Evaluating Inshore Dolphin Status Along the North Queensland Coast

November 2016

Isabel Beasley
Table of Contents

Table of Contents .................................................................................................................. 2

Acknowledgements ................................................................................................................. 4

Executive Summary .................................................................................................................. 5
Survey Importance .................................................................................................................. 6
Dolphin Sightings .................................................................................................................... 6
Megafauna Sightings .............................................................................................................. 6
Collaborations with Aboriginal Corporations ........................................................................... 6

Background .............................................................................................................................. 7
North Australian Inshore Dolphins ............................................................................................ 7
Previous Inshore Dolphin Studies ........................................................................................... 7
North Queensland Inshore Dolphin Project Background ......................................................... 13

Aims and Objectives ................................................................................................................. 14

Study Area ............................................................................................................................... 14

Methods .................................................................................................................................. 15
Project Participants .................................................................................................................. 15
Survey Methods ...................................................................................................................... 15
  Vessel speed ........................................................................................................................ 16
  Data Collection ..................................................................................................................... 16
  Species identification and survey mode ............................................................................. 18
  Group Size ........................................................................................................................... 19
  Group Composition ............................................................................................................. 19
  Behavioural Categories ....................................................................................................... 20
  Environmental Data ............................................................................................................ 21
  Transect Protocols ............................................................................................................. 21
  Additional Marine Megafauna Data to be Collected .......................................................... 22
  Survey Protocols and Data Entry ....................................................................................... 22
  Vessel Used ......................................................................................................................... 23
  Transect Lines ..................................................................................................................... 23

Results ..................................................................................................................................... 24
Survey Effort ............................................................................................................................ 24
Beaufort Conditions ................................................................................................................. 26
Dolphin Sightings .................................................................................................................... 26
  Calves Sighted in Groups ................................................................................................... 29
  Moon and Tide States ........................................................................................................ 30
  Relative Sighting Rate ....................................................................................................... 32
  Species Summaries And Environmental Parameters .......................................................... 32
    Humpback dolphins .......................................................................................................... 32
    Snubfin dolphins .............................................................................................................. 33
    Mixed humpback and snubfin dolphins ............................................................................ 34
    Bottlenose dolphins ........................................................................................................ 35

Photo-identificiation .................................................................................................................. 36
Snubfin Dolphins ..................................................................................................................... 36
  Humpback dolphins .......................................................................................................... 37
  Bottlenose dolphins ........................................................................................................... 38
  Marine Megafauna Sightings ............................................................................................... 39
Other Events ........................................................................................................... 40
Humpback Dolphin Calf Entangled ........................................................................... 40
Flatback Turtle Found in Mandubarra Sea Country ..................................................... 41
Un-attended Netting vessel ....................................................................................... 42
Stranded Bottlenose Dolphin at Wunjunga Beach – 62544 (Strandnet) ..................... 43

Discussion ............................................................................................................. 44
Survey Importance .................................................................................................. 44
Dolphin Sightings ................................................................................................... 44
Megafauna Sightings .............................................................................................. 44
Collaborations with Aboriginal Corporations ......................................................... 44

General Images .................................................................................................... 45

References ............................................................................................................ 49
Acknowledgements

Many thanks to the Aboriginal Corporations that participated in, and supported these surveys being undertaken in their Sea Country:

- Girringun Aboriginal Corporation
- Mandubarra Aboriginal land and Sea Inc.
- Dawul Wuru Aboriginal Corporation
- Jabalbina Yalanji Aboriginal Corporation

Special thanks to the volunteers and Indigenous rangers/Traditional Owners that participated on these surveys:

- Mathew Golding
- Laura Morse
- Elizah Nagombi
- Erin Weir
- Anya Jaeckli
- Girringun Aboriginal Corporation Rangers
- Mandubarra Aboriginal Land and Sea Inc.
  - Henry Epong
  - Jason Epong
- Jabalbina Yalanji Aboriginal Corporation
  - Anthea Solomon

Thanks also to the Port of Townsville Ltd, which allowed photo-identification to be conducted within Townsville Port limits.

Particular thanks to the SeaWorld Research and Rescue Foundation for providing funding to undertake these surveys.
Executive Summary

This report documents boat-based surveys conducted along the North Queensland coast from Townsville north to Port Douglas. Surveys were conducted from 10 September – 19 October 2016. Further surveys throughout Cleveland Bay were conducted from 17 – 19 December 2016.

Survey Effort

- A total of 33 days were spent conducting boat-based surveys along the North Queensland coast. Of these, 23 days were considered suitable survey days. The wind speeds were too high to survey on the ten other days (i.e. >11 knots).
- A total of 1851 km were travelled during surveys over 144 hours (this total includes transiting to and from transects, and distance/time spent photographing dolphin groups).
- A total of 867 km (96 hours) were spent on transect, surveying for dolphin groups and other marine megafauna.

Dolphin Sightings

A total of 33 dolphin groups (195 individuals) were sighted during surveys, consisting of:

- 18 humpback dolphin groups (total group size = 99)
- 7 snubfin dolphin groups (total group size = 43)
- 1 mixed snubfin and humpback dolphin group (total group size = 9 individuals; 7 humpback dolphins and 2 snubfin dolphins)
- 5 bottlenose dolphin groups (total group size = 42)
- 2 groups of unknown species (total group size = 2)

Photo-identification

Of the 33 groups sighted, 30 groups were photographed, with at least one individual being photo-identified. A total of 18,521 images were taken.

A total of 127 individuals were photo-identified:

- 29 snubfin dolphins
- 65 humpback dolphins
- 33 bottlenose dolphins
Marine megafauna
A total of 59 groups of megafauna (116 individuals) were sighted, consisting of:

- 6 dugongs
- 66 turtles – unknown species
- 1 flatback turtle
- 3 green turtles
- 1 olive ridley turtle
- 3 seasnakes
- 1 ray
- 6 sharks

Discussion

Survey Importance

- These were the first systematic boat-based inshore dolphin surveys to be conducted north of Townsville.
- The large study area provided important information on distribution of inshore dolphins, and the opportunity to compare occurrence and movements from other nearby sites (i.e. Dr. Cagnazzi’s study south of Townsville, Townsville and Girringun Aboriginal Corporation surveys).
- Photo-identification comparisons between sites will be undertaken once other survey reports have been completed.

Dolphin Sightings

- Humpback dolphins were sighted throughout the study area, from Townsville north to Port Douglas.
- The lack of snubfin dolphin sightings north of Balgal Beach was surprising, as given potentially favorable environmental characteristics north of Balgal Beach snubfin dolphins should have been sighted.

Megafauna Sightings

- In addition to dolphin sightings, these surveys collected information on marine megafauna sighted during surveys. There was a notable lack of dugong sightings north of Cleveland Bay, Townsville.

Collaborations with Aboriginal Corporations

- Collaboration with Aboriginal Corporations was essential to the success of this project. Future projects are planned that build on this initial study and partner with Terrain NRM and other Aboriginal Corporations.
Background

North Australian Inshore Dolphins
The Australian snubfin dolphin (Orcaella heinsohni), Australian humpback dolphin (Sousa sahulensis), and Indo-Pacific bottlenose dolphin (Tursiops aduncus) are tropical inshore dolphins of northern Australia. The Australian snubfin dolphin and Australian humpback dolphin are newly described species (2005 and 2014 respectively), thought to be endemic to northern Australia and Papua New Guinea (Beasley et al., 2016, Beasley et al., 2005, Jefferson and Rosenbaum, 2014). These little-known dolphin species occur in small, localised populations in often remote regions of northern Australia, from the Fitzroy River on the east coast of Australia across to the Dampier Peninsula on the west coast (Parra et al., 2002, Parra and Cagnazzi, 2016, Parra et al., 2004, Hanf et al., 2016). All three inshore dolphin species are listed as migratory and Matters of National Environmental Significance in Australian legislation. Snubfin and humpback dolphins were recently assessed as Vulnerable under the Queensland Nature Conservation Act and IUCN Red List (Parra and Cagnazzi, 2016).

Previous Inshore Dolphin Studies

Townsville Region
Boat–based surveys and photo-identification data collected in the coastal waters of Cleveland Bay Dugong Protected Area (hereafter referred to as Cleveland Bay) from January 1999 to October 2002 provided the first comprehensive estimates of abundance of Australian snubfin (hereafter snubfin) and Australian humpback (hereafter humpback) dolphins (Parra et al., 2006b). No further studies were undertaken until 2016, when a comprehensive mark-recapture study was undertaken in Cleveland Bay from May – September 2016. The results of this study are still pending.

Hinchinbrook Region – Girringun Ranger Surveys
Girringun Aboriginal Corporation (GAC) Ranger Unit was established in 2010. Rangers began recording opportunistic dolphin sightings in 2010. From 2010-2012, rangers recorded 28 marine mammal groups (Fig. 1), consisting of:

- 8 humpback dolphin groups (one with unknown position information)
- 3 bottlenose dolphin groups
- 1 snubfin dolphin group
- 6 unknown dolphin species groups
- 8 dugong groups
- 2 humpback whale groups

Photographs were obtained of some dolphin groups confirming species identifications (Figs. 2-6).

Figure 1. Marine mammal groups observed by Girringun Rangers since 2010
01 December 2010 – Humpback Dolphins

Figure 2. Humpback dolphins sighted near Hinchinbrook Island

6 February 2012 – Humpback Dolphins

Figure 3. Identifiable humpback dolphin sighted on 6 February 2012

Figure 4. Identifiable humpback dolphin sighted on 6 February 2012

Figure 5. Identifiable humpback dolphin sighted on 6 February 2012

Figure 6. Humpback dolphin calf sighted on 6 February 2012
Hinchinbrook Region – James Cook University Aerial Surveys

James Cook University has conducted aerial surveys along the north Australian coast for the past 20 years. Surveys were conducted along the northern GBR coast in 1992, 1994, 2005, and 2011.

Dolphin sightings obtained as part of these dugong surveys from 1992-2005 are shown in Fig. 7, where the majority of sightings are ‘unknown’ groups, apart from one humpback dolphin group sighted near the north-western tip of Hinchinbrook Island.

Figure 7. Sightings of dolphins observed during dugong aerial surveys conducted in 1992, 1994 and 2005. Data obtained thanks to Alana Grech and Susan Sobtzick

According to Sobtzick et al (2012), the estimated size of the dugong population in the Southern GBR region in November 2011 was 481 ± 43, which are the lowest estimates since surveys began in the 1980s (Figure 8). Only four of the 21 blocks provided sufficient sightings for population size estimations in 2011: S5 (Shoalwater Bay), C6 (Upstart Bay), C10 and C11 (Hinchinbrook area) (Sobtzick, 2012).

Dugong population size estimates for the Hinchinbrook regions ranged from:

- 144-168 individuals (Block C10)
- 106-112 individuals (Block C11)

Figure 8. Estimated dugong distribution based on aerial surveys conducted by JCU in 2005 (left) and 2011 (right) (map created by Alana Grech).
Hinchinbrook Region – Aerial Surveys Conducted by Tony Preen (JCU)
From March 1997 – April 1998, Dr. Tony Preen (JCU) conducted aerial surveys for inshore dolphins and dugongs around the Townsville to Hinchinbrook region, and also conducted satellite tracking on some dugongs (Preen, 2000). This study was funded by the Commonwealth Government to determine marine mammal occurrence in relation to the Port Hinchinbrook development, and provided very important information on dugongs and turtles (Fig. 9) and dolphins (Figs. 10), being:

- the first detailed, year-round study of dugong distribution, abundance and movement patterns in the region using repeated aerial surveys, satellite tracking, historical aerial surveys and other approaches to obtain independent data on habitat use.
- the first summary of inshore dolphin occurrence and habitat use for the Townsville to Hinchinbrook region.


Dugong Sighting Locations 97-98

Turtle Sighting Locations 97-98

Figure 9. Locations of dugong (left) and turtles (right) observed during aerial surveys (Preen 2000)
Humpback Dolphin Sighting Locations 97-98

Snubfin Dolphin Sighting Locations 97-98

Figure 10. Locations of humpback dolphins (left map) and snubfin dolphins (right map) observed during aerial surveys (Preen 2000)

Hinchinbrook Region – Boat-based Surveys Conducted by Dr. Guido Parra (JCU)

From 1999-2003, Dr. Guido Parra from James Cook University conducted boat surveys to investigate the status of inshore dolphins for his PhD (Parra et al., 2002, Parra, 2005). Although Dr. Parra’s work was primarily focused in Cleveland Bay near Townsville, he also conducted some surveys in other areas along the northern Great Barrier Reef coastline, including Girringun Sea Country.

During surveys in Girringun Sea Country, a total of 61 dolphin groups were observed (Fig. 11), consisting of:

- 49 humpback dolphin groups
- 2 bottlenose dolphin groups
- 10 snubfin dolphin groups

There is currently no information available on months that dolphins were sighted, however, this information will hopefully become available in the near future to assist with survey design and planning.

Figure 11. Sightings of dolphins observed during Dr. Guido Parra’s boat-based surveys. Data and map kindly contributed by Dr. Guido Parra
Hinchinbrook Region – GAC/James Cook University Dolphin and Dugong Surveys
GAC in collaboration with James Cook University have been conducting inshore dolphin surveys since 2012 (Beasley et al., 2013). The study area for these surveys is Balgal Beach north to Kurramine Beach. Bottlenose, humpback and snubfin dolphins, and dugong, have been sighted in Girringun Sea Country, although snubfin dolphins have only been sighted a few times near Lucinda. GAC conducted further surveys in September 2016, so were complementary to this project. The results of these surveys are still pending.

Mandubarra Sea Country (Innisfail Region)
The only other region of the North Queensland coast where surveys have previously been conducted is south of Innisfail to Kurramine Beach, in collaboration with Mandubarra Aboriginal Land and Sea Inc. Bottlenose and humpback dolphins were previously sighted on these surveys (Beasley and Mandubarra Aboriginal Corporation Inc, 2014)

Princess Charlotte Bay - Boat-based Surveys Conducted by Dr. Guido Parra (JCU)
Dr. Guido Parra from James Cook University conducted boat surveys to investigate the status of inshore dolphins in three adjacent bays (Princess Charlotte, Bathurst and Ninan Bays) located in the Far Northern Section of the Great Barrier Reef Marine Park, northeast Queensland (Parra et al., 2006a). The study indicated that snubfin and humpback dolphins occur closer to land than would be expected at random, and that snubfin dolphins were found closer to river mouths than humpback dolphins (Parra et al., 2006a). Snubfin dolphins were sighted off Bathurst Head and Princess Charlotte Bay, whereas humpback dolphins were sighted in all three bays (Figure 12).

Figure 12. Sightings in Princess Charlotte Bay

Princess Charlotte Bay - Boat-based Surveys Conducted by Lama Lama Rangers and JCU
Lama Lama Rangers collaborated with JCU to conduct inshore dolphin surveys in 2013 and 2014. Humpback dolphins were sighted during both surveys, however, no snubfin or bottlenose dolphins were sighted.
North Queensland Inshore Dolphin Project Background

This project initially aimed to undertake inshore dolphin surveys in Bowling Green Bay, North Queensland, complementing other similar inshore dolphin projects being undertaken in neighbouring regions, such as:

- Cleveland Bay and Girringun Sea Country (Dr. Isabel Beasley)
- south of Bowling Green Bay to the Fitzroy River (Dr. Danielle Cagnazzi)
- north of Port Douglas (Dr. Isabel Beasley)

The Cleveland Bay project was originally scheduled to begin in November 2015, however, because of survey design considerations did not begin until May 2016. Similarly, surveys of Girringun Sea Country were scheduled to begin in October 2015, were conducted in September 2016. Dr. Danielle Cagnazzi conducted inshore dolphin surveys south of Bowling Green Bay to the Fitzroy River region from May-July 2016.

As a result of delays to these complementary studies, Bowling Green Bay surveys were also postponed to August/September 2016. Unfortunately, as a result of very unfavourable weather conditions and consistenly strong south-easterly winds, no surveys were possible in Bowling Green Bay throughout August or September. A further access issue arose because the boat ramp that was to be used to access the eastern portion of Bowling Green Bay (Ocean Creek Boat Ramp) is under construction until November 2016 (http://www.burdekin.qld.gov.au/community/facilities/boat-ramps/).

Cleveland Bay surveys were very successful, with numerous Australian snubfin dolphins and Australian humpback dolphins being sighted and photographed. Similarly, Dr. Cagnazzi has had significant success with his surveys, with numerous Australian snubfin dolphins and Australian humpback dolphins being photographed south of Bowling Green Bay.

Given the access and weather difficulties of conducting 20 days of surveys in Bowling Green Bay, approval was obtained from the SeaWorld Research and Rescue Foundation (SWRRF) to change the study area from only Bowling Green Bay to a combination of some, or all, of the following:

1. Bowling Green Bay south to Cape Upstart (to be conducted in collaboration with Gudjuda Rangers based at Home Hill)
2. Saunders Beach north to Balgal Beach
3. Southern Innisfail (to be conducted in collaboration with Mandubarra Traditional Owners)
4. Cairns region north to Port Douglas

Twenty survey days will be completed throughout some, or all of these regions, however, the number of surveys conducted in each region will depend on collaborators schedules and weather conditions.

This report documents these boat-based surveys conducted from Townsville north to Port Douglas during October/November 2016, with funding provided by the SeaWorld Research and Rescue Foundation.
Aims and Objectives

The aim of this study is to obtain information on broad-scale distribution of inshore dolphins along the North Queensland coastline. The objectives are:

- **Objective 1** - Collate existing data on inshore dolphin sightings in the North Queensland region
- **Objective 2** - Investigate current-day distribution and abundance of inshore dolphins along the North Queensland coastline from Bowling Green Bay north to Port Douglas
- **Objective 3** - Engage Traditional Owners and JCU students in the research project to enable long-term monitoring of the inshore dolphin population occurring around Townsville coastal waters

Study Area

The study area for this project was Bowling Green Bay north to Port Douglas. During the same time surveys along the Capricon Coast north to Mackay were being conducted by Dr. Cagnazzi (Figure 13). Surveys in the Bowling Green Bay/Townsville region were therefore close enough to Dr. Cagnazzi’s study site for potential inshore dolphin movements between sites to be detected.

The Townsville and Girringun Aboriginal Corporation inshore dolphin studies preceeded this project, therefore, the chance for re-sightings along the coast from Townsville north to Balgal Beach were high.

![Figure 13. Map of Central and North Queensland showing regions that Dr. Danielle Cagnazzi has been conducting inshore dolphin surveys (red highlight), regions that Dr. Isabel Beasley has been, or is going to, conduct inshore dolphin surveys during 2016 (blue highlight), and regions proposed for this study as weather and collaborators are available (green highlight).](image-url)
Methods

As part of the SeaWorld funded project – Looking for Dolphin and Dugongs Along the North Queensland Coast, boat-based surveys were conducted along the north Queensland coast from Townsville north to Port Douglas from 10 September to 18 October 2016.

Project Participants

James Cook University
Isabel Beasley
Mat Golding
Erin Weir
Anya Jaeckli
Laura Velasquez

Mandubara Aboriginal land and Sea Inc.
Henry Epong
Jason Epong

Jabalbina Yalanji Aborioginal Corporation
Anthea Solomon

Volunteer
Kea Lewry

Survey Methods

A minimum of two observers undertook observations. Two observers were ‘on-effort’ on either side of the boat, searching along the transect with binoculars (binoculars to be used intermittently) in the front of the boat, while the other observer assumed a ‘recorder’ position, scanning naked eye behind the main observers. Observer positions were rotated every 30 mins to reduce observer fatigue. ‘Off-effort’ observers could still search for dolphins while resting if they did not feel fatigued (Figure 14).

Figure 14. Off-effort observers from Mandubara searching for dolphins

Scanning methods for all vessels followed those outlined in Beasley et al. (2010). The scanning pattern utilised is designed to maximise observers sighting dolphins close to the transect line, as well as further away from the vessel:

1. Each observer scanned for dolphins with binoculars from 90 degrees to their side of the boat to 10 degrees to the opposite side of the bow.
2. Observers scanned each field of view for 5 seconds and moved onto the next field of view until 90 degrees was reached. Approximately 2-3 minutes was then spent scanning with naked eye. This avoided eye fatigue, and allowed observers the opportunity to spot marine wildlife in a broader field of view. This scanning protocol was repeated in a slow, gradual scan motion throughout each 30 min observer rotation.

Once a dolphin group was sighted, the boat collected the necessary location data, and then transited to the dolphin group to obtain additional data and photographs.

**Vessel speed**
Following the methodology described in Beasley *et al.* (2010), surveys were carried out at a consistent low speed (12-15 km/h, 6-8 knots) while ‘on-transect’. Previous experience has shown that if surveys are conducted at higher speeds fewer sightings will be observed, as there is considerably less time for animals to surface within the field of view of observers. Thus it is important that speed is kept constant across all transect lines.

**Data Collection**
The ‘effort’ data sheet (data sheet that records time and number of kilometres surveyed throughout the day) is completed everyday day by both teams.

**Start of day**
At the start of the day before the boat departs for surveys, observers complete the top section of the effort data sheet, which includes details about:
- departure location
- the area to be surveyed
- names of observers
- start time from the GPS
- start odometer km from the GPS (which is always reset to ‘0’ before surveys begin).

A Garmin GPS was used for surveys (Figure 15), where the ‘trip computer’ page displays all relevant information for the effort sheet, primarily time and odometer. The boat then travels to the location that surveys will begin for the day. The boat track is always recording automatically every two minutes using the GPS, and is not turned off until the survey team has finished surveys for the day.

![Figure 15. Handheld GPS that is used for all surveys by both boats (GPSMap78SC)](image)
Information on tides and tide state is also collected, to determine whether tides have an influence on dolphin distribution within the study area.

**Tides and Beaufort**

The semi-diurnal range (the difference in height between high and low waters over about half a day) varies in a two-week cycle. Approximately twice a month, around new moon and full moon when the sun, moon, and earth form a line (a condition known as syzygy, the tidal force due to the sun reinforces that due to the Moon. The tide's range is then at its maximum; this is called the *spring tide* (Figure 16).

When the moon is at first quarter or third quarter, the sun and moon are separated by 90° when viewed from the Earth, and the solar tidal force partially cancels the Moon's. At these points in the lunar cycle, the tide's range is at its minimum; this is called the *neap tide*, or *neaps* (a word of uncertain origin).

Spring tides result in high waters that are higher than average, low waters that are lower than average, ‘slack water’ time that is shorter than average, and stronger tidal currents than average. Neaps result in less-extreme tidal conditions. There is about a seven-day interval between springs and neaps (http://en.wikipedia.org/wiki/Tide).

![Figure 16. Schematic of the spring and neap tide patterns (Photo – http://en.wikipedia.org/wiki/Tide).](http://en.wikipedia.org/wiki/Tide)

**Data collection while ‘on-transect’**

Once the boat has arrived to the location that surveys begin, the boat stops and the second portion of the ‘effort’ data sheet is completed. This includes information on:

- effort type (i.e. Begin Effort at the start of surveys, OC = Observer change, EC = Environmental change, PC = Position change and EE = End effort)
- time
- transect/WPT number
- odometer
- beaufort/swell
- depth (from boats sounder)
- temperature (from boats sounder)

Beaufort is one of the most important environmental variables to collect consistently during surveys, as the rougher the sea conditions the more difficult it is to observe marine mammals (Figure 17).
• **Beaufort/swell** - the Beaufort state and swell height, written as e.g. ‘2 / 0’ for Beaufort / Swell respectively.
  - **Beaufort 0** = no ripples, flat calm.
  - **Beaufort 1** = corrugated iron-type ripples.
  - **Beaufort 2** = wavelets but no white-caps.
  - **Beaufort 3** = wavelets with white caps.
  - **Beaufort 4** = large waves, lots of white caps that are rolling, white bubbles.

![Figure 17. Classification of Beaufort (Photo – http://www.deltas.org/weer/beaufort.html).](image)

Once a dolphin sighting was observed, an entry would be made to end effort (with all other associated information), and the dolphin group was approached to complete the sighting sheet. All megafauna (i.e., sharks, turtles, sea snakes) were recorded on the ‘megafauna data sheets’, while to boat continued along the survey line.

**Species identification and survey mode**

‘Closing mode’ was used for these inshore dolphin surveys since:

1. Accurate species identification is required
2. Photo-ID will be conducted on individuals sighted, which requires the group to be approached.

As a result of conducting the surveys in ‘closing mode’, observers went “off effort” when a sighting was observed (Figure 18).

After the dolphin group was approached, data on the groups’ exact location, species identity, group size, group age composition and general behaviour was recorded. Photographs were taken during observations of the group. Environmental variables (depth, turbidity, temperature, salinity, beaufort and tide state) were recorded at the sighting location, once all information had been collected and the sighting was complete. The following provides more detail on the data to be collected (see below).
Group Size
A dolphin group/cluster was defined as a tight aggregation with one or more dolphins in close proximity (0-500 m), in apparent association, moving in the same direction and often, but not always, engaged in the same activity (Parra, 2005). Following Smith and Reeves (2000), group size was estimated, based on ‘low’, ‘high’ and ‘best’ estimates of the number of animals. Group size was estimated after at least 10-15 minutes of careful observation. ‘Low’ is defined as the absolute minimum number of dolphins sighted in the group, ‘high’ the absolute maximum number of dolphins in the group and ‘best’ is defined as the best estimate of the number of dolphins, acknowledging minimum and maximum estimates.

Group Composition
Information was recorded on group composition following Beasley (2007):

- A ‘newborn’ was defined as a dolphin approximately 1 m in length, swimming constantly in close proximity to another dolphin (presumably the mother), surfacing in a ‘corkscrew’ fashion (irregular surfacing with its head jerking high out of the water), with obvious foetal folds.
- A ‘calf’ was defined as a dolphin < ½ the length of an adult, swimming in a regular manner and constantly in close proximity to another dolphin (presumably the mother).
- A ‘juvenile’ was defined as a dolphin approximately ½ - ¾ the size of an adult, swimming independently of any other larger dolphins in the group, generally with few identifiable dorsal fin features.
- An ‘adult’ was defined as a dolphin that is 2-3 m or greater in length.

It is difficult to define the sex of individual dolphins, as there is no documented evidence of obvious sexual dimorphism in inshore dolphins (although Kreb (2004) reported sexual dimorphism for the Mahakam Irrawaddy dolphin population). A dolphin was classified as a female when seen consistently swimming with a newborn, or calf, near her side (Figure 19).
Figure 19. A bottlenose dolphin with calf, sighted off Port Douglas

**Behavioural Categories**

During this study, collection of behavioural data was a lower priority than transect of photo-identification since distribution, abundance and habitat use are the highest priorities. However, behaviour was systematically recorded and videoed while photo-ID was attempted. Behavioural categories followed those developed by Parra (2006) for inshore dolphins in northern Australian waters:

- **Foraging**: Foraging was identified from: individuals moving in various directions without an obvious pattern; dolphins diving frequently and steeply downwards (often preceded by fluke or peduncle arches), with extended submersion times; rapid accelerations and erratic movement at the surface, indicative of animals chasing fish; and animals seen directly pursuing a fish (e.g. fish jumping at the surface) or with fish in their mouths (Figure 20).
- **Foraging behind trawler**: Repeated diving in varying directions around the side or behind the stern of a trawler boat while the boat is fishing.
- **Travelling**: Travelling was identified by the persistent and directional movement with a regular pattern of surfacing and diving; shallow dive angles; and animals not underwater for extended lengths of time.
- **Socialising**: Socialising includes: Localised movement, unpredictable dive directions; dolphins in close proximity showing high levels of interaction (animals touching each other, rubbing their bodies); fins and flukes often breaking the surface of the water and frequent aerial behaviour such as leaps and summersaults.
- **Milling**: Milling includes movement slow with no apparent direction; dolphins swimming in close proximity, but without interaction; no aerial behaviour and low activity levels. Dolphins surface in a synchronised manner and most of the time is spent at the waters’ surface. Dive angles are shallow.
- **Slow travel**: Slow travel involves moving in slow and persistent directional pattern, regular surfacing and diving pattern and animals not underwater for great lengths of time.
- **Fast travel**: Fast travel includes moving fast in a persistent and directional pattern; regular surfacing and diving patterns and animals not underwater for great lengths of time.

Figure 20. Bottlenose dolphin foraging on garfish
Environmental Data

Environmental parameters (depth, temperature, turbidity, salinity, pH, beaufort, tide, tide-state and tide height) were taken at the location of every dolphin sighting, and at the extremities of the survey region (i.e. the furthest points travelled upstream).

- Depth and tide height were taken from the vessels depth sounder.
- Temperature, turbidity, salinity, PH were taken from the Horiba water quality meter (Figure 21).
- Tide and tide state were taken from Austides 2013 (produced by the Australian Hydrographic Service).

These environmental data are important when investigating habitat preferences and potential seasonality of sighting data of dolphins and dugongs. Unfortunately only one water quality meter was available for these surveys, so only one boat was able to take the meter each day. This resulted in some sightings having a limited number of environmental parameters collected and no parameters collected throughout the day.

![Figure 21. Survey team taking water quality measurements](image)

Transect Protocols

Transect breaks occurred when:
1. dolphin groups were sighted,
2. weather deteriorates,

Refreshment and toilet breaks were scheduled for when observers are ‘off-effort’, so as not to interfere with survey progress and to maximise the distance covered each day.

Once a break was taken for a dolphin sighting, the boat returned to the transect line when observers were confident that all required data had been collected (including group size estimations) and photographs had been taken (taking into consideration the groups behaviour and the requirement to finish transect lines). The boat returned to the transect line at the closest location from the transect break point, taking into consideration the requirement to reduce double-counting by attempting to leave the sighted dolphin group behind.

Studies have shown that sighting rates of a variety of marine wildlife decreases as weather deteriorates. Thus, all surveys were conducted in calm sea conditions (i.e. Beaufort Sea state $\leq 3$ (no whitecaps) and swell $\leq 1m$, and no rain) to minimize variation in animal sightings and optimize use of resources available (Beasley 2010).
Additional Marine Megafauna Data to be Collected
During all surveys, any marine megafauna (i.e. dugongs, turtles, crocodiles) birds, and other marine wildlife sighted were recorded with associated position and depth data. This sighting data is mapped, with associated mapping of the survey tracks travelled. Photographs were taken of additional marine megafauna whenever possible to enable confirmation of species identification, which is particularly important for turtles and sea snakes.

Survey Protocols and Data Entry
Data entry for these surveys utilised a purpose-made app. (developed by Environmental Systems Solutions (ESS), Girringun Aboriginal Corporation (QLD) and Dr. Beasley), where the data could be collected in the field and then uploaded to a central database once back to internet reception (Figures 22 and 23).

Figure 22. Environmental Systems Solutions database developed specifically for inshore dolphin surveys

Figure 23. Jabalbina Ranger Anthea Solomon entering survey data on the handheld device
**Vessel Used**
The JCU vessel ‘Snubby’ a 5.8m Formosa was used for these surveys (Figure 24). This vessel has been sponsored by WWF-Australia and Tassal to be used for inshore dolphin surveys in northern Australian waters, particularly along the north Queensland coast.

*Figure 24. The JCU vessel Snubby*

**Transect Lines**
Proposed transect lines were placed at 5km intervals, 10-15km from the coast (Figure 25). Survey lines were from Bowling Green Bay north to Port Douglas; a distance of 450km.

*Figure 25. Proposed survey lines*
Results

Survey Effort

- A total of 33 days were spent conducting boat-based surveys along the North Queensland coast (Figure 26; Table 1). Of these, 23 days were considered suitable survey days. The wind speeds were too high to survey on the ten other days (i.e. >11 knots).
- A total of 1851km were travelled during surveys over 144 hours (this total includes transiting to and from transects, and distance/time spent photographing dolphin groups).
- A total of **867km (96 hours)** were spent on transect, surveying for dolphin groups and other marine megafauna.
- Most of the proposed survey lines were completed, apart from:
  - Bowling Green Bay due to unfavourable weather conditions
  - North of Innisfail to Russell River due to unfavourable weather conditions

Table 1. Effort summary information from North Queensland surveys conducted in September/October 2016

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Total KM Travelled</th>
<th>Total Time</th>
<th>Total Transect KM</th>
<th>Total Transect Time</th>
<th># Sightings</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-Sep-16</td>
<td>Saunders Beach</td>
<td>122.0</td>
<td>9:09</td>
<td>29.3</td>
<td>3:18</td>
<td>3</td>
</tr>
<tr>
<td>11-Sep-16</td>
<td>Saunders Beach</td>
<td>106.0</td>
<td>5:00</td>
<td>19.4</td>
<td>2:15</td>
<td>1</td>
</tr>
<tr>
<td>26-Sep-16</td>
<td>Innisfail South</td>
<td>80.3</td>
<td>7:29</td>
<td>60.1</td>
<td>6:07</td>
<td>1</td>
</tr>
<tr>
<td>27-Sep-16</td>
<td>Innisfail South</td>
<td>48.2</td>
<td>3:02</td>
<td>15.4</td>
<td>1:35</td>
<td>0</td>
</tr>
<tr>
<td>28-Sep-16</td>
<td>Innisfail South</td>
<td>29.0</td>
<td>2:09</td>
<td>15.7</td>
<td>1:44</td>
<td>0</td>
</tr>
<tr>
<td>29-Sep-16</td>
<td>Mission Beach</td>
<td>44.2</td>
<td>3:34</td>
<td>35.5</td>
<td>3:16</td>
<td>0</td>
</tr>
<tr>
<td>30-Sep-16</td>
<td>Cairns north</td>
<td>58.5</td>
<td>5:32</td>
<td>40.7</td>
<td>3:52</td>
<td>1</td>
</tr>
<tr>
<td>01-Oct-16</td>
<td>Cairns north</td>
<td>95.0</td>
<td>8:19</td>
<td>51.8</td>
<td>5:34</td>
<td>2</td>
</tr>
<tr>
<td>02-Oct-16</td>
<td>Cairns north</td>
<td>169.0</td>
<td>12:54</td>
<td>74.5</td>
<td>7:15</td>
<td>5</td>
</tr>
<tr>
<td>03-Oct-16</td>
<td>Port Douglas</td>
<td>69.8</td>
<td>5:18</td>
<td>37.9</td>
<td>3:35</td>
<td>1</td>
</tr>
<tr>
<td>04-Oct-16</td>
<td>Port Douglas</td>
<td>63.3</td>
<td>6:04</td>
<td>47.4</td>
<td>4:31</td>
<td>1</td>
</tr>
<tr>
<td>09-Oct-16</td>
<td>Cairns north</td>
<td>17.8</td>
<td>1:58</td>
<td>7.83</td>
<td>0:15</td>
<td>2</td>
</tr>
<tr>
<td>10-Oct-16</td>
<td>Cairns north</td>
<td>64.7</td>
<td>4:20</td>
<td>35.87</td>
<td>3:10</td>
<td>0</td>
</tr>
<tr>
<td>11-Oct-16</td>
<td>Cairns south</td>
<td>181.0</td>
<td>12:21</td>
<td>93.5</td>
<td>8:58</td>
<td>2</td>
</tr>
<tr>
<td>12-Oct-16</td>
<td>Cairns north</td>
<td>103.0</td>
<td>8:53</td>
<td>76</td>
<td>7:05</td>
<td>1</td>
</tr>
<tr>
<td>13-Oct-16</td>
<td>Port Douglas</td>
<td>62.7</td>
<td>5:39</td>
<td>37.9</td>
<td>4:01</td>
<td>1</td>
</tr>
<tr>
<td>16-Oct-16</td>
<td>Innisfail South</td>
<td>10.4</td>
<td>1:00</td>
<td>0.0</td>
<td>0:00</td>
<td>0</td>
</tr>
<tr>
<td>17-Oct-16</td>
<td>Townsville north</td>
<td>203.0</td>
<td>11:19</td>
<td>80.2</td>
<td>7:01</td>
<td>1</td>
</tr>
<tr>
<td>18-Oct-16</td>
<td>Saunders Beach</td>
<td>63.1</td>
<td>3:31</td>
<td>9.12</td>
<td>0:52</td>
<td>2</td>
</tr>
<tr>
<td>19-Oct-16</td>
<td>Balgal Beach</td>
<td>79.1</td>
<td>5:51</td>
<td>6.8</td>
<td>11:02</td>
<td>4</td>
</tr>
<tr>
<td>17-Dec-16</td>
<td>Townsville</td>
<td>39.1</td>
<td>4:43</td>
<td>21.7</td>
<td>2:46</td>
<td>1</td>
</tr>
<tr>
<td>18-Dec-16</td>
<td>Townsville</td>
<td>97.1</td>
<td>9:12</td>
<td>58.6</td>
<td>7:09</td>
<td>0</td>
</tr>
<tr>
<td>19-Dec-16</td>
<td>Townsville</td>
<td>45.2</td>
<td>6:56</td>
<td>12.1</td>
<td>1:23</td>
<td>4</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>1851.5</strong></td>
<td><strong>144:13</strong></td>
<td><strong>867.31</strong></td>
<td><strong>96:44</strong></td>
<td><strong>33</strong></td>
</tr>
</tbody>
</table>
Figure 26. Survey lines completed along the North Queensland coast
Beaufort Conditions

Sea conditions were average during most mornings, generally degrading to un-surveyable by early afternoon. The majority of survey time searching was spent in low Beaufort 3 conditions (323.3km) and Beaufort 2 (307.1km) (Table 2; Figure 27).

Table 2. The number of kilometres surveyed in each Beaufort state

<table>
<thead>
<tr>
<th>Beaufort</th>
<th>Kilometres surveyed</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>20.5</td>
</tr>
<tr>
<td>1</td>
<td>125.7</td>
</tr>
<tr>
<td>2</td>
<td>328.4</td>
</tr>
<tr>
<td>3</td>
<td>392.7</td>
</tr>
<tr>
<td>4</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>867.3</strong></td>
</tr>
</tbody>
</table>

Figure 27. Bar chart showing total kilometres surveyed during transect surveys in each Beaufort state during North Queensland surveys.

Dolphin Sightings

A total of 33 dolphin groups (195 individuals) were sighted during surveys (Figures 28-30), consisting of:

- 18 humpback dolphin groups (total group size = 99)
- 7 snubfin dolphin groups (total group size = 43)
- 1 mixed snubfin and humpback dolphin group (total group size = 9 individuals; 7 humpback dolphins and 2 snubfin dolphins)
- 5 bottlenose dolphin groups (total group size = 42)
- 2 groups of unknown species (total group size = 2)
Figure 28. Dolphin sightings during North Queensland surveys
Figure 29. Dolphin sightings from Mission Beach north to Port Douglas

Figure 30. Dolphin sightings from Townsville north to Ingham
Calves Sighted in Groups
Few calves were sighted during surveys (Figure 31-32). The only snubfin dolphin calf was sighted near Townsville Port on 19 December 2016.

Figure 31. Dolphin sightings with calves in group from Mission Beach north to Port Douglas

Figure 32. Dolphin sightings with calves in group from Townsville north to Ingham
Moon and Tide States
Surveys were conducted during both spring and neap tides. Each region was only surveyed during one moon state, apart from north of Cairns, which was surveyed during both spring and neap tides (Figure 33-34).

Figure 33. Dolphin sightings by moon state from Mission Beach north to Port Douglas

Figure 34. Dolphin sightings by moon state from Townsville north to Ingham
Surveys were also conducted throughout a variety of tide states (Figure 35-36), where dolphins were sighted during:

- ebb and flood tides in Cleveland Bay and along the cairns coast
- high tide near Balgal Beach

Figure 35. Dolphin sightings by tide state from Mission Beach north to Port Douglas

Figure 36. Dolphin sightings by tide state from Townsville north to Ingham
Relative Sighting Rate
The relative sighting rate for each species during surveys are shown in Table 3. The most commonly sighted species was the humpback dolphin.

Table 3. Group and individual sighting rate for each dolphin species sighted during North Queensland surveys

<table>
<thead>
<tr>
<th>Species</th>
<th>Groups/km surveyed</th>
<th>Individuals/km surveyed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humpback</td>
<td>0.02</td>
<td>0.11</td>
</tr>
<tr>
<td>Snubfin</td>
<td>0.01</td>
<td>0.05</td>
</tr>
<tr>
<td>Humpback/Snubfin</td>
<td>0.00</td>
<td>0.01</td>
</tr>
<tr>
<td>Bottlenose</td>
<td>0.01</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Species Summaries And Environmental Parameters
A summary of group size, composition and associated environmental parameters for each species sighted is below.

Humpback dolphins
A total of 18 humpback dolphin groups (total group size = 99) were sighted during surveys, consisting of:
- 77 adults
- 14 juveniles
- 8 calves

No newborns were sighted. These groups were sighted throughout the North Queensland coast. The following environmental parameters collected at sighting locations (Table 4, Figures 37-40):

Table 4. Environmental parameters at humpback dolphin sighting locations

<table>
<thead>
<tr>
<th></th>
<th>Depth (m)</th>
<th>Temperature (°C)</th>
<th>Salinity (ppt)</th>
<th>Turbidity (NTU)</th>
<th>pH</th>
<th>Tide Height (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>7.3</td>
<td>28.4</td>
<td>36.3</td>
<td>3.7</td>
<td>8.4</td>
<td>1.8</td>
</tr>
<tr>
<td>SD</td>
<td>3.95</td>
<td>1.60</td>
<td>0.65</td>
<td>5.67</td>
<td>0.08</td>
<td>0.46</td>
</tr>
<tr>
<td>Range</td>
<td>2.8 – 16.4</td>
<td>25.2 – 30.7</td>
<td>35.5 – 37.5</td>
<td>0.0 – 16.2</td>
<td>8.1 – 8.5</td>
<td>1.1 – 2.7</td>
</tr>
</tbody>
</table>

Figure 37. Humpback dolphin sighted outside Townsville Port – 10 September 2016
Figure 38. Juvenile humpback dolphin sighted near Balgal Beach – 18 September 2016

Figure 39. Humpback dolphins sighted near Balgal Beach – 18 September 2016

Figure 40. Humpback dolphins sighted near Cairns carrying a sponge

Snubfin dolphins

Seven snubfin dolphin groups (total group size = 43) were sighted, consisting of:
- 31 adults
- 4 juveniles
- 1 calf

The calf was sighted during December surveys. No newborns were sighted. These groups were all sighted in the Saunders/Balgal Beach and Townsville regions. No snubfin dolphins were sighted north of Balgal Beach. The following environmental parameters collected at sighting locations (Table 5, Figures 41 and 42):

Table 5. Environmental parameters at snubfin dolphin sighting locations

<table>
<thead>
<tr>
<th></th>
<th>Depth (m)</th>
<th>Temperature (°C)</th>
<th>Salinity (ppt)</th>
<th>Turbidity (NTU)</th>
<th>pH</th>
<th>Tide Height (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>8.3</td>
<td>28.3</td>
<td>37.2</td>
<td>1.04</td>
<td>8.4</td>
<td>1.6</td>
</tr>
<tr>
<td>SD</td>
<td>3.08</td>
<td>2.30</td>
<td>0.53</td>
<td>1.81</td>
<td>0.01</td>
<td>0.67</td>
</tr>
<tr>
<td>Range</td>
<td>5.6 – 14.7</td>
<td>24.9 – 30.8</td>
<td>36.7 – 38.3</td>
<td>0.0 – 4.2</td>
<td>8.4 – 8.5</td>
<td>1.1 – 2.7</td>
</tr>
</tbody>
</table>

No new environmental parameters included in the table.
Mixed humpback and snubfin dolphins

One mixed group of humpback/snubfin dolphins (total group size = 9; seven humpback dolphins and two snubfin dolphins) was sighted between Magnetic Island and Rowes Bay, Townsville, consisting of:

- 7 adults (five humpback dolphins and two snubfin dolphins)
- 1 juvenile (humpback dolphin)
- 1 calf (humpback dolphin)

No newborns were sighted. The following environmental parameters were collected at the sighting location (Table 6, Figures 43 and 44):

Table 6. Environmental parameters at snubfin dolphin sighting locations

<table>
<thead>
<tr>
<th></th>
<th>Depth (m)</th>
<th>Temperature (°C)</th>
<th>Salinity (ppt)</th>
<th>Turbidity (NTU)</th>
<th>pH</th>
<th>Tide Height (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>5.0</td>
<td>28.3</td>
<td>36.5</td>
<td>0.0</td>
<td>8.4</td>
<td>1.4</td>
</tr>
<tr>
<td>SD</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Range</td>
<td>---</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Figure 41. Snubfin dolphins sighted near Pallarenda

Figure 42. Snubfin dolphins sighted near Balgal Beach

Figure 43. Snubfin and humpback dolphin sighted south of Magnetic Island

Figure 44. Snubfin and humpback dolphin sighted south of Magnetic Island
Bottlenose dolphins

Five bottlenose dolphin groups (total group size = 42) were sighted, consisting of:

- 31 adults
- 6 juveniles

No calves or newborns were sighted. These groups were primarily sighted near Innisfail and Port Douglas. The following environmental parameters were collected at the sighting locations (Table 7, Figure 45 and 46):

Table 7. Environmental parameters at humpback dolphin sighting locations

<table>
<thead>
<tr>
<th></th>
<th>Depth (m)</th>
<th>Temperature (°C)</th>
<th>Salinity (ppt)</th>
<th>Turbidity (NTU)</th>
<th>pH</th>
<th>Tide Height (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>14.4</td>
<td>28.0</td>
<td>36.4</td>
<td>0.0</td>
<td>8.4</td>
<td>1.8</td>
</tr>
<tr>
<td>SD</td>
<td>7.37</td>
<td>0.93</td>
<td>0.62</td>
<td>0.0</td>
<td>0.03</td>
<td>0.3</td>
</tr>
<tr>
<td>Range</td>
<td>6.2 – 23.6</td>
<td>26.9 – 29.4</td>
<td>35.9 – 37.5</td>
<td>0.0 – 0.0</td>
<td>8.3 – 8.5</td>
<td>1.3 – 1.9</td>
</tr>
</tbody>
</table>

Figure 45. Bottlenose dolphins sighted near Innisfail

Figure 46. Bottlenose dolphins sighted near Cairns
Photo-identificiation

Of the 33 groups sighted, 30 groups were photographed, with at least one individual being photo-identified. A total of 18,521 images were taken.

A total of 127 individuals were photo-identified:
- 29 snubfin dolphins (Figures 47 and 48)
- 65 humpback dolphins (Figures 49-51)
- 33 bottlenose dolphins (Figures 52-54)

Snubfin Dolphins

All snubfin dolphin groups were observed near Balgal/Saunders Beaches and within the Port of Townsville or within the dredged channel leading out to Magnetic Island.

Of the dolphins identified:
- 6 individuals were sighted twice
- 9 individuals were sighted once

Figure 47. OHEI01 – 10 September 2016 – Saunders Beach

Figure 48. OHEI09 – 11 September 2016 – Pallarenda
Humpback dolphins were sighted throughout the study area. Of the 65 humpback dolphins photo-identified:

- 4 individuals were sighted twice
- 7 individuals were sighted once

Figure 49. SSAH08 – 18 October 2016 - Townsville

Figure 50. SSAH30 – 3 October 2016 – Port Douglas

Figure 51. SSAH39 – 11 October 2016 – Cairns
Bottlenose dolphins

Thirty-three bottlenose dolphins were photo-identified during surveys. These groups were sighted near Port Douglas, Innisfail and Cairns. Of the 33 bottlenose dolphins photo-identified all individuals were sighted once.

Figure 52. TADU01 (with calf) – 26 September 2016 - Innisfail

Figure 53. TADU12 – 2 October 2016 – Yorkeys Knob

Figure 54. TADU24 (with calf) – 4 October 2016 – Port Douglas
Marine Megafauna Sightings

A total of 59 groups of megafauna (116 individuals) were sighted during surveys (Figure 55), consisting of:

- 6 dugongs
- 66 turtles – unknown species
- 1 flatback turtle
- 3 green turtles
- 1 olive ridley turtle
- 3 seasnakes
- 1 ray
- 6 sharks

Another probable dugong was sighted south of Port Douglas at the Mowbray River mouth.

Figure 55. Marine megafauna sightings during North Queensland surveys
Other Events

During surveys along the North Queensland coast, some notable events occurred.

Humpback Dolphin Calf Entangled

Mother and calf humpback dolphins were sighted on 30 September 2016 at 957am off Yorky’s Knob Recreational Boating Club, Cairns at latitude -16.79617, longitude 145.71710. The calf appeared healthy, in good condition, and was swimming normally, however, it had marine debris wrapped around its neck (Figure 56). The netting was tight around the calves neck and had begun to depress into the flesh. The calf also appeared to have healed scaring around the tail region. The mother humpback dolphin was in good condition, with no apparent injuries, or netting, around her. The dolphins were followed down towards Trinity Inlet, with the group being left at Machan’s Beach at 1123am. The dolphins were continuing down towards Trinity Inlet when last sighted.

![Figure 56. Entangled humpback dolphin calf sighted on 30 September 2016](http://www.couriermail.com.au/news/queensland/baby-dolphin-spotted-off-queensland-coast-with-marine-debris-wrapped-around-neck/news-story/aba7cf10f362709ec0e0f7000428a088)

The entangled humpback dolphin calf and mum was re-sighted again near Holloways Beach, Cairns on 2 October 2016 (Figure 57). This is the same location that the dolphins were left on 30 September 2016. The mother and calf pair were sighted at 1049am, at location -16.83998, 145.74658. The calf was still swimming strongly and pretty much beside its mum the whole time.

![Figure 57. Entangled humpback dolphin calf sighted on 2 October 2016](http://www.couriermail.com.au/news/queensland/baby-dolphin-spotted-off-queensland-coast-with-marine-debris-wrapped-around-neck/news-story/aba7cf10f362709ec0e0f7000428a088)

A media release went out on in the Courier Mail on 18 October 2016 about the dolphin, asking the public to keep an eye out for it (http://www.couriermail.com.au/news/queensland/baby-dolphin-spotted-off-queensland-coast-with-marine-debris-wrapped-around-neck/news-story/aba7cf10f362709ec0e0f7000428a088). Unfortunately no information has been received confirming a re-sight of the calf.
Flatback Turtle Found in Mandubarra Sea Country

During surveys with Mandubarra Traditional owners south of Innisfail on 28 September 2016, an adult female flatback turtle was found floating at the surface, unable to dive, at 1340pm (Figures 58 and 59). It was at location: -17.75957, 146.19206 (21.6m water depth and 26.5 degrees water temp). The turtle was collected and taken back to the Mandubarra Turtle Rehabilitation Centre. The turtle was released at Kurramine Beach on 25 February 2017.

Figure 58. Flatback turtle recovered on 28 September 2016

Figure 59. Flatback turtle recovered on 28 September 2016
Un-attended Netting vessel

On 11 September 2016 during surveys near Toolkea (north of Townsville), an unattended netting vessel was sighted (Figure 60 and 61). Upon closer inspection the fisher was found to be sleeping in the bottom of the boat.

Figure 60. Netting vessel sighted on 11 September 2016

Figure 61. Netting vessel left unattended at Tolkea on 11 September 2016

As stated on the business QLD website (https://www.business.qld.gov.au/industries/farms-fishing-forestry/fisheries/fisheries-profiles/commercial-net-fisheries/regulations), commercial net fishers need to be aware of the relevant legislation and regulations. Management arrangements for Queensland’s commercial net fisheries are found in the Fisheries Regulation 2008, and include:

- area closures
- closures during spawning season
- dugong protection areas, which are closed to net fishing or restrict the type of netting that may be used
- restrictions on the number, length, drop and mesh size of nets
- restrictions on the minimum legal size of fish and in some cases total allowable catches (TACs)
- 'attendance' requirements (by law, net fishers are required to be 'in attendance' at the net while fishing so as to minimise harm to species of conservation concern, such as crocodiles, dugongs and turtles).
Stranded Bottlenose Dolphin at Wunjunga Beach – 62544 (Strandnet)

On 20 October 2016 at 630am, a juvenile male bottlenose dolphin (51.7 kg; 179cm) was found stranded at Wunjunga Beach, south of Townsville (Figure 62). The dolphin was taken to a nearby channel where it was released. The dolphin re-stranded on the afternoon of 20 October. It was still alive but had been badly bitten by a shark. The dolphin was left on the beach overnight and was found dead on the beach the next morning, 21 October 2016.

Figure 62. Juvenile male bottlenose dolphin found at Wunjunga Beach on 20 October 2016

The carcass was collected by local Wunjunga residents on 21 October 2016, and then Dr. Beasley transported the carcass to the JCU Veterinary School for a comprehensive necropsy by Dr. Linda Hayes. The strandnet record (62544) is below.

| ID: | 62544 |
| Date: | 20/10/2016 06:30:00 |
| Taxon: | Dolphin |
| Genus: | Tursiops |
| Species: | Tursiops sp. (Unidentified bottlenose dolphin) |
| Sex: | Sex not determined/not examined |
| Age: | Unweaned immature, dependent on mother for milk |
| Location: | BU: WUNJUNGA |
| Latitude/Longitude: | -19.76108 / 147.60413 |
| Carcass Condition: | D1 - Live but subsequently died; unsuccessful rescue |
| Fate/Disposal: | Left insitu |
| Compliance Notified: | Not required |
| Damage: | LARGE BITE/LACERATIONS ON BACK. A FEW OTHER LACERATIONS ON BODY. |
| Body Length: | 180.0cm |
| Notes: | DOLPHIN FOUND STRANDED ON BEACH AT WUNJUNGA. LOCALS TOOK IT INTO A DEEP WATER CHANNEL AND ATTEMPTED A REFLOAT. OBSERVED SWIMMING FOR SOME TIME, BUT FOUND DEAD ON THE BEACH THE FOLLOWING MORNING WITH FRESH PREDATOR WOUNDS. |
| Contact: | Jan Jeynes 0438297397 Wunjunga |

The necropsy confirmed that the stranding resulted because the dolphin was infected with cetacean morbillivirus. Symptoms of infection are often a severe combination of pneumonia, encephalitis and damage to the immune system, which greatly impair the cetacean’s ability to swim and stay afloat unassisted. This provides an example of the importance of undertaking a comprehensive necropsy on all stranded dolphins when possible, and not assume that the dolphin died primarily because of the shark attack (as would have been assumed had the necropsy not been conducted).
Discussion

Survey Importance

• These were the first systematic boat-based inshore dolphin surveys to be conducted north of Townsville.

• The large study area provided important information on distribution of inshore dolphins, and the opportunity to compare occurrence and movements from other nearby sites (i.e. Dr. Cagnazzi’s study south of Townsville, Townsville and Girringun Aboriginal Corporation surveys).

• Photo-identification and habitat use comparisons between sites will be undertaken once other 2016 survey reports have been completed.

Dolphin Sightings

• Humpback dolphins were sighted throughout the study area, from Townsville north to Port Douglas.

• The lack of snubfin dolphin sightings north of Balgal Beach was surprising, as given potentially favorable environmental characteristics north of Balgal Beach snubfin dolphins should have been sighted.

Megafauna Sightings

• In addition to dolphin sightings, these surveys collected information on marine megafauna sighted during surveys. There was a notable lack of dugong sightings north of Cleveland Bay, Townsville.

Collaborations with Aboriginal Corporations

• Collaboration with Aboriginal Corporations was essential to the success of this project. Future projects are planned that build on this initial study and partner with Terrain NRM and other Aboriginal Corporations.
General Images

Figure 63. Mandubarra Traditional Owners, Henry Epong and Jason Epong

Figure 64. Entangled humpback dolphin calf (SSAH10) swimming with mother (SSAH09).

Figure 65. Un-attended vessel at Toolkea with nets in background
Figure 66. Bottlenose dolphin with a garfish sighted 2 October 2016 at Yorkeys Knob

Figure 67. Bottlenose dolphin with a mackerel sighted 2 October 2016 at Yorkeys Knob

Figure 68. Remora on a humpback dolphin sighted 18 October 2016 at Balgal Beach
Figure 69. Diamond scale mullet on a humpback dolphin sighted 19 December 2016 at Townsville

Figure 70. Humpback dolphin with a butter fish sighted 19 December 2016 at Townsville

Figure 71. Photographing humpback dolphins with Girringun Rangers

Figure 72. Snubfin dolphins sighted at Balgal Beach
Figure 73. Photographing bottlenose dolphins off Port Douglas

Figure 74. Data collection with Anthea Solomon from Jabalbina Rangers

Figure 75. Snubfin dolphins sighted at Balgal Beach
References

BEASLEY, I., GOLDING, M. & RANGERS, G. 2013. Looking for Palangal (dolphins) and Balangal (dugongs) in Girringun Sea Country.


SOBTZICK, S. 2012. Aerial survey of the urban coast of Queensland to evaluate the response of the dugong population to the widespread effects of the extreme weather events of the summer of 2010-11.