

# EPBC Referral Report No. 2

## Boskalis Cambridge Gulf Marine Sand Proposal Western Australia

### SETTING & EXISTING ENVIRONMENT

## ANNEX 14: MARINE MEGA-FAUNA SURVEYS REPORT



Prepared for Boskalis Australia Pty Ltd by EcoStrategic Consultants

In support of Project Referral under Part 7 of Commonwealth *Environment Protection & Biodiversity Conservation Act*

(Also relates to referral under Section 38 of Western Australia *Environmental Protection Act*)

**OCTOBER 2024**



## CONTENTS

---

FURTHER INFORMATION.....	3
REFERRAL DOCUMENTS.....	4
ACRONYMS.....	6
PROJECT LOCATION.....	7
1. INTRODUCTION & BACKGROUND.....	8
2. SURVEY OBJECTIVES & TARGET SPECIES.....	8
3. LOCAL ASSESSMENT UNIT.....	10
4. SURVEY METHODS & TEAM.....	12
4.1 Literature Search & Review.....	12
4.2 Inputs from Experts & Stakeholders.....	12
4.3 Initial Recon Survey.....	13
4.4 Dry- & Wet-season Vessel-based MMF Surveys.....	13
4.5 Incidental Observations.....	16
4.6 Other MMF Surveys.....	16
4.6.1 DBCA Cape Domett turtle nesting data.....	16
4.6.2 Aerial drone surveys of turtle nesting areas.....	16
4.6.3 eDNA sampling for Sawfish & River Sharks.....	16
5. SURVEY RESULTS.....	17
5.1 Literature Search & Review Findings.....	17
5.2 Inputs from Experts & Stakeholders.....	18
5.3 Dry- & Wet-season Vessel-based MMF Survey Results.....	19
5.4 Incidental Observations.....	20
6. DISCUSSION & CONCLUSIONS.....	25
REFERENCES.....	27
APPENDIX 1: MMF SIGHTINGS MASTER DATA TABLES.....	28
A.1.1: Dry-season Survey Jul-Aug 2023.....	28
A.1.2: Wet-season Survey Feb 2024.....	29
APPENDIX 2: MMF IMAGES.....	30
A.2.1: Dry-season Survey MMF Images.....	30
A.2.2: Wet-season Survey MMF Images.....	33
APPENDIX 3: MMF SIGHTING LOCATIONS.....	37
A.3.1: Snubfin Dolphin Sighting Locations.....	37
A.3.2: Humpback Dolphin Sighting Locations.....	38
A.3.3: Unidentified Dolphin Sighting Locations.....	38
A.3.4: Flatback Turtle Sighting Locations.....	39
A.3.5: Green Turtle Sighting Locations.....	39
A.3.6: Unidentified Turtle Sighting Locations.....	40
A.3.7: Crocodile Sighting Locations.....	41

Appendices 4 and 5 are submitted as separate [Excel files](#) (DCCEEW Excel Template) with the following file names:

- EPBC [Referral Report No. 2](#) - Boskalis Cambridge Gulf - [Annex 14](#) - *Appendix 4 - Species Obs Data - Dry Season*.
- EPBC [Referral Report No. 2](#) - Boskalis Cambridge Gulf - [Annex 14](#) - *Appendix 5 - Species Obs Data - Wet Season*.

## FURTHER INFORMATION

---

Peter Boere

*Director*

**Boskalis Australia Pty Ltd**

Suited 1.3 / 9 Havelock St, West Perth 6005

Mobile 041 9987 158

[peter.boere@boskalis.com](mailto:peter.boere@boskalis.com)

Steve Raaymakers

*Lead Report Author / Consultant to Boskalis*

**EcoStrategic Consultants**

PO Box 968, Edge Hill, Cairns 4870

Mobile 040 9909 422

[steve@eco-strategic.com](mailto:steve@eco-strategic.com)

## REFERRAL DOCUMENTS

This report is part of a larger set of documents submitted as part of Boskalis Australia's referral under Part 7 of the Commonwealth *Environment Protection & Biodiversity Conservation Act* (EPNC Act), as listed in the table below.

A similar set of reports was also submitted as part of referral of the same proposal under section 38 of the Western Australia (WA) *Environmental Protection Act* (EP Act), with some differences to specifically address State requirements.

Doc No.	Electronic File Names (PDFs) (except Doc No.s 9 & 10 which are Excel files). As required, these file names are how the reports are referenced in the online referral submitted via the EPBC Act Business Portal <a href="https://epbcbusinessportal.environment.gov.au">https://epbcbusinessportal.environment.gov.au</a>
0	List of EPBC Referral Reports - Boskalis Cambridge Gulf
1	EPBC <u>Referral Report No. 1</u> - Boskalis Cambridge Gulf - <i>Description of Proposed Action &amp; Regulatory Framework</i>
2	EPBC <u>Referral Report No. 2</u> - Boskalis Cambridge Gulf - <i>Setting &amp; Existing Environment</i> Includes in same document: <ul style="list-style-type: none"> <li>• Annex 3 - Drop Camera Video Extracts</li> <li>• Annex 4 - Dry Season Sample Point Specs</li> <li>• Annex 5 - Wet Season Sample Point Specs</li> <li>• Annex 6 - Benthic Taxa per Sample Point - Dry Season Maps</li> <li>• Annex 7 - Benthic Taxa per Sample Point - Wet Season Maps</li> <li>• Annex 8 - Benthic Taxa per Sample Point - Dry Season Graphs</li> <li>• Annex 9 - Benthic Taxa per Sample Point - Wet Season Graphs</li> <li>• Annex 11 - Sediment Contamination Assessment</li> <li>• Annexes 1, 2, 10, 12, 13 and 14 are submitted as separate documents as listed below.</li> </ul>
3	EPBC <u>Referral Report No. 2</u> - Boskalis Cambridge Gulf - <u>Annex 1</u> - <i>Sand Assessment</i>
4	EPBC <u>Referral Report No. 2</u> - Boskalis Cambridge Gulf - <u>Annex 2</u> - <i>MScience BCH Methods</i>
5	EPBC <u>Referral Report No. 2</u> - Boskalis Cambridge Gulf - <u>Annex 10</u> - <i>Aerial Drone Lidar Report</i>
6	EPBC <u>Referral Report No. 2</u> - Boskalis Cambridge Gulf - <u>Annex 12</u> - <i>Cape Domett Turtle Data Report</i>
7	EPBC <u>Referral Report No. 2</u> - Boskalis Cambridge Gulf - <u>Annex 13</u> - <i>Marine eDNA Report</i>
8	<b>[THIS REPORT]</b> EPBC <u>Referral Report No. 2</u> - Boskalis Cambridge Gulf - <u>Annex 14</u> - <i>Marine Mega-fauna Surveys Report</i> Includes in same document: <ul style="list-style-type: none"> <li>• Appendix 1 - MMF Sightings Master Data Tables</li> <li>• Appendix 2 - MMF Images</li> <li>• Appendix 3 - MMF Sighting Locations</li> <li>• Appendices 4 and 5 are submitted as separate Excel files as listed below.</li> </ul>
9	EPBC <u>Referral Report No. 2</u> - Boskalis Cambridge Gulf - <u>Annex 14</u> - <i>Appendix 4 - Species Obs Data - Dry Season</i> (Excel)
10	EPBC <u>Referral Report No. 2</u> - Boskalis Cambridge Gulf - <u>Annex 14</u> - <i>Appendix 5 - Species Obs Data - Wet Season</i> (Excel)

Doc No.	<p><b>Electronic File Names (PDFs)</b> (except Doc No.s 9 &amp; 10 which are Excel files).</p> <p>As required, these file names are how the reports are referenced in the online referral submitted via the EPBC Act Business Portal <a href="https://epbcbusinessportal.environment.gov.au">https://epbcbusinessportal.environment.gov.au</a></p>
11	<p>EPBC <u>Referral Report No. 3</u> - Boskalis Cambridge Gulf - <i>Traditional Owner Matters</i></p> <p>Includes in same document:</p> <ul style="list-style-type: none"> <li>• Annex 1 - <i>BAC Native Title Determination Map</i></li> <li>• Annex 2 - <i>MG Native Title Determination Map</i></li> <li>• Annex 3 - <i>Letter from BAC</i></li> <li>• Annex 4 - <i>Letter from MG</i></li> </ul>
12	<p>EPBC <u>Referral Report No. 4</u> - Boskalis Cambridge Gulf - <i>Impact Assessments</i></p> <p>Includes in same document:</p> <ul style="list-style-type: none"> <li>• Annex 1 - <i>Main Datasets Used to Inform Impact Assessments</i></li> <li>• Annex 2 - <i>Shipping &amp; Oil Spill Risk Assessment</i></li> <li>• Annex 3 - <i>Plume Mitigation Capability Statement</i></li> <li>• Annex 4 - <i>Marine Mega-fauna Capability Statement</i></li> </ul>
13	<p>EPBC <u>Referral Report No. 5</u> - Boskalis Cambridge Gulf - <i>Metocean &amp; Sed Dynamics Initial Report</i></p> <ul style="list-style-type: none"> <li>• Includes in same document <u>Annex 1</u> - <i>Supplementary Technical Note</i>.</li> <li>• Annex 2 is submitted as a separate document as listed below.</li> </ul>
14	<p>EPBC <u>Referral Report No. 5</u> - Boskalis Cambridge Gulf - <u>Annex 2</u> - <i>Factual Data Report</i></p> <p>(NOTE: Superseded by <i>Updated Factual Data Report</i> - see Doc No. 19, <u>Referral Report No. 8</u> - <u>Annex B</u> below).</p>
15	<p>EPBC <u>Referral Report No. 6</u> - Boskalis Cambridge Gulf - <i>Consultation</i></p> <ul style="list-style-type: none"> <li>• Includes in same document Annex 1 - <i>List of Meeting Minutes</i></li> </ul>
16	<p>EPBC <u>Referral Report No. 7</u> - Boskalis Cambridge Gulf - <i>Commonwealth Matters</i></p> <ul style="list-style-type: none"> <li>• Includes in same document Annex 1 - <i>PMST Report for POA &amp; 10 Km Buffer</i></li> </ul>
17	<p>EPBC <u>Referral Report No. 8</u> - Boskalis Cambridge Gulf - <i>Metocean &amp; Sed Dynamics Full Modelling Report</i></p> <ul style="list-style-type: none"> <li>• Appendices and Annexes are submitted as a separate document each, as listed below.</li> </ul>
18	<p>EPBC <u>Referral Report No. 8</u> - Boskalis Cambridge Gulf - <i>Appendices</i></p> <p>Includes:</p> <ul style="list-style-type: none"> <li>• Appendix A - <i>Model Calibration and Validation Plots</i></li> <li>• Appendix B - <i>Hydrodynamic and Wave Impact Plots</i></li> <li>• Appendix C - <i>Sediment Transport Impact Plots</i></li> <li>• Appendix D - <i>Sediment Plume Modelling Results</i></li> </ul>
19	<p>EPBC <u>Referral Report No. 8</u> - Boskalis Cambridge Gulf - <i>Annexes</i></p> <p>Includes:</p> <ul style="list-style-type: none"> <li>• Annex A - <i>Independent Expert Review</i></li> <li>• Annex B - <i>Updated Factual Data Report</i></li> </ul>

## ACRONYMS

---

AIMS	Australian Institute of Marine Science
BAC	Balanggarra Aboriginal Corporation
BC Act	<i>WA Biodiversity Conservation Act</i>
BCH	Benthic communities & habitats
BIA	Biologically Important Area (for various marine species as defined by DCCEEW)
BKA	Boskalis Australia Pty Ltd
CG	Cambridge Gulf
CSIRO	Commonwealth Scientific and Industrial Research Organization
DBCA	WA Department of Biodiversity, Conservation & Attractions
DCCEEW	(Commonwealth) Department of Climate Change, Energy, the Environment & Water
DEMIRS	WA Department of Energy, Mines, Industry Regulation & Safety
DWER	WA Department of Water & Environmental Regulation
EPA	WA Environmental Protection Authority
EP Act	<i>WA Environmental Protection Act</i>
EPBC Act	(Commonwealth) <i>Environment Protection &amp; Biodiversity Conservation Act</i>
FMO	False Mouths of Ord (River)
IMSA	WA Index of Marine Surveys for Assessments
KS	King Shoals
LAU	Local Assessment Unit (area where impact studies are undertaken, as per WA EPA technical guidelines)
LiDAR	Light Detection & Ranging
MG Corporation	Yawoorroong Miriuwung Gajerrong Yirrgeb Noong Dawang Aboriginal Corporation
MMF	Marine mega-fauna (whales, dolphins, dugong, marine turtles, crocodile, seasnakes and sharks and rays)
MNES	Matters of National Environmental Significance (under Commonwealth EPBC Act)
PMST	(Commonwealth) Protected Matters Search Tool
POA	Proposed operational area (where the proposed action will operate)
SPRAT	(Commonwealth) Species Profile & Threats Database
TO	Traditional Owner
WA	Western Australia (State of)
WAMSI	Western Australian Marine Science Institute

## PROJECT LOCATION

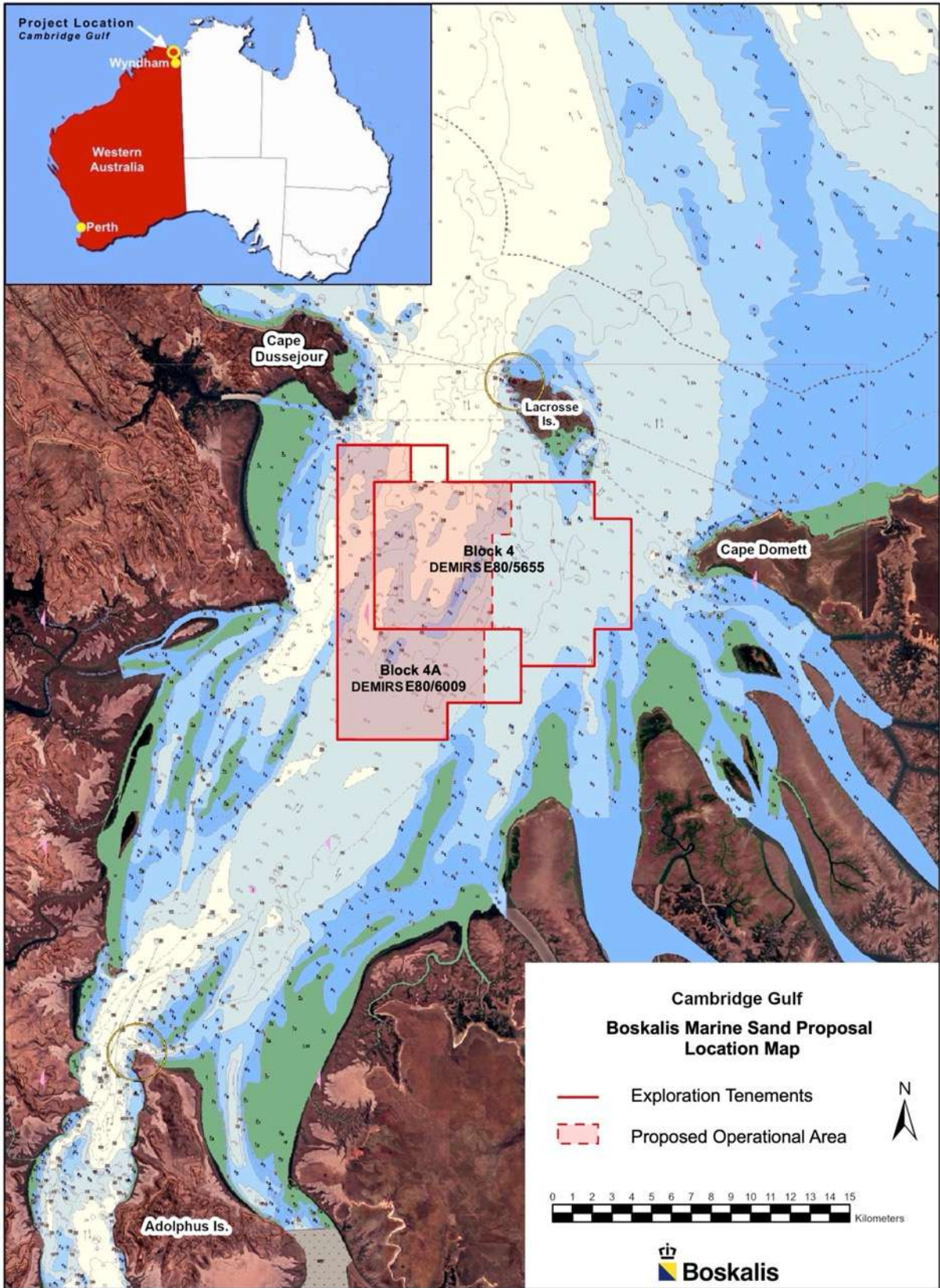


FIGURE 1: Location of the proposed action in Cambridge Gulf near Wyndham in the northeast of Western Australia.

## 1. INTRODUCTION & BACKGROUND

---

1. Boskalis Australia Pty Ltd (BKA) is assessing the feasibility of developing a marine sand-sourcing operation in Cambridge Gulf (CG) near Wyndham in the northeast of Western Australia (WA). BKA currently holds two sand exploration tenements in CG under the *WA Mining Act*, as the basis for the proposed action (Figure 1). More details about the proposed action are contained in EPBC Referral Report No. 1 - Boskalis Cambridge Gulf - Description of Proposed Action & Regulatory Framework.
2. To support its assessment BKA has undertaken a wide range of comprehensive engineering, economic and environmental studies since 2018. These studies provide a detailed description of the existing environmental and biodiversity values of CG as presented in EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Proposal Setting & Existing Environment (the mother-report of this report). As outlined in EPBC Referral Report No. 4 - Boskalis Cambridge Gulf - Impact Assessments, these studies find that the proposal is feasible and viable and unlikely to cause significant environmental impacts, as defined by significant impact criteria under both the *WA Environmental Protection Act* (EP Act) and the *Commonwealth Environmental Protection & Biodiversity Conservation Act* (EPBC Act).
3. Given these findings and the fact that the proposal is subject to the *WA Mining Act*, including the comprehensive environmental assessment and management framework under that Act, as well as a range of other environmental regulatory requirements as outlined in EPBC Referral Report No. 1 - Boskalis Cambridge Gulf - Description of the Proposed Action & Regulatory Framework, BKA considers that the proposal may not require an assessment process under the *WA EP Act* or *Commonwealth EPBC Act*.
4. Never-the-less, as a responsible company with stringent environmental and social policies, BKA has committed to self-referring the proposal to both the State and the Commonwealth under their respective Acts, for their determination of what further environmental assessments might be required, if any. If it is determined that assessment is required under both Acts, BKA will seek a joint process under the *WA environmental assessment system*, which is accredited by the Commonwealth.
5. The environmental studies undertaken and commissioned by BKA included vessel-based and aerial drone-assisted surveys for marine mega-fauna (MMF), including whales, dolphins, dugong, marine turtles, crocodile, seasnakes and sharks and rays, including species protected under the EPBC Act, in and near CG.
6. The surveys were underpinned by a literature search and review to identify all previous studies and data on marine mega-fauna in the area, consultations with relevant experts and local stakeholders with knowledge of MMF in the area, and an initial reconnaissance survey in March 2023. To account for inter-seasonal variation in some species, the actual surveys were carried out in the both the northern WA winter dry-season in July-August 2023 and in the summer wet-season in February 2024.
7. This report describes the methods used and presents the results and findings from the CG MMF surveys.

## 2. SURVEY OBJECTIVES & TARGET SPECIES

---

1. The objectives of the CG MMF surveys were to:
  - a) Provide data to support and inform the overall assessment of potential impacts of the proposed action on MMF, including species protected under the EPBC Act and *WA Biodiversity Conservation Act* (BC Act).
  - b) Assess the presence / absence, distribution and numbers of MMF species, including species protected under the EPBC Act and BC Act, in the CG area, including in the proposed operational area (POA) (Figure 1).
  - c) Assess any seasonal differences between the winter dry-season in July-August 2023 and in the summer wet-season in February 2024.
  - d) Establish the basis for a long-term database and photographic catalogue of MMF in CG, to assist future monitoring should the proposed action go ahead.
  - e) Provide data to support general conservation and management of MMF in the area, including species protected under the EPBC Act and BC Act, irrespective of the proposed action. All data collected by BKA as part of these studies are made freely available to relevant agencies and stakeholders, as well as the public through the *WA Index of Marine Surveys for Assessments* (IMSA).



2. In terms of target species, in order to provide a comprehensive picture of MMF in the area, the surveys were intentionally designed to record any and all MMF species, without restrictions, including any and all whales, dolphins, dugong, marine turtles, crocodile, seasnakes and sharks and rays, that might be sighted during the surveys. Never-the-less, specific attention was given to observing for certain protected species that are adapted to the highly turbid, macro-tidal, estuarine environments like CG, and/or which are known to occur in CG or in the general area around CG, as listed in Table 1.
3. Dugong (*Dugong dugon*) were included as target species for precautionary verification purposes, although it is well-known that they are not be present in CG due to lack of seagrass (Traditional Owners pers. comms 2024), (Mark Douglas pers. comms 2024), (DBCA East Kimberley District staff pers. comms 2023), (McMahon et al. 2017) (Walker et al. 1996).
4. Other MMF species that are of conservation significance that may occur in the CG area include River Sharks (*Glyphis spp*) and Sawfish (*Pristis spp*). However, as these are epibenthic fish species that live on and near the seabed, typically well upstream in tidal inlets, creek and rivers, they are not amenable to detection by vessel-based surveys. A separate marine eDNA sampling program was therefore carried out to survey for these species, as outlined in section 4.6.2.

**TABLE 1: Priority target species for the vessel-based MMF surveys (noting that any and all MMF sighted were recorded)**

Common Name	Species Name	IUCN Status	EPBC Act Status	WA BC Act Status
Australian Humpback Dolphin	<i>Sousa sahalensis</i>	Vulnerable	Not listed as threatened. Protected as a marine mammal & migratory species.	Migratory. Priority 4 = Rare, Near Threatened and other species in need of monitoring.
Australian Snubfin Dolphin	<i>Orcaella heinshoni</i>	Vulnerable	Not listed as threatened. Protected as a marine mammal & migratory species.	Migratory. Priority 4 = Rare, Near Threatened and other species in need of monitoring.
Dugong	<i>Dugong dugon</i>	Vulnerable	Not listed as threatened. Protected as a marine mammal & migratory species.	Migratory
Flatback Turtle	<i>Natator depressus</i>	Data deficient	Vulnerable. Protected as a marine & migratory species.	Vulnerable
Green Turtle	<i>Chelonia mydas</i>	Endangered	Vulnerable. Protected as a marine & migratory species.	Vulnerable
Olive Ridley Turtle	<i>Lepidochelys olivacea</i>	Vulnerable	Endangered. Protected as a marine & migratory species.	Endangered
Saltwater Crocodile	<i>Crocodylus porosus</i>	Least concern	Not listed as threatened. Protected as a marine & migratory species.	Migratory

### 3. LOCAL ASSESSMENT UNIT

---

1. Because, in addition to referring the proposed action under the Commonwealth EPBC Act, BKA has also submitted referral under the WA EP Act, BKA has followed the WA Environmental Protection Authority's (EPA's) technical guidelines for impact assessment. These guidelines include a requirement that for marine projects a spatially-defined Local Assessment Unit (LAU) should be determined within which potential impacts are assessed.
2. The EPA guidelines state that determination of the LAU boundaries should be specific to the location and should be configured to cover the full area within which impacts might occur from the proposed action. This should take into account aspects of the local marine environment such as coastal geomorphology, bathymetry, hydrodynamics, the presence of islands and reefs, biological attributes including the distribution of habitat and community types and ecological connectivity of the area. Jurisdictional and administrative factors such as State coastal waters and marine reserve boundaries should also be taken into account.
3. The EPA guidelines state that while LAU boundaries should be site-specific, marine LAUs in WA would typically be approximately 50 km<sup>2</sup> (e.g. a rectangular area defined by a 10 km stretch of coastline extending 5 km offshore or to the 3 nm limit of State Waters).
4. Figure 2 shows the LAU used by BKA for the CG proposal, overlain on the Benthic Habitat Map for CG. The LAU covers a marine area of over 2,800 km<sup>2</sup>, very significantly larger than the 50 km<sup>2</sup> reference stated by the EPA. This does not in any way imply potential for impacts throughout the area, but reflects BKA's conservatively precautionary approach to assessment, ensuring that all relevant environmental resources and values of the general area are included.
5. As shown on Figure 2 the LAU is centred on the proposed operational area (POA) and includes:
  - all coastal and marine areas within the main body of CG,
  - all of the coasts of Adolphus Island at the southern end of the main body of CG,
  - all of the coasts of Lacrosse Island at the entrance to CG,
  - the complex of mangrove-lined inlets and on the eastern side of CG known as the False Mouths of the Ord and part of the Ord River Floodplain Ramsar Wetland,
  - the three mangrove-lined rivers on the western side of CG, from north to south the Helby, Lyne and Thompson Rivers,
  - seaward to include the part of the State North Kimberley Marine Park located just offshore from CG,
  - east along the coastline outside of CG to include the beaches east of Cape Domett; and
  - west along the coastline outside of CG to include the beaches west of Cape Dussejour.
6. The MMF surveys were undertaken throughout the LAU, as described in section 4.4 and shown on Figure 5.

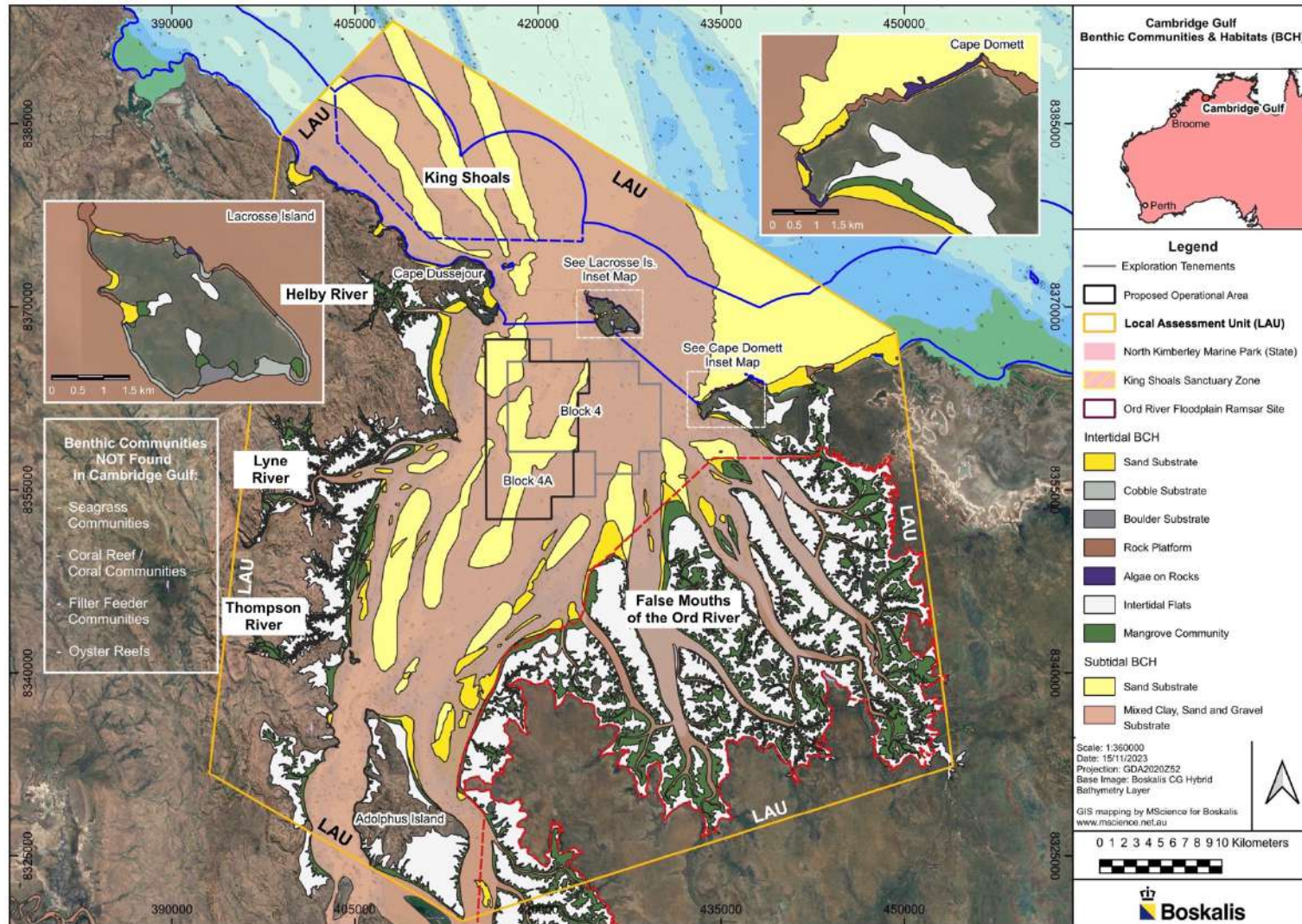


FIGURE 2: The Local Assessment Unit (LAU) used by BKA for the CG proposal, overlain on the Benthic Habitat Map for CG.

## 4. SURVEY METHODS & TEAM

---

### 4.1 Literature Search & Review

1. In accordance with standard procedure for commencing any environmental study, the first step was to undertake a search for existing reports, papers, studies and data of the area, using Google, Google Scholar and academic search engines, searching the research directories and web sites of relevant institutions including the Australian Institute of Marine Science (AIMS), the Commonwealth Scientific and Industrial Research Organization (CSIRO) and the Western Australian Marine Science Institute (WAMSI), and searching government directories such as the Commonwealth Protected Matters Search Tool (PMST) and Species Profile & Threats Database (SPRAT), the National Marine Biodiversity Hub, the Atlas of Living Australia, the National Conservation Values Atlas and the Digital Atlas of Australia.
2. While very useful reports, papers and datasets were obtained relating to geology, sediments, hydrodynamics and coastal processes, and some on water quality, very few were found relating to MMF. This reflects a general lack of previous studies on MMF in CG.
3. The most useful references and datasets that were identified, obtained and reviewed were:
  - a) Flatback Turtles:
    - Whiting et al (2008) who surveyed Flatback Turtle nesting at Cape Domett 2006-2007.
    - WA Department of Biodiversity Conservation & Attractions (DBCA), who have undertaken annual Flatback Turtle nesting surveys at Cape Domett since 2012 (raw data only).
  - b) Dolphins:
    - Brown et al (2016 & 2017) who undertook dolphin surveys in and near CG.
  - c) Crocodiles:
    - Kay (2004) who studied crocodile movements in the lower Ord River upstream from CG in 2001-2003.
  - d) River Sharks.
    - Kyne et al (2020 & 2021) who sampled for River Sharks (*Glyphis spp*) in rivers upstream from CG.
4. The DBCA East Kimberly District staff advised that they have undertaken dolphin and crocodile surveys in CG in cooperation with local TOs, but no reports have been produced and no data was available.
5. No other studies, reports or datasets on other MMF types specifically relating to CG were identified.
6. The findings from the review of the existing literature and data are reported in section 5.1 below, and these findings were used to inform the planning and design of the field surveys.

### 4.2 Inputs from Experts & Stakeholders

1. In accordance with good practice for planning, designing and undertaking MMF surveys, consultations were held and inputs were sought from relevant experts and stakeholders who are familiar with MMF and with the CG area. These included:
  - a) Planning sessions, including review of the findings of the literature search, with marine zoologist Dr Helen Penrose, who would lead the dry-season vessel-based survey, and with MMF survey experts Mia McIntyre and Yasmin Hunt, who would lead the wet-season vessel-based survey.
  - b) Meetings with representatives from the two Traditional Owner (TO) groups in the area, the Balangarra peoples through the Balangarra Aboriginal Corporation (BAC) and the Miriuwung Gajerrong peoples through the MG Corporation, and inviting their indigenous rangers to join the vessel-based surveys.
  - c) Meeting with DBCA East Kimberly District staff based in Kununurra, who undertake marine patrols and surveys of the area from time to time, sending them the draft survey plan for review and comment, and inviting them to join the vessel-based surveys.
  - d) Meetings with Wyndham-based commercial gillnet fisherman (Mark Douglas) who has over 20 years of experience working throughout CG and along the WA coastline outside of CG.

- e) Meetings with individual recreational fishermen based in both Wyndham and Kununurra who spend significant time fishing throughout CG.
  - f) Meeting with the Wyndham Volunteer Marine Rescue (WVMR) group who spend significant time working throughout the marine waters of CG.
2. The results of these consultations and inputs are reported in section 5.2 below, and were used to inform the planning and design of the field surveys. Further details about consultations are presented in [EPBC Referral Report No. 6 - Boskalis Cambridge Gulf - Consultation](#).

#### 4.3 Initial Recon Survey

1. Over nine days in February and March 2023 BKA undertook a sand exploration survey in Block 4 (see Figure 1). In order to take advantage of the presence of the survey vessel in CG, two marine environmental scientists (the author of this report and an assistant) joined the vessel to undertake initial environmental reconnaissance of the area, to better understand site conditions and inform planning of more detailed environmental assessment work. This included incidental observations for MMF while undertaking other work and observations of general environmental conditions (weather, sea conditions etc).
2. The site familiarisation gained from the initial recon survey was used to inform the planning and design of the subsequent MMF surveys.

#### 4.4 Dry- & Wet-season Vessel-based MMF Surveys

1. Dedicated, systematic vessel-based, visual transect surveys were undertaken over eight-days in the dry-season and nine-days in the wet-season. The dry-season survey was undertaken from 15 to 22 July 2023 inclusive, with additional incidental observations on 3 August 2023. The wet-season survey was undertaken from 18 to 28 February 2024, with no survey effort on 19 and 20 February, and with additional incidental observations on 8 February 2024.
2. As outlined in section 2 the surveys targeted larger (mega) marine fauna including dugong, snubfin dolphins, humpback dolphins, other dolphins, marine turtles, crocodiles, seasnakes, sharks and rays and any other sightings.
3. The dry-season MMF survey was led by marine zoologist Dr Helen Penrose. The wet-season survey was led by Mia McIntyre, an internationally experienced, certified marine fauna observer who also works with the DBCA North-west Shelf Flatback Turtle Program, and Yasmin Hunt who is also an internationally experienced, certified marine fauna observer with extensive experience in WA waters.
4. Both surveys were designed to be as consistent as possible, subject to variable site conditions and logistics, and followed established best practice methods for such surveys.
5. During the dry-season survey the MMF team worked from a dedicated 8 m jetboat (Jetfire), supported by a mother-vessel (MV Kuri Pearl 2). The wet-season team worked from both a dedicated small boat (Barrafish) and from a mother-vessel (MV Warrego), depending on other survey work being undertaken at the time. The vessels used are shown in Figure 3.
6. Both surveys had a minimum of two observers equipped with high-powered binoculars and cameras with telescopic lenses (100-400 mm lens capturing high resolution geotagged images). Observers were positioned on the port and starboard bows of the survey vessel, scanning their respective 180° views (Figure 4). Often there were supplementary observers on board (other team members, vessel crew etc) to add extra eyes to the search effort.
7. Observers went 'off effort' when a sighting was made, the vessel slowed and attempts were made to photograph the sighting. Data was recorded including location, species identity, group size, group age composition, any notable health observations and general behavior. Environmental variables, visibility, beaufort scale and tide state etc were recorded. Records were kept of 'on effort' and 'off-effort' times and used to calculate daily and total observer hours.
8. Surveys were carried out at a consistent low speed while 'on-effort' (10-12km/h or 6-8 knots). Vessel tracks were captured using GPS tracking and MFF sighting locations were recorded as way points on GPS, and also recorded through geotagged imagery where photos were possible.
9. Survey transects were distributed to provide as much coverage of the LAU as possible, including BKA's proposed operational area (POA), and spaced to reduce the likelihood of re-sightings while being relevant to the spatial scale of the proposal.

10. Both surveys covered over 800 km and over 50 hours of transects each during their respective periods. Areas covered included throughout all of CG, into upstream areas, and also areas slightly outside of CG and along the seaward coast to both west and east of CG, as shown on Figure 3.
11. During both surveys, when operating near the coast the MMF team was accompanied by an aerial drone operator and the drone was flown along beach areas to identify any MFF such as crocodiles and turtles on and near the beaches, and also up mangroves inlets and creeks, to assist in directing the vessel-based survey.
12. The results of vessel-based surveys are reported in section 5.4 below. It should be noted that the number of MMF sightings do not automatically equate to the number of individual animals, as repeat sightings on the same day or on different days can be the same animals. Positive photographic identification of individuals through distinguishing markings is required.



MV Kuri Pearl 2: Mother-vessel for dry-season survey Jul-Aug 2023



Jet Fire: Dedicated dry-season MMF survey vessel



MV Warrego: Mother-vessel for wet-season survey Feb-Mar 2024



Barrafish: Dedicated wet-season MMF survey vessel

**FIGURE 3:** Vessels used by BKA for the MMF surveys in CG.



**FIGURE 4:** Observers were positioned on the port bow (top image) and starboard bow (bottom image) of the survey vessels, scanning their respective 180° views while on-transect. These images are from one of the days when the main research vessel MV Warrego was used during the wet-season survey (Feb 2024).

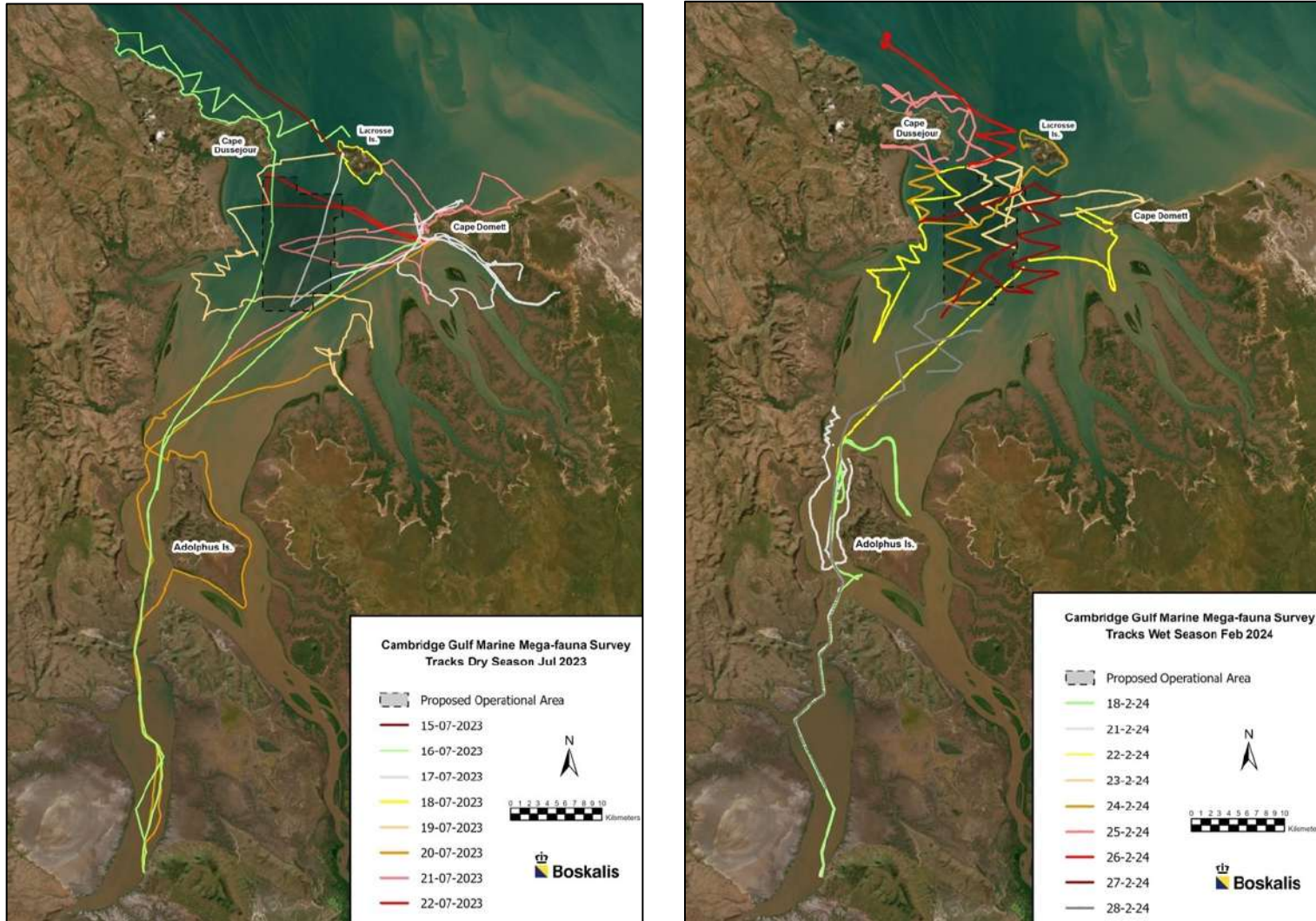


FIGURE 5: Left: Dry-season MMF survey tracks. Right: Wet-season MMF survey tracks. Over 800 km of tracks were surveyed during each season.

## 4.5 Incidental Observations

1. Every opportunity was taken to observe and record MMF during other environmental survey work and routine vessel operations on all survey trips to CG. This included:
  - a) briefing all team members and vessel-crew on incidental MMF observation protocols,
  - b) asking all personnel to maintain watch for MMF when undertaking their day-to-day work and recording all incidental observations made, including species, location and date, and to photograph the sighting if possible; and
  - c) assessing all drone video and photo-imagery for signs of marine fauna.
2. The results of the incidental observations are integrated with the results from the vessel-based surveys as reported in section 5.4 below.

## 4.6 Other MMF Surveys

### 4.6.1 DBCA Cape Domett turtle nesting data

1. Since 2012 the WA Department of Biodiversity Conservation & Attractions, (DBCA) has been undertaking annual monitoring of turtle nesting at the Cape Domett Seaward Beach, outside and just to the east of CG, in cooperation with the TOs of the area. While a wealth of useful data has been collected, up to 2023 it had not been fully analysed. During consultations between DBCA and BKA in 2023, access was granted to DBCA's data under a data-sharing agreement, to ensure that BKA's environmental assessment is based on the best available data, and thus optimize scope for protection of marine turtles.
2. Under the agreement BKA undertook an analysis of the data for DBCA, and this is reported in EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 12 - Cape Domett Turtle Data Report.

### 4.6.2 Aerial drone surveys of turtle nesting areas

1. In addition to the vessel-based MMF surveys reported in this report, aerial drone video surveys of known and potential turtle nesting beaches in the LAU were carried during both the dry-season (July-August 2023) and wet-season (February 2024) environmental surveys, and the aerial videos were assessed to map and count any identifiable turtle nesting tracks and nests.
2. The methods and results are presented in section 9.2.5 of EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Proposal Setting & Existing Environment (the mother-report of this report).

### 4.6.3 eDNA sampling for Sawfish & River Sharks

1. As outlined in section 2, MMF species of conservation significance that may occur in the overall CG area include River Sharks (*Glyphis spp*) and Sawfish (*Pristis spp*). As these are epibenthic fish species that live on and near the seabed, typically well upstream in tidal inlets, creeks and rivers, they are not amenable to detection by the vessel-based surveys reported in this report.
2. Sampling methods for these species include gill netting and hook and line fishing (Kyne & Pillans 2014). These methods can be harmful to the animals and, in settings like CG, present serious safety risks to personnel from potential crocodile and shark attack. BKA therefore opted for eDNA sampling as being a more efficient, ethical and safer sampling method, which is totally non-harmful to the target species.
3. The University of Canberra National eDNA Reference Centre was commissioned to undertake the marine eDNA sampling program at 20 sites throughout CG, including up the tidal inlets, creeks and rivers, in the open-water environment of the POA and at intermediate sites. The methods and results are presented in EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 13 - Marine eDNA Report.
4. The study found trace DNA evidence of one species of sawfish - the Narrow Sawfish (*Anoxypristis cuspidae*) at one site ~8 km upstream in the Lyne River on the western side of CG, but not at other sites. No evidence of the other species of sawfish or river sharks was found at any sites, including in the POA (which is deep, open-water, and not the typical habitat for these species).



## 5. SURVEY RESULTS

---

### 5.1 Literature Search & Review Findings

1. As outlined in section 4.1 the literature search identified very few existing reports, papers and datasets relating to MMF in the CG area. This reflects a general lack of previous studies on MMF in the area. Previous studies in the area restricted to Flatback Turtle nesting surveys, dolphin surveys, crocodile counts and a crocodile movements study in the Ord River upstream from CG and sampling for river sharks. The findings of the relevant previous studies are summarized below.

#### Flatback turtles:

1. Whiting et al (2008) undertook several surveys of Flatback Turtle nesting at the Cape Domett Seaward Beach, outside and just to the east of CG, during 2006 and 2007. They estimated that the Flatback nesting population is one of the largest known, with mean peak nesting of 70.8 to 73.7 turtles per night (up to 290 turtle tracks per night) and an estimated yearly population in the order of several thousand turtles (estimated ~3,250). Peak nesting for Flatbacks at Cape Domett is in the winter dry-season August-September each year, which differs from the west coast of WA where peak nesting season is in summer.
2. As outlined in section 4.6.1, annual monitoring of turtle nesting at the Cape Domett Seaward Beach has been undertaken by DBCA since 2012. Under a data-sharing agreement BKA undertook an analysis of the data for DBCA, and this is reported in [EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 12 - Cape Domett Turtle Data Report](#).
3. The DBCA data shows that over the ten-year period; a total of 130 nights were surveyed, the average number of nights surveyed annually was 13; a total of 6,270 track sets were counted, the average number of track sets counted per survey was 627; a total of 858 hatched nests were counted, the average number of hatched nests counted per survey was 85.7; a total of 84 predated nests were counted, and the average number of predated nests counted per survey was 8.4.
4. The DBCA data supports the earlier studies by Whiting et al (2008) which found that Cape Domett is a significant nesting site for Flatback Turtles. Evidence of nesting by Green Turtles was counted on 12 occasions over 7 years within the ten-year period, equating to an average of 1.7 per year, indicating that Cape Domett is not a significant nesting site for this species.
5. Overall, despite some minor limitations in the DBCA data, it appears that generally, Flatback Turtle nesting numbers at Cape Domett Seaward Beach may not have changed significantly since the surveys by Whiting et al (2008), although more rigorous data collection and analysis would be required to confirm this.

#### Dolphins:

1. Brown et al (2016 & 2017) conducted dedicated surveys for Humpback, Snubfin and Bottlenose Dolphins in and near CG as well as other sites along the Kimberly coast west to Roebuck Bay (Broome).
2. They found that the number of Snubfins in CG was much lower than at the other sites surveyed, and for previous surveys in the Dampier Archipelago. They made 34 sightings over nine days, with repeat sightings possibly being the same individuals. They identified six as distinct individuals. This compared to 140 identified individual Snubfin Dolphins in Roebuck Bay. The significantly lower number of Snubfins in CG could relate to the extreme environmental conditions and food limiting factors in CG compared to other sites.
3. They made no sightings of Snubfin Dolphins in the POA itself - they were mostly observed offshore outside of CG, on the western side of CG near Cape Dussejour and a group of four to five south of Adolphus Island.
4. With regard to Humpback Dolphins, they recorded 42 sightings, mostly near Cape Dussejour and outside and to the west of CG, and none in the POA. There is an area of expansive inter-tidal sand-banks along the coast just south of Cape Dussejour, and Humpback Dolphins are known to target such areas for feeding (Parra & Jefferson 2017). This may be why most sightings have been in that area.
5. As for all MMF surveys, different sightings could possibly be the same individual(s), so the actual number of dolphins may be less than the number of sightings. The number of sightings in the CG area are quite low considering that typical local area population sizes for Humpback Dolphins average ~50 to 90 individuals (Parra & Cagnazzi 2016).
6. Brown et al (2016 & 2017) made no sightings of Bottlenose Dolphins in the CG area, probably because the highly turbid waters are not suitable for this species.

Crocodiles:

1. WMI (2012) reports that in the early 2000s an annual survey program on the Ord River upstream from CG was implemented as a monitoring component related to an egg harvesting program. This work indicated that saltwater crocodile numbers had increased from historical lows (since crocodiles became protected from hunting in WA in 1970), had most likely reoccupied their historical ranges and were no longer under any significant known pressures.
2. Kay (2004) undertook a study of crocodile movements in the lower Ord River which runs into CG. He tracked 16 radio-tagged crocodiles between October 2001 and May 2003. Male and female crocodiles exhibited distinctly different patterns of movement. Females occupied a small core linear range ( $1.3 \pm 0.9$  km) on the main river channel during the dry season and moved upstream by up to 62 km to nesting habitat during the wet season, returning to the same core area the following dry season. They occasionally made excursions away from their core areas during the dry season.
3. Males moved considerable distances along the Ord River throughout the year. The largest range recorded was 87 km for a 2.5-m juvenile male. There were significant seasonal differences, with the highest mean rates of movement occurring during the summer wet season ( $4.0 \pm 5.4$  km day<sup>-1</sup>).
4. Neither males nor females showed exclusive habitat preferences for any of four broad riverine habitats identified on the Ord River. However, the three largest males had activity centres that they returned to frequently despite numerous excursions throughout the year, both up- and downriver. Males had substantial range overlaps with no obvious spatial partitioning, suggesting that territoriality is not an important behavioural characteristic of free-ranging male crocodiles along the Ord River.
5. It is not clear if these movement patterns in the Lower Ord River are representative of crocodile behaviour in CG itself.

River sharks.

1. Kyne (2020) reported sampling for Northern River Sharks (*Glyphis garricki*) in 11 rivers in the Northern Territory (NT) and WA, starting in 2013. The species was found in the Lower Ord, Durack and Pentecost Rivers upstream from CG. The report estimates the total Australian population size to be between 2,500 and 10,000 adults, and recommends a down-listing of this species from 'endangered' to 'vulnerable'.
2. Kyne et al (2021) reported sampling juvenile Speartooth Sharks (*Glyphis glyphis*) in the Lower Ord River upstream from CG in 2015 and 2019.

**5.2 Inputs from Experts & Stakeholders**

1. The pre-survey meetings with experts and stakeholders proved very useful in providing local knowledge about the presence, absence and distribution of MMF in CG.
2. Both the TOs and the DBCA district staff advised that Dugong are not seen in CG, due to lack of seagrass (their food source), that small numbers of Snubfin and Humpback Dolphins are seen from time-to time, that the Cape Domett seaward beach outside of CG is a significant Flatback Turtle nesting site and that crocodiles are most abundant in the lower Ord River upstream from CG. They did not identify the presence of other significant MMF species, and the extreme tidal currents and very high natural turbidity in CG are a limiting factor that make the area unsuitable for many MMF species.
3. The Wyndham-based commercial gillnet fisherman Mark Douglas, who has over 20 years of experience working throughout CG and along the coastline outside of CG, shared a number of observations, including:
  - a) He has never seen Dugong, whales, dolphin species other than Snubfin or Humpback dolphins (see below), seasnakes or larger sharks in CG.
  - b) Small numbers (individuals or small groups of two to five) of Snubfin and Humpback dolphins are seen from time-to time. These are mostly seen near and around Adolphus Island in the southern part of CG. This may be where their preferred food source is located - small fish, crustaceans and cephalopods (Marshe et al 1989). Sightings of these species are more common in waters along the coast outside of CG, as also observed during the surveys by Brown et al (2016 & 2017).
  - c) Sightings of Snubfin and Humpback Dolphins are much less inside CG during the wet season, when they seem to migrate out of CG, perhaps due to increased freshwater inputs.
4. Individual recreational fishermen based in both Wyndham and Kununurra and the WVMR group, who spend significant time throughout the marine waters of CG, did not identify any significant MMF and stated that the extreme tidal currents and very high natural turbidity in CG are limiting factors, including for recreational fishing.

### 5.3 Dry- & Wet-season Vessel-based MMF Survey Results

**IMPORTANT NOTE:** *The number of MMF sightings do not automatically equate to the number of individual animals, as repeat sightings on the same day or on different days can be the same animals. Positive photographic identification of individuals through distinguishing markings is required in order to provide reliable counts of the number of individual animals.*

1. Figure 5 above shows the survey transects for each survey. Figure 6 shows the locations of all sightings made during each survey. Table 2 lists the combined number of sightings of each species per survey and combined totals. Table 3 lists all sightings made per day during each survey. Figure 7 shows three examples of MMF images captured during the surveys. Appendix 1 contains the MMF sightings master tables, listing all relevant sighting data for each day surveyed. Appendix 2 contains the full set of images captured. Appendix 3 describes the sighting locations for dolphins, turtle and crocodiles, and identifies the sightings that occurred within the POA.
2. It should be noted that separate sightings on the same day or different days could be the same individual(s), so the number of sightings does not equate to number of animals. Positive photo ID of distinguishable identifying features is required to be able to identify distinct individuals and count numbers.
3. All of the animals observed in CG including most crocodiles were quite elusive and moved away and submerged out of site rapidly, making photography difficult. Out of a total of 59 MMF sightings of all species across both surveys, only 10 were successfully photographed, and only three have identifying features, as shown in Figure 7.
4. The summary results for the dry-season survey were (note numbers are sightings not necessarily separate individuals) (POA = Proposed Operational Area as shown on Figure 6):

a) Days surveyed:	Eight - 15 to 22 July 2023 inclusive, + incidental sightings 8 Aug 2023.
b) Total effort:	56 hours and 823 km of transects.
c) Snubfin Dolphin:	11 (3 in POA)
d) Humpback Dolphin:	0
e) Other dolphin (identified):	0
f) Unidentified dolphin:	2 (0 in POA)
g) Flatback turtle:	6 (0 in POA)
h) Green turtle:	1 (outside CG to west)
i) Other turtle (identified):	0
j) Unidentified turtle:	7 (1 in south of POA)
k) Saltwater crocodile:	10 (zero on POA)
l) Seasnake:	0
m) Shark / ray:	2 (juvenile Blacktip south of Adolphus Is. & juvenile Tiger Shark outside CG).
n) Other:	0

5. The results for the wet-season survey were:

a) Days surveyed:	Nine - 18 Feb then 21 to 28 Feb inclusive, + incidental sightings 8 Feb 2024.
b) Total effort:	51.5 hours and 850 km of transects.
c) Snubfin Dolphin:	4 (2 in POA)
d) Humpback Dolphin:	1 (in POA)
e) Other dolphin (identified):	0
f) Unidentified dolphin:	1 (not in POA)
g) Flatback turtle:	0
h) Green turtle:	0
i) Other turtle (identified):	0
j) Unidentified turtle:	2 (1 in POA)
k) Saltwater crocodile:	5 (1 in POA)
l) Seasnake:	0
m) Shark / ray:	0
n) Other:	0

6. There were a number of notable features in the findings as follows:

- a) For both seasons there were zero sightings of Dugong, zero sightings of identified species of dolphin other than Snubfins and Humpbacks, zero sightings of identified species of turtle other than Flatbacks and one Green Turtle (sighted outside of CG to the west of Cape Dussejour) and zero sightings of seasnakes and rays.

- b) The overall number of sightings for all species sighted were very low considering the very large area covered and the hours of effort with two observers per survey (all sightings were low single digits except for 11 Snubfin sightings in the dry-season survey).
  - c) Despite almost the same distance and hours covered between surveys, the number of sightings for all species were lower in the wet season than in the dry-season, except there was one Humpback Dolphin sighting in the wet-season and none in the dry-season (refer also Figure 8).
  - d) The majority of sightings for all species were outside of BKA's POA, although there were three Snubfin sightings in the POA in the dry season survey, and two Snubfin and one unconfirmed Humpback Dolphin sightings in the POA in the wet-season survey (in all cases they were swimming purposefully and directionally).
  - e) The majority of all turtle sightings were outside of the POA, except for one unidentified turtle in the POA in each survey.
  - f) Similarly, the majority of all crocodile sightings were outside of the POA, except for one during the wet-season survey. Most crocodile sightings were in or near coastal mangrove areas, except in the dry-season a total of six were observed outside of CG at the Cape Domett turtle nesting beach. They were positioned either on the beach or in the water just off the beach, ready to feed on nesting and hatchling turtles each evening (Figure 6 inset and Appendix 2).
7. More detailed location descriptions for all sightings are provided in Appendix 3.

## 5.4 Incidental Observations

1. Incidental sightings were three Snubfin dolphins and one crocodile on 8 August 2023 after the dry-season MMF survey team had departed, and three crocodiles on 8 February 2024 before the wet-season MMF team commenced. These sightings were added to the MMF survey data as reported in section 5.3 and marked in red on Table 3.
2. Of note is that during all three vessel-based environmental surveys conducted by BKA in CG to date, comprising nine days on site in March 2023, 20 days on site in July-August 2023 and 20 days on site in February 2024, all personnel on board, including marine biologists, other scientists and vessel crew, each with decades or many years of experience at sea, commented on how astounded they were by the lack of evidence of marine fauna, compared to other areas of tropical northern Australia.
3. During surveys up the rivers and inlets, which have dense mangrove fringes, team members expected to see signs of life such as schools of mullet feeding along the surface and bait fish jumping being chased by predators, as typically occurs in such habitats. These were not evident. When at anchor at night the team expected to see bait fish, squid, larger fish and even small sharks near the surface attracted by the stern light, as typically occurs in such areas, but night-after-night there was nothing at all, over a combined 49 nights across all three surveys. Not a single flock of seabirds feeding on schools of fish was seen in CG during the combined 49 days spent in CG. Crew monitoring the vessel's depth-sounder/fish finder commented on a constant lack of signs of fish.
4. The highly experienced MMF surveyors covered over 800 km of transects over eight- and nine-days during each survey, and on many days returned with zero sightings (in the wet season on most days). When there were sightings, they were a single sighting or single digits. They commented on the very low abundance of MMF compared to other areas where they work, including further west on the WA coast.
5. When operating outside of CG in the clearer, bluer waters of Joseph Bonaparte Gulf, the scenario was starkly different, with numerous signs of marine fauna including marine turtles at the surface, pelagic fish jumping and flocks of seabirds feeding on schools of fish.
6. The lack of observed biological activity in CG was so stark that it became a feature of discussion and hypotheses on every field trip.
7. While there is obviously a productive food-web in CG, as evidenced by the presence of larger animals such as crocodiles and a small number of Snubfin and Humpback Dolphins, it appears that despite the extensive mangrove fringe around the coast, in-water primary productivity and biological activity may be constrained by the extreme environmental conditions. As outlined in section 8 of EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Proposal Setting & Existing Environment (the mother-report of this report), chlorophyll-a concentrations in CG were relatively low in both the dry- and wet seasons. As a result of these factors, it appears that overall abundance of marine fauna in CG is low relative to other areas.

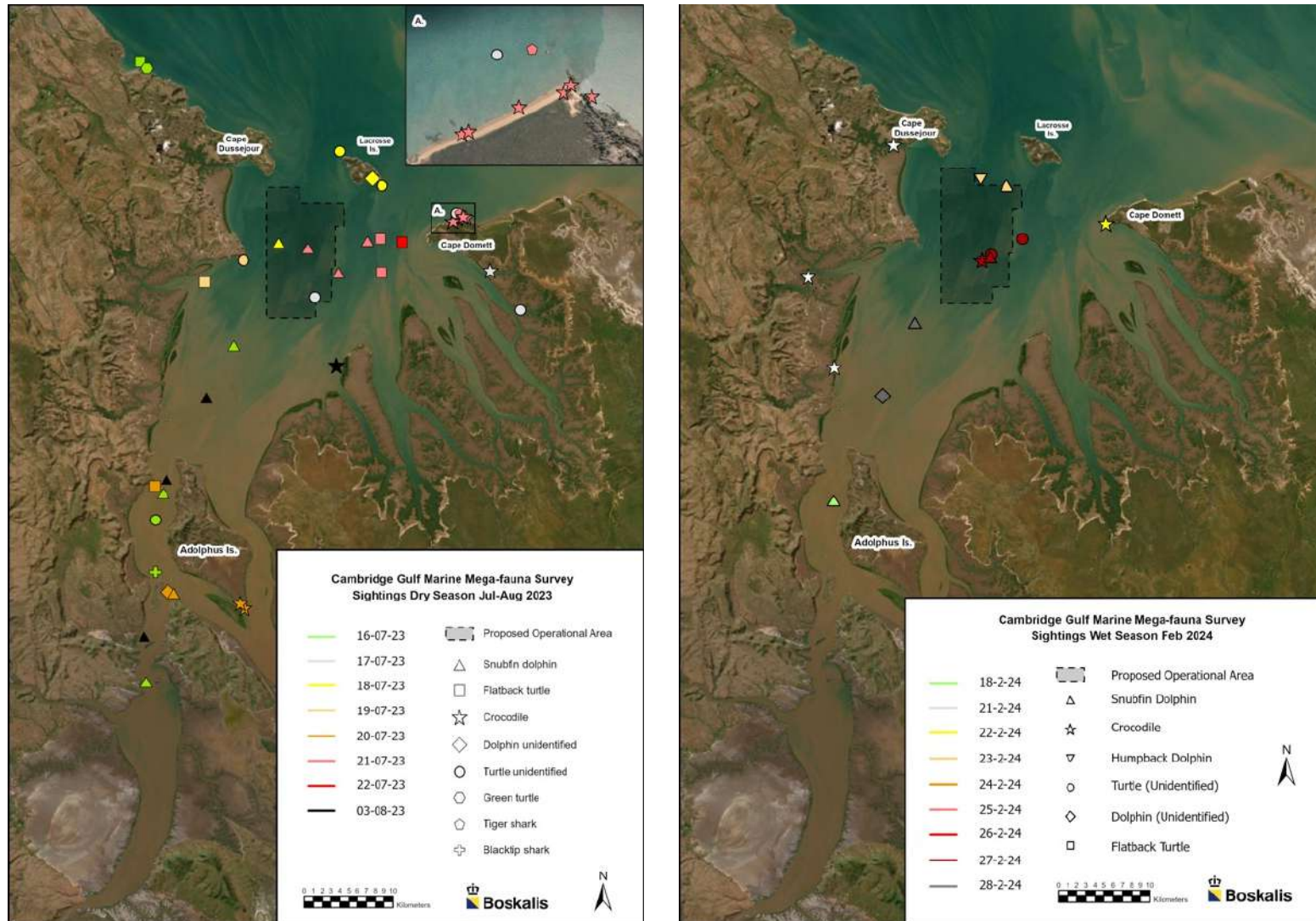
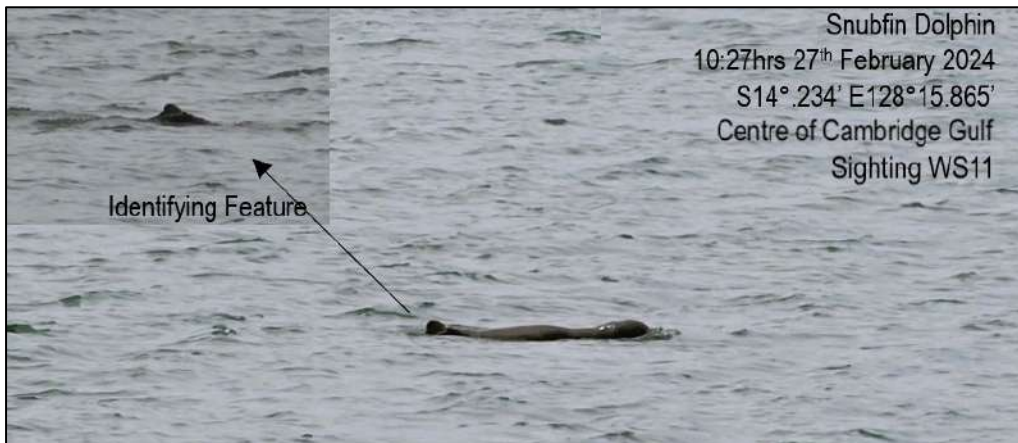
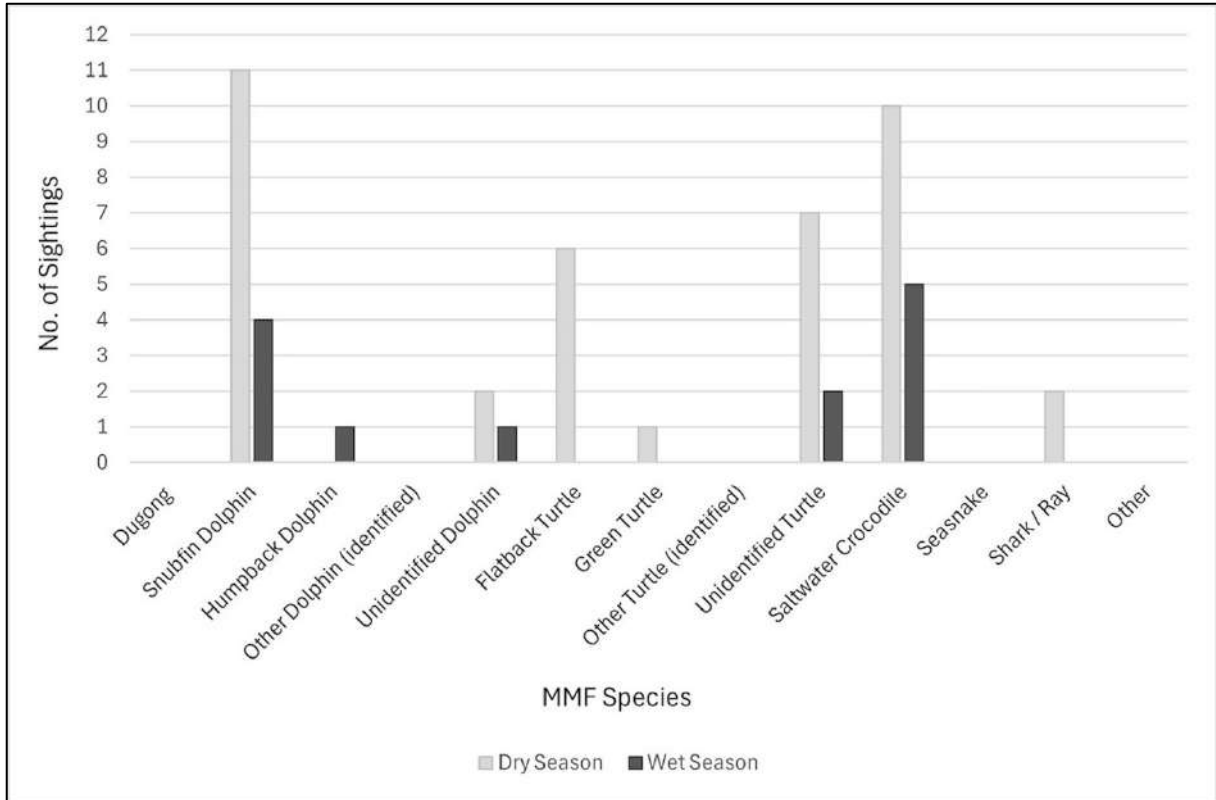


FIGURE 6: Left: Dry-season MMF sightings. Right: Wet-season MMF sightings.



**FIGURE 7:** Three examples of images of MMF that were captured during the surveys. All images captured are presented in Appendix 2. These create the basis for a long-term database and photographic catalogue of MMF in CG, to assist monitoring should the BKA proposal be approved and go ahead.



**FIGURE 8:** Comparison between dry- and wet-season sighting numbers.

**TABLE 2:** Combined sightings of each species per MMF survey and combined totals

	Dry-Season	Wet Season	Total Sightings
Dugong	0	0	0
Snubfin Dolphin:	11	4	15
Humpback Dolphin:	0	1	1
Other Dolphin (identified):	0	0	0
Unidentified Dolphin:	2	1	3
Flatback Turtle:	6	0	6
Green Turtle:	1	0	1
Other Turtle (identified):	0	0	0
Unidentified Turtle:	7	2	9
Saltwater Crocodile:	10	5	15
Seasnake:	0	0	0
Shark / Ray:	2	0	2
Other:	0	0	0
<b>Total Sightings:</b>	<b>39</b>	<b>13</b>	<b>52</b>

**TABLE 3:** Summary data for the two MMF surveys in CG (see location descriptions in Appendix 3).

	Dry-season Jul-Aug 2023										Wet-season Feb 2024										Total		
	15-7	16-7	17-7	18-7	19-7	20-7	21-7	22-7	3-8	Sub-total	8-2	18-2	21-2	22-2	23-2	24-2	25-2	26-2	27-2	28-2		Sub-total	
Dugong	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	0	0
Snubfin Dolphin:	-	3(1P)	-	2(T)(P)	-	-	3	-	3	11	-	1(P)	-	-	1(P)	-	-	-	-	1(P)	1	4	15
Humpback Dolphin:	-	-	-	-	-	-	-	-	-	0	-	-	-	-	1	-	-	-	-	-	-	1	1
Other Dolphin (identified):	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	0	0
Unidentified Dolphin:	-	-	-	1	-	1	-	-	-	2	-	-	-	-	-	-	-	-	-	-	1	1	3
Flatback Turtle:	-	1	-	-	1(P)	1	2	1	-	6	-	-	-	-	-	-	-	-	-	-	-	0	6
Green Turtle:	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	0	1
Other Turtle (identified):	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	0	0
Unidentified Turtle:	-	1	3	2	1	-	-	-	-	7	-	-	-	-	-	-	-	-	-	2	-	2	9
Saltwater Crocodile:	-	-	1	-	-	2(1P)	6(2P)	-	1	10	3	-	-	1(P)	-	-	-	-	-	1	-	5	15
Seasnake:	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	0	0
Shark / Ray:	-	1(BT)	-	-	-	-	1(TS)	-	-	2	-	-	-	-	-	-	-	-	-	-	-	0	2
Other:	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	0	0

(P) = Photo captured. (T) = Together. (BT) = Blacktip. (TS) = Tiger Shark. Red = Incidental sightings, not on-survey.



## 6. DISCUSSION & CONCLUSIONS

---

**IMPORTANT NOTE:** *The number of MMF sightings do not automatically equate to the number of individual animals, as repeat sightings on the same day or on different days can be the same animals. Positive photographic identification of individuals through distinguishing markings is required in order to provide reliable counts of the number of individual animals.*

1. The environment and habitats of CG including the highly dynamic and turbid open waters in the main body of CG, the mangrove-lined coastlines, the three tidally dominated, relatively small and short rivers that flow into the western side of CG (from north to south the Helby, Lyne and Thompson Rivers), the highly turbid tidal inlets of the False Mouths of the Ord on the eastern side of CG, and the sand beaches found mainly on the seaward coast outside of CG, all provide habitats that are suitable for a range of marine fauna species.
2. Like any ecosystem, the types of marine fauna and their numbers and distribution in CG are driven by the environmental conditions. As outlined in section 6.4.2 of [EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Proposal Setting & Existing Environment](#) (the mother-report of this report), environmental conditions in CG are generally not hospitable to marine fauna. These conditions include strong tidal currents, very high suspended sediment concentrations and associated turbidity, acute wet season inputs of freshwater and sediments, permanently aphotic benthic zone, highly mobile seabed sediments and exposure to tropical cyclone impacts.
3. The types of marine fauna found in CG, including MMF, are therefore species that are specifically adapted to extreme, highly dynamic and turbid conditions.
4. The vessel-based MMF surveys commissioned by BKA and carried out in the dry-season July-August 2023 and the wet-season February 2024 provide useful data to support and inform the overall assessment of potential impacts of the proposed action on MMF, including species protected under the EPBC Act and WA BC Act.
5. The surveys also established the basis for a long-term database and photographic catalogue of MMF in CG, to assist future monitoring should the proposed action go ahead, and provide data to support general conservation and management of MMF in the area, irrespective of the proposed action. All data collected by BKA as part of these studies are made freely available to relevant agencies and stakeholders, as well as the public through IMSA.
6. The two surveys covered extremely large areas throughout the LAU. The dry-season survey was conducted over eight days with a total of 56 hours of logged effort along 823 km of transects, with an additional day yielding incidental MMF observations. The wet-season survey was conducted over nine days with a total of 51.5 hours of logged effort along 850 km of transects, with an additional day yielding incidental MMF observations. This gives a total of over 107.5 hours of logged effort along 1,673 km of transects for both surveys combined, plus an additional two days of incidental sightings.
7. Given the high-level of effort and large areas covered, the number of MMF sightings were very low, including compared to other areas along the WA coastline, as also reported by Brown et al (2016 & 2017). All sightings were low single digits except for 11 Snubfin sightings in the dry-season survey. On many days there were MMF zero sightings (in the wet season on most days). This most-likely relates to the inhospitable habitat conditions in CG.
8. For both seasons there were zero sightings of Dugong, zero sightings of identified species of dolphin other than Snubfins and one unconfirmed Humpback Dolphin in the wet-season, zero sightings of identified species of turtle other than Flatbacks and one Green Turtle (sighted outside of CG to the west of Cape Dussejour) and zero sightings of seasnakes and rays.
9. For Snubfin Dolphins there were 11 sightings during the dry-season survey, including three sightings in the POA, over the eight-day survey period. Photographs were obtained for two of the sightings, but neither with distinguishing features (see Appendix 2). There were four sightings during the wet-season survey, including two in the POA, over the nine-day survey period. Photographs were obtained for three of the sightings, with two having distinguishing features (see Appendix 2). Most Snubfin sightings were near and around Adolphus Island to the south of CG. For all sightings in both seasons the dolphins were swimming purposefully and directionally.
10. For Humpback Dolphins there were zero sightings in the dry-season and only one sighting (not confirmed by photograph) in the wet-season, just inside the POA. Given a single unconfirmed sighting during a combined total of over 107.5 hours of logged effort along 1,673 km of transects, this species appears to be largely absent from CG during the periods surveyed.
11. For marine turtles, during the dry-season survey, there were six Flatback sightings, with only one being photographed (see Appendix 2). Most were located towards Cape Domett, which is to be expected as it was near the peak nesting season. None were in the POA. One Green Turtle was sighted well outside of CG along the coast to the west. There were seven sightings of unidentified turtles, with no photographs. All were outside the POA, except for one sighted near the southern boundary of the POA. During the wet-season survey there were no sightings of Flatback or Green Turtles, and two sightings

- only of unidentified turtles, with no photographs. One was located in the POA and one east of the POA (both sightings were on the same day and may have been the same individual).
12. For saltwater crocodiles there were 10 sightings during the dry-season survey, all in coastal mangrove areas or at the Cape Domett seaward beach where they prey on nesting turtles, and none in the POA. Photographs were obtained for five of the sightings, with one photograph at the Cape Domett seaward beach showing three crocodiles in the one image (see Appendix 2). There were five sightings during the wet-season survey, again all in coastal / mangrove areas, except for one in the POA, which appeared to be focussed on the survey mother-vessel which was grab sampling in the area at the time. Photographs were obtained for two of the sightings, with one image being of the crocodile's slide only, after it had entered the water from the mudbank (see Appendix 2).
  13. The number of sightings for all species were lower in the wet season than in the dry-season, except for the one Humpback Dolphin sighting in the wet-season. The seasonal differences in turtle sightings relate to the dry-season survey being in late July close to the peak Flatback nesting period, when more turtles are present in the general area. The seasonal differences in Snubfin Dolphin sightings are consistent with advice from the local commercial fisherman who has more than 20 years of experience in CG, who advised that they seem to migrate out of CG in the wet season, perhaps due to increased freshwater inputs (Douglas pers. comms. 2024).
  14. Overall, the main conclusions that can be drawn are:
    - a) The total number of MMF sightings in CG were very low compared to other areas along the WA coastline, as also found by Brown et al (2016 & 2017). There were less MMF sightings in the wet-season than in the dry-season.
    - b) There were zero sightings of Dugong, zero sightings of identified species of dolphin other than Snubfins and one unconfirmed Humpback Dolphin in the wet-season, zero sightings of identified species of turtle other than Flatbacks and one Green Turtle (sighted outside of CG to the west of Cape Dussejour) and zero sightings of seasnakes and rays.
    - c) There is a very small population of Snubfin Dolphins in CG, perhaps in the order of a few individuals. Most Snubfin sightings were near and around Adolphus Island to the south of CG, although they may swim through the POA from time to time.
    - d) Humpback Dolphins appear to be largely absent from CG during the periods surveyed.
    - e) On-water sightings of marine turtles were low in the dry-season (a total of 14 over eight days, despite this period being near the peak nesting season), and extremely low in the wet season, with only two sightings (possibly the same individual) on the same day over nine days. All marine turtle sightings were outside the POA except for one unidentified turtle sighting inside the POA during each of the two surveys.
    - f) All crocodile sightings were in or near coastal mangrove areas and at the Cape Domett seaward beach, except for one inside the POA during the wet-season survey.
  15. The results for the vessel-based MMF surveys were used to inform the assessment of potential impacts of the proposed action on MMF, as reported in EPBC Referral Report No. 4 - Boskalis Cambridge Gulf - *Impact Assessments*, and EPBC Referral Report No. 7 - Boskalis Cambridge Gulf - *Commonwealth Matters*. The assessments find that the proposed action does not present a risk of significant impact on MMF, as defined by both Commonwealth and State significant impact criteria, and with application of the impact mitigation hierarchy, including best-practice impact prevention and reduction measures, as outlined in those reports.

## REFERENCES

---

Brown, A. et al (2017). *Relative abundance, population genetic structure and passive acoustic monitoring of Australian snubfin and humpback dolphins in regions within the Kimberley*. 10.13140/RG.2.2.17354.06082.

Brown, A. et al (2016). *Relative abundance, population genetic structure and acoustic monitoring of Australian snubfin and humpback dolphins in regions within the Kimberley*. Report of Project 1.2.4 prepared for the Kimberley Marine Research Program, Western Australian Marine Science Institution, Perth, Western Australia, 61pp plus appendices.

Kyne, P.M. & Pillans, R.D. (2014). *Protocols for Surveying and Tagging Sawfishes and River Sharks*. National Environmental Research Program Marine Biodiversity Hub, Hobart.

Kyne P.M., et al (2021) *Molecular analysis of newly-discovered geographic range of the threatened river shark *Glyphis glyphis* reveals distinct populations*. Report to the National Environmental Science Program, Marine Biodiversity Hub. Charles Darwin University and CSIRO.

Kyne P.M. (2020). *Sampling in 11 rivers yields expanded range and population size estimate for the Northern River Shark*. Marine Biodiversity Hub - National Environmental Science program: Fact Sheet June 2020.

Marsh H. et al (1989). *Irrawaddy dolphin *Orcaella brevirostris**. Ridgeway S.H. & R. Harrison, eds. Handbook of Marine Mammals. River Dolphins and the Larger Toothed Whales. Vol 4:101-118.

McMahon K, et al (2017). *Seagrasses of the north west of Western Australia: biogeography and considerations for dredging-related research*. Report of Theme 5 - Project 5.1.2 prepared for the Dredging Science Node, Western Australian Marine Science Institution, Perth, Western Australia. 39 pp.

Parra, G.J., & D. Cagnazzi (2016). *Conservation Status of the Australian Humpback Dolphin (*Sousa sahulensis*) Using the IUCN Red List Criteria*. Advances in Marine Biology. 73:157-192.

Parra, G. & Jefferson, T. (2017) in *Encyclopedia of Marine Mammals* Vol. Third Edition (eds B Würsig, J.G.M. Thewissen, & K.M. Kovacs) (Academic Press, Elsevier, 2017

Walker, D., et al (1996). *Survey of the marine biota of the eastern Kimberley, Western Australia*. University of WA, WA Museum and Museum of the Northern Territory.

Whiting, A., et al (2008). *Seasonality, abundance and breeding biology of one of the largest populations of nesting flatback turtles, *Natator depressus*: Cape Domett, Western Australia*. Australian Journal of Zoology, 2008(5), 297-303.

WMI (2012) *Results of Spotlight and Helicopter Surveys of Crocodiles in Cambridge Gulf, Lake Argyle and Lake Kununurra, 2012*. Wildlife Management International, Karama, NT 0813

## APPENDIX 1: MMF SIGHTINGS MASTER DATA TABLES

This data is also submitted in the DCCEEW Excel Template as Appendix 4, submitted as a separate [Excel file](#) with the following file name: [EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 14 - Appendix 4 - Species Obs Data - Dry Season](#).

### A.1.1: Dry-season Survey Jul-Aug 2023

DS = Dry-season survey. CG = Cambridge Gulf. PO = Proposed Operational Area. C. = Cape.

Note: Separate sightings can potentially be the same individual(s). Number of sightings does not necessarily equate to number of individual animals.

Date	Time	Sighting No.	Species	Common Name	Number	Size	Behaviour	Location	Lat	Long	Photo <sup>2</sup>	Observer
15-7-23	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	H Penrose
16-7-23	09:57	DS01	<i>Natator depressus</i>	Flatback Turtle	1	Adult	Swimming @ surface	Coast 20 km west of CG	-14.641333	128.090510	No	H Penrose
	10:52	DS02	<i>Chelonia mydas</i>	Green Turtle	1	Juvenile	Swimming @ surface	Coast 20 km west of CG	-14.641333	128.090510	No	H Penrose
	13:21	DS03	<i>Orcaella heinshoni</i>	Aus Snubfin Dolphin	1	Adult	Swimming @ surface. Dove away from vessel	North of Adolphus Is.	-14.927140	128.183565	No	H Penrose
	16:08	DS04	<i>O. heinshoni</i>	Aus Snubfin Dolphin	1	Adult	Swimming @ surface. Dove away from vessel	South of Adolphus Is.	-15.269101	128.094782	Yes	H Penrose
	16:32	DS05	<i>Carcharhinus melanopterus</i>	Blacktip Reef Shark	1	Juvenile	Foraging in mangroves	SW coast of Adolphus Is.	-15.158168	128.103918	No	H Penrose
	16:43	DS06	Unidentified	Turtle (unidentified)	1	Adult	Swimming @ surface	West of Adolphus Is.	-15.105165	128.104115	No	H Penrose
	16:49	DS07	<i>O. heinshoni</i>	Aus Snubfin Dolphin	1	Adult	Swimming @ surface	West of Adolphus Is.	-15.077346	128.111878	No	H Penrose
17-7-23	07:34	DS08	Unidentified	Turtle (unidentified)	1	Juvenile	Swimming @ surface	Off C. Domett Beach	-14.793581	128.409467	No	H Penrose
	12:57	DS09	<i>Crocodylus porosus</i>	Saltwater Crocodile	1	Juvenile	Swimming @ surface	Mangroves S of C. Domett	-14.851890	128.444622	No	H Penrose
	13:45	DS10	Unidentified	Turtle (unidentified)	1	Juvenile	Swimming @ surface	Tidal Inlet E side of CG	-14.892012	128.475205	No	H Penrose
	16:03	DS11	Unidentified	Turtle (unidentified)	1	Juvenile	Swimming @ surface	South part of POA	-14.878733	128.265928	No	H Penrose
18-7-23	12:55	DS12	Unidentified	Dolphin (unidentified)	1	Adult	Swimming @ surface	SE point of Lacrosse Is.	-14.761217	128.327478	No	H Penrose
	13:03	DS13	Unidentified	Turtle (unidentified)	1	Adult	Swimming @ surface. Dove away from vessel	SE point of Lacrosse Is.	-14.762234	128.329190	No	H Penrose
	14:14	DS14	Unidentified	Turtle (unidentified)	1	Juvenile	Swimming @ surface	NW point of Lacrosse Is.	-14.730781	128.291515	No	H Penrose
	17:05	DS15	<i>O. heinshoni</i>	Aus Snubfin Dolphin	2	Adults	Swimming @ surface	W side of POA	-14.822927	128.229557	Yes	H Penrose
	19-7-23	11:13	DS16	Unidentified	Turtle (unidentified)	1	Adult	Swimming @ surface	Mouth of Lyne River	-14.841240	128.193522	No
12:30	DS17	<i>N. depressus</i>	Flatback Turtle	1	Adult	Swimming @ surface	Mouth of Lyne River	-14.863487	128.154086	Yes	H Penrose	
20-7-23	07:52	DS18	<i>N. depressus</i>	Flatback Turtle	1	Adult	Swimming @ surface	West of Adolphus Is.	-15.070741	128.103353	No	H Penrose
	10:27	DS19	Unidentified	Dolphin (unidentified)	1	Adult	Swimming @ surface	West of Adolphus Is.	-15.178719	128.119716	No	H Penrose
	11:34	DS20	<i>C. porosus</i>	Saltwater Crocodile	1	Adult	Sunbaking on mudbank	South tip Adolphus Is.	-15.193103	128.192685	Yes	H Penrose
	11:09	DS21	<i>C. porosus</i>	Saltwater Crocodile	1	Adult	Milling in mangroves	South tip Adolphus Is.	-15.192490	128.191132	No	H Penrose
21-7-23	09:05	DS22	<i>C. porosus</i>	Saltwater Crocodile	1	Adult	Sunbaking on beach	Central Cape Domett Bch	-14.802063	128.405735	No	H Penrose
	09:12	DS23	<i>C. porosus</i>	Saltwater Crocodile	1	Adult	Swimming @ surface	Off Cape Domett Bch	-14.799167	128.411833	Yes	H Penrose
	09:16	DS24	<i>C. porosus</i>	Saltwater Crocodile	2	Adults	Sunbaking on beach	East end Cape Domett Bch	-14.796612	128.416897	Yes	J Dickie
	09:33	DS25	<i>C. porosus</i>	Saltwater Crocodile	1	Adult	Swimming @ surface	East of Cape Domett Bch	-14.798040	128.419632	Yes	J Dickie
	11:01	DS26	<i>Galeocerdo cuvier</i>	Tiger Shark	1	Adult	Swimming @ surface	East end Cape Domett Bch	-14.796134	128.417199	No	H Penrose
	11:45	DS27	<i>C. porosus</i>	Saltwater Crocodile	1	Adult	Sunbaking on beach	Central Cape Domett Bch	-14.801777	128.406443	No	H Penrose
	14:30	DS28	<i>N. depressus</i>	Flatback Turtle	1	Adult	Milling @ surface	West of Cape Domett	-14.819230	128.332624	No	H Penrose
	14:36	DS29	<i>O. heinshoni</i>	Aus Snubfin Dolphin	1	Adult	Swimming @ surface	West of Cape Domett	-14.821018	128.319491	No	H Penrose
	15:07	DS30	<i>O. heinshoni</i>	Aus Snubfin Dolphin	1	Adult	Swimming @ surface	Centre of POA	-14.828319	128.259128	No	H Penrose
	15:40	DS31	<i>O. heinshoni</i>	Aus Snubfin Dolphin	1	Adult	Swimming @ surface	Centre of POA	-14.853326	128.289973	No	H Penrose
	16:04	DS32	<i>C. porosus</i>	Saltwater Crocodile	1	Adult	Swimming @ surface	East end Cape Domett Bch	-14.795794	128.417013	No	H Penrose
	15:06	DS33	<i>N. depressus</i>	Flatback Turtle	1	Adult	Swimming @ surface	West of Cape Domett	-14.822697	128.354863	No	H Penrose
	3-8-23 <sup>1</sup>	16:10	DS34	<i>O. heinshoni</i>	Aus Snubfin Dolphin	3	Adults	Swimming @ surface. Dove away from vessel	North of Adolphus Is.	-14.980102	128.155872	No
17:05		DS35	<i>C. porosus</i>	Saltwater Crocodile	1	Adult	Milling @ surface	East of East Bank in CG	-14.948597	128.288120	No	Raaymakers

<sup>1</sup>Incidental sightings off-survey, data included. <sup>2</sup>Photo No.s in report are the same as Sighting No.s.

### A.1.2: Wet-season Survey Feb 2024

This data is also submitted in the DCCEEW Excel Template as Appendix 5, submitted as a separate Excel file with the following file name: EPBC Referral Report No. 2 - Boskalis Cambridge Gulf - Annex 14 - Appendix 5 - Species Obs Data - Wet Season.

WS = Wet-season survey. CG = Cambridge Gulf. PO = Proposed Operational Area. C. = Cape.

Note: Separate sightings can potentially be the same individual(s). Number of sightings does not necessarily equate to number of individual animals.

Date	Time	Sighting No.	Species	Common Name	Number	Size	Behaviour	Location	Lat	Long	Photo <sup>2</sup>	Observer
8-2-24 <sup>1</sup>	08:02	WS01	<i>Crocodylus porosus</i>	Saltwater Crocodile	1	Adult	On mudbank – quickly slid into water	Mouth of Helby River	-14.744103	128.169499	Slide	Raaymakers
	14:30	WS02	<i>C. porosus</i>	Saltwater Crocodile	1	Adult	On mudbank - quickly slid into water	Mouth of Lyne River	-14.873566	128.085558	No	Raaymakers
	16:41	WS03	<i>C. porosus</i>	Saltwater Crocodile	1	Adult	Swimming @ surface	Mouth of Thompson River	-14.962752	128.111023	Yes	Raaymakers
18-2-24	12:18	WS04	<i>Orcaella heinshoni</i>	Aus Snubfin Dolphin	1	Adult	Swimming @ surface	West of Adolphus Is.	-15.093514	128.110346	Yes	Yasmin Hunt
21-2-24	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Yasmin Hunt
22-2-24	11:20	WS05	<i>C. porosus</i>	Saltwater Crocodile	1	Adult	Swimming @ surface	Off Cape Dornett western beach	-14.821112	128.378648	Yes	Yasmin Hunt
23-2-24	07:57	WS06	<i>Sousa sahalensis</i>	Humpback Dolphin	1	Adult	Broke surface twice	N-central Cambridge Gulf	-14.777812	128.255472	No	Yasmin Hunt
	15:00	WS07	<i>O. heinshoni</i>	Aus Snubfin Dolphin	1	Adult	Swimming @ surface	N-central Cambridge Gulf (POA border)	-14.784211	128.280851	Yes	Yasmin Hunt
24-2-24	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Yasmin Hunt
25-2-24	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Yasmin Hunt
26-2-24	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Yasmin Hunt
27-2-24	08:30	WS08	Unidentified	Turtle (unidentified)	1	Adult	Breaching surface to breath	Central Cambridge Gulf	-14.836503	128.296245	No	Yasmin Hunt
	10:19	WS09	<i>C. porosus</i>	Saltwater Crocodile	1	Adult	Brief sighting @ surface	Central Cambridge Gulf (in POA)	-14.857228	128.256801	No	Yasmin Hunt
	10:24	WS10	Unidentified	Turtle (unidentified)	1	Adult	Brief sighting @ surface	Central Cambridge Gulf (in POA)	-14.851682	128.265419	No	Mia McIntyre
	10:27	WS11	<i>O. heinshoni</i>	Aus Snubfin Dolphin	1	Adult	Broke surface multiple times	Central Cambridge Gulf (in POA)	-14.853906	128.264413	Yes	Mia McIntyre
28-2-24	06:55	WS12	Unidentified	Dolphin (unidentified)	1	Adult	Swimming @ surface	North of Adolphus Is.	-14.990691	128.159077	No	Mia McIntyre
	12:38	WS13	<i>O. heinshoni</i>	Aus Snubfin Dolphin	1	Adult	Broke surface once	S-central Cambridge Gulf	-14.918637	128.190777	No	Mia McIntyre

<sup>1</sup>Incidental sightings off-survey, data included.

<sup>2</sup>Photo No.s in report are the same as Sighting No.s.

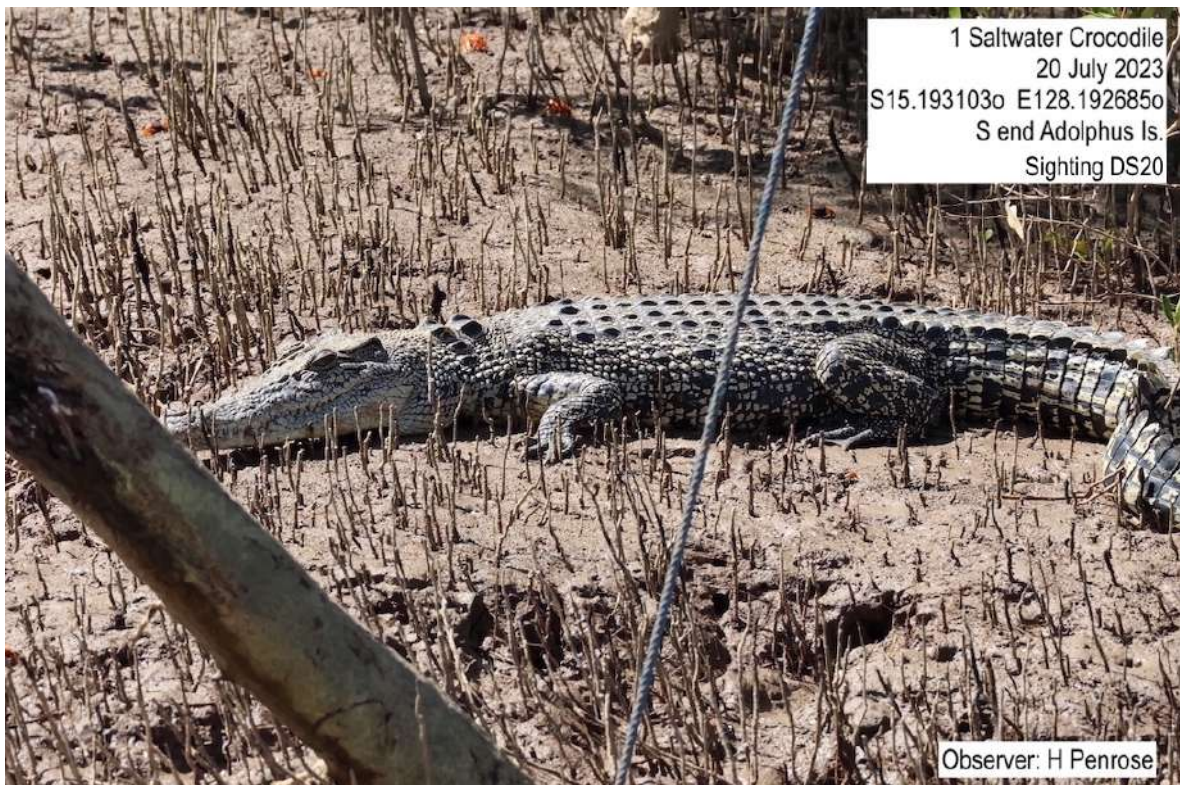
## APPENDIX 2: MMF IMAGES

---

### A.2.1: Dry-season Survey MMF Images

In chronological order.



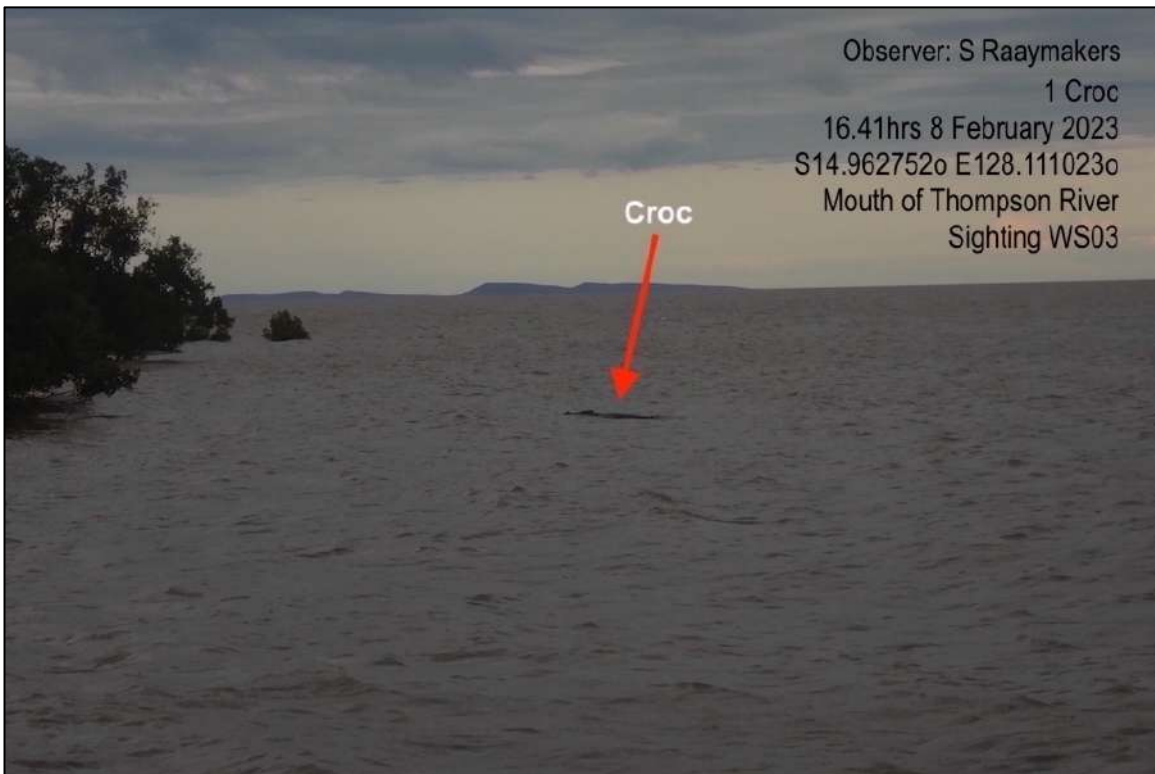






## A.2.2: Wet-season Survey MMF Images

In chronological order.









## APPENDIX 3: MMF SIGHTING LOCATIONS

### A.3.1: Snubfin Dolphin Sighting Locations

POA = Proposed Operational Area.

Dry-season	
Date	Locations
15 Jul:	Nil
16 Jul:	1 x West Arm S of Adolphus Is. 1 x West Arm W of Adolphus Is. 1 x N of Adolphus Is.
17 Jul:	Nil
18 Jul:	2 (pair) in POA.
19 Jul:	Nil
20 Jul:	Nil
21 Jul:	1 in POA 2 x E of POA
22 Jul:	Nil
3 Aug:	3 x N of Adolphus Is.
-	-
<b>Combined:</b>	<b>2 x West Arm S of Adolphus Is.</b> <b>2 x West Arm W of Adolphus Is.</b> <b>2 x N of Adolphus Is.</b> <b>3 in POA.</b> <b>2 x E of POA</b>

Wet-season	
Date	Locations
8 Feb:	Nil
18 Feb:	1 x West Arm W of Adolphus Is.
21 Feb:	Nil
22 Feb:	Nil
23 Feb:	1 in POA
24 Feb:	Nil
25 Feb:	Nil
26 Feb:	Nil
27 Feb:	1 in POA
28 Feb:	1 x S of POA.
<b>Combined:</b>	<b>1 x West Arm W of Adolphus Is.</b> <b>1 x S of POA</b> <b>2 in POA</b>

### A.3.2: Humpback Dolphin Sighting Locations

POA = Proposed Operational Area.

Dry-season		Wet-season	
Date	Locations	Date	Locations
15 Jul:	Nil	8 Feb:	Nil
16 Jul:	Nil	18 Feb:	Nil
17 Jul:	Nil	21 Feb:	Nil
18 Jul:	Nil	22 Feb:	Nil
19 Jul:	Nil	23 Feb:	1 x N of PoA
20 Jul:	Nil	24 Feb:	Nil
21 Jul:	Nil	25 Feb:	Nil
22 Jul:	Nil	26 Feb:	Nil
8 Aug:	Nil	27 Feb:	Nil
-	-	28 Feb:	Nil
<b>Combined:</b>	<b>Nil</b>	<b>Combined:</b>	<b>1 x N of PoA</b>

### A.3.3: Unidentified Dolphin Sighting Locations

POA = Proposed Operational Area.

Dry-season		Wet-season	
Date	Locations	Date	Locations
15 Jul:	Nil	8 Feb:	Nil
16 Jul:	Nil	18 Feb:	Nil
17 Jul:	Nil	21 Feb:	Nil
18 Jul:	1 x S of Lacrosse Is.	22 Feb:	Nil
19 Jul:	Nil	23 Feb:	Nil
20 Jul:	1 x West Arm S of Adolphus Is.	24 Feb:	Nil
21 Jul:	Nil	25 Feb:	Nil
22 Jul:	Nil	26 Feb:	Nil
8 Aug:	Nil	27 Feb:	Nil
-	-	28 Feb:	1 x N of Adolphus Is.
<b>Combined:</b>	<b>1 x S of Lacrosse Is. 1 x West Arm S of Adolphus Is.</b>	<b>Combined:</b>	<b>1 x N of Adolphus Is.</b>

### A.3.4: Flatback Turtle Sighting Locations

POA = Proposed Operational Area.

Dry-season	
Date	Locations
15 Jul:	Nil
16 Jul:	1 x W of C. Dussejour (outside CG)
17 Jul:	Nil
18 Jul:	Nil
19 Jul:	1 x mouth of Lyne RV (W side of CG)
20 Jul:	1 x West Arm W of Adolphus Is.
21 Jul:	2 x W of Cape Domett
22 Jul:	1 x W of Cape Domett
8 Aug:	Nil
-	-
<b>Combined:</b>	<b>1 x W of C. Dussejour (outside CG) 1 x mouth of Lyne RV (W side of CG) 1 x West Arm W of Adolphus Is. 3 x W of Cape Domett</b>

Wet-season	
Date	Locations
8 Feb:	Nil
18 Feb:	Nil
21 Feb:	Nil
22 Feb:	Nil
23 Feb:	Nil
24 Feb:	Nil
25 Feb:	Nil
26 Feb:	Nil
27 Feb:	Nil
28 Feb:	Nil
<b>Combined:</b>	<b>Nil</b>

### A.3.5: Green Turtle Sighting Locations

POA = Proposed Operational Area.

Dry-season	
Date	Locations
15 Jul:	Nil
16 Jul:	1 x W of C. Dussejour (outside CG)
17 Jul:	Nil
18 Jul:	Nil
19 Jul:	Nil
20 Jul:	Nil
21 Jul:	Nil
22 Jul:	Nil
8 Aug:	Nil
-	-
<b>Combined:</b>	<b>1 x W of C. Dussejour (outside CG)</b>

Wet-season	
Date	Locations
8 Feb:	Nil
18 Feb:	Nil
21 Feb:	Nil
22 Feb:	Nil
23 Feb:	Nil
24 Feb:	Nil
25 Feb:	Nil
26 Feb:	Nil
27 Feb:	Nil
28 Feb:	Nil
<b>Combined:</b>	<b>Nil</b>

### A.3.6: Unidentified Turtle Sighting Locations

POA = Proposed Operational Area. FMO = False Mouths of Ord (E side of CG).

Dry-season	
Date	Locations
15 Jul:	Nil
16 Jul:	1 x West Arm W of Adolphus Is.
17 Jul:	1 in S POA. 1 in FMO. 1 off Cape Domett Bch (outside CG)
18 Jul:	1 x E end of Lacrosse Is. 1 x NW end of Lacrosse Is.
19 Jul:	1 at Vancouver Point
20 Jul:	Nil
21 Jul:	Nil
22 Jul:	Nil
8 Aug:	Nil
-	-
<b>Combined:</b>	<b>1 x West Arm W of Adolphus Is.</b> <b>1 in S POA.</b> <b>1 in FMO.</b> <b>1 off Cape Domett Bch (outside CG)</b> <b>1 x E end of Lacrosse Is.</b> <b>1 x NW end of Lacrosse Is.</b> <b>1 at Vancouver Point</b>

Wet-season	
Date	Locations
8 Feb:	Nil
18 Feb:	Nil
21 Feb:	Nil
22 Feb:	Nil
23 Feb:	Nil
24 Feb:	Nil
25 Feb:	Nil
26 Feb:	Nil
27 Feb:	Nil
28 Feb:	1 x in POA. 1 x E of POA.
<b>Combined:</b>	<b>1 x in POA.</b> <b>1 x E of POA.</b>



### A.3.7: Crocodile Sighting Locations

POA = Proposed Operational Area. FMO = False Mouths of Ord (E side of CG).

Dry-season	
Date	Locations
15 Jul:	Nil
16 Jul:	Nil
17 Jul:	1 in FMO.
18 Jul:	Nil
19 Jul:	Nil
20 Jul:	2 x S Adolphus
21 Jul:	6 x C. Domett Bch (outside CG)
22 Jul:	Nil
8 Aug:	1 x East Bank
-	-
<b>Combined:</b>	<b>1 in FMO</b> <b>2 x S Adolphus</b> <b>6 x C. Domett Bch (outside CG)</b> <b>1 x East Bank</b>

Wet-season	
Date	Locations
8 Feb:	3 at W of CG: - 1 x mouth of Helby Rv. - 1 x mouth of Lyne Rv. - 1 x mouth of Thompson Rv.
18 Feb:	Nil
21 Feb:	Nil
22 Feb:	1 x C. Domett
23 Feb:	Nil
24 Feb:	Nil
25 Feb:	Nil
26 Feb:	1 in POA
27 Feb:	Nil
28 Feb:	Nil
<b>Combined:</b>	<b>3 at W of CG:</b> <b>- 1 x mouth of Helby Rv.</b> <b>- 1 x mouth of Lyne Rv.</b> <b>- 1 x mouth of Thompson Rv.</b>  <b>1 x C. Domett</b>  <b>1 in POA</b>