 20 x 20 n miles survey boxes; one off James Price Point and one at Pender Bay (Figure 1). The James Price Point survey box extended 10 nm to the north and south of the proposed development area. The Pender Bay survey box encompassed part of a known humpback whale calving ground. The survey areas excluded existing pearl farms within the survey boxes and were restricted to safely navigable water depths (> 5 m deep during the survey).

The survey team recorded marine megafauna along parallel transects which were approximately 0.5 n miles apart and covered the entire survey boxes. The transects were orientated perpendicularly to the local bathymetric contours at both sites; they ran east-west off James Price Point and northwest–southeast at Pender Bay. Transects were selected randomly for each day of surveying to avoid spatial bias in sampling between days.

The survey vessel, the *Browse Express*, provided an observer eye-height of approximately 5.3 m above water level and travelled at approximately 7 kts along the transects. The bridge deck had an adequate observation area for the scientific staff, Traditional Owners (TOs) and crew. The primary survey team comprised two dedicated observers (one port, one starboard) and one data recorder. The data recorder logged transect, record and environmental data onto a laptop computer using a customised Access database. The TO and Team Leader also kept look out for megafauna to maximise the potential for detecting all megafauna present in the survey area.

Each observer scanned the forward quadrant on their side; from directly ahead to approximately ninety degrees abeam the vessel. Observers used hand-held binoculars where necessary to aid in identifying fauna. For each megafauna sighting, the following data were recorded:

- species
- sighting cue (blow, body, dive/fluke, jump/splash, breach, slick/footprint, colour underwater, associated wildlife)
- time
- bearing (magnetic compass)
- distance
- reliability index (certain, probable, guess)
- number in group

- age class (adult, sub-adult, calf)
- number of calves
- number at surface
- direction of travel
- method of estimating distance (range estimate or reticle)
- environmental data (Beaufort Sea State (BSS), wind speed and direction, cloud cover, swell direction and height, glare, turbidity and oceanographic features).

Throughout each survey, the vessel's geographic position, accurate to within 10 - 15 m (GPSCO 2007), was streamed continuously from a Garmin GPSMAP 60CSx to a computer. The position of each megafauna sighting was derived from the GPS dataset according to the time of the sighting and its distance and bearing from the vessel.

Woodside conducted a geotechnical survey of the seabed 2 - 3 km off James Price Point in water depths of 8.5 - 10.5 m in August-September 2010. During the geotechnical survey, two observers surveyed marine megafauna during daylight hours. The observers scanned separate sides of the accommodation vessel when anchored near the geotechnical drilling rigs. Megafauna observations were recorded as described above.

### 2.3.2 Aerial Surveys

Aerial survey is the most effective method for surveying the distribution and abundance of megafauna at regional spatial scales (Marsh and Sinclair 1989). Aerial transect surveys allow the survey team to cover large areas (1000's km<sup>2</sup>) in a short time. Completing the survey in a short time reduces the potential for repeated sightings of individuals as they move through the area and allows a large survey area to be covered under similar environmental conditions (on the same day). The aerial surveys making up the Browse MMFS program are shown in Figure 1 with the methods described in (RPS 2010 a; b; c; RPS 2011) and in the following.

#### 2.3.2.1 Nearshore Regional Dugong Surveys (2009) and Marine Megafauna Survey (2011)

The dugong aerial surveys conducted in March 2009 (SKM 2009) and in July and September 2009 (RPS 2010b) were designed to sample dugongs and small cetaceans along the entire west coast of the Dampier Peninsula, from Lagrange Bay in the south to Cape Leveque in the north. Each survey comprised a single aerial survey consisting of a series of transects running east-west, from nearshore waters out to approximately the 20 m isobath.

Transects 23–37 of the 2009 Nearshore Regional Dugong Survey (RPS 2010b) were re-surveyed during the 2011 Marine Megafauna Survey. This survey extended 35 km to the north and south of James Price Point and was designed to gain an understanding of the annual variation in the dugong population off James Price Point.

Dolphins were recorded during these aerial surveys and the following features of the survey methods increased their effectiveness in detecting dolphins:

- Observers focussed on the waters within 400 m of each side of the aircraft divided into four key zones of sighting certainty; Low, Medium, High and Very High.
- Surveys were conducted in a dual platform configuration with two observers independently collecting records from each side of the aircraft (total of four observers).
- The observers focussed on dugongs and dolphins.
- The survey altitude was 900 feet.
- Survey flights were undertaken over neap tides when turbidity was likely to be lowest.
- Survey flights were only flown when sea state was BSS 3 or less.

#### 2.3.2.2 Migration Corridor Surveys (2009–2010)

The surveys of the humpback whale migration corridor were designed to quantify the temporal and spatial patterns in the abundance and distribution of humpback whales off the West Kimberley coast, particularly in the waters near James Price Point. Although the surveys were designed to survey whales, they were suitable for surveying the distribution of dolphins and the observers also recorded dolphin sightings. The Migration Corridor surveys were flown in 2009 (eight flights) and 2010 (ten flights) incorporating the following design elements:

- Observers focussed on the waters within approximately 7 km of each side of the aircraft for humpback whales but recorded dolphins within a strip of 400 m either side where the possibility of seeing and differentiating dolphin species was maximised.
- Surveys were conducted using a dual platform configuration with two observers independently collecting records from each side of the aircraft (total of four observers).
- The survey personnel were primarily focussed on humpback whales, but recorded other marine megafauna opportunistically.
- The survey altitude was 1,000 feet.
- Surveys were flown over neap tides when turbidity was likely to be lowest.
- Surveys were only conducted when sea state conditions were BSS 4 or less for the majority of the time.



### 2.3.2.3 Reference Sites and Scott Reef Surveys (2009–2010)

The Reference Sites and Scott Reef Surveys were designed to determine the distribution and abundance of humpback whales and other marine megafauna in reference areas, along the proposed pipeline corridor and at Scott Reef.

The aerial transect surveys started from Cape Latreille, followed the potential pipeline corridor out to Scott Reef and returned to the coast at Pender Bay. The surveys covered approximately 1,043 km of transects per flight. The flight characteristics (altitude and speed) were the same as for the Migration Corridor Surveys. Given the distance involved in these surveys, the transects between the mainland and Scott Reef were sampled using a single platform and the observers worked in shifts to reduce fatigue.

The geographic position of the aircraft was recorded every second using a Garmin GPSMAP 60CSx and positional data were streamed continuously to a computer. These positions are accurate to within 10-15 m (GPSCO 2007). An audio management system was used to capture the voice records from each observer. The audio management system, flight computer, GPSs and watches were synchronised prior to every flight so that megafauna observations, positional data and environmental conditions could be aligned by time coding.

## 2.4 **Survey Effort**

Table 2 summarises the amount of survey effort for each of the surveys during which dolphin data were collected.

## 2.5 **Data Analysis**

The marine megafauna data were collated and analysed to generate species lists, summary statistics and distribution maps.

### 2.5.1 **Species Lists**

Dolphin species lists were compiled from both aerial and vessel-based survey data. Records from both front and rear platforms of the aerial surveys were used to compile the species list. A larger proportion of animals were identifiable to species level from the vessel-based surveys because the observers were closer to the fauna.

Where morphologically similar species or subspecies could not be reliably differentiated, they were recorded to the lowest taxonomic level appropriate. Many dolphins could not be reliably assigned to a genus or species during the surveys due to their distance from the observation platform, but were positively identified as delphinids. These are listed as unidentified dolphins (Family Delphinidae).

Spinner dolphins are probably represented in the survey region by the long-snouted subspecies (*Stenella longirostris longirostris*) and the dwarf subspecies (*Stenella longirostris roseiventris*); however, these subspecies could not be reliably differentiated from a distance in the field and were pooled in the survey reporting. They were reported as *Stenella longirostris*.

Similarly, it is likely that common bottlenose dolphins (*Tursiops truncatus*) and Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) are both present throughout this region, with a tendency for the former to frequent deeper waters and for the latter to frequent shallower waters. Where the two species could not be differentiated, they are recorded as *Tursiops* spp. indicating the records from a particular survey area may be of either or both congeneric species.

### 2.5.2 Distribution and Abundance Mapping

The size and position of each group of dolphins recorded during the aerial and vessel-based surveys were mapped using ArcGIS software to produce abundance and distribution plots. The plots of the unidentified and spinner dolphin records were based only on the data from the front platform of the aircraft because the dolphins were numerous enough to sample without using both platforms and this reduced the potential for duplicating counts. For less abundant taxa, both front and rear platform observations were used; the number of sightings for these taxa was too low to introduce concerns of duplicating records of dolphin groups. These data were not adjusted for environmental conditions.

**Table 2: Summary of survey effort during the Browse MMFS**

Year	Survey Name	No. of Observers	Survey Method	Area	Effort
2009	Vessel-based Transect Survey	5	Single platform distance sampling and short term behaviour	James Price Point	3 periods (June – October) 144.5 hrs over 17 days 1,033 km of transect
	Nearshore Regional (Dugong) Aerial Survey	4	Dual Platform Strip Width Sampling	Cape Bossut to Cape Leveque	1 flight by SKM (March), 2 flights by RPS (July and September) 9,353 km <sup>2</sup> , approximately 20 hrs on transect per survey
	Vessel-based Transect Survey	5	Single platform distance sampling and short term behaviour	Pender Bay	3 periods (July, August and September) 68 hrs over 8 days 647 km of transect
	Migration Corridor Aerial Survey	4	Dual platform distance sampling	James Price Point	8 flights (July – October) 19.1 hrs and 4,095 km of transect
	Reference Site Aerial Survey	4	Dual platform distance sampling	Gourdon Bay, JPP and Pender Bay	11-14 flights (July – October) 24.9 hrs and 5,336 km on transect
	Scott Reef Offshore Aerial Survey	4 (Scott Reef) 2 (transits)	Dual platform (Scott Reef) Single platform (intermediate transects)	From Reference Site Transects to Scott Reef	3 (Scott Reef) and 6 between mainland and Scott Reef (July – October) 21.4 hrs and 4,658km on transect
2010	Geotechnical Survey	2	Single platform point survey for marine megafauna	James Price Point	20 days (August to September) 98 hrs on transect/station
	Migration Corridor Aerial Survey	4	Dual platform distance sampling	James Price Point	10 flights (July – October) 37.6 hrs and 6,906 km of transect
	Reference and Scott Reef Aerial Surveys	4 (Scott Reef) 2 (elsewhere)	Dual/single platform distance sampling	James Price Point , Pender Bay and out to Scott Reef	10 flights (July – October) 49.8 hrs and 10,433 km of transect
2011	Marine Megafauna Aerial Survey	4	Dual platform strip width	James Price Point	7 flights (July – September) 16.3 hrs and 3,533 km of transect
	Aerial Marine Megafauna	4	Dual platform strip width	James Price Point	6 flights (July – September) 11.5 hrs and 2,533 km of transect

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### 3.0 EPBC ACT PROTECTED DOLPHINS

The EPBC Act Protected Matters Search Tool indicated that 17 species (and subspecies) of dolphins (Family Delphinidae) are likely to occur in the area encompassing the west coast of the Dampier Peninsula and offshore to Scott Reef. Four of these species are listed under the EPBC Act as Migratory (Table 3, Appendix 1). All other delphinids are listed under the EPBC Act as Cetacean, which affords them legislative protection in Australian waters. However, none of these species are listed as Threatened by the IUCN. Three species are listed as Priority Fauna (P4) for conservation under the Wildlife Conservation Act (Table 3).

**Table 3: Dolphin species expected to occur in the area encompassing the west coast of the Dampier Peninsula and out to Scott Reef**

Common Name	Scientific Name	Status		
		EPBC Act	IUCN	WC Act
Australian snubfin dolphin	<i>Orcaella heinsohni</i>	Migratory	Near Threatened	Priority 4
Killer whale	<i>Orcinus orca</i>	Migratory	Data Deficient	
Indo-Pacific humpback dolphin	<i>Sousa chinensis</i>	Migratory	Near Threatened	Priority 4
Indo-Pacific, or spotted bottlenose dolphin	<i>Tursiops aduncus</i> (Arafura/Timor Sea populations)	Migratory	Data Deficient	
Short-beaked common dolphin	<i>Delphinus delphis</i>	Cetacean	Least Concern	
Pygmy killer whale	<i>Feresa attenuata</i>	Cetacean	Data Deficient	
Short-finned pilot whale	<i>Globicephala macrorhynchus</i>	Cetacean	Data Deficient	
Risso's dolphin	<i>Grampus griseus</i>	Cetacean	Least Concern	
Fraser's dolphin	<i>Lagenodelphis hosei</i>	Cetacean	Least Concern	
Melon-headed whale	<i>Peponocephala electra</i>	Cetacean	Least Concern	
False killer whale	<i>Pseudorca crassidens</i>	Cetacean	Data Deficient	
Pantropical spotted dolphin	<i>Stenella attenuata</i>	Cetacean	Least Concern	
Striped dolphin	<i>Stenella coeruleoalba</i>	Cetacean	Least Concern	
Long-snouted spinner dolphin	<i>Stenella longirostris</i>	Cetacean	Data Deficient	Priority 4 ( <i>S. l. longirostris</i> )
Rough-toothed dolphin	<i>Steno bredanensis</i>	Cetacean	Least Concern	
Indo-Pacific bottlenose dolphin	<i>Tursiops aduncus</i>	Cetacean	Data Deficient	
Common bottlenose dolphin	<i>Tursiops truncatus</i>	Cetacean	Least Concern	

No dolphin species listed as Threatened under the EPBC Act were identified by the Protected Matters Search Tool for this area (Appendix I). Dolphin species that have previously been recorded from, or are expected to occur in, the West Kimberley region are described in more detail in the following sections with notes on their ecology, abundance and distribution, including data from the 2009–2011 Browse MMFS where relevant.

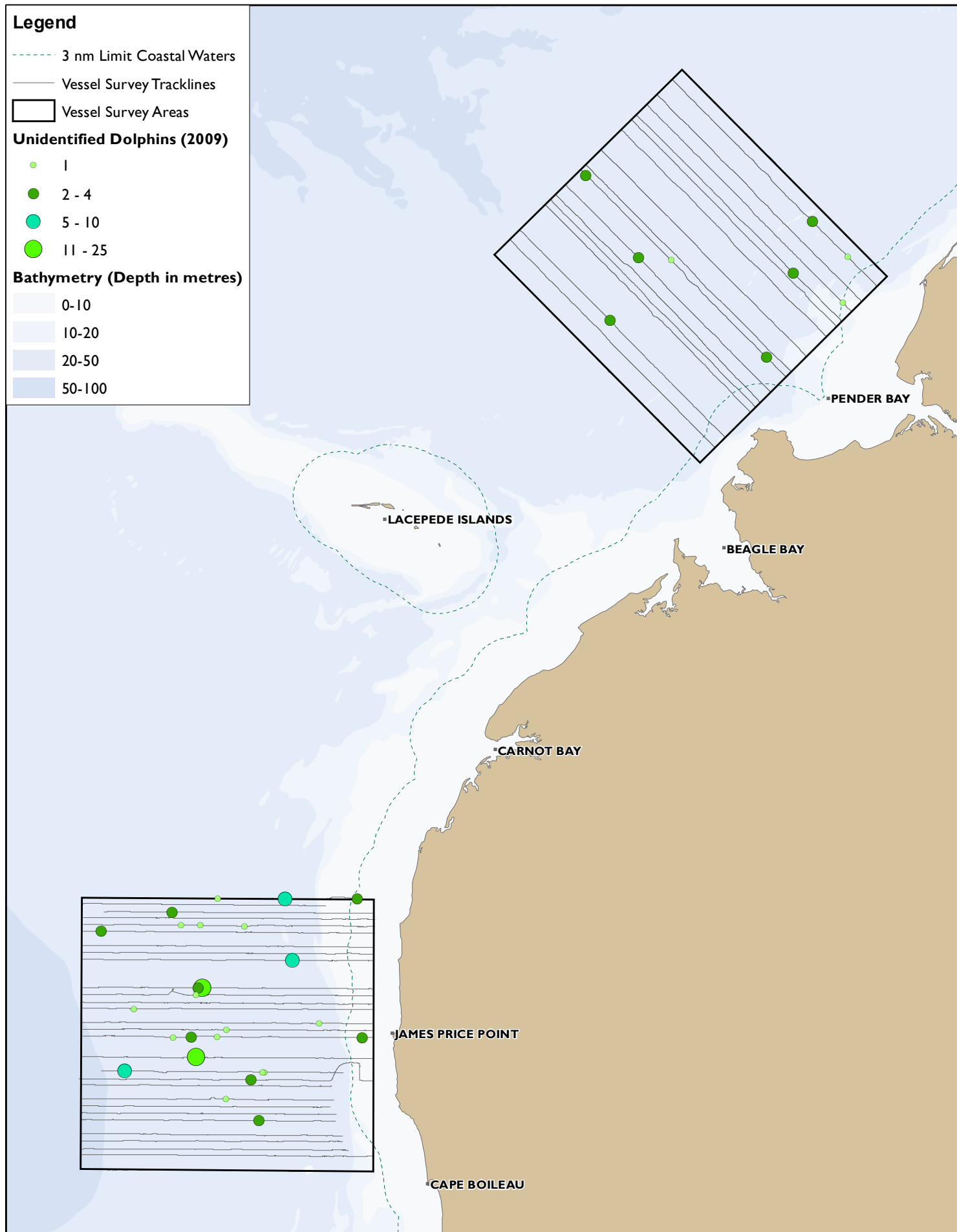
## 4.0 DOLPHINS OF THE WEST KIMBERLEY REGION

### 4.1 Unidentified Dolphins

Many of the dolphins observed during the aerial and vessel-based surveys could not be identified to species level for a number of reasons common to megafauna studies, for example brief sightings, too far from the observer to be reliably identified, or poor visibility.

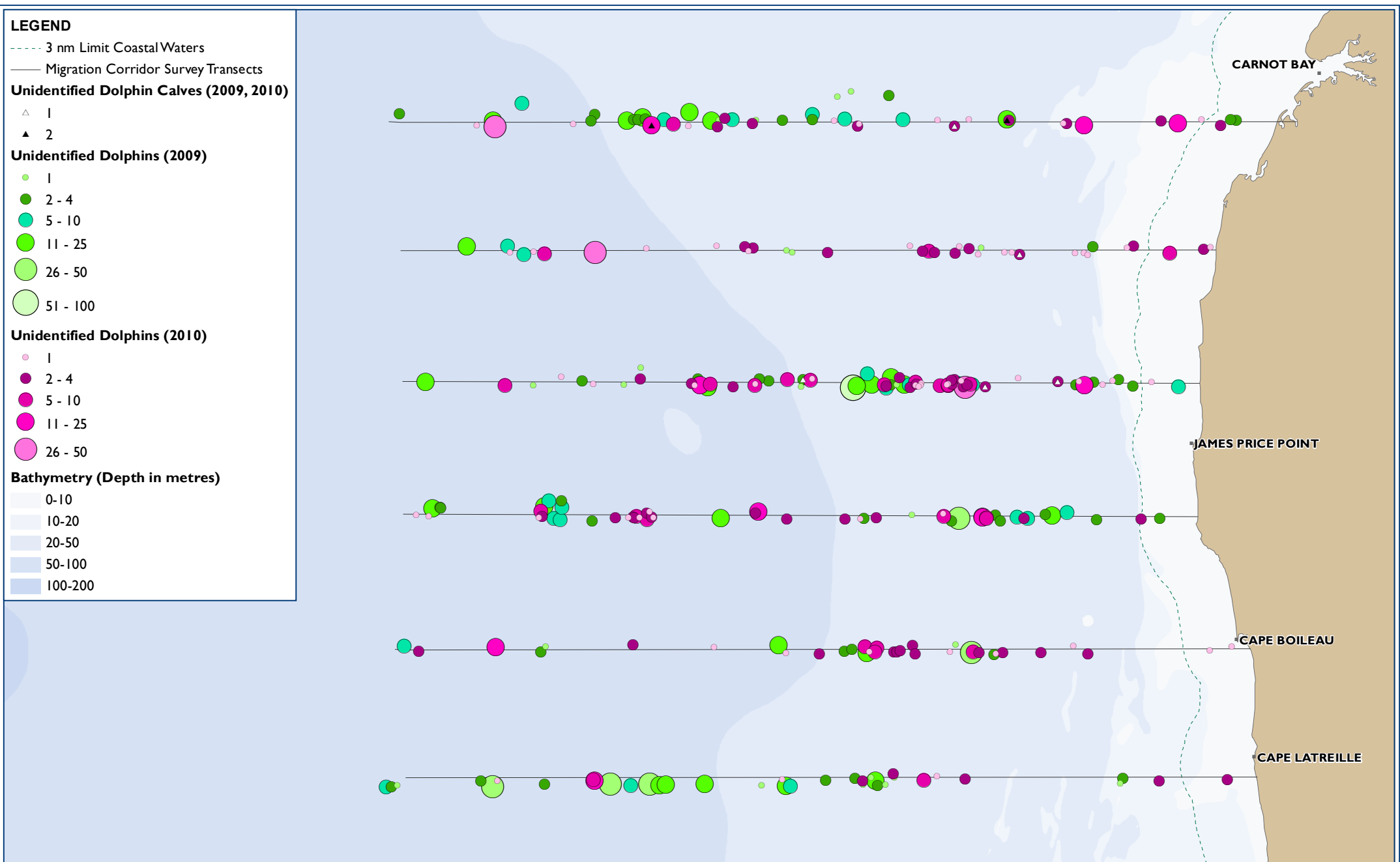
These unidentified dolphin records provide valuable information on the general distribution and abundance of delphinids across the survey area. Dolphins (Delphinidae spp.) were widely distributed across the West Kimberley survey areas and were recorded on practically every transect within all zones. The highest densities of unidentified dolphins were in the offshore waters with only occasional groups of greater than ten individuals observed in state waters within 3 n miles of the coast (Figure 2–Figure 6). The scattered records of dolphin calves suggest that there is widespread breeding within the region, but no specific calving areas were identified during the times of year sampled. While the taxonomic identity of the unidentified dolphins could not be determined, the higher densities in the Offshore zone suggests that the regional delphinid assemblage is dominated by oceanic species.

The unidentifiable dolphin records are mapped in Figure 2 - Figure 6.



**Figure 2: Records of unidentified dolphins acquired during the vessel surveys off James Price Point and Pender Bay in the Browse MMFS campaign in July-October 2009**





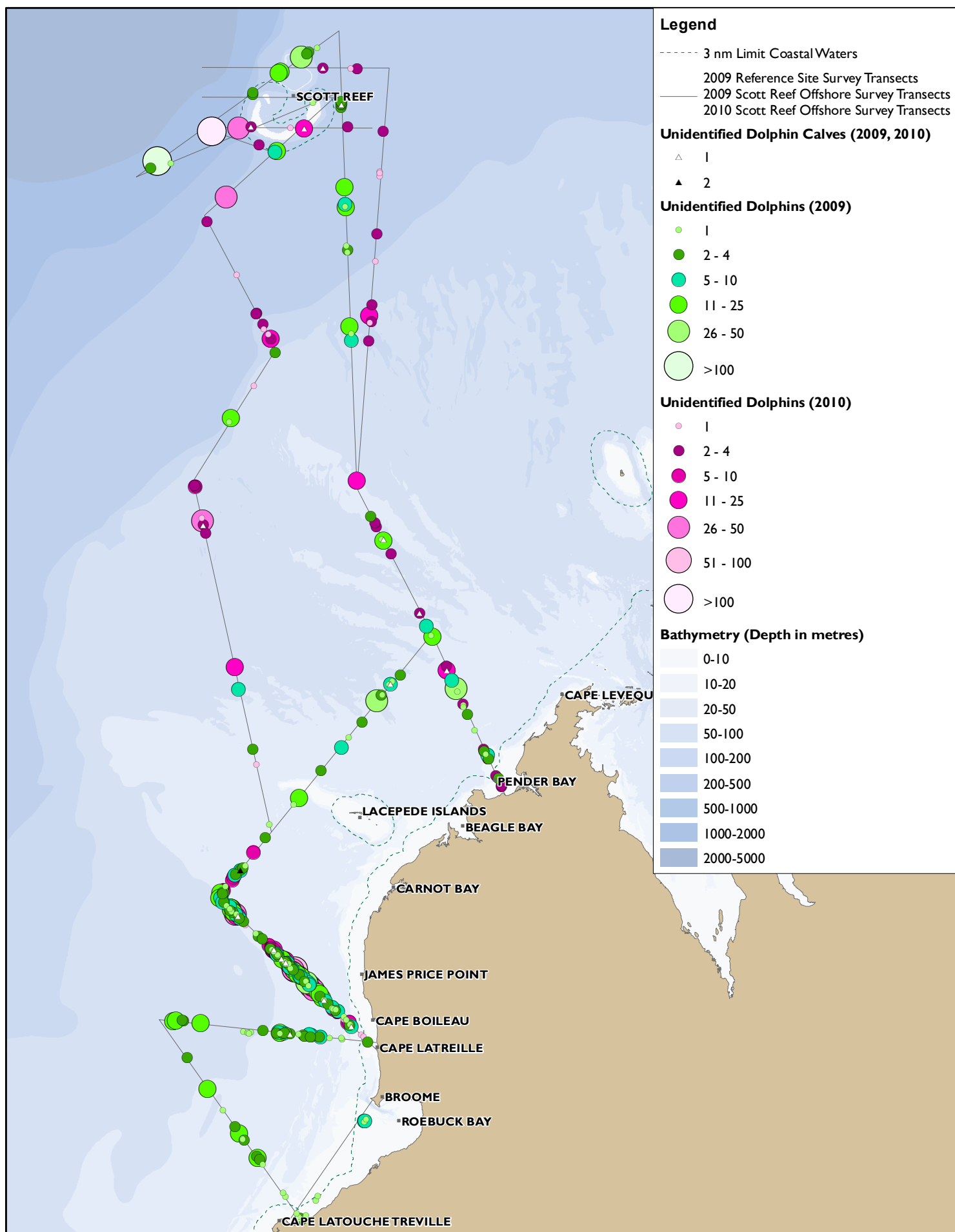
RPS



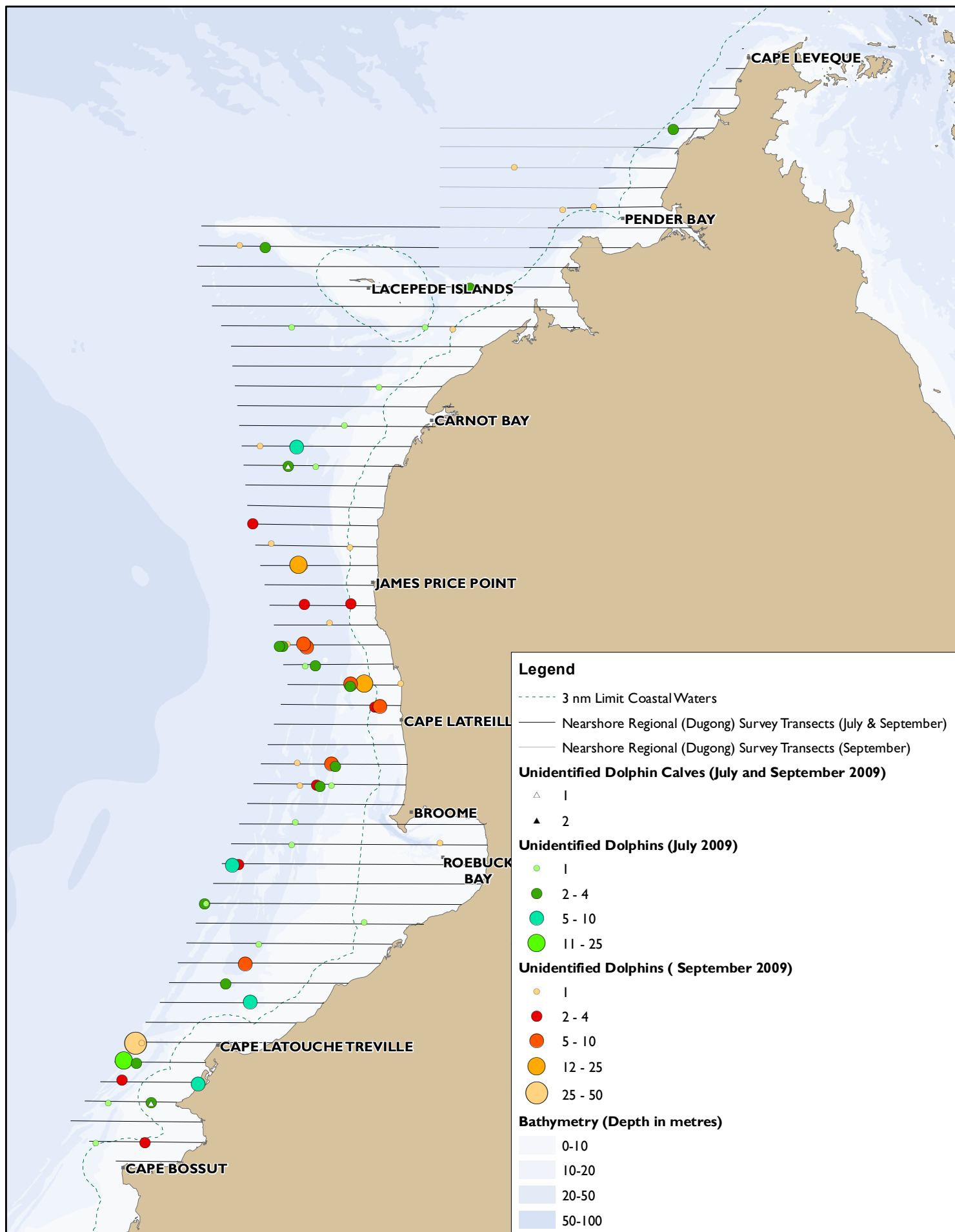
Dwg Number: NI208402  
 Date: 17/10/2012  
 Revision: C  
 Scale: 1 : 500,000 @ A4  
 Drafted by: M Angove  
 Source: RPS 2012, Woodside 2012



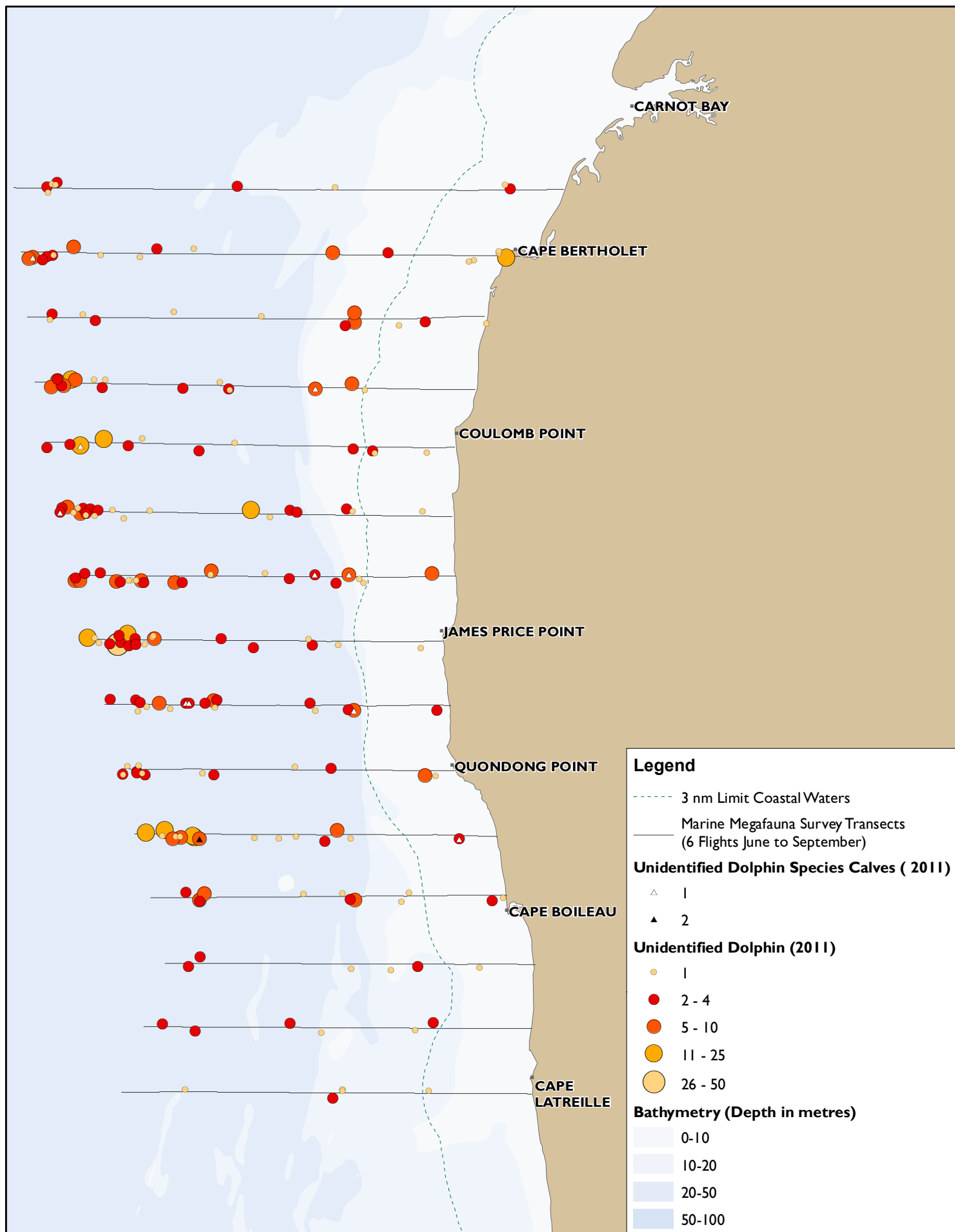
**Figure 3: Records of unidentified dolphins acquired during the Migration Corridor aerial surveys undertaken during the Browse MMFS campaign in July-October 2009 and 2010**



**Figure 4: Records of unidentified dolphins acquired during the Reference and Scott Reef aerial surveys undertaken during the Browse MMFS campaign in July-October 2009 and 2010**



**Figure 5: Records of unidentified dolphins acquired during the Nearshore Regional (Dugong) aerial surveys undertaken on Transects T1-T71 during the Browse MMFS campaign in July and September 2009**



**Figure 6: Records of unidentified dolphins acquired during the Marine Megafauna aerial surveys undertaken on Transects T23-T37 during the Browse MMFS campaign in July-September 2011**

## 4.2 Australian Snubfin Dolphin

### 4.2.1 Overview

The Australian snubfin dolphin (*Orcaella heinsohni*) was formerly known as the Irrawaddy dolphin (*O. brevirostris*) in Australia. It is characterised by a small dorsal fin and a broadly rounded head that is extremely mobile and usually has a visible neck crease (Beasley et al. 2005). They have a dark cape, white abdomen and intermediate light grey to brownish grey side (Arnold and Heinsohn 1996; Beasley et al. 2005). The males are generally larger than females, often reaching 2.7 m long whilst females reach 2.3 m long (Beasley et al. 2005).

Australian snubfin dolphins are believed to be endemic to Australia and possibly Papua New Guinea (Beasley et al. 2002). Snubfin dolphins have been reported along the northern coastline of Australia from Broome in Western Australia to the Brisbane River in Queensland (Parra et al. 2002). However, Bejder et al. (2012) suggest that they are more widely distributed than previously thought and that their range may extend as far south as Exmouth Gulf in Western Australia.

These dolphins primarily live in protected, shallow coastal and estuarine waters and their association with seagrass meadows and creeks may reflect their foraging preferences (Parra 2006). They generally feed in shallow waters close to river mouths and creeks on a wide range of estuarine and coastal fish and cephalopods (Parra and Jedensjö 2009; DSEWPaC 2012).

Australian snubfin dolphins live in groups of 1-15 animals, within isolated local populations of 50-100 dolphins (Parra 2005; Parra et al. 2006; Parra 2011). Research on their seasonal movements in Cleveland Bay, Queensland indicates that they are not permanent residents in this bay (Parra 2006). These dolphins have been observed socialising throughout the year in Cleveland Bay, suggesting that they don't have a specific breeding period (Parra 2006). This suggests that the local populations move into and out of embayments, but that their movements are probably not related to seasonal breeding cycles.

### 4.2.2 West Kimberley Distribution

The Australian snubfin dolphin is widely distributed in creeks and embayments along the West Kimberley coast. Roebuck Bay, Beagle Bay and Pender Bay on the Dampier Peninsula, tidal creeks around Yampi Sound and creeks between Kuri Bay and Cape Londonderry are important areas for these dolphins (DEWHA 2008b; Thiele 2010). They have also been observed in Camden Sound, Prince Regent River, the Buccaneer Archipelago, the Bonaparte Archipelago, Deception Bay, Talbot Bay, King Sound, Cape Bertholet and the Cambridge Gulf (Costin and Sands 2009; RPS 2007; Thiele 2008). A group of snubfin dolphins was recorded approximately 35 km north of James Price Point (RPS 2007).

The Australian snubfin dolphin population in Roebuck Bay, comprising approximately 160 individuals, is possibly the largest in Australian waters (Thiele 2010). The size of the other populations is largely unknown. Allen et al. (2012) also recorded snubfin dolphins in Roebuck Bay, along Cable Beach and to the north of Cable Beach. These records are also referred to in Hodgson et al. (2011), however there is some ambiguity between the two reports about where the dolphins were seen.

#### 4.2.3 Browse MMFS Data

Snubfin dolphins were frequently observed in Roebuck Bay from vessels conducting the Vessel Transect Surveys when in transit to the survey areas. They were not observed to the north of Broome during the aerial and vessel-based surveys for the Browse MMFS in 2009. However, an unconfirmed observation of six Australian snubfin dolphins in water about 5 m deep between Cape Latreille and James Price Point was recorded during the 2010 Migration Corridor aerial surveys (Figure 7).

In 2011, two adult snubfin dolphins were tentatively identified during the Migration Corridor aerial survey approximately 10 km west of James Price Point in water approximately 10 m deep (Figure 7). In the same year two adults and a calf were observed in waters approximately 15 m deep, 10 km off Cape Bertholet (Figure 7) during the Marine Megafauna aerial survey.

#### 4.2.4 Discussion

Despite the intensive vessel-based surveys in the coastal waters off James Price Point and along the Dampier Peninsula, few snubfin dolphins were observed during the Browse MMFS. The low numbers of snubfin dolphins observed off James Price Point combined with the absence of protected shallow waters and estuaries, suggests this area is unlikely to support resident populations of this species. However, with the exception of the March Dugong Survey (SKM 2009), all vessel and aerial surveys for the Browse MMFS were conducted in winter and spring. It is possible that snubfin dolphins are more abundant in other seasons.

If snubfin dolphins move between adjacent creeks and embayments along the West Kimberley coast, the coastal waters of the Dampier Peninsula may be part of a 'corridor' that connects areas of preferred habitat for these dolphins. Movement of coastal dolphins along Dampier Peninsula may be an important source of gene flow between adjacent populations. If snubfin dolphins move along the coast between Roebuck Bay and Pender Bay and King George Sound they are likely to pass through the nearshore waters off James Price Point.

The extent of the snubfin dolphin's nearshore habitat is largely unknown, however they have been recorded 10 km off the coast at James Price Point during the Browse MMFS. The presence of snubfin dolphins 30 km from the mainland coast at the Maret Islands (RPS 2007) indicates that these dolphins are not restricted to nearshore habitats.

## 4.3 Killer Whale

### 4.3.1 Overview

The killer whale (*Orcinus orca*) is the largest of the delphinid species, growing up to 8–10 m long (Ford et al. 2005; DEH 1999). While these cetaceans are highly social and form life-long groups, some individuals are solitary, especially older males (DEH 1999).

Killer whales are distributed throughout the marine waters of the world (Ford et al. 2005). They range widely through polar and tropical regions in Australian waters although they are more abundant at high latitudes (Corkeron and Conner 1999; Ford et al. 2005; Jefferson et al. 1993). Killer whales generally prefer cold, deep, oceanic waters, but they have also been recorded in warmer, shallower waters over the continental shelf in Australia (DSEWPaC 2012).

Within an area, they may be transient or form resident populations. Soviet whaling data suggest that some killer whales migrate annually to temperate climates in response to changes in prey availability (Corkeron and Conner 1999).

Killer whales' feed on a range of fish, pinnipeds (seals and sea lions) and small cetaceans (Corkeron and Conner 1999; Jefferson et al. 2008). Less commonly, they feed on dugongs (Jefferson et al. 2008) and medium-sized cetaceans such as minke whales (Ford et al. 2005), or the calves of larger cetaceans such as grey and humpback whales. Killer whales seek out their prey and either herd them into coastal waters or attack them in deeper water (Ford et al. 2005).

Female killer whales mature earlier than males; reaching sexual maturity at approximately 10 years old compared with 16 years for males (Ross 2006). They breed every 3–8 years and gestation lasts approximately 12–17 months (Ross 2006). They likely breed throughout the year, but are not known to calve in Australian waters (DSEWPaC 2012; Ross 2006).

### 4.3.2 West Kimberley Distribution

There is little available information on the distribution of killer whales in the Kimberley region. They have been recorded in Exmouth Gulf (Jenner and Jenner 2005) and in the Barrow Island area (Butler 1975).

### 4.3.3 Browse MMFS Data

One killer whale was recorded during the 2009 Migration Corridor survey in 25–50 m water depth, approximately 35 km north-west of James Price Point (Figure 7). A killer whale was also recorded during the Scott Reef survey in 2010, approximately 170 km north-north-west from the mainland. During a humpback whale focal-follow survey in 2009, a group of around six adult female and juvenile killer whales were observed

attacking a humpback mother and calf off James Price Point. This incidental record is shown in Figure 7.

They are large and distinctively patterned and are unlikely to have been missed or recorded as unidentified dolphins in the other Browse MMFS vessel-based and aerial based surveys in the region.

#### 4.3.4 Discussion

Killer whales are likely to range widely across the Kimberley region at very low densities. They may be more abundant in the region during the austral winter and spring when the calving humpback whales are present, as they may follow the migrating whales (Corkeron and Connor 1999). Killer whales are possibly the most active predator of humpback whales in the Kimberley and are known to frequent calving grounds (Corkeron and Connor 1999).

### 4.4 Indo-Pacific Humpback Dolphin

#### 4.4.1 Overview

The Indo-Pacific humpback dolphin (*Sousa chinensis*) is characterised by a robust, medium-sized body of uniform grey with a short, triangular dorsal fin (Ross 2002; Reeves et al. 2002). This species grows to approximately 2.6 m long and males are slightly larger than females (Reeves et al. 2002).

Indo-Pacific humpback dolphins inhabit coastal areas throughout the Indian Ocean and South China Sea (DSEWPaC 2012). The Indo-Pacific humpback dolphin lives along the northern coast of Australia, from Shark Bay in Western Australia to northern New South Wales (Bannister et al. 1996; Corkeron et al. 1997). They are difficult to survey because they tend to live in small groups and are easily disturbed (DSEWPaC 2012). Adults generally live alone or in pairs, while juveniles generally live in groups (Ross 2002).

Indo-Pacific humpback dolphins prefer sheltered coastal and estuarine waters less than 20 m deep, but also inhabit rivers and shallow, protected offshore areas around reefs and islands (Bannister et al. 1996; Corkeron et al. 1997; Jefferson 2000; Parra et al. 2002; Parra 2005).

These dolphins are listed as Migratory, although no migratory pathways have been identified in Australia (DSEWPaC 2012). The degree to which they migrate, varies within populations. Whilst most individuals range widely on a seasonal basis, some individuals appear to remain in one area throughout the year (Parra et al. 2006; DSEWPaC 2012). As a species, they are therefore likely to have a permanent presence throughout their range but their abundance in some specific areas will vary seasonally (Parra et al. 2006).



Male Indo-Pacific humpback dolphins reach sexual maturity at approximately thirteen years old; females reach sexual maturity at approximately ten years old (Jefferson and Karczmarski 2001; Ross 2002). They reproduce throughout the year, but calving probably peaks in summer (Bannister et al. 1996; Jefferson and Karczmarski 2001). Mating and calving areas have not been identified in Australia (Bannister et al. 1996), however they are likely to prefer sheltered areas close to the coast.

Indo-Pacific humpback dolphins are opportunist-generalist feeders, mainly feeding on coastal and estuarine fish and invertebrates (Parra 2006; Parra and Jedensjö 2009). They commonly forage behind fishing trawlers and this behaviour has been recorded in Moreton and Cleveland bays in Queensland (Bannister et al. 1996; Ross et al. 1994; Parra et al. 2002; Paterson 1990).

#### **4.4.2 West Kimberley Distribution**

In Western Australia, resident populations have been identified within the shallow waters of the inner Rowley Shelf, to the north of Exmouth Gulf (Corkeron et al. 1997). During a separate study of the humpback whale calving grounds in the Kimberley region, Indo-Pacific humpback dolphins were occasionally sighted in the nearshore habitats of Pender Bay (RPS 2007). This species was also recorded in the shallow waters of Roebuck Bay and off Cable Beach (Allen et al. 2012; Hodgson et al. 2011).

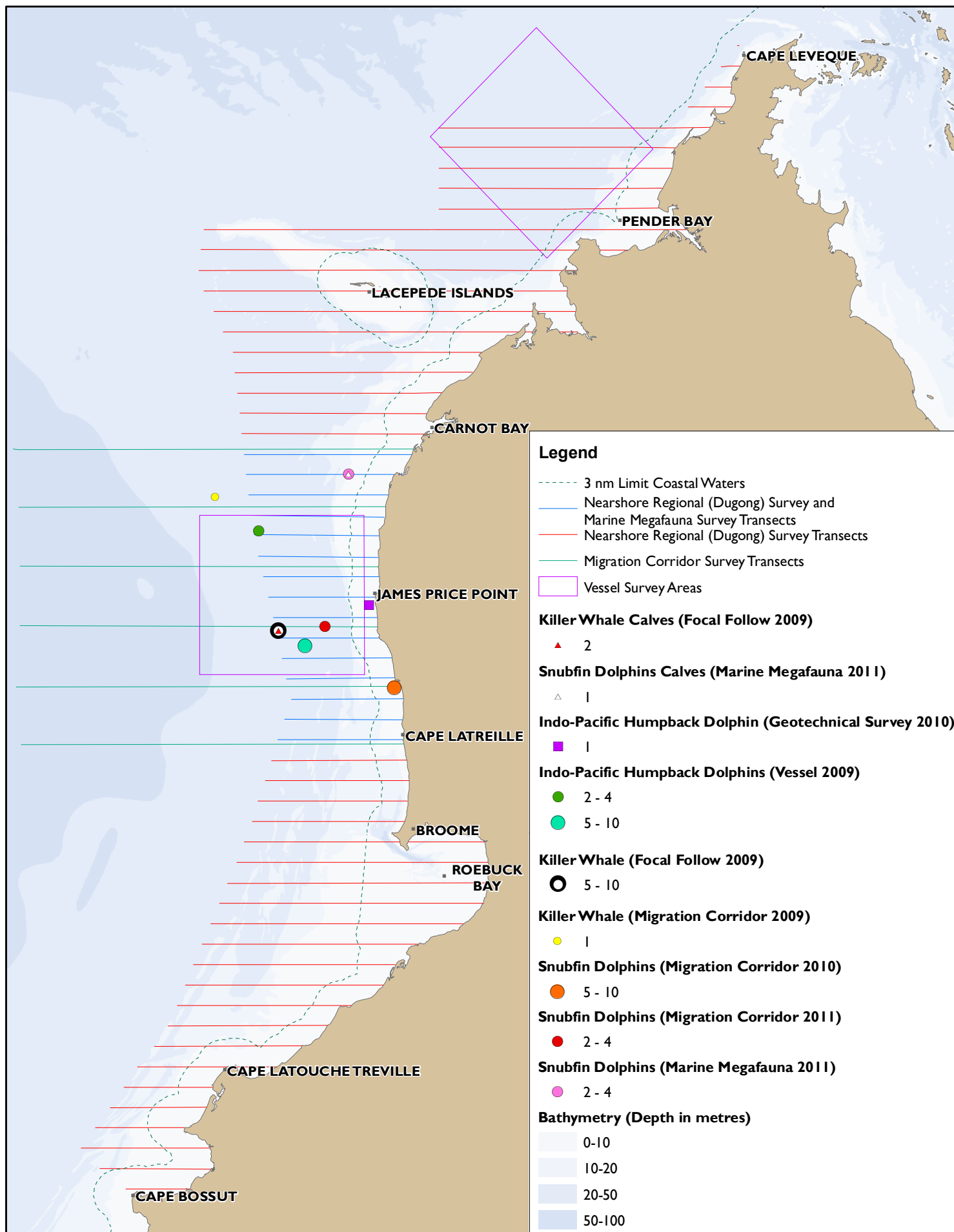
#### **4.4.3 Browse MMFS Data**

Two groups of Indo-Pacific humpback dolphins, comprising a total of seven individuals, were recorded during the 2009 vessel-based surveys in water approximately 20 m deep off James Price Point (Figure 7). One group of five individuals was observed to the west of Quondong Point and a pair was observed to the west of Coulomb Point. One humpback dolphin was recorded during the 2010 Geotechnical Survey approximately 1.5 km from the coast near James Price Point (RPS 2010d).

It is possible that this species was present amongst the small groups of unidentified dolphins observed during the aerial surveys over the nearshore waters off the Kimberley coast (Figure 2 to Figure 6).

#### **4.4.4 Discussion**

Given the amount of survey effort for dolphins during the vessel-based surveys, two confirmed records of Indo-Pacific humpback dolphins in 2009 and one in 2010, indicates that this species is present in very low numbers along the west coast of the Dampier Peninsula. They were not recorded in offshore waters or at reference sites, but are likely to be present in low numbers throughout the Nearshore zone of the West Kimberley region.



**Figure 7: Location of Indo-Pacific humpback dolphin, Australian snubfin dolphin and killer whale records acquired during the vessel and aerial surveys during July-September/October 2009 to 2011**

## 4.5 Spinner Dolphin

### 4.5.1 Overview

The spinner dolphin (*Stenella longirostris*) occurs in tropical and subtropical zones of the Pacific, Atlantic and Indian oceans, ranging from approximately 40°N to 40°S (IUCN 2012). In Australia, its range extends northwards from Bunbury in southern Western Australia around the top of Australia to northern New South Wales (DEWHA 2008 and DSEWPaC 2012).

This species is considered to be the most morphologically variable of all dolphin species (Perryman and Westlake 1998). Four subspecies of the spinner dolphin have been described with two of the subspecies, the dwarf spinner dolphin (*S. l. roseiventris*) and the long-snouted spinner dolphin (*S. l. longirostris*) probably present in Australian waters (Ross 2006). Dwarf spinner dolphins occur in the Timor and Arafura seas while the populations in Queensland, New South Wales and on the west coast as far south as Bunbury, are likely to be *S. l. longirostris* (Ross 2006). However, RPS (2007) recorded a dwarf form, possibly *S. l. roseiventris*, in the waters of the North Kimberley. Perrin et al. (2007) suggest the two subspecies are at least partially sympatric on geographic scales and they may both occur in the Kimberley region.

The subspecies *S. l. longirostris* is listed as a Priority Four species for DEC conservation management in the Kimberley, Pilbara and more southern regions. The dwarf subspecies (*S. l. roseiventris*) is not recognised with a unique conservation status in Western Australia. It is only confirmed to occur in the Gulf of Thailand and in the Timor and Arafura seas (Ross 2006; Perrin 1999). We assume that both subspecies are present and that they have equal conservation significance.

The average adult length of the more pelagic *S. l. longirostris* is 1.88 m long with males generally being larger than females (Perrin et al. 1999). Whereas, *S. l. roseiventris* is smaller at about 1.45 m long on average and has proportionately larger appendages and a smaller skull (Perrin et al. 2007). It is unclear whether a fifth subspecies is present in areas of the Great Barrier Reef as specimens appear to be intermediate between *S. l. longirostris* and *S. l. roseiventris* in terms of body length and skull size (Perrin et al. 1999).

The reproductive cycle of Australian spinner dolphins is largely unknown. However, it is believed that males reach sexual maturity at approximately six years and females at four years of age (Ross 2006). Based on information from non-Australian populations, spinner dolphins can give birth at any time of year and have a gestation period of approximately 10 months, with a calving interval of 2-3 years (Bannister et al. 1996; DSEWPaC 2012). No distinct spinner dolphin calving areas are known in Australian waters (Bannister et al. 1996).

Despite its status as Migratory under the CMS, the species is not known to migrate in Australia (Ross 2006). However, they may undertake daily (Ross 2006) or occasional movements in response to the presence of warm oceanographic currents such as the

Leeuwin Current in Western Australia (Secchi and Siciliano 1995). Some populations of spinner dolphins move daily in response to food availability, remaining inshore in protected areas during the day and moving offshore to feed on prey species that migrate towards the surface at night (Norris et al. 1985).

There are no estimates of spinner dolphin population sizes, either globally or for Australia, so the proportion of the global population in Australian waters is unknown (DSEWPaC 2012). It is also unknown whether the Australian spinner dolphins are genetically isolated from those in Southeast Asian waters (DSEWPaC 2012).

Spinner dolphins are usually seen in groups and are often observed bow-riding vessels or leaping and surfing waves (DSEWPaC 2012). Generally, they live in groups of less than 250 dolphins, but can occur in groups of thousands of individuals (Leatherwood and Reeves 1983). Spinner dolphins are often found in association with other dolphins and small whales and are known to form associations with tuna and seabirds, which is probably linked to feeding habits (Bannister et al. 1996).

The long-snouted spinner dolphin feeds on mesopelagic fish, shrimp and squid species down to depths in excess of 250 m (Perrin 1998). Where the dwarf form has been studied, it appears to prefer shallow water habitats (< 50 m water depth) around reefs where it feeds on benthic reef organisms (Perrin et al. 2007).

#### **4.5.2 West Kimberley Distribution**

Spinner dolphins have been recorded during most vessel-based and aerial surveys in the Kimberley (Jenner and Jenner 2009b; RPS 2007) suggesting that they are abundant and widely distributed through the region. RPS (2007) reported the dwarf form of spinner dolphins in two large groups, totalling over 300 animals, in the offshore waters of the Browse Basin.

#### **4.5.3 Browse MMFS Data**

Spinner dolphins were the most frequently recorded dolphins off James Price Point during the 2009 vessel-based surveys. Twenty-six groups of up to 25 dolphins, comprising approximately 189 animals, were recorded (Figure 8). A further two groups were recorded off Pender Bay.

Spinner dolphins were generally observed outside the 20 m isobath during the vessel-based surveys and were generally more than 10 km from land. No spinner dolphins were observed during the three weeks of the Geotechnical Survey in the nearshore area up to 3 km off James Price Point

Adult spinner dolphins were recorded regularly between the mainland and Scott Reef and it is in this area where groups of up to 100 individuals were recorded (RPS 2010c). The species was also identified during the Migration Corridor aerial surveys in 2009 and 2010 (Figure 9). As well as numerous adults, a single spinner dolphin calf was recorded

during the 2009 Reference and Scott Reef survey (Figure 10). Spinner dolphins were also the most abundant dolphins recorded during the 2011 Marine Megafauna aerial surveys and were most abundant in waters >20 m deep with a minimum distance from land of around 10 km (Figure 11).

It is likely that some observations of unidentified dolphins may have been spinner dolphins, especially for those observations that included larger groups. The higher numbers of spinner dolphins recorded off James Price Point in 2011 may reflect the greater ability to identify dolphin taxa due to the lower survey altitude in this survey with a stronger focus on dolphins. The large numbers of unidentified dolphins recorded in the offshore waters throughout the region during 2009, particularly those in large groups (Figures 3 and 4) are likely to include spinner dolphins.

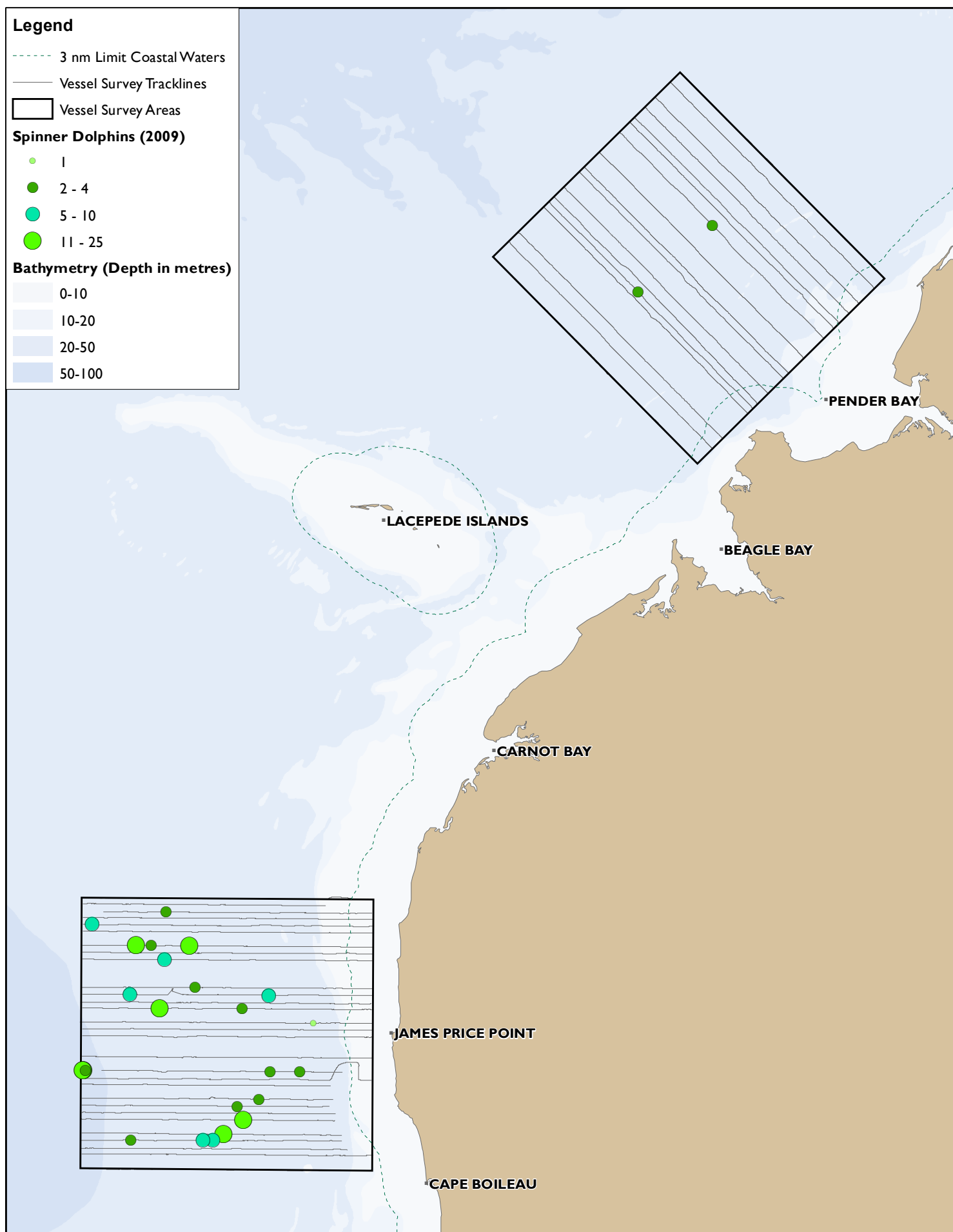
#### 4.5.4 Discussion

Spinner dolphins were the most abundant dolphin in the three years of the Browse MMFS indicating that they are common in the West Kimberley region. They were widely distributed in the waters off the Dampier Peninsula, but were most abundant in offshore waters. It is also likely that many of the unidentified dolphins in the Browse MMFS were spinner dolphins.

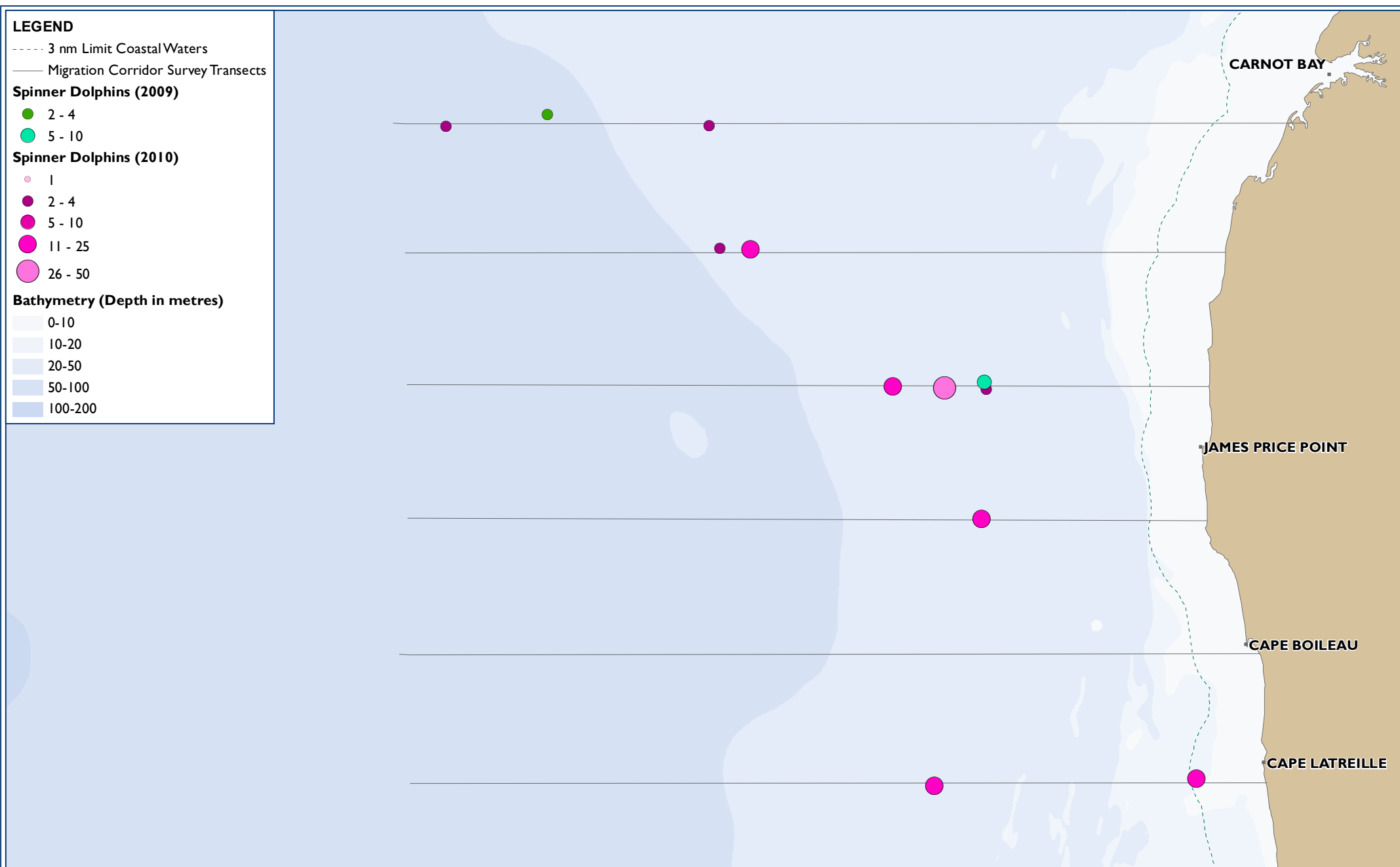
The broad geographic ranges of the two spinner dolphin subspecies (*S. l. longirostris* and *S. l. roseiventris*) overlap in the Kimberley region. It is likely that both are present in the offshore waters of the West Kimberley region. The dwarf form described from the Gulf of Thailand is considered a shallow water dolphin because it inhabits waters less than 50 m deep (Perrin et al. 1999). If its habitat preference is similar in the Kimberley region, this would extend the dwarf form's habitat range to approximately 40 km from the coast at James Price Point. Ross (2006) also suggested that the two subspecies are separated by water depth; however survey data from the Kimberley region indicates that the distribution of the two subspecies overlaps (Jenner and Jenner 2009b; RPS 2007).

The two subspecies are morphologically similar and size alone is not a reliable differentiator given the juveniles of the long-snouted subspecies may be confused with adults of the dwarf subspecies. It is considered imprudent to attempt to differentiate the subspecies during field surveys where the animals are observed from a distance.

Anecdotal sightings of dwarf spinner dolphins off the west coast of the Dampier Peninsula were reported in a press release from Murdoch University (Simon Allen, *Come in Spinner*, *Weekend Australian*, 2 June 2012). This report was subsequently amended in Allen et al. (2012) to say the small dolphins were 'tentatively' identified as the dwarf spinner dolphin subspecies (*S. l. roseiventris*) which is consistent with the conservative approach adopted herein.



**Figure 8: Records of spinner dolphins (*Stenella longirostris*) acquired during the Vessel Transect Surveys in July-October 2009**



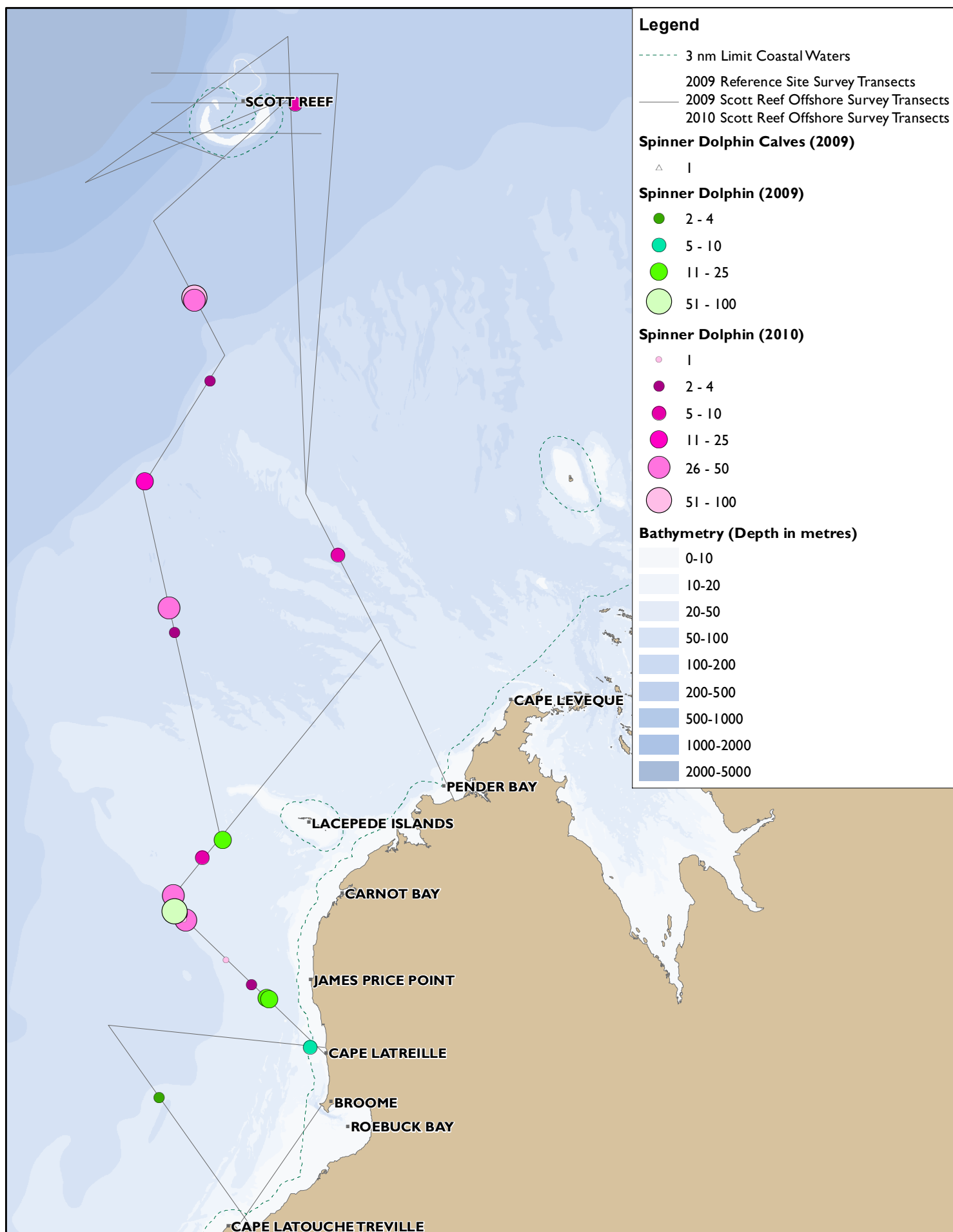
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 Revision: B  
 Scale: 1 : 500,000 @ A4  
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 Source: RPS 2012, Woodside 2012

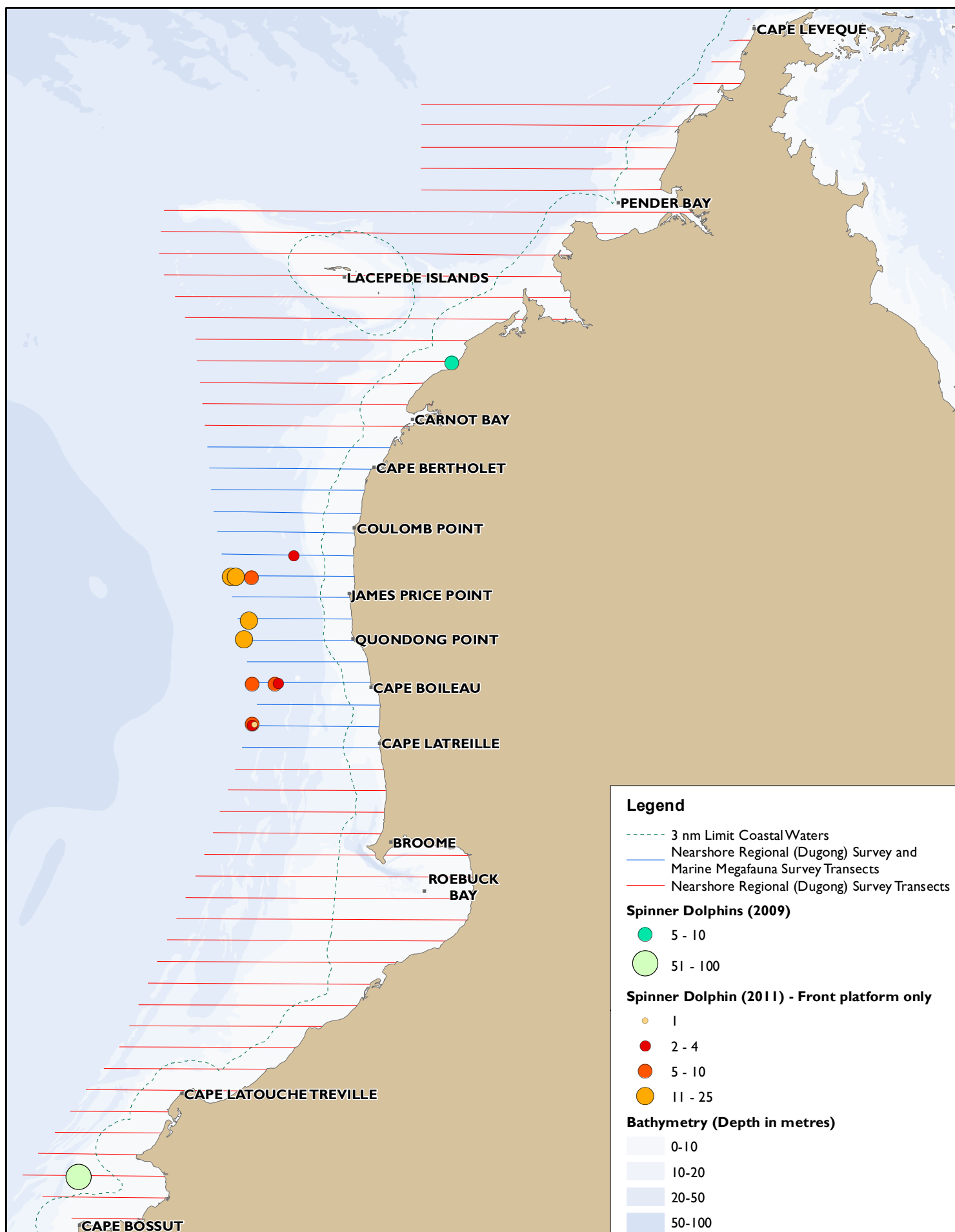


**Figure 9: Records of spinner dolphins (*Stenella longirostris*) acquired during the Migration Corridor aerial surveys in July-October 2009 and 2010**



**Figure 10: Records of spinner dolphins (*Stenella longirostris*) acquired during the Reference and Scott Reef aerial surveys in July-October 2009 and 2010**





**Figure 11: Records of spinner dolphins (*Stenella longirostris*) acquired during the Nearshore Regional (Dugong) and Marine Megafauna aerial surveys in July-September 2009 and 2011**

## 4.6 Bottlenose Dolphin

While controversy still exists around the classification of bottlenose dolphins (DSEWPaC 2012), there are currently two recognised species in Australian waters; the common bottlenose dolphin (*Tursiops truncatus*) and the Indo-Pacific bottlenose dolphin (*T. aduncus*). A third species has been proposed that inhabits Port Phillip Bay, Victoria (Moller et al. 2008).

Both of the current bottlenose dolphin species are found off the Kimberley but little is known about their distribution, population structures or by how much the two species' ranges overlap. The species are difficult to separate from a distance and therefore difficult to survey independently. While, only the Indo-Pacific bottlenose dolphin has been confidently identified to species level during any of the surveys associated with the Browse project (RPS 2010d), it must be assumed that both species are present. Distribution maps for the bottlenose dolphins (*Tursiops* spp.) observed during the aerial surveys of the Browse MMFS campaign are presented in Figure 12 to Figure 15.

### 4.6.1 Overview

#### 4.6.1.1 Common Bottlenose Dolphins

Common bottlenose dolphins (*Tursiops truncatus*) occur worldwide in temperate and tropical estuaries, bays, lagoons, rivers and offshore waters (Hale et al. 2000; Reeves et al. 2002; DSEWPaC 2012; Ross 2006; IUCN 2012). In Australia, common bottlenose dolphins generally inhabit offshore waters deeper than 30 m, but they have also been recorded in coastal areas (Ross 2006; Hale et al. 2000).

The IUCN estimated that there is at least 600,000 common bottlenose dolphins worldwide (IUCN 2012). The total population size for Australia is unknown (DSEWPaC 2012) and, although several studies have provided minimum estimates for local populations such as Shark Bay, (Bannister et al. 1996), there are no population estimates for the Kimberley. In Australia, the common bottlenose dolphin is found in all states and the Northern Territory, with the global population range extending between 65° north and 55° south (Bannister et al. 1996).

Common bottlenose dolphins live in groups ranging from fewer than five individuals to groups of over 1,000 individuals (Bannister et al. 1996, Connor et al. 1991, Connor et al. 1999). The species sometimes occurs in mixed groups with Indo-Pacific bottlenose dolphins (*T. aduncus*) and recent data from Shark Bay indicates hybridization between *T. aduncus* and *T. truncatus* in this bay (DSEWPaC 2012). They are also known to associate with large whales and other dolphin species (IUCN 2012).

Female common bottlenose dolphins reach sexual maturity between five and 11 years of age, whilst males mature between eight and 14.5 years of age (Bannister et al. 1996; Wells and Scott 1999). The Australian mating season is diffused and occurs in summer with gestation lasting approximately twelve months, therefore the calving peaks in the

austral summer also (Bannister et al. 1996; DSEWPaC 2012). There are no known calving areas in Australia (Bannister et al. 1996).

Little is known on the migratory patterns of the species, although it is believed that common bottlenose dolphins in the extremes of the species range may migrate seasonally in response to varying water temperature and prey availability (DSEWPaC 2012, IUCN 2012). Common bottlenose dolphins feed on fish and invertebrates (Reyes 1991; Wells and Scott 1999) and probably also in association with human activities such as trawling (Bannister et al. 1996; Wells and Scott 1999).

#### 4.6.1.2 Indo-Pacific Bottlenose Dolphins

In eastern Australia, Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) grow to 2.3 m long and generally live in groups of 5–16 individuals (Hale et al. 2000; Reeves et al. 2002; DSEWPaC 2012). The size of the Australian population of these dolphins is unknown (DSEWPaC 2012) although the size of the Shark Bay population is estimated at 1,800–3,000 individuals (Preen et al. 1997; IUCN 2012).

In Australia, this dolphin inhabits coastal, estuarine and nearshore areas, and shallow offshore areas around oceanic islands (Ross and Cockcroft 1990; Hale et al. 2000). It is known to be common throughout Western Australia (Bannister et al. 1996), especially in estuarine and coastal waters of northern Australia (Möller and Beheregaray 2001; Ross and Cockcroft 1990). This is the well-known species that inhabits the waters of Monkey Mia and the surrounding Shark Bay Marine Park (Bannister et al. 1996). It is, as a result, a highly studied species and has been found to exhibit complex social organisation and behavioural diversity (Krutzen and Allen 2008).

Some populations of Indo-Pacific bottlenose dolphins in Australia are resident within small areas, for example south-eastern Australia populations exhibit a high degree of site fidelity (Corkeron et al. 1990). Other populations migrate long distances (Corkeron 1990).

Indo-Pacific bottlenose dolphins mainly feed alone on a variety of fish and cephalopods and in association with trawlers (Corkeron et al. 1990).

Males reach sexual maturity at 11–15 years and females reach sexual maturity at between 9–11 years (Cockcroft and Ross 1989). Females breed every 3–6 years and gestation lasts around 12 months therefore calving peaks coincides with mating peaks, and generally occur between spring and autumn (Bannister et al. 1996; Mann et al. 2000; Ross 2006).

#### 4.6.2 **West Kimberley Distribution**

Bottlenose dolphins (*Tursiops* spp.) are known to occur in the Kimberley area (Ross 2006) however, there are no population estimates for the region. They have been documented in offshore waters deeper than 30 m and also in coastal areas (Hale et al.

2000). Common bottlenose dolphins were recorded during a vessel-based survey between Browse Island and Scott Reef (Jenner and Jenner 2009b) and all were recorded in relatively deep water (approximately 500 m deep).

Indo-Pacific bottlenose dolphins have been recorded in nearshore waters in the Kimberley region and in deep offshore waters (Jenner and Jenner 2009b; RPS 2007). Indo-Pacific bottlenose dolphins were also recorded by Allen et al. (2012) in the shallow waters of Roebuck Bay and off Cable Beach.

#### 4.6.3 Browse MMFS Data

Common bottlenose dolphins could not be reliably distinguished from Indo-Pacific bottlenose dolphins during the aerial surveys and therefore all records of bottlenose dolphins (*Tursiops* spp.) will be presented together. Whilst differentiating between the two species is possible from vessels, good views of the animals must be obtained and in 2009 none of the bottlenose dolphins observed could be confidently identified to species level. Conversely, during the Geotechnical Survey and associated cetacean study, all 11 records of bottlenose dolphins were confidently established as Indo-Pacific bottlenose dolphins.

Bottlenose dolphins were the most commonly recorded small cetacean offshore of James Price Point and Pender Bay during the vessel-based surveys between July and October 2009. There was a total of 66 confirmed records of bottlenose dolphins acquired during the vessel-based surveys with no clear difference between Pender Bay (30 records) and James Price Point (36 records). SKM (2009) also reported that 9 of its 36 dolphin records were thought to be bottlenose dolphins but were not confident of the identification. Dolphins were recorded throughout the survey area alone, or in group sizes of 2 - 20 individuals.

Although the 2009 Dugong and 2011 Marine Megafauna survey flights were usually conducted in good weather conditions, only a few bottlenose dolphins were confidently identified (Figure 15). During the two dugong surveys conducted by RPS in 2009, four groups of bottlenose dolphins, comprising approximately 38 individuals, were recorded from both front and back platforms. Group sizes ranged from one to 25 individuals. Most bottlenose dolphins were observed in waters deeper than 20 m and 10–20 km from the coastline. During the Marine Megafauna Survey in 2011, 12 groups of bottlenose dolphins were recorded from both platforms. Group sizes ranged from 1 to 11 individuals and the largest group included a calf. These groups were also recorded in waters deeper than 20 m and 10–20 km from the coastline.

A large number of unidentified dolphins were also recorded in this region (Figure 2 to Figure 6). It can be expected that a portion of these would consist of common and Indo-Pacific bottlenose dolphins given their abundance in the area.

The 2009 and 2010 aerial surveys (Migration Corridor and Reference and Scott Reef surveys) identified that bottlenose dolphins were present throughout the survey areas between July and October, generally in water depths over 20 m (Figure 13 and

Figure 14). This genus was also occasionally recorded in water up to 500 m deep further offshore near Scott Reef in 2009 and 2010 and on one occasion a single bottlenose dolphin was recorded on transects that extended out from transects 3 and 4 of the 2010 Migration Corridor Survey (RPS 2011). It can be expected that a number of the unidentified dolphins recorded in the 20–50 m isobath belonged to this genus too, based on the high frequency of records during the vessel-based surveys in the area. There were no obvious locations in which bottlenose dolphins were particularly abundant.

Bottlenose dolphins were observed in groups of 1–9 individuals in 2009, 1–23 individuals in 2010 and 1–11 individuals in 2011. Bottlenose dolphin calves have been recorded every year across the survey areas, albeit in low numbers.

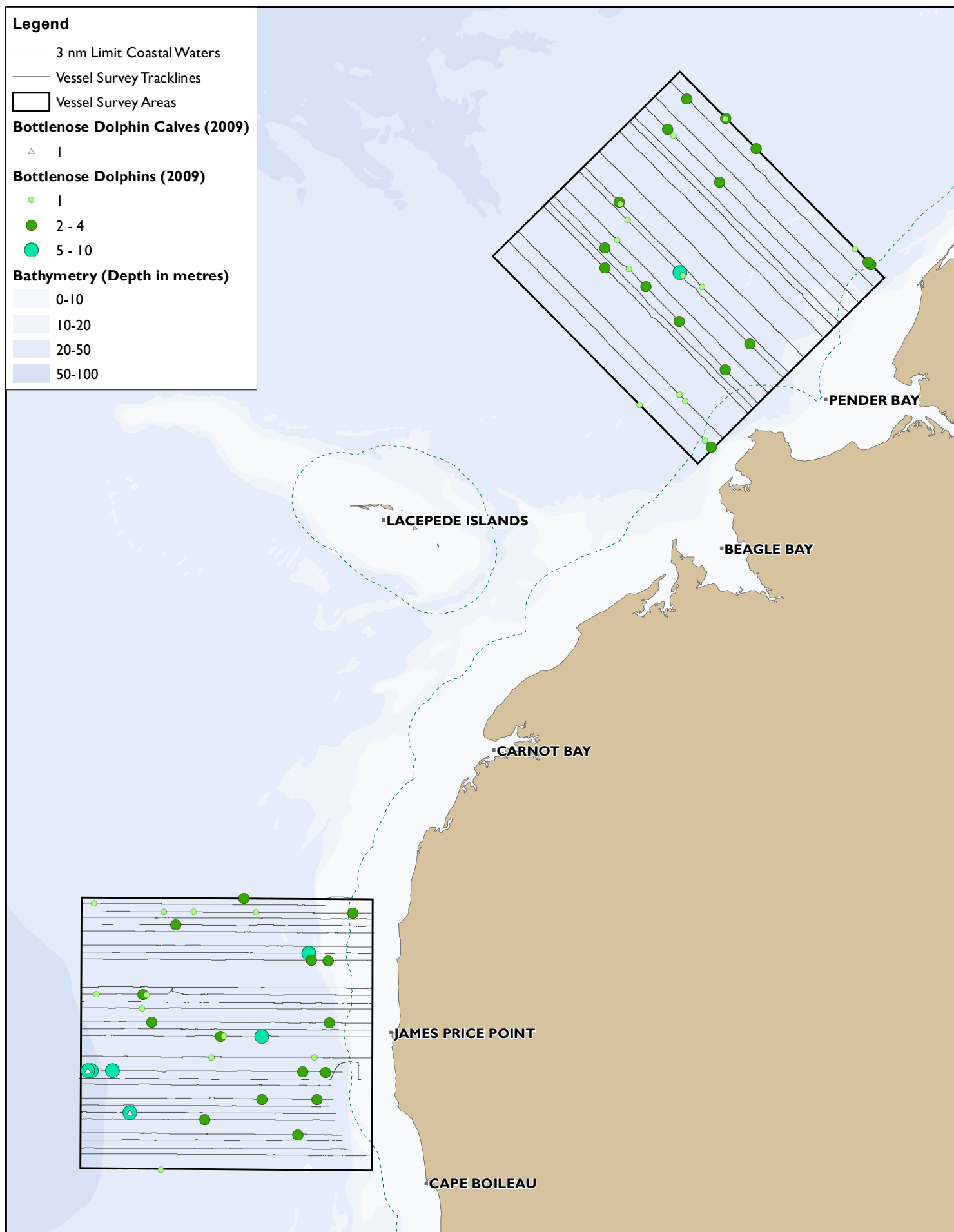
During the Geotechnical Survey and associated cetacean study, all 11 records (1–8 per group) of bottlenose dolphins were confidently identified as Indo-Pacific bottlenose dolphins. These dolphins were observed between 0.75 and 2.5 km from shore (V. Jaiteh pers. comm.).

#### 4.6.4 Discussion

The data acquired across all baseline surveys, in particular broader scale 2009 and 2010 surveys, indicate that bottlenose dolphins are widely distributed along the west coast of the Dampier Peninsula. They were frequently recorded in coastal waters out to the 50 m isobath, or around 60 km offshore, and also occasionally further offshore (RPS 2011). It is possible that the bottlenose dolphins recorded offshore near Scott Reef in 2009 and 2010 were common bottlenose dolphins as they are known to inhabit offshore waters in the region (Hale et al. 2000; Ross 2006; Jenner and Jenner 2009b).

No common bottlenose dolphins were observed during the Geotechnical Survey in 2010 suggesting that there may be some bathymetric habitat partitioning between the two *Tursiops* species; Indo-Pacific bottlenose dolphins frequent the near coastal waters, and common bottlenose dolphins inhabiting waters further offshore, as has been recorded elsewhere (Hale et al. 2000; Ross 2006). However, data reported in RPS (2007) and Jenner and Jenner (2009b) show that both species of bottlenose dolphins may be found in the offshore region.

Group size has remained constant across the surveys at 1–25 animals which is fairly typical for *Tursiops* species (Ross 2006). The presence of calves suggests that they may be present along the west coast of the Dampier Peninsula during all stages of their life cycle. It is likely that this species is present year-round in the offshore waters off the Dampier Peninsula and out to Scott Reef.



**Figure 12: Records of bottlenose dolphins (*Tursiops* spp.) acquired during the Vessel Transect Surveys in July-October 2009**



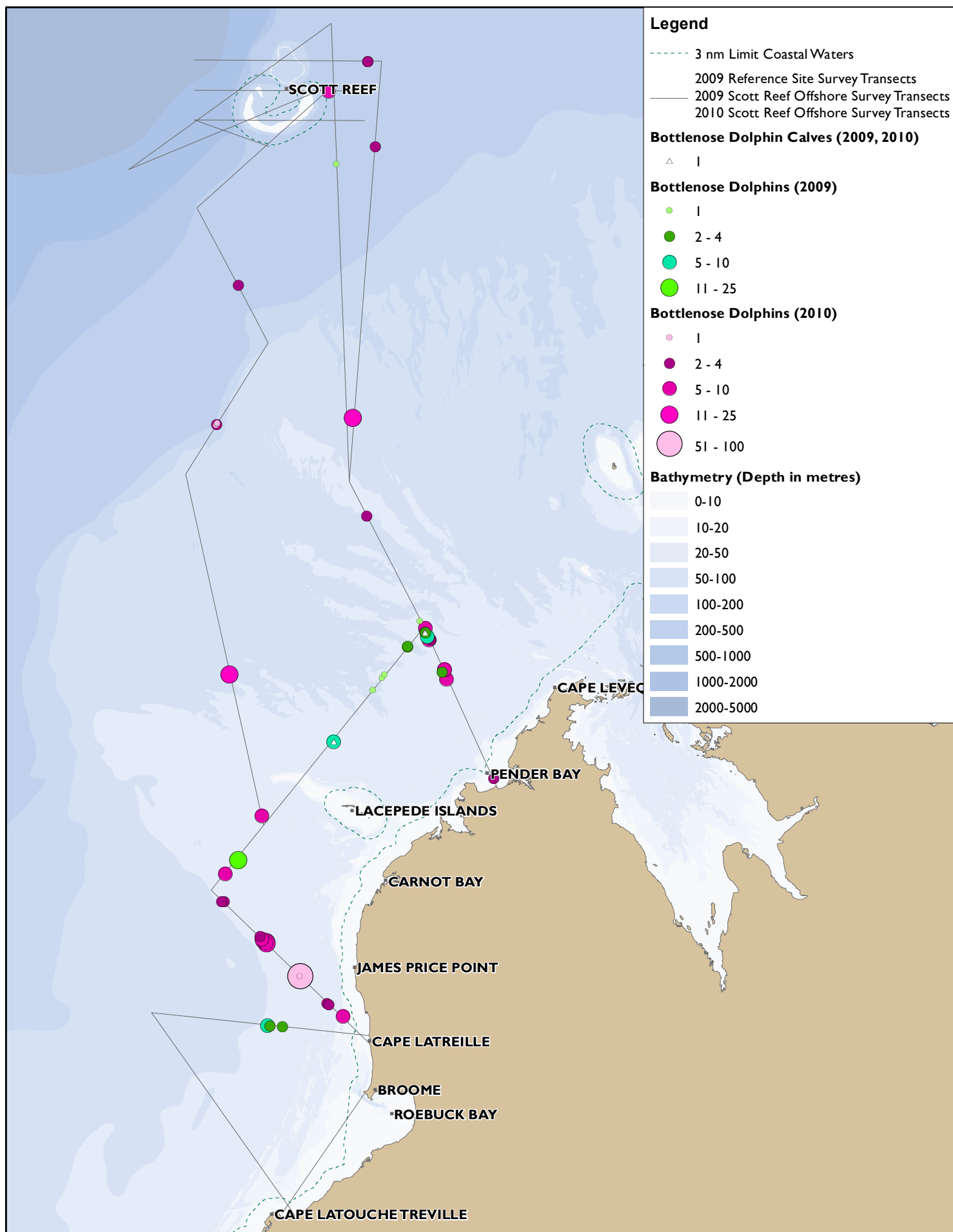
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 Source: RPS 2012, Woodside 2012

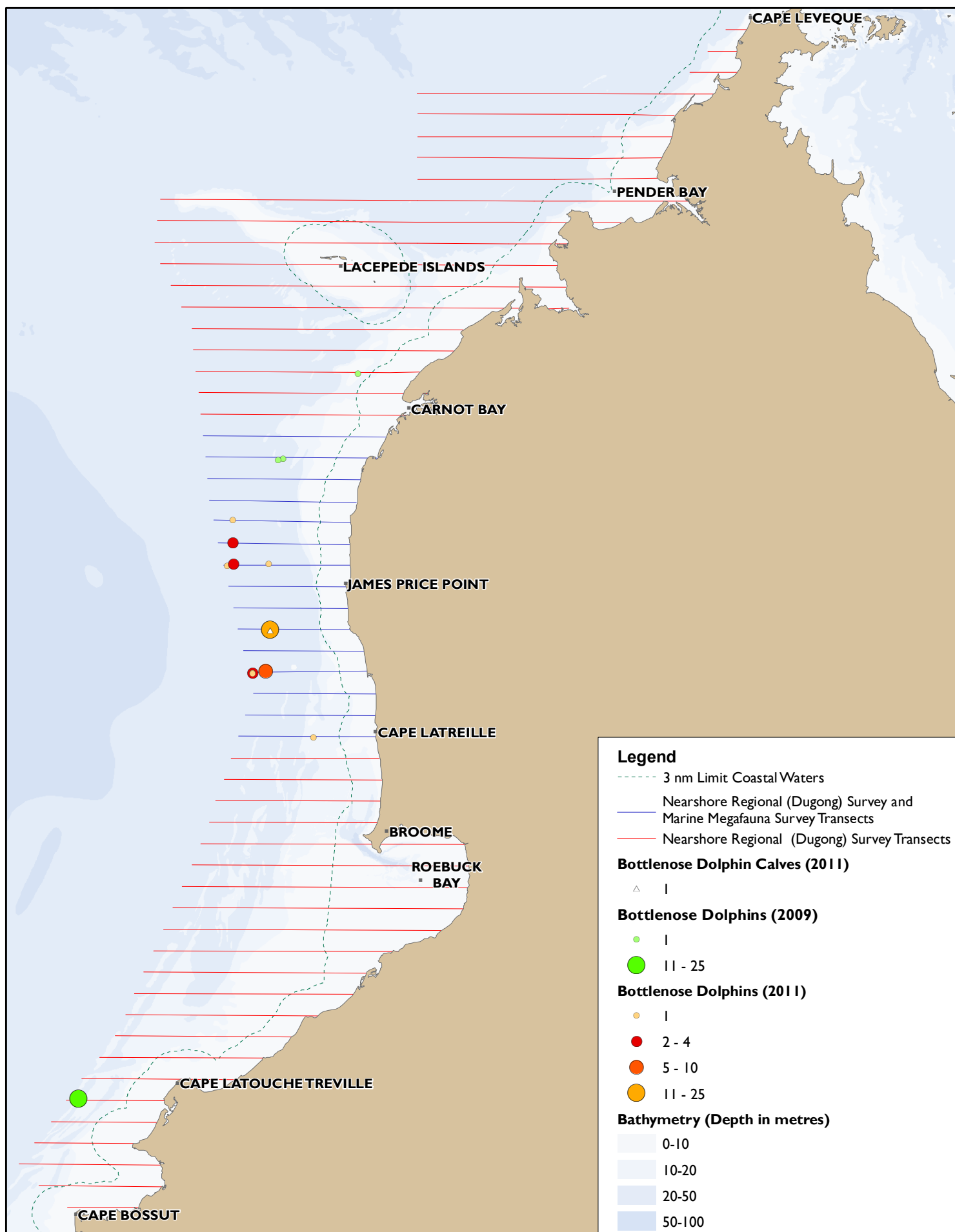


**Figure 13: Records of bottlenose dolphins (*Tursiops* spp.) acquired during the Migration Corridor aerial surveys in July-October 2009 and 2010**



**Figure 14: Records of bottlenose dolphins (*Tursiops* spp.) acquired during the Reference and Scott Reef aerial surveys in July-October 2009 and 2010**





**Figure 15: Records of bottlenose dolphins (*Tursiops* spp.) acquired during the Nearshore Regional (Dugong) and Marine Megafauna aerial surveys in July-September 2009 and 2011**

## 4.7 Common Dolphin

### 4.7.1 Overview

The short-beaked common dolphin (*Delphinus delphis*) is the only species of *Delphinus* that is listed by the EPBC Act Protected Matters Search Tool as potentially present in the Kimberley region (Appendix I). The long-beaked common dolphin (*D. capensis*) has been reported by RPS (2007) and Jenner and Jenner (2009b) in the Kimberley. However, these two *Delphinus* species are difficult to differentiate from a distance, so these observations should be considered tentative.

The common dolphin occurs in offshore waters around Australia, although it appears to be less common in northern Australian waters (Jefferson and Waerebeek 2002; Ross 2006). They inhabit the temperate and tropical waters of the world and have been recorded from the coast to thousands of kilometres offshore (Perrin 2002). They are thought to prefer areas with seabed features such as ridges and escarpments and to frequent areas of seasonal upwelling (Bannister et al. 1996). It is believed that common dolphins migrate seasonally in response to changes in sea temperature and prey abundance, although no migratory routes have been established for Australian populations (DSEWPaC 2012).

The size of the Australian population of common dolphins is unknown (Ross 2006), however they appear to be most abundant in oceanic waters off Western Australia and in the Tasman Sea (DSEWPaC 2012). They are very social and have been observed travelling in groups of thousands and are often observed with other dolphins and whales (Bannister et al. 1996).

Common dolphins are opportunistic feeders and their prey varies according to season and availability (Bannister et al. 1996). Generally, they feed on small pelagic fish and cephalopods (Shaughnessy et al. 2003; Ross 2006).

Common dolphins are small and slender, with females being slightly smaller at approximately 2.6 m long than males at 2.7 m long (Reeves et al. 2002). Females tend to reach sexual maturity earlier than males. They usually breed every 1-3 years and gestate their young for approximately 10–11 months (Perrin 2002). They calve throughout the year, but with a peak in spring and autumn (Perrin 2002). Common dolphins are not known to calve in Australian waters (Bannister et al. 1996).

### 4.7.2 West Kimberley Distribution

Common dolphins are widespread throughout northern Western Australian waters. They probably inhabit most of the deep waters off the North West Shelf, based on their habitat preferences outside Australia (DSEWPaC 2012). Short-beaked common dolphins have been widely recorded in the offshore waters of the Kimberley region (RPS 2007; Jenner and Jenner 2009b). Long-beaked common dolphins have been recorded between Scott Reef and Browse Island (RPS 2007; Jenner and Jenner 2009b).

#### 4.7.3 Browse MMFS Data

Common dolphins are considered to be uncommon along the West Kimberley coast and were not recorded during the Browse MMFS between 2009 and 2011. They have been reported from the offshore area (RPS 2007; Jenner and Jenner 2009b) and may have been represented amongst the unidentified dolphins during the Reference Site and Scott Reef aerial surveys in 2009-2010.

#### 4.7.4 Discussion

Common dolphins were not recorded in any of the Browse MMFS. However, both short-beaked and long-beaked common dolphins have been observed in offshore waters of the region, confirming the presence of both species in the area (RPS 2007; Jenner and Jenner 2009b). Given the global distribution and behaviour of these species, it is likely that they are present throughout the year in offshore waters of the Kimberley. It is possible that the unidentified dolphin records on the Browse MMFS comprised a number of common dolphins but they could not be positively identified from the aircraft.

### 4.8 Pygmy Killer Whale

#### 4.8.1 Overview

The pygmy killer whale (*Feresa attenuata*) resembles the false killer whale (*Pseudorca crassidens*), but is much smaller (DSEWPac 2012). The species has a slender body, narrowing toward the tail, and grows to approximately 2-2.5 m with males being slightly larger than females (Jefferson et al. 1993).

This distribution of pygmy killer whales is poorly known but they are thought to prefer the deep, warm, tropical waters, generally beyond the edge of the continental shelf and rarely venture close to shore (IUCN 2012). They are known from strandings in Australia, some of which have occurred in Western Australia (DSEWPac 2012).

Although there is little information on populations of this species, the pygmy killer whale appears to be naturally uncommon, but may occur in groups of up to 50 individuals (Reeves et al. 2002; IUCN 2012, DSEWPac 2012). No population estimates are available for the species in Australian waters (DSEWPac 2012).

No data are available on pygmy killer whale movements in Australian waters, but the limited evidence suggests this species does not migrate in other regions (Bannister et al. 1996).

Pygmy killer whales probably feed on a variety of cephalopod and fish species. Limited behavioural observations suggest that the species is also a predator of other cetaceans including *Stenella* sp. and *Delphinus delphis* (Jefferson et al. 1993).

Very little is known on the natural history of the species in Australia including mating or calving seasons (Bannister et al. 1996). In other regions, they reach sexual maturity at 2.16 m long for males and 2.21 m long for females (Bannister et al. 1996).

#### **4.8.2 West Kimberley Distribution**

One group of five pygmy killer whales was recorded in Camden Sound during vessel surveys in Northern Kimberley waters (RPS 2007). Pygmy killer whales were also reported from a survey of the waters between Scott Reef and Browse Island (Jenner and Jenner 2009b). The species is also known to occur in Western Australia from records of strandings (DSEWPaC 2012). The species is rarely seen close to shore and is probably restricted to deep, offshore habitats of the Kimberley region.

#### **4.8.3 Browse MMFS Data**

Pygmy killer whales were not recorded in any of the aerial or vessel-based Browse MMFS conducted in the area in the years 2009 to 2011.

#### **4.8.4 Discussion**

This species is not expected to occur in close proximity to James Price Point; instead they are more likely to occur further offshore in the open ocean to the west or north of Scott Reef. Pygmy killer whales may have been recorded as unidentified dolphins in surveys of the deeper waters during the 2009 and 2010 Reference and Scott Reef surveys (Figure 2 to Figure 6).

### **4.9 Risso's Dolphin**

#### **4.9.1 Overview**

Risso's dolphin (*Grampus griseus*) is a large dolphin which grows to 3-4 m long (Reeves et al. 2002). They generally occur in groups of 1-25 but have also been seen in groups in excess of a hundred individuals (Leatherwood and Reeves 1983).

Risso's dolphins inhabit inshore and offshore waters in tropical and temperate regions around Australia. They are often associated with waters deeper than 1,000 m and are considered pelagic (Ross 1984). In Australia, Risso's dolphins have been recorded in most states, with the only known resident population being around Fraser Island in Queensland (Corkeron and Bryden 1992).

There are no estimates of population size in Australia, however based on surveys conducted elsewhere in the world; it is probable that Risso's dolphins are fairly abundant throughout Australian waters (DSEWPaC 2012). Clear migration patterns for Risso's dolphins have not been defined although their abundance in any area may vary seasonally (Reeves et al. 2002).

Very little is known about the reproductive cycle of Risso's dolphins in Australia. In other parts of the world, they reach sexual maturity at 2.5-3 m long and have a gestation period of approximately one year (Bannister et al. 1996).

Risso's dolphins feed mainly at night on pelagic squid and less frequently on other cephalopods and fish (Bannister et al. 1996; Reeves et al. 2002). They generally feed at night in response to prey availability (IUCN 2012).

#### **4.9.2 West Kimberley Distribution**

Risso's dolphins have been recorded in the northern Kimberley region (Jenner and Jenner 2009b; RPS 2007). They are likely to be most abundant in the offshore waters of the region based on their preference for deeper pelagic habitat (Ross 1984; DSEWPaC 2012).

#### **4.9.3 Browse MMFS Data**

Risso's dolphins were not recorded during any of the vessel-based and aerial surveys conducted during the Browse MMFS between 2009 and 2011.

#### **4.9.4 Discussion**

The adults of the species exhibit a longer body size and blunt head when compared with other pelagic dolphin species found in the Kimberley region. It is therefore unlikely that this species would have been confused with other pelagic dolphins recorded during the RPS aerial surveys. This species had previously been recorded in the Kimberley but it must be concluded that they are widely dispersed in the offshore environment or not found regularly in the survey area sampled during the Browse MMFS.

### **4.10 Short-finned Pilot Whale**

#### **4.10.1 Overview**

Short-finned pilot whales (*Globicephala macrorhynchus*) have long but robust bodies (Jefferson et al. 1993; Reeves et al. 2002). Males grow to a maximum length and weight of 5.89 m and two tonnes, while females are smaller at 4.8 m and 1.5 tonnes (Ross 2006).

Groups of short-finned pilot whales normally comprise 15–30 individuals of mixed age and sex (Reeves et al. 2002). However, they are also commonly seen in groups of several hundred animals, often accompanied by dolphins, especially bottlenose dolphins (Bannister et al. 1996).

These whales are found throughout the warmer temperate and tropical regions, in deep waters over the edge of the continental shelf (Carwardine 1995). In the Australian region, they mainly occur in tropical to temperate oceanic waters (Ross 2006). No population estimates are available for the short-finned pilot whales in Australian waters, although they are generally considered to be abundant within their range (Reeves et al. 2002). Short-finned pilot whales are not well surveyed within Australian waters and no key localities of the species are known within Australia (Bannister et al. 1996; DSEWPac 2012).

Seasonal movements, probably in response to prey abundance, are known to occur outside Australia (Olson and Reilly 2002). There are no known migration patterns for short-finned pilot whales in Australian waters and they appear to be generally nomadic (DSEWPac 2012). Short-finned pilot whales feed mainly on vertically migrating prey, which includes squid, cuttlefish, octopus and fish, and they are known to dive to great depths to hunt.

Males reach sexual maturity at 14–15 years old, although larger males mature earlier, whereas females mature at around nine years of age (Bannister et al. 1996; Perrin and Reilly 1984). Mating occurs year round and as a result, they have a diffused calving season. Gestation lasts approximately 15 months, followed by a two year weaning period and the calving interval is approximately five years (Bannister et al. 1996; Perrin and Reilly 1984). Most females will calve up to an age of 17–34, and only four to five times during their life (Ross 2006).

#### **4.10.2 West Kimberley Distribution**

There is little information available specifically on short-finned pilot whales in Western Australia, and only a relatively small number of stranding events have been recorded (Ross 2006). This species was recorded on five occasions by Jenner and Jenner (2009b) between Scott Reef and Browse Island in 2008.

#### **4.10.3 Browse MMFS Data**

No records of the short-finned pilot whale were acquired throughout the vessel-based and aerial surveys conducted between 2009 and 2011.

#### **4.10.4 Discussion**

Short-finned pilot whales are likely to be present in the offshore areas of the Kimberley region, where water depths exceed 500 m. James Price Point and other nearshore areas

along the Dampier Peninsula are not expected to comprise important habitat for this species.

## **4.11 Fraser's Dolphin**

### **4.11.1 Overview**

Fraser's dolphin (*Lagenodelphis hosei*) is a stocky dolphin characterised by its short beak, distinctive flank markings and thick tail stock (Reeves et al. 2002). The males tend to be larger than females differ slightly and grow up to approximately 2.7 m long (Louella and Dolar 2002).

These dolphins generally inhabit subtropical and tropical waters throughout the world, but are occasionally observed in temperate waters also (DSEWPaC 2012; IUCN 2012). They are often found in waters characterised by a stable, shallow mixed layer and thermocline ridging, as well as areas of upwelling (Ross 2006). In Australia, the species is believed to be most abundant in deep oceanic waters north of 30° S (DSEWPaC 2012). They are known to occur off Western Australia from stranding events (Bannister et al. 1996) and surveys in offshore parts of the Kimberley region (RPS 2007; Jenner and Jenner 2009b).

The size of the Australian population of Fraser's dolphin is unknown (DSEWPaC 2012). They form groups of up to approximately 1,000 individuals and occur in mixed groups with other cetaceans (DSEWPaC 2012).

Their diet usually consists of pelagic fish, squid and crustaceans (Dolar et al. 2003). Some of their prey items are deep-sea or benthic species, suggesting that Fraser's dolphin either feeds at depth (250–500 m) or when the prey moves towards the surface at night (DSEWPaC 2012).

Male Fraser's dolphins reach sexual maturity at 7-10 years old and around 2.3 m long, while females mature earlier at 5-8 years old and 2.2 m long (Louella and Dolar 2002). There is little information on the breeding cycles of the Australian population and no calving has been reported in Australian waters (Bannister et al. 1996).

### **4.11.2 West Kimberley Distribution**

Fraser's dolphins have been recorded in the offshore waters of the West Kimberley region. A group of approximately 12 Fraser's dolphins was observed to the north-west of Browse Island and another group of approximately 80 Fraser's dolphins was observed 30 km east of Scott Reef (RPS 2007; Jenner and Jenner 2009b).

#### 4.11.3 Browse MMFS Data

Fraser's dolphins were not recorded during any of the vessel-based or aerial surveys conducted for the Browse MMFS in 2009-2011.

#### 4.11.4 Discussion

Fraser's dolphins are easily distinguished from other dolphin species by their stocky body and extremely small appendages (DSEWPaC 2012). They would have been identifiable from the survey vessel and they have been identified from survey vessels in offshore parts of the Kimberley region, for example Jenner and Jenner 2009b. However, it is unlikely that observers on the Browse MMFS aerial surveys would have been able to distinguish these dolphins from other species at the altitudes flown.

It is likely that the species was observed during the Reference Sites and Scott Reef aerial surveys in 2009-2010 as part of the Browse MMFS, but recorded as unidentified dolphins (Figure 2 to Figure 6).

### 4.12 Melon-headed Whale

#### 4.12.1 Overview

The melon-headed whale (*Peponocephala electra*) is mostly dark grey with a slightly darker grey cape. Lighter patches around the lips and darker patches around the eyes are also characteristic for this species. Adult males are slightly larger than females (2.70 m long and 2.60 m long respectively) and may reach 228 kg (Perryman 2002). Males reach sexual maturity at 16-17 years old and 2.5 m long, while females are sexually mature at about 11-12 years old and 2.4 m long (Perrin and Reilly 1984). Calves are born at around 1 m in length and gestation may last for approximately one year (Bryden et al. 1977; Jefferson and Barros 1997). No calving areas or key localities are known for this species in Australian waters (DSEWPaC 2012).

Melon-headed whales occur in tropical and subtropical oceanic waters between about 40°N and 35°S (Jefferson and Barros 1997). They prefer warm waters (usually > 25°C) and a few high-latitude strandings are thought to be generally associated with incursions of warm water into temperate seas (Bannister et al 1996; IUCN 2012). Although melon-headed whales tend to occur from the continental shelf seaward and around oceanic islands, they may occur in some nearshore areas where deep water approaches the coast (IUCN 2012). In Australian waters, melon-headed whales have been recorded north of 35°S (Ross 2006). Movements of melon-headed whales in Australian waters are poorly known. However, in other regions they appear to be resident throughout the year (Jefferson and Barros 1997).



Melon-headed whales occur in large groups of up to 1,500 animals. While the size of the Australian population of melon-headed whales is unknown, the large group sizes recorded to date suggest that there is more than 10,000 adults in this region (DSEWPaC 2012).

Melon-headed whales are known to feed on pelagic squid and fish, and occasionally crustaceans. Most of the animals eaten by melon-headed whales are mesopelagic species, found in waters up to 1,500 m deep, suggesting that the whales feed deep in the water column (Jefferson and Barros 1997). Few foraging melon-headed whales have been observed. They are known to regularly form mixed groups with other cetaceans, including Fraser's dolphins, rough-toothed dolphins and bottlenose dolphins (Jefferson and Barros 1997).

#### **4.12.2 West Kimberley Distribution**

Records for the melon-headed whale in Western Australia are limited and their distribution in the West Kimberley region is largely unknown. This species was recorded once during a vessel-based survey to the north west of Browse Island (RPS 2007).

#### **4.12.3 Browse MMFS Data**

Melon-headed whale were not observed during the Browse MMFS in 2009-2011.

#### **4.12.4 Discussion**

This oceanic species is likely to be present throughout the offshore waters to the north and west of Browse Island and Scott Reef, but is not expected to occur in close proximity to James Price Point.

Melon-headed whales are no bigger than many other dolphin species and could not be reliably differentiated at the altitudes flown in the aerial surveys. There is potential for the species to have been recorded as unidentified dolphins during the 2009 and 2010 Reference and Scott Reef surveys (Figure 2 to Figure 6), as this species is known to swim in mixed groups with other species of similarly sized cetaceans.

### **4.13 False Killer Whale**

#### **4.13.1 Overview**

False killer whales (*Pseudorca crassidens*) can grow up to 5–6 m long and males are generally larger than females (Reeves et al. 2002).

False killer whales generally occur in groups of 20–50 animals, which may form part of much larger groups consisting of hundreds of animals aggregating in response to food

availability (Ross 2006). No population estimates are available for this species in Australian waters. They occur in low abundances and are widely distributed in oceanic waters (Reeves et al. 2002).

These cetaceans have extensive oceanic ranges and occur in all tropical and warm temperate waters. They generally prefer offshore areas with greater than 1,000 m water depth (Reeves et al. 2002). Much of the knowledge of the Australian distribution of false killer whales is based on stranding records (Bannister et al. 1996). In Australia, mass strandings of false killer whales are relatively frequent, occurring approximately every 2.5 years, and can involve groups of up to 100 individuals (Ross 2006).

Little is known about migration patterns for false killer whales, but shifts in north-south and inshore-offshore abundance indicates possible seasonal migrations associated with warm water currents and the availability of prey (Ross 2006).

False killer whales have low reproductive rates. They don't reach sexual maturity until 8-14 years of age and breed approximately every seven years; the interval increasing with age (Bannister et al. 1996). In Australia, no seasonal mating or calving patterns are known and no calving areas are known for the species (Bannister et al. 1996).

False killer whales are versatile predators and feed opportunistically on a wide variety of fish and cephalopods and occasionally on small cetaceans (Bannister et al. 1996; Alonso et al. 1999).

#### **4.13.2 West Kimberley Distribution**

The Australian distribution of the false killer whale is poorly known due to the paucity of records for Australia waters (DSEWPaC 2012). False killer whales were recorded a number of occasions during vessel surveys conducted in waters of the Northern Kimberley (RPS 2007). Additionally, they were recorded on six occasions during the vessel-based surveys between Scott Reef and Browse Island (Jenner and Jenner 2009b). They are likely to be widespread, but at low densities throughout the deep oceanic waters off the Dampier Peninsula.

#### **4.13.3 Browse MMFS Data**

False killer whales were not observed during the RPS vessel-based or aerial Browse MMFS between 2009 and 2011.

#### **4.13.4 Discussion**

The false killer whale was recorded on six occasions during the 2008 surveys between Scott Reef and Browse Island (Jenner and Jenner 2009b). While they are likely to be more common in deep water, they were not observed in any zone during the Browse MMFS. They are easily identified and are unlikely to have been recorded as an unidentified dolphin during the Browse MMFS.

## 4.14 Pantropical Spotted Dolphin

### 4.14.1 Overview

Pantropical spotted dolphins (*Stenella attenuata*) have a slender, streamlined body with characteristic spotting and distinct dark dorsal cape. Females grow to approximately 3.4 m long; males grow to 2.57 m long (Jefferson et al. 1993; Reeves et al. 2002). Males reach sexual maturity at 12-15 years and females at 10 to 12 years (DSEWPaC 2012). No calving areas are known in Australian waters (Bannister et al. 1996).

They are widely distributed in nearshore and oceanic habitats in the Pacific, Atlantic and Indian oceans (Reeves et al. 2003; Ross 2006). The global population size for the pantropical spotted dolphin is unknown, although they are not considered rare (DSEWPaC 2012). The species has been recorded off the Northern Territory, Western Australia, Queensland and New South Wales (DSEWPaC 2012). However, no key localities are known in Australian waters (Bannister et al. 1996). The species is not known to be migratory and no seasonal changes in distribution are known for Australian populations (DSEWPaC 2012).

The pantropical spotted dolphin's diet of fish and cephalopods overlaps greatly with that of yellowfin tuna and a close association has been noted between these species in the eastern tropical Pacific (Bannister et al. 1996; Ross 2006).

### 4.14.2 West Kimberley Distribution

Little is known about the distribution of pantropical spotted dolphins in Australia, but they are likely to be widespread in the Kimberley region. RPS (2007) reported that this species had been seen to the north of Browse Island. and Jenner and Jenner (2009b) observed a group of 10 individuals south of Browse Island.

### 4.14.3 Browse MMFS Data

Pantropical spotted dolphins were not encountered during the Browse MMFS in 2009 – 2011.

### 4.14.4 Discussion

While this species was not observed during the Browse MMFS, it is possible that some of the records of unidentified dolphins were pantropical spotted dolphins. However, given that Jenner and Jenner (2009b) only saw one group of these dolphins in 40 days of sampling, it seems likely that they are uncommon in the Kimberley region. It is expected that pantropical spotted dolphins inhabit deeper oceanic waters throughout the Kimberley region in small numbers.

## 4.15 Striped Dolphin

### 4.15.1 Overview

Striped dolphins (*Stenella coeruleoalba*) are small, robust dolphins with diagnostic patterns of slate blue and white stripes and blazes along the lateral and dorsal surfaces (Reeves et al 2003). Males grow to approximately 2.6 m long and females grow to 2.5 m (Reeves et al 2002).

Striped dolphins are widely-distributed across tropical and warm-temperate waters of the Atlantic, Pacific and Indian oceans (IUCN 2012). There are no estimates for the number of striped dolphins occurring off Australia (Bannister et al. 1996) although they are believed to be common throughout their range (DSEWPac 2012).

Few data are available on the life cycle of the species in Australian waters and no calving areas are known in Australian waters (Bannister et al. 1996). The species is very social, usually living in groups of a few hundred, though groups of up to several thousand individuals have been recorded (DSEWPac 2012).

The striped dolphin inhabits pelagic zones where they can forage to depths of up to as 200-700 m (IUCN 2012). They generally feed on small prey including fish, shrimp and squid (DSEWPac 2012).

### 4.15.2 West Kimberley Distribution

Striped dolphins have been recorded from strandings in the Kimberley region and from surveys around Browse Island, the Maret Islands and north of Pender Bay (RPS 2007). They are expected to be widespread off the West Kimberley coast in deep, warmer waters.

### 4.15.3 Browse MMFS Data

Striped dolphins were not observed during the Browse MMFS.

### 4.15.4 Discussion

Striped dolphins may be difficult to separate from common dolphins (*Delphinus delphis*) or spinner dolphins from the air but are readily identifiable from a vessel due to the distinctive markings on their flanks. They may be present in the region and possibly were among the unidentified dolphins, however, they were uncommon.

## 4.16 Rough-toothed Dolphin

### 4.16.1 Overview

Male rough-toothed dolphins (*Steno bredanensis*) grow to approximately 2.65 m long; females grow to approximately 2.55 m long (Miyazaki and Perrin 1994). They usually live in groups of 10–20 dolphins, but may also live in groups of up to several hundred individuals. They associate with pilot whales, bottlenose dolphins, spotted dolphins and spinner dolphins (Ross 2006).

The rough-toothed dolphin is widely distributed in deep, tropical to subtropical oceanic waters. They have been recorded in the Northern Territory, Queensland and southern New South Wales (Bannister et al. 1996; DSEWPaC 2012). Three individuals of this species stranded together on Barrow Island, Western Australia in 1971 (DSEWPaC 2012), confirming their presence off the Western Australian coast.

The limited data on feeding habits for the species indicate that their diet includes pelagic octopus, squid and reef fish and tend to prey on larger fish in deep water (Ross 2006). When feeding, the rough-toothed dolphin has been known to associate with other cetaceans such as pilot whales, bottlenose dolphins, and spinner dolphins (DSEWPaC 2012). These other species all occur at Scott Reef, suggesting that the foraging habitats there are also suitable for rough-toothed dolphins.

Calving intervals and seasons, mating seasons, gestation period and possible calving areas for these dolphins are all unknown in Australian waters (Bannister et al. 1996 Ross 2006).

### 4.16.2 West Kimberley Distribution

There is limited information on the distribution of rough-toothed dolphins in Western Australia and their distribution in the Kimberley region is largely unknown. This species has not been recorded in the Kimberley region, suggesting that they are rare visitors if present.

### 4.16.3 Browse MMFS Data

Rough-toothed dolphins were not observed during any of the vessel-based or aerial surveys for the Browse MMFS in 2009-2011.

### 4.16.4 Discussion

The rough-toothed dolphin has not been recorded in the Kimberley region but it is likely that they are rare visitors to the region. In other parts of the world, they inhabit oceanic waters with surface temperatures exceeding 25 °C (DSEWPaC 2012) indicating that they prefer tropical seas. Their presence in the Northern Territory and the

strandings on Barrow Island also indicate that they are likely to occur in offshore waters of the Kimberley region.

## 5.0 CONCLUSION

### 5.1 Survey Techniques and Identification of Species

Seven distinct taxonomic groups of dolphins were reliably identified during the aerial and vessel-based Browse MMFS:

- unidentified dolphins (Delphinidae)
- Australian snubfin dolphin (*Orcaella heinsohni*)
- killer whale (*Orcinus orca*)
- Indo-Pacific humpback dolphin (*Sousa chinensis*)
- unidentified spinner dolphin (*Stenella* spp.)
- unidentified bottlenose dolphin (*Tursiops* spp.)
- Indo-Pacific bottlenose dolphin (*Tursiops aduncus*).

Aerial surveys have the advantage of enabling a rapid assessment of the distribution of megafauna over large survey areas; reducing the potential for recapture and gaining a 'snapshot' of relative abundances, under the same conditions across the whole area. However, the survey height and speed can preclude reliable differentiation of morphologically similar taxa.

The large proportion of unidentified dolphins within the Browse MMFS dataset reflects the difficulty in differentiating delphinid species during aerial surveys. The Migration Corridor, Reference Site and Scott Reef aerial surveys were designed primarily to sample humpback whales. During these surveys, opportunistic dolphin observations were recorded with the intention of gaining a measure of the relative abundance of delphinids in various parts of the survey region. Species level identification was not required for this objective. Although dolphins were a higher priority during the 2009 Nearshore Regional Dugong and 2011 Marine Megafauna surveys, the altitude and survey coverage were selected specifically for sampling for dugongs over a large area.

Vessel-based surveys are a better technique for determining the distribution of individual species because, in good weather, individuals can be observed for long enough to confirm their species identity. However, the area covered each day is significantly smaller than for an aerial survey and daily variation in conditions can affect comparisons among days and areas.

Taxa which could not be reliably differentiated were pooled at a higher taxonomic level. While anecdotal reports have cited the presence of some dolphin taxa at subspecies level, possibly even new subspecies, this is speculative and they can only be reported to the lowest level at which they can be reliably identified. Consequently, this review pools the two species of bottlenose dolphins and pools the two subspecies of spinner dolphins. We note that the higher level of taxonomic diversity is probably present, but this does not affect the conclusions of the review.

All taxa which have been identified as 'likely to be present' due to their broader regional distribution and habitat preferences, are assumed to be present in the survey area at some time. Although some of the taxa listed by the EPBC Protected Matters Search Tool have not been positively identified in the West Kimberley region, it is assumed they are all present, albeit mostly at low densities.

## 5.2 Species of Conservation Significance

Long-snouted spinner dolphins (*S. l. longirostris*), Indo-Pacific humpback dolphins and Australian snubfin dolphins have specific conservation status under the EPBC Act and the Western Australian *Wildlife Conservation Act 1950*. Indo-Pacific bottlenose dolphins (Arafura/Timor Sea populations) are listed as Migratory under the EPBC Act. These taxa are all present in the West Kimberley region.

Spinner dolphins are abundant in the West Kimberley region and were the most frequently recorded dolphins during the vessel-based surveys off James Price Point. They were also occasionally observed in large groups during the aerial surveys further offshore including near Scott Reef.

In contrast, Indo-Pacific humpback dolphins were uncommon in the region. They were only recorded twice during vessel surveys in waters approximately 20 km off James Price Point and once in nearshore waters approximately 1.5 km from the coast. Australian snubfin dolphins were regularly observed in Roebuck Bay and are known to frequent other bays along the Kimberley coast, but were uncommon in the James Price Point area. Three records in total were acquired from aerial surveys in 2010 and 2011 and all within approximately 10 km of the coast.

Although Australian snubfin and Indo-Pacific humpback dolphins are coastal species and relatively cryptic in appearance and habit, the paucity of records relative to the level of effort conducted in suitable conditions off James Price Point, indicates that this area is not of particular importance for populations of either of these species. The assumed movement of the snubfin dolphins along the coast between areas of preferred habitat means that they may travel through the area off James Price Point on occasion. However, they are not restricted to coastal waters as is evident from their occurrence at offshore islands.

Both Australian species of bottlenose dolphin (*T. truncatus* and *T. aduncus*) occur in the West Kimberley region and the genus was abundant during the Browse MMFS. *Tursiops aduncus* is more likely to occur closer to shore than *T. truncatus*, but it must be assumed that both species range widely within the region. If the Arafura/Timor Sea populations of Indo-Pacific bottlenose dolphin (*T. aduncus*) are truly migratory, these dolphins are likely to be seasonal visitors to the West Kimberley region, but may also have resident populations in the region.



### 5.3 Delphinid Distribution off the Dampier Peninsula

Delphinids were ubiquitous in all survey areas along the Dampier Peninsula and out to Scott Reef. Their distributions within the three bathymetric zones encompassing various elements of the proposed development are described below.

#### 5.3.1 Nearshore Zone (0–20 m Water Depth)

The nearshore waters along the West Kimberley coast, up to the 20 m isobath, support dolphin species with preferences for shallow waters and a reliance on coastal features such as creeks and shallow benthic foraging habitats. The Indo-Pacific humpback dolphin and the Indo-Pacific bottlenose dolphin were confidently identified in shallow waters along the Dampier Peninsula. Other dolphin taxa were less common or not reliably identified in this zone, but are expected to be present on the basis of general distribution and habitat preferences.

The Australian snubfin dolphin was tentatively recorded in shallow coastal waters often less than 10 km from estuaries along the Dampier Peninsula. They probably move along the coast within the Nearshore zone.

Spinner dolphins were observed in low densities towards the outer limit of the Nearshore zone. Although the subspecies could not be differentiated reliably, it is likely that the dwarf subspecies (*S. l. roseiventris*) is present in this zone. They are likely to forage around the deeper reefs and rocky outcrops within this zone.

Small numbers of bottlenose dolphins were also present within this bathymetric zone and, although not identified to species level, were probably Indo-Pacific bottlenose dolphins. It is expected that this species would comprise the majority of the unidentified dolphin records from shallow waters considering the frequency of positive records closer to shore off James Price Point and Pender Bay. This species would forage throughout the zone.

Killer whales may also be rare visitors to the Nearshore zone. They prey on humpback whale calves towards the end of the humpback whale migration period and may occasionally follow whales into the nearshore zone at this time.

#### 5.3.2 Intermediate Zone (20–50 m Water Depth)

Small cetaceans were more abundant in the waters of the Intermediate zone. The most common of these were bottlenose and spinner dolphins, which are relatively common and widespread. Both genera are likely to be present in the Intermediate zone throughout the year.

Other dolphin taxa which prefer the shallow habitats of the Nearshore zone (e.g. Indo-Pacific humpback dolphins) or the oceanic habitats of the Offshore zone (e.g. common

bottlenose dolphins), are likely to visit the Intermediate zone as there is a gradation of water depths and habitats between the adjacent zones.

### 5.3.3 Offshore Zone (>50 m Water Depth)

Spinner and bottlenose dolphins were the most abundant dolphins in all zones, including the Offshore zone. There may be some habitat partitioning amongst the two subspecies of spinner dolphin and the two species of bottlenose dolphin according to water depth; however, it must be assumed that all of these taxa are present in the Offshore zone also.

The following oceanic dolphin species, and species with a preference for deeper waters, are known from the region and are likely to be present in the Offshore zone on occasion:

- Long-beaked common dolphin (*Delphinus capensis*)
- Short-beaked common dolphin (*D. delphis*)
- Pygmy killer whale (*Feresa attenuata*)
- Short-finned pilot whale (*Globicephala macrorhynchus*)
- Risso's dolphin (*Grampus griseus*)
- Fraser's dolphin (*Lagenodelphis hosei*)
- Melon-headed whale (*Peponocephala electra*)
- False killer whale (*Pseudorca crassidens*)
- Pantropical spotted dolphin (*Stenella attenuata*)
- Striped dolphin (*S. coeruleoalba*)
- Rough-toothed dolphin (*Steno bredanensis*).

### 5.3.4 Seasonality

The Browse MMFS was largely focused on the humpback whale migration period in the austral winter-spring; consequently nearly all of the surveys were conducted at this time of year. It is possible that some of the dolphin species have a seasonal component to their patterns of abundance and distribution which was not detected during the Browse MMFS. However, none of these species is known to be highly seasonal or migratory in other areas.

Dolphins which respond to seasonal changes in prey abundance, for example killer whales which may follow calving humpback whales, may have a stronger seasonal component to their distribution in the West Kimberley region. They would have been effectively sampled during the Browse MMFS.

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## **APPENDIX I**

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### **EPBC Act Protected Matters Search**

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# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information about the EPBC Act including significance guidelines, forms and application process details can be found at <http://www.environment.gov.au/epbc/assessmentsapprovals/index.html>

Report created: 19/07/12 16:07:13

[Summary](#)

[Details](#)

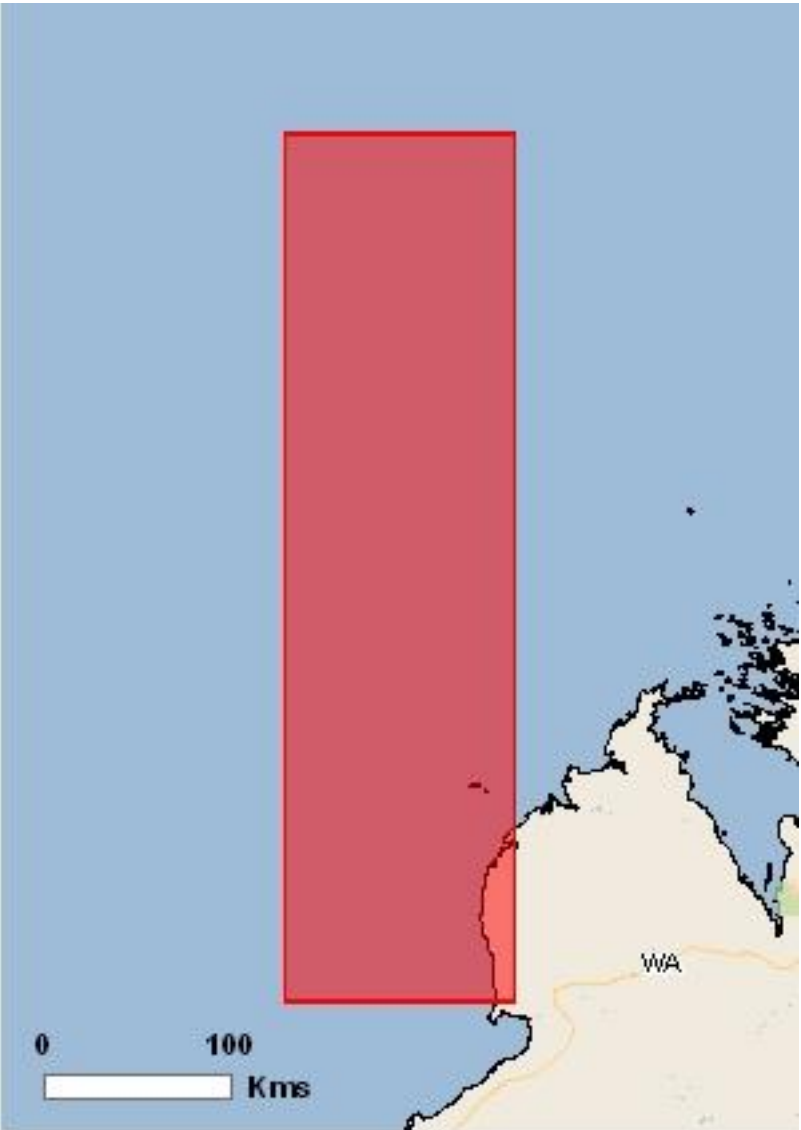
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



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[Buffer: 1.0Km](#)



## Summary

### Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see <http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html>

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	1
<a href="#">Wetlands of International</a>	1
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Areas:</a>	1
<a href="#">Threatened Ecological Communities:</a>	None
<a href="#">Threatened Species:</a>	22
<a href="#">Migratory Species:</a>	62

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage/index.html>

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at <http://www.environment.gov>.

<a href="#">Commonwealth Lands:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	2
<a href="#">Listed Marine Species:</a>	108
<a href="#">Whales and Other Cetaceans:</a>	26
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves:</a>	None

## Extra Information

This part of the report provides information that may also be relevant to the area you have

<a href="#">Place on the RNE:</a>	8
<a href="#">State and Territory Reserves:</a>	4
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	3
<a href="#">Nationally Important Wetlands:</a>	1

## Details

### Matters of National Environmental Significance

National Heritage Properties		[ Resource Information ]
Name	State	Status
Natural		
<a href="#">The West Kimberley</a>	WA	Listed place

Wetlands of International Significance (RAMSAR)		[ Resource Information ]
Name		Proximity
<a href="#">Roebuck bay</a>		Within 10km of Ramsar

Commonwealth Marine Areas		[ Resource Information ]
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Approval may be required for a proposed activity that is likely to have a significant impact on the environment in a Commonwealth Marine Area, when the action is outside the Commonwealth Marine Area, or the environment anywhere when the action is taken within the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred

Name
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Approval may be required for a proposed activity that is likely to have a significant impact on the environment in a Commonwealth Marine Area, when the action is outside the Commonwealth Marine Area, or the environment anywhere when the action is taken within the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred

Name		
EEZ and Territorial Sea		
Threatened Species		
[ Resource Information ]		
Name	Status	Type of Presence
BIRDS		
<a href="#">Erythrotriorchis radiatus</a> Red Goshawk [942]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Erythrura gouldiae</a> Gouldian Finch [413]	Endangered	Species or species habitat likely to occur within area
<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Tyto novaehollandiae kimberli</a> Masked Owl (northern) [26048]	Vulnerable	Species or species habitat may occur within area
MAMMALS		
<a href="#">Balaenoptera musculus</a> Blue Whale [36]	Endangered	Species or species habitat may occur within area
<a href="#">Dasycercus cristicauda</a> Mulgara [328]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Dasyurus hallucatus</a> Northern Quoll [331]	Endangered	Species or species habitat likely to occur within area
<a href="#">Macrotis lagotis</a> Greater Bilby [282]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Breeding known to occur within area
<a href="#">Xeromys myoides</a> Water Mouse, False Water Rat [66]	Vulnerable	Species or species habitat may occur within area
PLANTS		
<a href="#">Keraudrenia exastia</a> Fringed Keraudrenia [66301]	Critically Endangered	Species or species habitat may occur within area
REPTILES		
<a href="#">Aipysurus apraefrontalis</a> Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Breeding known to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
SHARKS		
<a href="#">Pristis clavata</a> Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Pristis microdon</a> Freshwater Sawfish [66182]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Pristis zijsron</a> Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding known to occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Migratory Species		[ <a href="#">Resource Information</a> ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
<a href="#">Anous stolidus</a> Common Noddy [825]		Breeding known to occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat may occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Breeding likely to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat may occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Foraging, feeding or related behaviour likely to occur within area
<a href="#">Puffinus leucomelas</a> Streaked Shearwater [66541]		Species or species habitat may occur within area
<a href="#">Sterna albifrons</a> Little Tern [813]		Breeding known to occur within area
<a href="#">Sterna anaethetus</a> Bridled Tern [814]		Breeding known to occur within area
<a href="#">Sterna bengalensis</a> Lesser Crested Tern [815]		Breeding known to occur within area



Name	Threatened	Type of Presence
<a href="#">Sterna caspia</a> Caspian Tern [59467]		Breeding known to occur within area
<a href="#">Sula leucogaster</a> Brown Booby [1022]		Breeding known to occur within area
<a href="#">Sula sula</a> Red-footed Booby [1023]		Breeding known to occur within area
Migratory Marine Species		
<a href="#">Balaenoptera bonaerensis</a> Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat may occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]		Endangered Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Breeding known to occur within area
<a href="#">Crocodylus porosus</a> Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]		Endangered Species or species habitat likely to occur within area
<a href="#">Dugong dugon</a> Dugong [28]		Species or species habitat known to occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Isurus oxyrinchus</a> Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
<a href="#">Isurus paucus</a> Longfin Mako [82947]		Species or species habitat likely to occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]		Endangered Species or species habitat likely to occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Breeding known to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<a href="#">Orcaella brevirostris</a> Irrawaddy Dolphin [45]		Species or species habitat may occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Physeter macrocephalus</a> Sperm Whale [59]	Vulnerable	Species or species habitat may occur within area
<a href="#">Rhincodon typus</a> Whale Shark [66680]		Foraging, feeding or related behaviour known to occur within area
<a href="#">Sousa chinensis</a> Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a> Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
<a href="#">Erythrura gouldiae</a> Gouldian Finch [413]	Endangered	Species or species habitat likely to occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Breeding known to occur within area
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat may occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat known to occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Breeding likely to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area
<a href="#">Arenaria interpres</a> Ruddy Turnstone [872]		Species or species habitat known to occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
<a href="#">Calidris alba</a> Sanderling [875]		Species or species habitat known to occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]		Species or species habitat known to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]		Species or species habitat known to occur within area
<a href="#">Calidris ruficollis</a> Red-necked Stint [860]		Species or species habitat known to occur within area
<a href="#">Calidris tenuirostris</a> Great Knot [862]		Species or species habitat known to occur within area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]		Species or species

Name	Threatened	Type of Presence
<a href="#">Charadrius mongolus</a> Lesser Sand Plover, Mongolian Plover [879]	Vulnerable*	habitat known to occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat known to occur within area
<a href="#">Glareola maldivarum</a> Oriental Pratincole [840]		Species or species habitat may occur within area
<a href="#">Heteroscelus brevipes</a> Grey-tailed Tattler [59311]		Species or species habitat known to occur within area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat known to occur within area
<a href="#">Limosa limosa</a> Black-tailed Godwit [845]		Species or species habitat known to occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew [847]		Species or species habitat known to occur within area
<a href="#">Numenius phaeopus</a> Whimbrel [849]	Vulnerable*	Species or species habitat known to occur within area
<a href="#">Pluvialis fulva</a> Pacific Golden Plover [25545]		Species or species habitat known to occur within area
<a href="#">Pluvialis squatarola</a> Grey Plover [865]		Species or species habitat known to occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]		Species or species habitat likely to occur within area
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
<a href="#">Xenus cinereus</a> Terek Sandpiper [59300]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Heritage Places		[ Resource Information ]
Name	State	Status
Natural		
<a href="#">Scott Reef and Surrounds - Commonwealth Area</a>	EXT	Listed place
<a href="#">Seringapatam Reef and Surrounds</a>	EXT	Listed place
Listed Marine Species		[ Resource Information ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat known to occur

Name	Threatened	Type of Presence
<a href="#">Anous stolidus</a> Common Noddy [825]		within area
<a href="#">Anseranas semipalmata</a> Magpie Goose [978]		Breeding known to occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat may occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat may occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Breeding likely to occur within area
<a href="#">Arenaria interpres</a> Ruddy Turnstone [872]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
<a href="#">Calidris alba</a> Sanderling [875]		Species or species habitat known to occur within area
<a href="#">Calidris canutus</a> Red Knot, Knot [855]		Species or species habitat known to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]		Species or species habitat known to occur within area
<a href="#">Calidris ruficollis</a> Red-necked Stint [860]		Species or species habitat known to occur within area
<a href="#">Calidris tenuirostris</a> Great Knot [862]		Species or species habitat known to occur within area
<a href="#">Calonectris leucomelas</a> Streaked Shearwater [1077]		Species or species habitat may occur within area
<a href="#">Charadrius leschenaultii</a> Greater Sand Plover, Large Sand Plover [877]		Species or species habitat known to occur within area
<a href="#">Charadrius mongolus</a> Lesser Sand Plover, Mongolian Plover [879]		Species or species habitat known to occur within area
<a href="#">Charadrius ruficapillus</a> Red-capped Plover [881]		Species or species habitat known to occur within area
<a href="#">Charadrius veredus</a> Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
<a href="#">Fregata ariel</a> Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
<a href="#">Fregata minor</a> Great Frigatebird, Greater Frigatebird [1013]		Foraging, feeding or related behaviour likely



Name	Threatened	Type of Presence
		to occur within area
<a href="#">Glareola maldivarum</a> Oriental Pratincole [840]		Species or species habitat may occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Breeding known to occur within area
<a href="#">Heteroscelus brevipes</a> Grey-tailed Tattler [59311]		Species or species habitat known to occur within area
<a href="#">Hirundo rustica</a> Barn Swallow [662]		Species or species habitat may occur within area
<a href="#">Larus novaehollandiae</a> Silver Gull [810]		Breeding known to occur within area
<a href="#">Limosa lapponica</a> Bar-tailed Godwit [844]		Species or species habitat known to occur within area
<a href="#">Limosa limosa</a> Black-tailed Godwit [845]		Species or species habitat known to occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew [847]		Species or species habitat known to occur within area
<a href="#">Numenius phaeopus</a> Whimbrel [849]		Species or species habitat known to occur within area
<a href="#">Pluvialis fulva</a> Pacific Golden Plover [25545]		Species or species habitat known to occur within area
<a href="#">Pluvialis squatarola</a> Grey Plover [865]		Species or species habitat known to occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Vulnerable*	Species or species habitat likely to occur within area
<a href="#">Sterna albifrons</a> Little Tern [813]		Breeding known to occur within area
<a href="#">Sterna anaethetus</a> Bridled Tern [814]		Breeding known to occur within area
<a href="#">Sterna bengalensis</a> Lesser Crested Tern [815]		Breeding known to occur within area
<a href="#">Sterna bergii</a> Crested Tern [816]		Breeding known to occur within area
<a href="#">Sterna caspia</a> Caspian Tern [59467]		Breeding known to occur within area
<a href="#">Sterna dougallii</a> Roseate Tern [817]		Breeding likely to occur within area
<a href="#">Sterna fuscata</a> Sooty Tern [794]		Breeding known to occur within area

Name	Threatened	Type of Presence
<a href="#">Sterna nereis</a> Fairy Tern [796]		Breeding known to occur within area
<a href="#">Stiltia isabella</a> Australian Pratincole [818]		Species or species habitat known to occur within area
<a href="#">Sula leucogaster</a> Brown Booby [1022]		Breeding known to occur within area
<a href="#">Sula sula</a> Red-footed Booby [1023]		Breeding known to occur within area
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
<a href="#">Tringa totanus</a> Common Redshank, Redshank [835]		Species or species habitat known to occur within area
<a href="#">Xenus cinereus</a> Terek Sandpiper [59300]		Species or species habitat known to occur within area
Fish		
<a href="#">Bhanotia fasciolata</a> Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
<a href="#">Campichthys tricarinatus</a> Three-keel Pipefish [66192]		Species or species habitat may occur within area
<a href="#">Choeroichthys brachysoma</a> Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
<a href="#">Choeroichthys suillus</a> Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
<a href="#">Corythoichthys amplexus</a> Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
<a href="#">Corythoichthys flavofasciatus</a> Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
<a href="#">Corythoichthys intestinalis</a> Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
<a href="#">Corythoichthys schultzi</a> Schultz's Pipefish [66205]		Species or species habitat may occur within area
<a href="#">Cosmocampus banneri</a> Roughridge Pipefish [66206]		Species or species habitat may occur within area
<a href="#">Doryramphus dactyliophorus</a> Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
<a href="#">Doryramphus excisus</a> Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
<a href="#">Doryramphus janssi</a> Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within

Name	Threatened	Type of Presence
<a href="#">Filicampus tigris</a> Tiger Pipefish [66217]		area  Species or species habitat may occur within area
<a href="#">Halicampus brocki</a> Brock's Pipefish [66219]		Species or species habitat may occur within area
<a href="#">Halicampus dunckeri</a> Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
<a href="#">Halicampus grayi</a> Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
<a href="#">Halicampus nitidus</a> Glittering Pipefish [66224]		Species or species habitat may occur within area
<a href="#">Halicampus spirostris</a> Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
<a href="#">Haliichthys taeniophorus</a> Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
<a href="#">Hippichthys penicillus</a> Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
<a href="#">Hippocampus angustus</a> Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
<a href="#">Hippocampus histrix</a> Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
<a href="#">Hippocampus kuda</a> Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
<a href="#">Hippocampus planifrons</a> Flat-face Seahorse [66238]		Species or species habitat may occur within area
<a href="#">Hippocampus spinosissimus</a> Hedgehog Seahorse [66239]		Species or species habitat may occur within area
<a href="#">Micrognathus micronotus</a> Tidepool Pipefish [66255]		Species or species habitat may occur within area
<a href="#">Solegnathus hardwickii</a> Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
<a href="#">Solegnathus lettiensis</a> Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
<a href="#">Solenostomus cyanopterus</a> Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
<a href="#">Solenostomus paegnius</a> Rough-snout Ghost Pipefish [68425]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Syngnathoides biaculeatus</a> Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
<a href="#">Trachyrhamphus bicoarctatus</a> Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
<a href="#">Trachyrhamphus longirostris</a> Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammals		
<a href="#">Dugong dugon</a> Dugong [28]		Species or species habitat known to occur within area
Reptiles		
<a href="#">Acalyptophis peronii</a> Horned Seasnake [1114]		Species or species habitat may occur within area
<a href="#">Aipysurus apraefrontalis</a> Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
<a href="#">Aipysurus duboisii</a> Dubois' Seasnake [1116]		Species or species habitat may occur within area
<a href="#">Aipysurus eydouxii</a> Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
<a href="#">Aipysurus fuscus</a> Dusky Seasnake [1119]		Species or species habitat may occur within area
<a href="#">Aipysurus laevis</a> Olive Seasnake [1120]		Species or species habitat may occur within area
<a href="#">Aipysurus tenuis</a> Brown-lined Seasnake [1121]		Species or species habitat may occur within area
<a href="#">Astrotia stokesii</a> Stokes' Seasnake [1122]		Species or species habitat may occur within area
<a href="#">Caretta caretta</a> Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
<a href="#">Chelonia mydas</a> Green Turtle [1765]	Vulnerable	Breeding known to occur within area
<a href="#">Crocodylus johnstoni</a> Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile [1773]		Species or species habitat may occur within area
<a href="#">Crocodylus porosus</a> Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
<a href="#">Dermochelys coriacea</a> Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
<a href="#">Disteira kingii</a> Spectacled Seasnake [1123]		Species or species habitat may occur within area



Name	Threatened	Type of Presence
<a href="#">Disteira major</a> Olive-headed Seasnake [1124]	Vulnerable	Species or species habitat may occur within area
<a href="#">Emydocephalus annulatus</a> Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
<a href="#">Ephalophis greyi</a> North-western Mangrove Seasnake [1127]		Species or species habitat may occur within area
<a href="#">Eretmochelys imbricata</a> Hawksbill Turtle [1766]		Species or species habitat known to occur within area
<a href="#">Hydrelaps darwiniensis</a> Black-ringed Seasnake [1100]		Species or species habitat may occur within area
<a href="#">Hydrophis coggeri</a> Slender-necked Seasnake [25925]		Species or species habitat may occur within area
<a href="#">Hydrophis elegans</a> Elegant Seasnake [1104]	Endangered	Species or species habitat may occur within area
<a href="#">Hydrophis mcdowellii</a> null [25926]		Species or species habitat may occur within area
<a href="#">Hydrophis ornatus</a> a seasnake [1111]		Species or species habitat may occur within area
<a href="#">Lapemis hardwickii</a> Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
<a href="#">Lepidochelys olivacea</a> Olive Ridley Turtle, Pacific Ridley Turtle [1767]		Species or species habitat likely to occur within area
<a href="#">Natator depressus</a> Flatback Turtle [59257]		Vulnerable
<a href="#">Pelamis platurus</a> Yellow-bellied Seasnake [1091]	Endangered	Species or species habitat may occur within area
Whales and other Cetaceans		[ <a href="#">Resource Information</a> ]
Name	Status	Type of Presence
Mammals		
<a href="#">Balaenoptera bonaerensis</a> Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]	Endangered	Species or species habitat may occur within area
<a href="#">Balaenoptera edeni</a> Bryde's Whale [35]		Species or species habitat may occur within area
<a href="#">Balaenoptera musculus</a> Blue Whale [36]		Species or species habitat may occur within area
<a href="#">Delphinus delphis</a> Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area

Name	Status	Type of Presence
<a href="#">Feresa attenuata</a> Pygmy Killer Whale [61]		Species or species habitat may occur within area
<a href="#">Globicephala macrorhynchus</a> Short-finned Pilot Whale [62]		Species or species habitat may occur within area
<a href="#">Grampus griseus</a> Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
<a href="#">Kogia breviceps</a> Pygmy Sperm Whale [57]		Species or species habitat may occur within area
<a href="#">Kogia simus</a> Dwarf Sperm Whale [58]		Species or species habitat may occur within area
<a href="#">Lagenodelphis hosei</a> Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
<a href="#">Megaptera novaeangliae</a> Humpback Whale [38]	Vulnerable	Breeding known to occur within area
<a href="#">Mesoplodon densirostris</a> Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
<a href="#">Orcaella brevirostris</a> Irrawaddy Dolphin [45]		Species or species habitat may occur within area
<a href="#">Orcinus orca</a> Killer Whale, Orca [46]		Species or species habitat may occur within area
<a href="#">Peponocephala electra</a> Melon-headed Whale [47]		Species or species habitat may occur within area
<a href="#">Physeter macrocephalus</a> Sperm Whale [59]		Species or species habitat may occur within area
<a href="#">Pseudorca crassidens</a> False Killer Whale [48]		Species or species habitat may occur within area
<a href="#">Sousa chinensis</a> Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
<a href="#">Stenella attenuata</a> Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
<a href="#">Stenella coeruleoalba</a> Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
<a href="#">Stenella longirostris</a> Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
<a href="#">Steno bredanensis</a> Rough-toothed Dolphin [30]		Species or species habitat may occur within area
<a href="#">Tursiops aduncus</a> Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
<a href="#">Tursiops aduncus (Arafura/Timor Sea populations)</a>		
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area
<a href="#">Tursiops truncatus s. str.</a>		
Bottlenose Dolphin [68417]		Species or species habitat may occur within area
<a href="#">Ziphius cavirostris</a>		
Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Extra Information

Places on the RNE	[ Resource Information ]
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Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
<a href="#">Parts of the Kimberley</a>	WA	Indicative Place
<a href="#">Point Coulomb Area</a>	WA	Indicative Place
<a href="#">Coulomb Point Nature Reserve</a>	WA	Registered
<a href="#">Lacepede Islands Middle and West</a>	WA	Registered
<a href="#">Scott Reef and Surrounds</a>	EXT	Registered
<a href="#">Scott Reef and Surrounds - Commonwealth Area</a>	EXT	Registered
<a href="#">Seringapatam Reef and Surrounds</a>	EXT	Registered
Historic		
<a href="#">Manfred Shipwreck</a>	WA	Indicative Place

State and Territory Reserves	[ Resource Information ]
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Name	State
Coulomb Point	WA
Lacepede Islands	WA
Scott Reef	WA
Unnamed WA37168	WA

Invasive Species	[ Resource Information ]
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Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit,

Name	Status	Type of Presence
Mammals		
<a href="#">Felis catus</a>		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Plants		
<a href="#">Cenchrus ciliaris</a>		
Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
<a href="#">Parkinsonia aculeata</a>		
Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[ Resource Information ]
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Name	State
<a href="#">Willie Creek Wetlands</a>	WA

# Coordinates

-17.9 121.2,-17.9 122.3,-13.7 122.3,-13.7 121.2,-17.9 121.2

## Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

## Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Department of Environment, Climate Change and Water, New South Wales](#)
- [-Department of Sustainability and Environment, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment and Natural Resources, South Australia](#)
- [-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [-Environmental and Resource Management, Queensland](#)
- [-Department of Environment and Conservation, Western Australia](#)
- [-Department of the Environment, Climate Change, Energy and Water](#)
- [-Birds Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-SA Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)

- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Atherton and Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [-State Forests of NSW](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

[Please feel free to provide feedback via the Contact Us page.](#)

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