

Learmonth Pipeline Fabrication Facility

Marine Fauna Management Plan

APFAC017-HSE-00006

This document is the property of Subsea 7 and its affiliates and subsidiaries and copying and/or disclosure of the information it contains is prohibited without the permission of Subsea 7. It has been reviewed and approved in accordance with Management System requirements and where applicable an audit trail is available within the relevant document management system. The most recently approved version is regarded as the controlled copy with all other copies being for information only. It is the holder's responsibility to ensure that they hold the latest approved version. © **Subsea 7**

REVISION RECORD SHEET

Revision	Issue Date	Purpose	Description of Updated/Modified Sections (if any)
Draft	21.01.2019	Internal Review	Update to plan submitted with EPBC referral in 2017 (Reference 2061AP)
Draft	03.05.2019	External Review	Minor revisions to document following Subsea 7 review
Final Draft	21.06.2019	External Review	Minor revisions to reflect amended Development Envelope and Development Footprint
Final	11.09.2019	External Review	Minor revisions to address EPA and DoEE comments

Executive Summary

Table 1 provides a summary of the Proposal and the purpose of the Marine Fauna Management Plan (MFMP) (this document) in context of EPA objective for marine fauna.

Summary of the Proposal	
Proposal Title	Learmonth Pipeline Fabrication Facility
Proponent Name	Subsea 7 Australia Contracting (Subsea 7)
Short Description	Construction and operation of an onshore pipeline fabrication facility at Heron Point.
Ministerial Statement No.	NA
Purpose of MFMP (This document)	<p>To document the management measures to be implemented to manage potential impacts to marine fauna.</p> <p>To support the Public Environmental Review submitted under the <i>Environmental Protection Act 1986</i> and <i>Environment Protection and Biodiversity Conservation Act 1999</i>.</p>
Key Environmental Factor/Objective	<p>Marine Fauna</p> <p>EPA Objective: To protect marine fauna so that biological diversity and ecological integrity are maintained.</p> <p>Subsea 7 Objectives:</p> <ul style="list-style-type: none"> • No impacts to potential fauna habitat beyond 50 m of the launchway footprint. • No physical injury (including permanent hearing loss) during construction or operations. • No Bundle or tow vessel strike on marine fauna.
Condition Clauses	NA
Key provisions in the plan	<ul style="list-style-type: none"> • Launchway construction material to be 'clean' (free of 'fines'). • Silt curtains to be deployed during launchway construction as required. • No Bundle launches during period of main Humpback whale usage of Exmouth Gulf (August to October (inclusive)). • Bundle launch and tow speed not to exceed 8 knots within Exmouth Gulf. • A Marine Fauna Observer (MFO) on board lead support vessel and key support vessels, to identify marine fauna within 500 m ahead of tow, to allow avoidance measures to be implemented. • The use of a 'spotter plane' during any Bundle launches undertaken between March and July (inclusive).

Table 1: Summary of the Proposal

TABLE OF CONTENTS

EXECUTIVE SUMMARY	III
1. CONTEXT, SCOPE AND RATIONALE	6
1.1 PROPOSAL	6
1.2 PURPOSE OF MFMP	10
1.3 OBJECTIVES	10
1.4 KEY ENVIRONMENTAL FACTOR: MARINE FAUNA	11
1.5 RATIONALE AND APPROACH	11
1.5.1 Survey and Study Findings	11
1.5.1.1 Desktop Assessment.....	12
1.5.1.2 Regional Studies	18
1.5.1.3 Proposal Specific Baseline Surveys	19
1.5.1.4 Key species summaries	19
1.5.2 Key assumptions and uncertainties	26
1.5.3 Management Approach	26
1.5.4 Rationale for choice of provisions.....	26
2. MARINE FAUNA MANAGEMENT PLAN PROVISIONS.....	27
2.1 OBJECTIVES	27
2.2 MANAGEMENT OBJECTIVES, ACTIONS AND TARGETS	27
2.3 REPORTING PROVISIONS	39
2.3.1 Annual Reporting.....	39
2.3.2 Reporting on Exceedance of Management Target.....	39
2.3.3 Reporting of Management Actions not Being Implemented.....	39
3. ADAPTIVE MANAGEMENT AND REVIEW OF MFMP	40
4. STAKEHOLDER ENGAGEMENT	41
5. REFERENCES.....	45

TABLES

Table 1:	Summary of the Proposal	iii
Table 2:	Marine MNES, Conservation Status and Likelihood of Occurrence in Exmouth Gulf and along tow route	15
Table 3:	Overview of Regional Marine Fauna Studies	18
Table 4:	Overview of Local Marine Fauna Studies	19
Table 5:	Management objective, actions and targets in relation to impacts to BCH during launchway construction	29
Table 6:	Management objective, actions and targets in relation to noise or light spill during construction	30
Table 7:	Management objective, actions and targets in relation to changes in marine water quality	31
Table 8:	Management objective, actions and targets in relation to loss or degradation of BCH during Bundle launch and tow.....	33
Table 9:	Management objective, actions and targets in relation to noise or light spill during Bundle launch and tow	34
Table 10:	Management objective, actions and targets in relation to strike or entanglement during Bundle launch and tow	35
Table 11:	Management objective, actions and targets in relation to a leak or spill of chemicals (including hydrocarbons).....	36

Table 12: Summary of Feedback relevant to the MFMP Provided by Stakeholders Between November 2016 and December 2018..... 44

FIGURES

Figure 1: Proposal Location 7
Figure 2: Offshore Operations Area and Indicative Tow Route 9
Figure 3: Mapped Marine Turtle Habitat 17
Figure 4: Distribution of Humpback whales in Exmouth Gulf in 2018 (Irvine 2019) 20
Figure 5: Distribution of dolphins in Exmouth Gulf in 2018 (Irvine 2019)..... 21
Figure 6: Distribution of Dugong in Exmouth Gulf in 2018 (Irvine 2019)..... 23
Figure 7: Distribution of Marine Turtles in Exmouth Gulf in 2018 (Irvine 2019) 24

1. Context, Scope and Rationale

This Marine Fauna Management Plan (MFMP) is submitted in support of the Environmental Review Document (ERD) (Assessment Number 2208 / EPBC 2017-8079) developed by Subsea 7 Australia Contracting Pty Ltd (Subsea 7) for the Learmonth Pipeline Fabrication Facility (the Proposal).

This document represents an update to the MFMP published in support of Subsea 7's referral of the Proposal under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 31 October 2017.

The MFMP is designed to be adaptive and will be updated over the life of the project (40 years) as further information about marine fauna within Exmouth Gulf and the project area, and effectiveness of implemented management measures, is obtained.

1.1 PROPOSAL

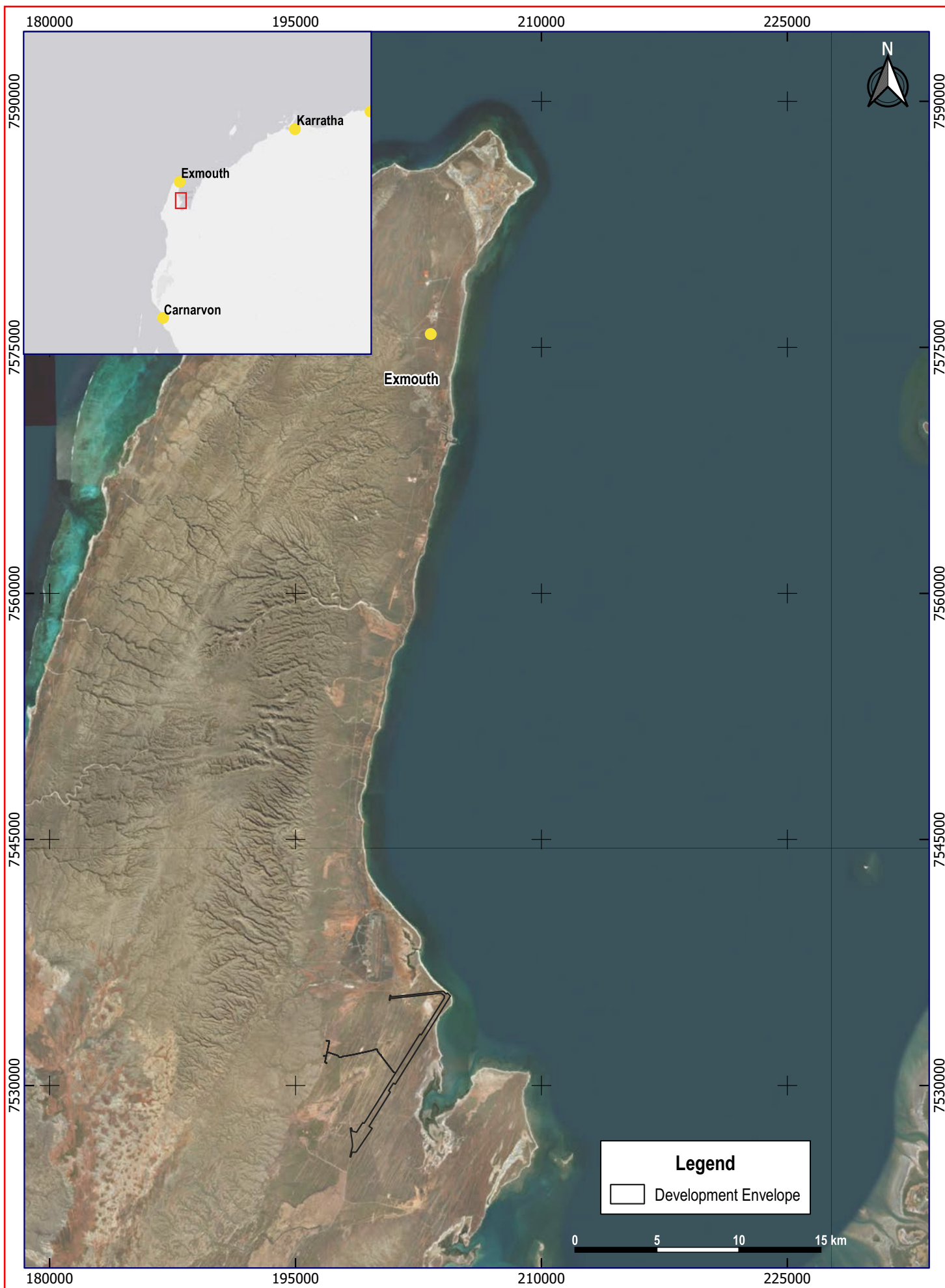
Subsea 7 proposes to build and operate a new pipeline Bundle fabrication site in Learmonth, Western Australia (the Proposal) (Figure 1).

Bundle pipelines would be progressively manufactured until completed as one, up to 10 km long, segment. Once manufactured to its desired length and pressure tested, each Bundle pipeline is then towed out by tugs and submerged on arrival at the offshore gas field.

The proposed pipeline Bundle fabrication facility will include a Bundle track of approximately 10 km in length and an access road from Minilya-Exmouth Road approximately 3 km in length. The proposal also includes the construction of a fabrication shed, where the Bundles will be constructed, a storage area where the Bundle materials will be stored prior to use, and two approximately 10 km long rail Bundle tracks along which each Bundle will be constructed and then launched. A Bundle launchway, crossing the beach and extending into the shallow subtidal area, will facilitate the launch of each Bundle.

To launch a Bundle, the Towhead on the offshore end of the Bundle is connected to a tug (the 'Leading Tug') via a long tow line. The tug then slowly (≤ 2 knots) heads offshore, pulling the Bundle along the track and into the ocean. In some instances the tug may anchor and use an onboard winch to pull the Bundle offshore. The onshore end of the Bundle is connected to another line which is slowly paid out from an onshore winch, until the Bundle reaches sufficient water depth for connection to another tug (the 'Trailing Tug').

The Bundle rolls down the track, which extends across the beach and into the shallow subtidal area. As the Bundle towheads (both lead and trailing towheads) enter the water and gain depth, they will become buoyant as the structure and floatation devices enter the water.



Scale: 1:300000
 Original Size: A4
 Aerial Photo: ESRI Satellite
 Grid: GDA 94 / MGA Zone 50

Notes: Location of Proposed Learmonth Pipeline Fabrication Facility

Subsea 7 Pipeline Fabrication Facility

subsea 7

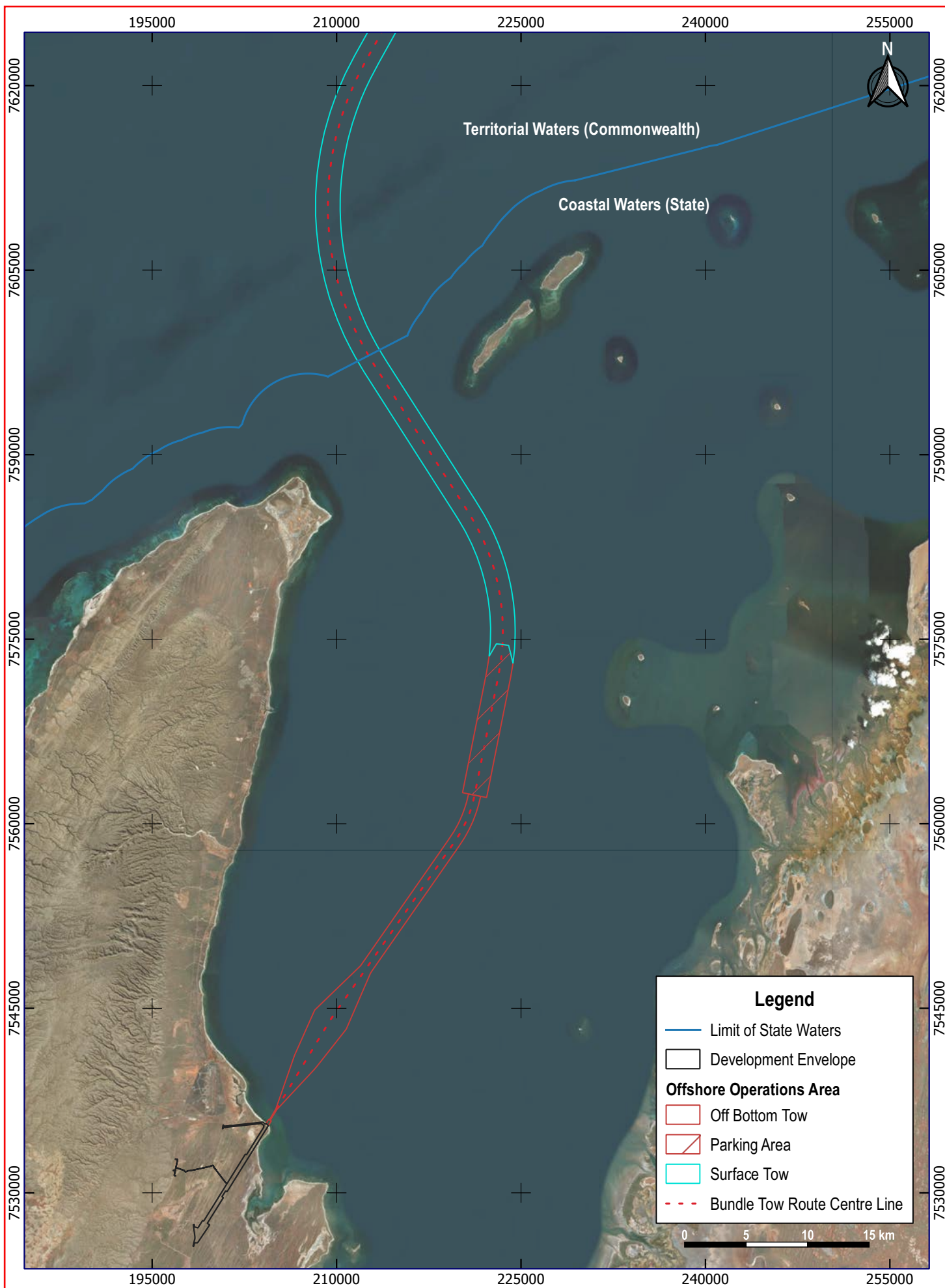
Figure 1: Proposal Location

Following launch the Bundle will be towed slowly (3-4 knots, up to a maximum of 5 knots) offshore along the tow route (Figure 2). The Bundle will be in 'Off Bottom Tow', meaning that the Bundle (including towheads) will be clear of the seabed. The lower links of the long Bundle chains will be in contact with the seabed in this mode. All seabed disturbance will be within the Offshore Operations Area (Figure 2).

On arrival at the Parking Area (Figure 2) the Bundle will be stopped and various checks and reconfiguration for the subsequent 'Surface Tow' completed. The Bundle may remain within this area for nominally up to 24 hours (likely duration < 12 hours) to allow for all checks and reconfiguration to be completed, and to allow for the 'Surface tow' out of Exmouth Gulf to be aligned with the optimal wind and current conditions.

On exit from the Parking Area the tow vessels will increase the tow speed to approximately 5-6 knots (up to a maximum of 8 knots¹). Hydrodynamic forces acting on the ballast chains produce a lift component and the Bundle will rise to the surface in a controlled manner. In this 'Surface Tow' configuration the Bundle lies right at the surface, ensuring maximum clearance from the seabed as it exits Exmouth Gulf.

¹ Speed through water.



Scale: 1:400000
 Original Size: A4
 Aerial Photo: ESRI Satellite
 Grid: GDA 94 / MGA Zone 50

Notes: Data sourced from Commonwealth of Australia (2018).

Subsea 7 Pipeline Fabrication Facility

subsea 7

Figure 2: Bundle Tow Route

1.2 PURPOSE OF MFMP

The purposes of the MFMP are:

- To document the management measures to be implemented to manage potential impacts to marine fauna.
- To support the Public Environmental Review submitted under the *Environmental Protection Act 1986* and *Environment Protection and Biodiversity Conservation Act 1999*.

1.3 OBJECTIVES

The objectives relevant to the MFMP are:

- EPA Objective: To protect marine fauna so that biological diversity and ecological integrity are maintained.
- Subsea 7 Objectives:
 - No impacts to potential fauna habitat beyond 50 m of the launchway footprint.
 - No physical injury (including permanent hearing loss) during construction or operations.
 - No Bundle or tow vessel strike on marine fauna.

1.4 KEY ENVIRONMENTAL FACTOR: MARINE FAUNA

The Environmental Protection Authority's (EPA) objective for marine fauna is "*To protect marine fauna so that biological diversity and ecological integrity are maintained*".

This document addresses the potential impacts to marine fauna (listed threatened and migratory species). Impacts could occur as a result of construction of the launchway at Heron Point, or during the proposed Bundle launch and tow operations through Exmouth Gulf (on average two, and up to three, per year).

The potential impacts to marine fauna² as a result of the Proposal are:

- Loss or degradation of BCH representing marine fauna habitat (e.g. foraging habitat) due to launchway construction.
- Temporary behavioural responses of marine fauna due to underwater noise or light spill during the construction phase.
- Temporary behavioural response of marine fauna due to changes in marine water quality.
- Loss or degradation of BCH representing marine fauna habitat (e.g. foraging habitat) during Bundle launch and tow.
- Temporary behavioural response of marine fauna due to underwater noise or light spill during Bundle launch and tow.
- Direct impact (strike or entanglement) during Bundle launch and tow.
- Loss or alteration of coastal habitat as a result of changes to coastal processes or hydrodynamic/hydrological regimes.
- Leak or spill of chemicals (including hydrocarbons) impacting marine fauna health.

1.5 RATIONALE AND APPROACH

1.5.1 Survey and Study Findings

A number of studies have previously been undertaken within the region, as outlined in the Public Environmental Review (PER) document (Subsea 7 2019). Subsea 7 has augmented the information available as a result of these previous studies by commissioning additional, Proposal-specific studies, to ensure an appropriate level of information is available to support the completion of the environmental impact assessment and environmental management plans.

Results of desktop assessment, and the regional and Proposal-specific studies, have been used to inform the level of risk to marine fauna posed by the Proposal and the development of management measures to ensure that the EPA's objective for marine fauna is met and that Subsea 7's objective is also met.

² Migratory birds are not addressed within the MFMP. Refer to Section 5.4 of the Public Environmental Review (PER) document for discussion of the receiving environment, potential impacts and mitigation measures relevant to migratory birds.

1.5.1.1 Desktop Assessment

A number of listed Threatened Species and listed Migratory species are known to occur, or may occur, within Exmouth Gulf and adjacent to the proposed Bundle tow route, based on the Protected Matters Search Tool (PMST) (Table 2).

Scientific Name	Common Name	EPBC Listing	Type of Presence (taking account of desktop and survey data)
Dolphins			
<i>Sousa sahalensis</i> (previously named <i>Sousa chinensis</i>)	Australian humpback dolphin	Migratory	Species or species habitat likely to occur in area. Dolphins were observed during surveys (but species not identified).
<i>Tursiops aduncus</i>	Indo-Pacific bottlenose dolphin	Migratory	Species or species habitat likely to occur in area. Dolphins were observed during surveys (but species not identified).
Whales			
<i>Balaenoptera borealis</i>	Sei whale	Vulnerable, Migratory	Individuals may occur in the region on rare occasions.
<i>Eubalaena australis</i>	Southern right whale	Endangered, Migratory	Sightings in more northern waters are relatively rare, but there have been records from Exmouth on the west coast (DoEE 2017a). Not recorded during surveys for the Proposal (Irvine 2019).
<i>Balaenoptera edeni</i>	Bryde's whale	Migratory	Species may occur in area. Small numbers recorded offshore of Proposal area during historic surveys.
<i>Balaenoptera musculus</i>	Blue whale	Endangered, Migratory	On their northern migration Pygmy blue whales come into the Perth Canyon in the period January to May, and then move up the coast passing Exmouth in the period April through to August before continuing north, with animals known to frequent Indonesian waters. They tend to pass along the shelf edge at depths of 500m out to 1000 m, moving faster on the southern migration and coming in close to the coast in the Exmouth – Montebello Islands area (McCauley and Jenner 2010).
<i>Megaptera novaeangliae</i>	Humpback whale	Vulnerable, Migratory	Species known to pass Exmouth during the northern and southern migrations, mother and calf pairs known to rest in Exmouth Gulf during southern migration (CWR 2005, Jenner et al. 2001). Contemporary aerial survey programme completed for Proposal (Irvine, unpublished)

Scientific Name	Common Name	EPBC Listing	Type of Presence (taking account of desktop and survey data)
<i>Balaenoptera physalus</i>	Fin whale	Vulnerable, Migratory	Individuals may occur in the region on rare occasions but there have been no published reports of this species off Exmouth.
<i>Physeter macrocephalus</i>	Sperm whale	Migratory	Individuals may occur in the region on rare occasions but there have been no published reports of this species off Exmouth.
<i>Orcinua orca</i>	Killer whale	Migratory	In Western Australia, Orcas are known to frequent the colder, southern waters near Albany. In 2014 a group of up to 27 killer whales were reported to be resident in the Exmouth Gulf for up to two months each year (ABC 2014). Species not recorded during surveys for the Proposal.
Marine Turtles			
<i>Carretta caretta</i>	Loggerhead turtle	Endangered, Migratory	Major nesting at Murion Islands (150 to 350 females breeding per year) and the beaches of the North West Cape (50 to 150 females breeding per year) (DoEE 2017b)
<i>Chelonia mydas</i>	Green turtle	Vulnerable, Migratory	The Green turtle is the most common to the Ningaloo region (Preen et al. 1997). No nesting activity has been recorded on beaches of the Exmouth Gulf, however the mangrove creeks and vegetated shallows of the east coast of the Exmouth Gulf are an important nursery for this species (Oceanica 2006).
<i>Eretmochelys imbricata</i>	Hawksbill turtle	Vulnerable, Migratory	Hawksbill Turtles nest on the Muiron Islands, located approximately 30 km off the coast of Exmouth. Feeding areas for this species potentially occur as far south as Shark Bay (DoEE 2017c). The species was recorded from Sandalwood Peninsula (located at the bottom of Exmouth Gulf) between 1990-1998 (Oceanica 2006).
<i>Dermochelys coriacea</i>	Leatherback turtle	Endangered, Migratory	There are no records of Leatherback turtles nesting in Western Australia. Furthermore the area is not known as a foraging ground or a nursery. It is unlikely that this species occurs in the Exmouth Gulf (Oceanica 2006).
<i>Natator depressus</i>	Flatback turtle	Vulnerable, Migratory	No nesting sites or rookeries have been recorded in the Exmouth Gulf (DoEE 2017d). Some data on foraging distribution comes from bycatch, with three adult turtles having been caught in trawler nets from the top half of the Exmouth Gulf (Oceanica 2006). An inter-nesting habitat buffer is mapped across the northern end of Exmouth Gulf and to the west (DEWHA 2011).

Scientific Name	Common Name	EPBC Listing	Type of Presence (taking account of desktop and survey data)
Other Marine Fauna			
<i>Dugong dugon</i>	Dugong	Migratory	Species or species habitat likely to occur in Exmouth Gulf. Species was recorded during surveys. Foraging habitat not present in proximity to Bundle tow route.
<i>Rhincodon typus</i>	Whale shark	Vulnerable, Migratory	Whale sharks aggregate close to the Ningaloo Reef front during late March to early May following the mass spawning of coral when there is an abundance of food in the form of planktonic larvae and schools of small fish in the waters adjacent to the reefs. Whale Sharks have been sighted within the northern end of Exmouth Gulf (Oceanica 2006). Not recorded within Exmouth Gulf during surveys undertaken for the Proposal (Irvine, unpublished).
<i>Carcharias taurus</i>	Grey nurse shark (west coast population)	Vulnerable	The Grey nurse shark (west coast population) is predominantly found in the south-west coastal waters of Western Australia but has been recorded as far north as the North West Shelf (DoEE 2017h). There have been occasional sightings of this species near Exmouth and the Muiron Islands (DoEE 2017h). A study of footage from a camera deployed at the Point Murat Navy Pier in Exmouth, 8 km west of the Bundle tow route, recorded 16 <i>C. taurus</i> individuals and suggested that the systematic nature of visitations by individual sharks, over a number of years, qualifies the location as a noteworthy aggregation site (Hoschke and Whisson 2016).
<i>Carcharodon carcharias</i>	Great white shark	Vulnerable, migratory	Great white sharks are widely, but not evenly, distributed in Australian waters. Tagging of sharks suggests that the species is highly mobile and movement is often seasonal. In Western Australia tagging has shown the species to move north during spring and return south during summer (DoEE 2017f). The aggregation of calving Humpback whales may attract Great White Sharks to the Exmouth Gulf (Oceanica 2006). For this reason, it is possible that the Great White Shark may occasionally forage within the Exmouth Gulf and to the north and west.
<i>Pristis clavata</i>	Dwarf sawfish, Queensland sawfish	Vulnerable, migratory	There are no known records of the Dwarf sawfish occurring within the Exmouth Gulf (DoEE 2017g). Surveys of Dwarf sawfish have previously encountered individuals over

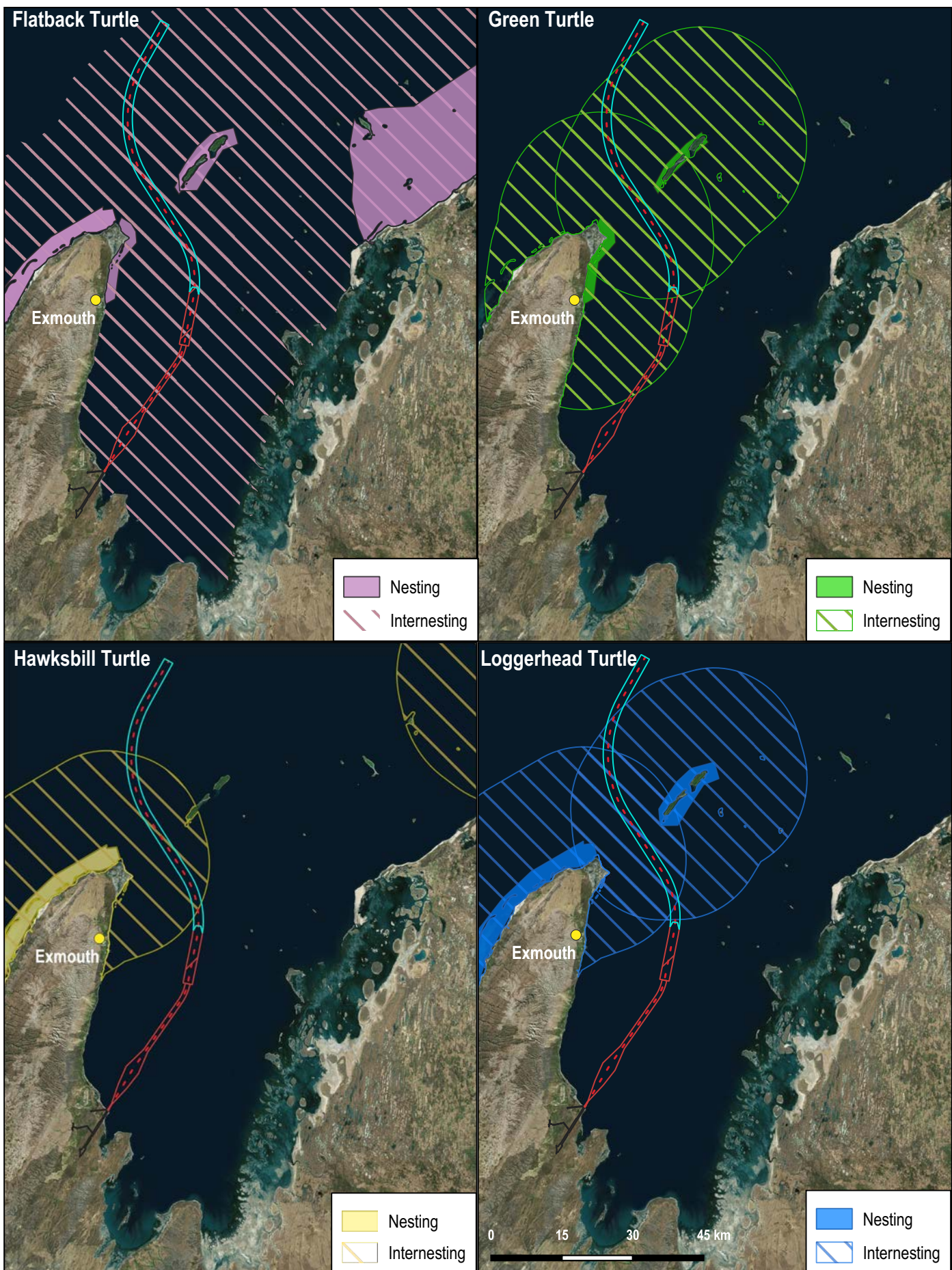
Scientific Name	Common Name	EPBC Listing	Type of Presence (taking account of desktop and survey data)
			fine substrates (mainly silt) in river channels. There is a low likelihood of this species occurring in Exmouth Gulf.
<i>Pristis zijsron</i>	Green sawfish, Dindagubba, Narrowsnout sawfish	Vulnerable, migratory	Green sawfish have been recorded in very shallow water (<1 m) to offshore trawl grounds in over 70 m of water (DoEE 2017h). It is possible that the species may utilise shallow waters within Exmouth Gulf. The Ashburton River estuary is currently the only identified pupping site and nursery for Green Sawfish (Morgan et al. 2016).
<i>Anoxypristis cuspidata</i>	Narrow sawfish	Migratory	Species may occur in wider region, but unlikely to occur in the deeper waters to the north west of Exmouth Gulf.
<i>Aipysurus apraefrontalis</i>	Short-nosed seasnake	Critically Endangered	The Short-nosed seasnake is endemic to Western Australia, and has been recorded from Exmouth Gulf, Western Australia (DoEE 2017i).
Marine Fish			
<i>Manta alfredi</i>	Reef manta ray, Coastal manta ray, Inshore manta ray	Migratory	Single individuals have been recorded in Exmouth Gulf during studies undertaken for the project (Irvine, unpublished).
<i>Manta birostris</i>	Giant manta ray, Chevron manta ray, Pelagic manta ray, Oceanic manta ray	Migratory	Recorded off the North West Cape, could enter the northern portion of the Gulf.
<i>Halicampus grayi</i>	Mud pipefish	Marine	Recorded in Exmouth Gulf (Kangas et al. 2006)
<i>Hippocampus zebra</i>	Zebra seahorse	Marine	Recorded in Exmouth Gulf (Kangas et al. 2006)
<i>Hippocampus angustus</i>	Narrow-bellied seahorse	Marine	Recorded in Exmouth Gulf (Kangas et al. 2006)

Table 2: Marine MNES, Conservation Status and Likelihood of Occurrence in Exmouth Gulf and along tow route

Humpback whales, Dugong, several species of marine turtle and dolphin, and seahorses are known to utilise Exmouth Gulf. The Whale shark, Bryde's whale, Manta ray, Killer whale, Blue whale and Short-nosed seasnake may occur at some time either within the Gulf or adjacent to the proposed tow route out into Commonwealth waters.

Exmouth Gulf has been identified as a biologically important area in recognition of its value as a resting area for migrating Humpback whales, with very high densities of nursing cows with calves during the southern migration (DSEWPAC 2012). Exmouth Gulf and Ningaloo

Reef have been identified as biologically important areas, year round, for foraging and nursing by Dugong (DSEWPAC 2012). Based on the mapping of Biologically Important Areas of Regionally Significant Marine Species (DoEE 2015), also available through the Conservation Values Atlas (DoEE 2018), the shoreline around the North West Cape, and the Muiron Islands, are areas of importance for Green turtle nesting, while the surrounding areas (within an approximate radius of 20 km) are important interesting habitat. Based on the mapping of Biologically Important Areas of Regionally Significant Marine Species (DoEE 2015) the shoreline around the western side of the North West Cape is of importance for Hawksbill turtle nesting, while the surrounding areas (within an approximate radius of 20 km) are important interesting habitat. Based on the mapping of Biologically Important Areas of Regionally Significant Marine Species (DoEE 2015) the shoreline around the North West Cape, and the Muiron Islands, are areas of importance for Loggerhead turtle nesting, while the surrounding areas (within an approximate radius of 20 km) are important interesting habitat. Figure 3 presents the areas of importance to marine turtle species relative to the proposed Offshore Operations Area.



Development Envelope
 Off Bottom Tow
 Parking Area
 Surface Tow
 Bundle Tow Route Centre Line

Scale: 1,100,000
 Original Size: A4
 Aerial Image: ESRI Satellite
 Grid: GDA 94 / MGA Zone 50

Notes: Data sourced from DoEE (2015).

Subsea 7 Pipeline Fabrication Facility

subsea 7

Figure 3: Mapped Marine Turtle Habitat

1.5.1.2 Regional Studies

A number of regional marine fauna studies have previously been undertaken as outlined in Table 3.

Survey Date	Researcher/Consultant	Study Description/Title
1998-1999	Department of Conservation and Land Management (now DBCA)	North West Cape and Muiron Islands Marine Turtle Nesting Population Study (CALM 1999)
2001	Centre for Whale Research	Geographical and temporal movements of Humpback Whales in Western Australian waters (Jenner <i>et al.</i> 2001)
1994	James Cook University	Aerial Survey (cetacean, dugong, turtle) of Exmouth and Ningaloo Reef (JCU 1994)
1995-2004	Centre for Whale Research	Humpback Whale survey report for Exmouth Gulf (1995-2004) (CWR 2004)
2004-2005	Centre for Whale Research	Distribution and abundance of Humpback Whales and other mega-fauna in Exmouth Gulf during 2004/2005 (CWR 2005)
2005	Oceanwise	Review of the Dugong in Exmouth Gulf (Oceanwise 2005)
2010	Murdoch University	Vessel-based survey of inshore dolphins off the North West Cape (Bejder <i>et al.</i> 2011)
2016	University of Tasmania, Institute for Marine & Antarctic Studies, Curtin University	Aerial survey programs to describe the distribution and abundance of Humpback whale calves within Ningaloo Marine Park

Table 3: Overview of Regional Marine Fauna Studies

1.5.1.3 Proposal Specific Baseline Surveys

A number of proposal specific studies have been undertaken by various technical specialists as outlined in Table 4.

Survey Date	Researcher/Consultant	Study Description/Title
2016	360 Environmental	Survey of benthic habitats off Heron Point
2017	360 Environmental	Survey of benthic habitats within Local Assessment Unit (LAU)
2017	360 Environmental	Opportunistic observations of marine fauna within and adjacent to the LAU
2017	360 Environmental	Survey of benthic habitats within the 'Bundle Laydown Area'
2018	MBS Environmental	Exmouth Gulf Benthic Communities and Habitat survey report
2018	Lyn Irvine	Exmouth Gulf Aerial Surveys (Irvine <i>et al.</i> 2018)

Table 4: Overview of Local Marine Fauna Studies

1.5.1.4 Key species summaries

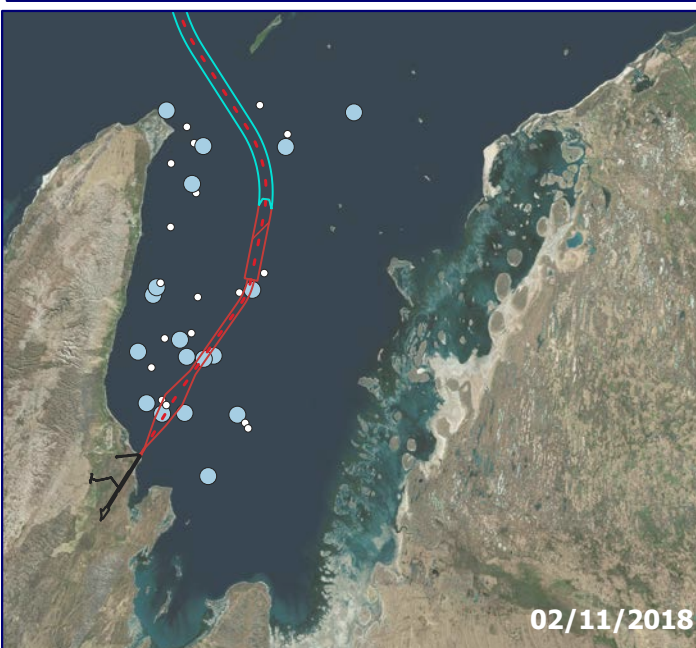
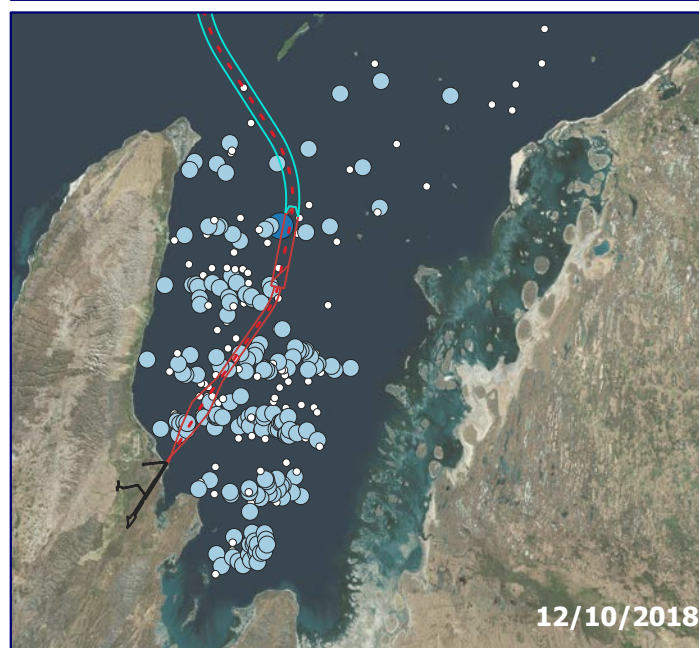
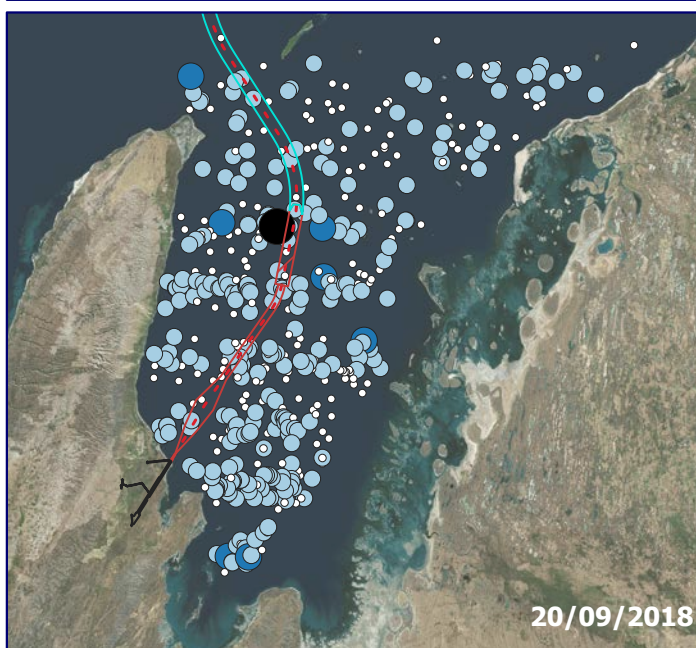
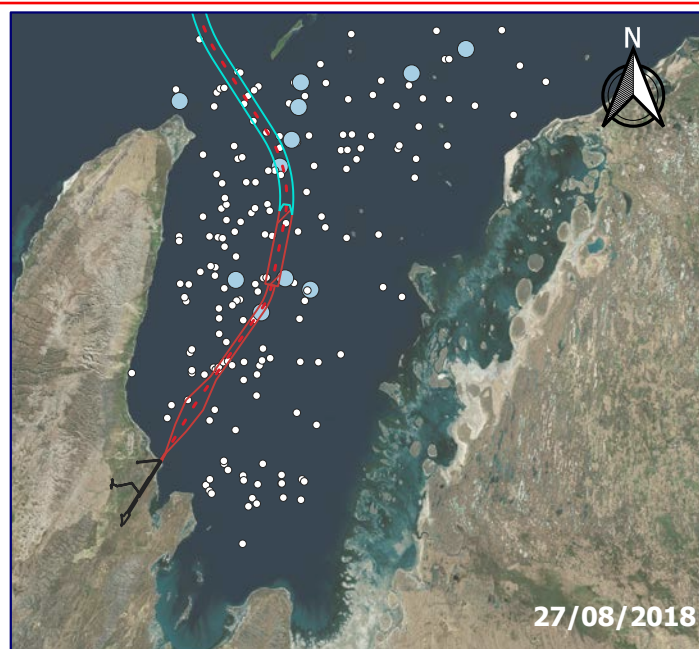
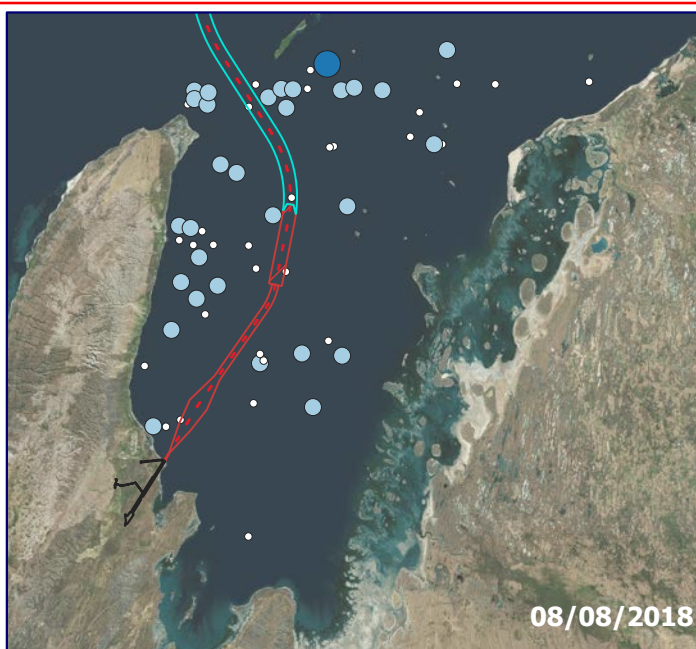
Based on reports produced by the EPBC Act Protected Matters Search Tool for the Proposal area (Table 2), species profiles and recovery plans, the Conservation Values Atlas, the Marine bioregional plan for the North-west Marine Region and regional and site-specific surveys, a number of listed threatened and migratory species, are likely to occur within Exmouth Gulf or adjacent waters. Key marine fauna species likely to occur are discussed below. Other species are discussed in more detail in the PER.

Cetaceans

Humpback whales (*Megaptera novaeangliae*) visit Exmouth Gulf annually between early August and November, during the southern migration. Whale numbers peak in September as migrating cow/calf pairs enter Exmouth Gulf and rest for up to two weeks.

Aerial surveys were completed in 2018, between early August and early November (Irvine 2019). Humpback whale numbers were relatively low (approximately 100) during the first half of August before increasing to a maximum of approximately 800 by mid-September. From this peak, numbers rapidly declined to approximately 50 by early November (Figure 4). Humpback whales were first observed within Exmouth Gulf and to the north in late July 2018 (Lyn Irvine pers comm. 2018a). Linear regression of the decline in abundance from the peak in September through to the final survey in early November (R Square value=0.995) indicated that by the 5 November 2018 all Humpback whales were likely to have left Exmouth Gulf. Thus a total occupancy period of 10 weeks, or 3 months, was recorded during the 2018 southern migration.

During the aerial surveys completed between early August and early November 2018 dolphins were opportunistically recorded (Irvine 2019). Dolphin numbers recorded during each survey ranged from 21 to 114 individuals, and they were observed to be present throughout Exmouth Gulf (Figure 5).



Legend

Development Envelope

Offshore Operations Area

Off Bottom Tow

Parking Area

Surface Tow

Bundle Tow Route Centre Line

Humpback Sightings

○ 1

● 2 - 3

● 4 - 6

● 7 - 9

0 15 30 45 km

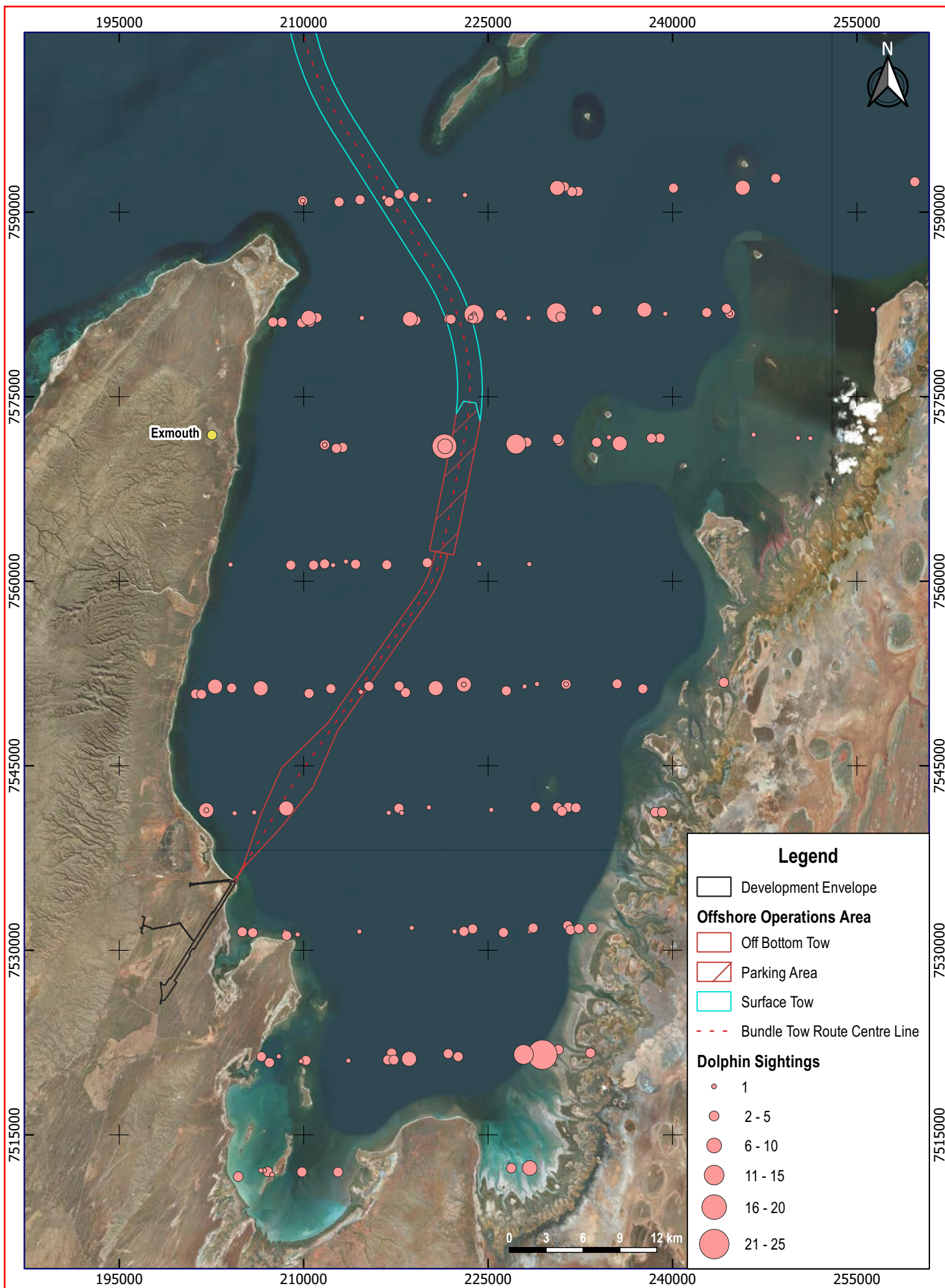
Scale: 1:1150000
Original Size: A4
Aerial Photo: ESRI Satellite
Grid: GDA 94 / MGA Zone 50

Notes: Data sourced from Irvine (2019).

Subsea 7 Pipeline Fabrication Facility

subsea 7

Figure 4: Distribution of Humpback Whales in Exmouth Gulf 2018



Scale: 1:400000
 Original Size: A4
 Aerial Image: ESRI Satellite
 Grid: GDA 94 / MGA Zone 50

Notes: Data sourced from Irvine 2019.

Subsea 7 Pipeline Fabrication Facility

subsea 7

Figure 5: Distribution of dolphins in Exmouth Gulf in 2018

Dugong

Large numbers of dugong are known to occur in Exmouth Gulf, with the majority recorded in the shallow, eastern portion, of the Gulf. During the aerial surveys completed between August and early November 2018, Dugong numbers ranged from 30 to 121 individuals (Irvine 2019).

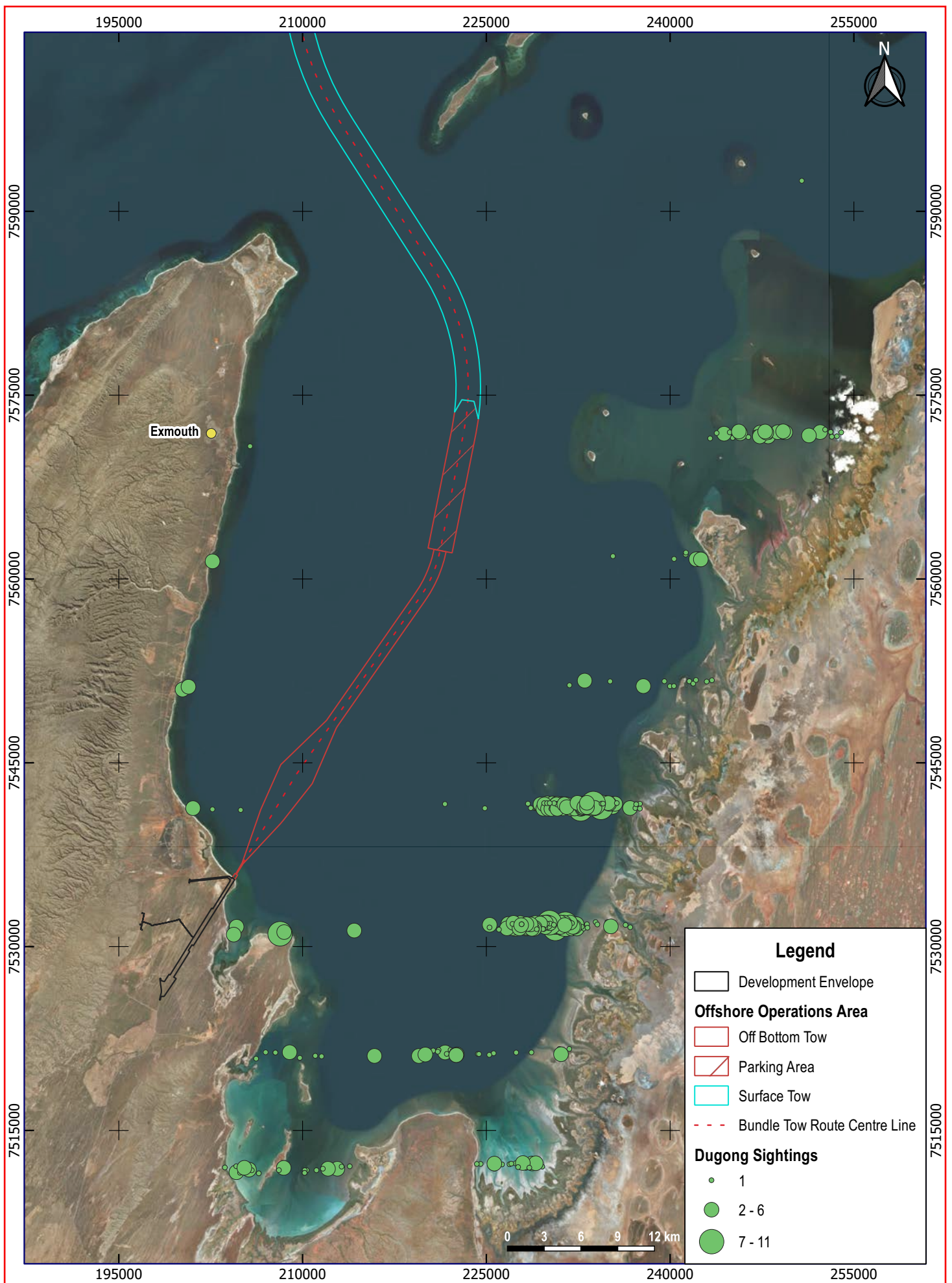
Dugong activity was focused on the south and east coasts of Exmouth Gulf, associated with the shallow seagrass habitats in the area (Figure 6). Low numbers of Dugong were recorded along the west coast of Exmouth Gulf (Irvine 2019).

Marine Turtles

Green turtles (*Chelonia mydas*), Loggerhead turtles (*Caretta caretta*) and Hawksbill turtles (*Eretmochelys imbricate*) are known to forage within Exmouth Gulf, with juveniles inhabiting the mangrove creeks and vegetated shallows (Straits 2006).

Aerial surveys have shown that turtles occur throughout Exmouth Gulf, with densities greatest in the shallow southern and eastern portions of the Gulf. The majority of animals sighted were identified as Green turtles (Oceanwise 2005, Oceanica 2006). This is consistent with the general understanding that it is Green turtles that predominantly utilize Exmouth Gulf, with smaller individuals being more abundant than larger animals. Nesting by Green turtles within Exmouth Gulf is very rare (Lyn Irvine, pers comm. 2018b).

During the aerial surveys completed between early August and early November 2018 turtles were opportunistically recorded (Irvine 2019). Turtles were observed to congregate and utilise the southern and eastern portions of the Gulf (Figure 7).



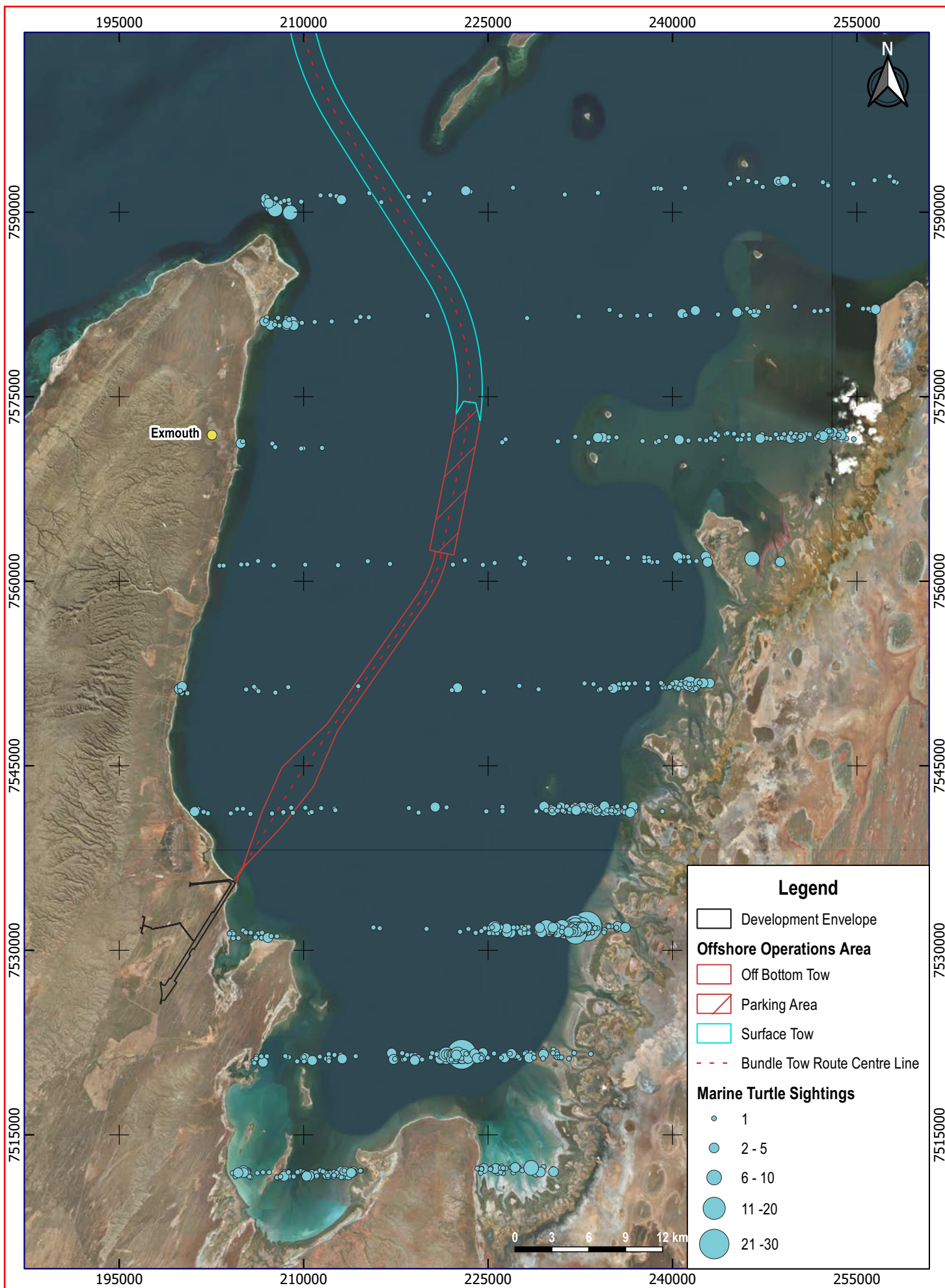
Scale: 1:400000
 Original Size: A4
 Aerial Image: ESRI Satellite
 Grid: GDA 94 / MGA Zone 50

Notes: Data sourced from Irvine 2019.

Subsea 7 Pipeline Fabrication Facility

subsea 7

Figure 6: Distribution of Dugong in Exmouth Gulf in 2018



Scale: 1:400000
 Original Size: A4
 Aerial Image: ESRI Satellite
 Grid: GDA 94 / MGA Zone 50

Notes: Data sourced from Irvine 2019.

Subsea 7 Pipeline Fabrication Facility

subsea 7

Figure 7: Distribution of Marine Turtles in Exmouth Gulf in 2018

Whale shark

The Whale shark population in the Indo-Pacific has been estimated, based on individual counts, modelled population estimates and habitat availability, at 75% of the global population with the remaining 25% in the Atlantic (Pierce and Norman 2016). Wildbook for Whale Sharks has an online database which comprises of photographs of global whale shark sightings from both researchers and the public (www.whaleshark.org) (Wild Me 2016, Norman et al. 2017). There are currently 9,739 individual Whale sharks that have been identified through the database from images submitted between 1964 and 2018, with the majority being males with most of these likely to be immature due to the estimated lengths (Norman and Stevens 2007). It is assumed that the current dataset does not fully represent the global whale shark population (Norman et al. 2017).

Whale sharks have been recorded along the continental shelf of the central west coast of Australia, with the aggregations within the Ningaloo Marine Park being one of the largest seasonal aggregations in the world. Whale sharks travel to Ningaloo Marine Park between March to July every year, with individuals sometimes remaining until early August (DPaW 2013, DoF 2011).

The Whale shark abundance at Ningaloo Reef has been modelled by two studies. Meekan et al. (2006) estimated the total population size to be 319 to 436 sharks (between the years 1992 and 2004), and Holmberg et al. (2009) estimated the annual abundance to vary between 86 and 143 sharks (between the years 2004 to 2007). Whale shark abundance at Ningaloo has been shown to correlate with the Southern Oscillation Index and several other oceanographic variables, which potentially relate to the strength of ocean currents and local productivity (Sleeman et al. 2010).

Reynold et al. (2017) recorded movements of Whale sharks migrating to and from Ningaloo Marine Park and observed that some sharks migrate long distances before returning intra-annually. Tracking data suggests that Ningaloo Marine Park is of importance year round for Whale sharks. Whale sharks have been observed to utilise the north-western portion of Ningaloo Marine Park during the peak season, moving southwards towards Coral Bay outside of season (Reynolds et al. 2017, Norman et al. 2017). Whale sharks displayed habitat preference for warmer, shallower waters and have been shown to move into international waters, Indonesian waters, and down the West Australian Coastline. Whale sharks exhibit high individual fidelity to the Ningaloo Reef area during the austral autumn/winter, with individuals often re-sighted in the area over consecutive years (Reynolds et al. 2017).

The majority of foraging conducted by Whale sharks occurs close to the surface, with approximately 25% of the time spent at depths of 2 m or less and 40% of their time within the upper water column (15 m or less) (DoEE 2016). During migration Whale sharks spend most of their time within the upper 15 m of the water column (DoEE 2016).

1.5.2 Key assumptions and uncertainties

Key assumptions regarding the risk of impact to marine fauna were as follows:

- Despite the timing of the Humpback whale northern migration, and Humpback whale occurrence in Exmouth Gulf, varying by up to four weeks annually (Jenner and Jenner 2005, Irvine 2019), the timing of the peak of the Humpback whale southern migration is likely to remain relatively consistent, occurring between mid-September and mid-October (the timing of the 2004 and 2018 southern migrations were very similar).
- The Humpback whale population is expected to continue to grow at a rate of between 9.7% and 13% per annum (Salgado Kent et al. 2012).
- Neonate Humpback whale calves are considered the most vulnerable species and life stage to behavioural impacts associated with the proposed Bundle launch and tow operations. Adult Humpback whales, and other species, are expected to be better able to detect and avoid the slow moving Bundle and associated tow vessels. Further, behavioural responses in adult Humpback whales are likely to be significantly less biologically significant than behavioural responses in calves.
- Whale sharks are likely to be present within Ningaloo Marine Park, and adjacent Commonwealth waters, from March to July, with a low number of individuals remaining in the region until August.

1.5.3 Management Approach

The management approach follows a precautionary approach, whereby a lack of full scientific certainty has not been used as a reason for postponing measures to prevent environmental degradation.

Subsea 7 has undertaken comprehensive environmental studies on aspects of the Proposal that may impact the environment, including marine fauna.

The Proposal design has, as much as possible, taken into account the outcomes of the environmental technical studies, in consultation with the community and relevant agencies.

Management and mitigation measures to minimise potential environmental impacts during construction and operations of the Proposal have been developed to avoid impacts as much as possible, and to minimise any residual risks.

1.5.4 Rationale for choice of provisions

Management and mitigation measures have been developed based on the following approaches (preferred first):

- Avoidance of potential impact (e.g. use of 'Ecological Windows' such as defining a 'no launch' period covering the peak of the Humpback whale southern migration).
- Reduce likelihood of impact occurring (e.g. vessel speed limits, marine fauna observers, use of a Whale shark spotter plane for launches between March and July).
- Reduce magnitude of impact (e.g. measures to reduce turbidity associated with launchway construction, selection of low risk chemicals for use in Bundle flow lines).

2. MARINE FAUNA MANAGEMENT PLAN PROVISIONS

This section was prepared in accordance with the Instructions on how to prepare *Environmental Protection Act 1986* Part IV Environmental Management Plans (EPA 2018). It identifies the management based provisions that Subsea 7 proposes to implement to ensure marine fauna are managed appropriately and specifies the:

- Management actions that will be implemented to mitigate and manage potential risks.
- Management targets that will be used to measure the efficacy and performance of management actions.
- Monitoring programs that will be used to assess the effectiveness of the management actions in meeting environmental objectives of this plan.
- Reporting requirements relevant to implementation of this plan.

2.1 MANAGEMENT ACTIONS AND TARGETS

The overall objectives of this plan are to ensure that:

- Impacts to marine fauna from the Proposal are minimised.
- No significant impacts to listed Threatened or Migratory marine species occur.
- The EPA Objective for marine fauna is met.
- Subsea 7's Objective for marine fauna is met.

The purpose of the management targets is to define Subsea 7's aims in the context of the identified potential impacts. To meet the management targets, a series of fit-for-purpose management actions have been developed to ensure potential impacts on marine fauna are minimised to levels considered acceptable.

Management actions and targets, focussed on achieving the overall MFMP objectives (refer Table 1), are presented in Table 5 to Table 11. These actions were specifically developed to ensure the EPA's objective for marine fauna will be met.

EPA Factor/Objective: Marine Fauna/To protect marine fauna so that biological diversity and ecological integrity are maintained

Management Objective: No impacts to potential fauna habitat beyond 50 m of the launchway footprint

Key Environmental Values: Inshore BCH potentially representing marine fauna foraging habitat

Key Impacts and Risks: Direct or indirect impacts to BCH during launchway construction

Management Actions	Management Targets	Monitoring	Reporting
Construction material to be 'clean' (free of 'fines')	No impact to benthic communities and habitat (BCH) beyond immediate surrounds (50 m) of construction area	Audit of rock fill screening prior to use	Construction close-out report
Silt curtains deployed as required		Twice daily visual monitoring during construction to examine turbidity magnitude and extent Silt curtain deployed as required	Completion of daily construction log
Suspension of turbidity generating activities		Twice daily (during works: approximately 10am and 2pm) visual monitoring during construction. The severity, location and extent of the visible turbidity plume will be recorded. In the event that silt curtain(s) prove ineffective or cannot be deployed, the following criteria will be assessed at the 50 m boundary (from the construction footprint) in the event persistent elevated turbidity is recorded through visual monitoring: <ul style="list-style-type: none">• Mean seabed light levels (PAR) at any site at the 50 m boundary fall below the 20%ile of unimpacted reference site data over 3 consecutive days. In the event of threshold exceedance, turbidity generating activities will be suspended until seabed	Completion of daily construction log

EPA Factor/Objective: Marine Fauna/To protect marine fauna so that biological diversity and ecological integrity are maintained Management Objective: No impacts to potential fauna habitat beyond 50 m of the launchway footprint Key Environmental Values: Inshore BCH potentially representing marine fauna foraging habitat Key Impacts and Risks: Direct or indirect impacts to BCH during launchway construction			
Management Actions	Management Targets	Monitoring	Reporting
		<p>light levels beyond 50 m (from the construction footprint) has returned to background levels or does not significantly differ from unimpacted reference site levels (refer to Marine Construction Monitoring and Management Plan (MCMMP)).</p> <p>Quantitative BCH monitoring (replicate video transects) adjacent to launchway (refer to MCMMP) prior to construction and within one year following the completion of construction to confirm no impacts beyond the ZoMI³.</p>	

Table 5: Management objective, actions and targets in relation to impacts to BCH during launchway construction

³ Quantitative pre- and post-construction BCH surveys to be completed at the same time of year to minimise the effect of seasonal changes in macroalgae biomass.

EPA Factor/Objective: Marine Fauna/To protect marine fauna so that biological diversity and ecological integrity are maintained Management Objective: No physical injury (including permanent hearing loss) during construction or operations Key Environmental Values: Marine fauna (particularly marine turtles, dolphins or Dugong off Heron Point) Key Impacts and Risks: Temporary behavioural responses of marine fauna due to noise or light spill during construction			
Management Actions	Management Targets	Monitoring	Reporting
Should unplanned circumstances occur requiring work outside of daylight hours, light spill management will be implemented including: <ul style="list-style-type: none"> Onshore lighting to use of shrouded or directional lighting. Placement of onshore lighting such that the majority of light is focused on the working areas and not out to sea. 	Light emissions contained to work areas.	Daily visual monitoring during construction phase (when onshore lighting present seaward of the coastal dune)	Completion of daily construction log
Construction methods to avoid piling	No physical injury or hearing loss within marine fauna due to underwater noise during construction	NA	Completion of daily construction log
Suspension of marine construction activities in the event listed marine fauna enters 'marine fauna exclusion zone'		Use of a Marine Fauna Observer (MFO) during marine construction activities to ensure no listed marine fauna enter within a 'marine fauna exclusion zone' (50 m surrounding active construction e.g. placement of rock fill, placement of pre-cast slabs)	MFO observation logs

Table 6: Management objective, actions and targets in relation to noise or light spill during construction

EPA Factor/Objective: Marine Fauna/To protect marine fauna so that biological diversity and ecological integrity are maintained

Management Objective: No significant impacts to marine fauna

Key Environmental Values: Marine fauna (particularly Humpback whales, marine turtles, dolphins and Dugong off Heron Point or adjacent to tow route)

Key Impacts and Risks: Temporary behavioural response of marine fauna due to changes in marine water quality

Management Actions	Management Targets	Monitoring	Reporting
Launchway construction material to be 'clean' (free of 'fines')	No significant increase in water column turbidity beyond immediate surrounds (50 m) of construction area	Twice daily (during works: approximately 10am and 2pm) visual monitoring during construction.	Internal daily construction phase reports
Silt curtains deployed as required during launchway construction		<p>The severity, location and extent of the visible turbidity plume will be recorded. Buoys located at a distance of 50 m from construction footprint to aid in description of the plume extent.</p> <p>Silt curtain(s) deployed prior to expected turbidity generating activities and/or in the event construction-related turbidity is recorded beyond 50 m from the construction site.</p>	Internal daily construction phase reports
No Bundle launches during peak of Humpback whale southern migration (see note)	No calves exposed to elevated water column turbidity caused by Bundle launch and tow	NA	NA

Table 7: Management objective, actions and targets in relation to changes in marine water quality

EPA Factor/Objective: Marine Fauna/To protect marine fauna so that biological diversity and ecological integrity are maintained

Management Objective: No significant impacts to marine fauna

Key Environmental Values: BCH potentially representing marine fauna foraging habitat

Key Impacts and Risks: Loss or degradation of BCH representing marine fauna habitat (e.g. foraging habitat) during Bundle launch and tow

Management Actions	Management Targets	Monitoring	Reporting
Seabed interaction during Bundle launch activities limited to within Offshore Operation Area (Off bottom tow and Parking area)	No direct loss of BCH outside of Offshore Operation Area (Off bottom tow and Parking area)	Use of Bundle and vessel position tracking systems	Bundle launch report
No more than three launches per annum	No impacts to BCH outside of Offshore Operation Area (Off bottom tow)	Water quality monitoring adjacent to sensitive BCH outside of the Offshore Operation Area during initial Bundle launch to validate sediment fate modelling predictions (refer to Marine Operational Environmental Monitoring Plan)	Bundle launch report
Selection of appropriate tow vessels (all to have appropriate redundancy such as DP24 or above, or redundant vessels will be present within tow fleet) Scheduling of Bundle launch and public notifications completed ahead of Bundle launch	No loss of control of a Bundle during launch and tow	<ul style="list-style-type: none"> • Certification retained for all rigging and lift equipment • Vessel and Bundle position tracking 	Bundle launch report

⁴ Dynamic positioning (DP) is a computer-controlled system to automatically maintain a vessel's position and heading by using its own propellers and thrusters. DP2 systems have redundancy so that no single fault in an active system (e.g. generator, thruster, switchboard, remote controlled valve) will cause the system to fail.

EPA Factor/Objective: Marine Fauna/To protect marine fauna so that biological diversity and ecological integrity are maintained

Management Objective: No significant impacts to marine fauna

Key Environmental Values: BCH potentially representing marine fauna foraging habitat

Key Impacts and Risks: Loss or degradation of BCH representing marine fauna habitat (e.g. foraging habitat) during Bundle launch and tow

Management Actions	Management Targets	Monitoring	Reporting
<p>Tow rigging and equipment selection, testing and inspection in accordance with industry standards and Subsea 7 Rigging Design Standards</p> <p>Tow lines load tested and inspected by NATA approved third party</p>			

Table 8: Management objective, actions and targets in relation to loss or degradation of BCH during Bundle launch and tow

EPA Factor/Objective: Marine Fauna/To protect marine fauna so that biological diversity and ecological integrity are maintained Management Objective: No physical injury (including permanent hearing loss) during construction or operations Key Environmental Values: Marine fauna (particularly marine turtles, dolphins or Dugong off Heron Point) Key Impacts and Risks: Temporary behavioural response of marine fauna due to noise or light spill during Bundle launch and tow			
Management Actions	Management Targets	Monitoring	Reporting
Shrouded or directional lighting as well as motion-sensor or timed lighting will be used at the launch site with lighting placed such that the majority of light is focused on the working areas and not out to sea	Light emissions contained to work areas	Daily visual monitoring during operations phase (when lighting present seaward of the coastal dune)	Bundle launch report
No Bundle launches during peak of Humpback whale southern migration (see note) Specific vessel crew trained on marine fauna observation and avoidance training A Marine Fauna Observer (MFO) on board lead support vessel and key support vessels, to identify marine fauna within 500 m ahead of tow, to allow avoidance measures to be implemented	No behavioural response by Humpback whale calves during Bundle launch and tow	Visual monitoring by MFOs during Bundle launches	<ul style="list-style-type: none"> • Bundle launch report • MFO observation logs

Table 9: Management objective, actions and targets in relation to noise or light spill during Bundle launch and tow

EPA Factor/Objective: Marine Fauna/To protect marine fauna so that biological diversity and ecological integrity are maintained

Management Objective: No Bundle or tow vessel strike on marine fauna

Key Environmental Values: Marine fauna (particularly marine turtles, dolphins or Dugong off Heron Point)

Key Impacts and Risks: Direct impact (strike or entanglement) during Bundle launch and tow

Management Actions	Management Targets	Monitoring	Reporting
<p>No bundle launches during period of main Humpback whale usage of Exmouth Gulf (see note)</p> <p>Specific vessel crew trained on marine fauna observation and avoidance training</p> <p>A Marine Fauna Observer (MFO) on board lead support vessel and key support vessels, to identify marine fauna within 500 m ahead of tow, to allow avoidance measures to be implemented (avoidance measures may include a delay to the start of the Surface tow component of a tow or a slight change to the tow route (within the 2 km wide Surface tow envelope)</p> <p>Tow vessels and Bundle launch speeds low during launch (≤ 2 knots) and tow (≤ 8 knots)</p> <p>The use of a 'spotter plane' during any Bundle launches undertaken between March and July (inclusive) (see note)</p>	<p>No strike or entanglement of listed marine fauna during Bundle launch and tow</p>	<p>Visual monitoring by MFOs during Bundle launches</p>	<ul style="list-style-type: none"> • Bundle launch report • MFO observation logs

Table 10: Management objective, actions and targets in relation to strike or entanglement during Bundle launch and tow

EPA Factor/Objective: Marine Fauna/To protect marine fauna so that biological diversity and ecological integrity are maintained Management Objective: No significant impacts to marine fauna Key Environmental Values: Marine fauna Key Impacts and Risks: Leak or spill of chemicals (including hydrocarbons) impacting marine fauna health			
Management Actions	Management Targets	Monitoring	Reporting
Selection of tow vessels, scheduling of Bundle launch and public notifications completed ahead of Bundle launch in accordance with Launch philosophy	No loss of control of a Bundle during launch and tow	NA	Bundle launch report
Selection of tow vessels, scheduling of Bundle launch and public notifications completed ahead of Bundle launch in accordance with Launch philosophy	No leak or spill of chemicals (including hydrocarbons)	NA	Bundle launch report
Bundle carrier pipe does not contain any hydrocarbons (filled with inert nitrogen gas plus solid corrosion inhibitors). Any chemical to be used within flow lines must have: <ul style="list-style-type: none"> • An OCNS Hazard Quotient rating of Gold, Silver, E or D have no substitution or product warning; or • Further assessment to ensure the environmental risk is As Low As Reasonably Practicable (ALARP). 	Negligible risk of impact to marine fauna in the event of a chemical leak or spill	NA	Bundle specifications
Each Bundle tow vessel equipped with a vessel specific Shipboard Oil Pollution Emergency Plan (SOPEP) or equivalent, and will follow response actions to incidental pollution in accordance with the vessel's emergency plan	Negligible risk of impact to marine fauna in the event of a chemical leak or spill	NA	<ul style="list-style-type: none"> • Vessel inventories • Incident report

Table 11: Management objective, actions and targets in relation to a leak or spill of chemicals (including hydrocarbons)

NOTE ON 'NO LAUNCH' PERIOD

Within the referral supporting document Subsea 7 noted that, to minimise the risk of 'direct interaction between marine fauna and tow vessel or Bundle during Bundle launch/tow', the following mitigation measure would be implemented:

No bundle launches during period of main Humpback whale usage of Exmouth Gulf (nominally mid-September to mid-November).

It was noted that the timing of this 'no launch' period would be accurately determined through survey prior to the initial Bundle launch. Since the submission of the referral aerial surveys have been completed, between early August and early November 2018, to characterize the current Humpback whale usage patterns and period within Exmouth Gulf. Prior to these surveys the most recent data was collected by Curt Jenner in 2004/05.

During the 2018 surveys (Irvine 2019, Attachment 2 K) a total of 1,661 pods, consisting of 2,772 whales, were recorded. Humpback whales were first observed within Exmouth Gulf and to the north in late July 2019, just prior to the first formal survey (Lyn Irvine pers comm. 2018a). Humpback whale numbers were relatively low (approximately 100) during the first half of August before increasing to a maximum of approximately 750 by mid-September. From this peak, numbers rapidly declined to approximately 50 by early November. Based on the rapid decline in numbers through October and into early November, all Humpback whales were likely to have left Exmouth Gulf by 5 November 2018. Thus a total occupancy period of 3 months was recorded during the 2018 southern migration.

To avoid impacts to Humpback whales during their southern migration, Subsea 7 commits to a 12 week 'no launch' period, which will be in force for the months of August, September and October each year. This period was defined with reference to:

- The occurrence of young calves, the most sensitive life stage (likely born off the North West Cape), within Exmouth Gulf during the initial survey on 8 August 2018.
- The high abundance of Humpback whales between late August and mid-October 2018.
- The rapid decline in Humpback whales numbers, including calf numbers, through October.
- The lack of young calves during the last survey on 2 November 2018.

NOTE ON 'SPOTTER PLANE' TO MITIGATE RISK TO WHALE SHARKS

Research into the movement and habitat use of Whale sharks within and adjacent to Ningaloo Marine Park, as a part of the Ningaloo Outlook programme, determined that, based on a number of tagged sharks:

- Whale sharks are predominantly present near the sea surface (top 3 m) during daylight hours but dive to greater depths (frequently 20 m to 100m, or deeper) during the night.
- Whale sharks can dive at speeds exceeding 0.4 m/s (or 24 m in one minute), though the most common dive speeds are between 0.16 m/s and 0.4 m/s during the day and between 0.05 m/s and 0.25 m/s during the night.

The risk of collision between a Bundle or tow vessel and a Whale shark is considered low, given:

- Whale sharks predominantly aggregate to the west of North West Cape (Pillans et al. 2018) but do travel between the North West Cape and waters to the north east.
- Whale sharks are able to swim at relatively high speed and dive rapidly, thus allowing them to avoid an approaching vessel or Bundle.
- Bundle tow speeds will fall below 8 knots.
- An average of two, up to a maximum of three, Bundle launches will occur each year, so the likelihood of a Whale shark being present within the Offshore Operation Area during a tow is low.

Notwithstanding the above, Subsea 7 understands the local social significance of the Whale shark, and proposes to further reduce the risk of a collision through the use a 'Spotter Plane' during Bundle launches between the beginning of March and the end of July each year. The objectives of the 'Spotter Plane' are:

- Survey the tow route (between the southern boundary of Ningaloo Marine Park out to a distance of approximately 20 km off the North West Cape) prior to the Surface tow component of the tow.
- Record and report to the command vessel any Whale sharks (or other marine megafauna) present in the vicinity of the tow route and report their position and heading.
 - In the event of one or more Whale sharks being present within or adjacent to the tow route, maintain a visual as the tow proceeds and provide advice to the command vessel to allow avoidance measures to be implemented. Such measures may include a delay to the start of the Surface tow component of a tow or a slight change to the tow route, within the 2 km wide Offshore Operations Area (Surface tow), to maximise the temporal and/or spatial separation between Bundle tow vessels and Whale shark(s).

2.2 REPORTING PROVISIONS

2.2.1 Annual Reporting

Subsea 7 will prepare a Compliance Assessment Report (CAR) annually, for submission to the CEO of the Department of Water and Environmental Regulation (DWER). The format of these reports will be consistent with the approved Compliance Assessment Plan (CAP).

2.2.2 Reporting on Exceedance of Management Target

In the event that monitoring, tests, surveys or investigations indicate an exceedance of, or failure to meet, the marine fauna management targets specified in this management plan, Subsea 7 will:

Report the incident in writing to the CEO of DWER within 21 days of the incident being identified.

Investigate to determine the cause of the management targets being exceeded or not being met and the potential impact associated with the incident.

Provide a report to the CEO of DWER within 90 days of the exceedance being reported (or other time frame that may be agreed between Subsea 7 and DWER) that shall include:

- The cause of the management targets being exceeded or not being met.
- The findings of the investigations that was undertaken.
- Details of revised and/or additional management actions to be implemented to prevent future exceedance of the management targets.
- Relevant changes to the proposal activities.

2.2.3 Reporting of Management Actions not Being Implemented

In the event that one or more management actions have not been implemented as specified in this management plan, Subsea 7 will:

Report the failure to implement management actions in writing to the CEO of DWER within the annual CAR.

Investigate to determine the cause of the management actions not being implemented. Provide a report in the CAR that shall include:

- The cause for failure to implement management actions.
- The findings of the investigations that was undertaken.
- Relevant changes to proposal activities.
- Measures to prevent control or abate the environmental harm which may have occurred.

3. ADAPTIVE MANAGEMENT AND REVIEW OF MFMP

Adaptive management in relation to the MFMP will include the following:

- Monitor and evaluate the effectiveness of the management actions against the management targets.
- In the event one or more of the management targets (Section 2.2) has not been met, or is considered at risk of not being met, review and adjust the management measures and monitoring to ensure the objectives are met, based on what is learned from evaluation of the monitoring data, or any new data that becomes available.
- Review the assumptions in light of the monitoring data or any new data that becomes available.

The MFMP (this plan) will be formally reviewed following the initial Bundle launch, and updated as required.

4. STAKEHOLDER ENGAGEMENT

A number of meetings and briefings on the Proposal have been held with the local community, local, State and Federal government agencies, other industry participants, non-government organisations, Traditional Owner groups and the pastoralist.

A broad cross-section of community and service organisations local to Exmouth, including conservation groups, has also been contacted regarding the Proposal. The subjects of discussion have varied through the range of stakeholders, and valuable input has been gained for development of the environmental investigation programmes and design of the Proposal.

Table 12 presents a summary of the feedback provided by stakeholders considered of relevance to the MFMP. Note that this is not intended to be an exhaustive record of all questions and queries that were received during stakeholder engagement, but is intended to summarise themes of feedback received, and how this has been implemented or addressed.

STAKEHOLDERS	FEEDBACK RECEIVED	INCORPORATION OF FEEDBACK
<p>Cape Conservation Group. Protect Ningaloo Campaign. Conservation Council WA. Exmouth Community. Local Businesses, particularly Tourism Operators. DWER. DoEE.</p>	<p>Whale Interaction in Exmouth Gulf – concern was raised regarding the potential for whale interactions in Exmouth Gulf, particularly during the Southern Whale Migration.</p>	<p>Subsea 7, in advance of performing any public consultation or stakeholder engagement, mandated that no bundle launch and tow operations would occur during the peak of the southern whale migration and occupation of Exmouth Gulf.</p> <p>During the conduct of the environmental investigations, a contemporary study of the Humpback whale migration was commissioned by Subsea 7, to inform the proposed no-launch period. This period is now proposed as a 3 month window encompassing the months of August, September and October.</p> <p>As part of the impact assessment, research has also been commissioned to understand the potential reduction in marine use of the Exmouth Gulf by vessels directly connected to the offshore construction industry. This has shown that there are potentially large reductions in offshore vessel operations following the adoption of Bundle technology. This highlights that the adoption of new technology, such as Bundles, can lead to a net improvement in the environmental footprint associated with meeting the State's, and Australia's, energy demands.</p>
<p>Cape Conservation Group and local Sea Shepherd Member</p>	<p>Light spill and management – in this discussion, the potential for light spill from the Bundle site operations, and its potential impact, was raised</p>	<p>In response to this feedback, Subsea 7 has confirmed that the vast majority of site operations and construction activity would be performed during daylight hours, thereby limiting the lighting requirements for the site.</p> <p>To address the potential impact of light spill, mitigating measures have been proposed as part of the ERD, which include timed and directional lighting.</p>
<p>Cape Conservation Group. Protect Ningaloo Campaign. Conservation Council WA. Exmouth Community. Fishing Charter Business.</p>	<p>Towhead launching – during engagement, feedback was received expressing concern regarding the potential for towheads to impact the seabed during launch</p>	<p>Subsea 7 performed a 12 month engineering study with Bundle experts from their centre of excellence in Aberdeen, and driven by a highly respected Bundle Towmaster, to develop a specific launch and tow methodology for Bundles in Exmouth Gulf.</p> <p>As a result of the study, the potential for interaction between the towheads and seabed has been reduced, as well as the potential for seabed interaction from the launch tow tugs. Subsea 7's target is that towheads do not touch the seabed.</p>

STAKEHOLDERS	FEEDBACK RECEIVED	INCORPORATION OF FEEDBACK
Cape Conservation Group. Protect Ningaloo Campaign. Conservation Council WA. Ningaloo Coast World Heritage Committee. Exmouth Community. DWER. DoEE.	Potential impact to Ningaloo Reef – during stakeholder engagement, regular feedback was received that highlighted the importance of the Ningaloo marine area, noting that the Proposal included marine operations in the Ningaloo Marine Park	Initial feedback to stakeholders regarding this concern highlighted that the operations inside the Ningaloo Marine Park were limited to vessel movements and towing operations, which are broadly already undertaken safely and regularly for other operations and developments. To address the Bundle tow specifically, Subsea 7 commissioned an extensive engineering study to consider the tow of a Bundle through the Ningaloo Marine Park. The tow methodology was subsequently amended slightly to incorporate a 'surface tow' method for a Bundle when in the Ningaloo Marine Park. While the Proposal has never included any Bundle chain interaction with the seabed in this area, the inclusion of the 'surface tow' method increases the clearance between Bundle chains and the seabed, and therefore further reduces the low risk of potential impact.
Cape Conservation Group. Protect Ningaloo Campaign. Conservation Council WA. Shire of Exmouth. Exmouth Community. Jock Clough.	Gulf industrialisation – in general, opposition to the Proposal has voiced concern regarding the potential for the Proposal to lead to a general 'industrialisation' of Exmouth Gulf.	Subsea 7 has approached the Proposal with a planning strategy that considers the regional context. Subsea 7's scheme amendment request proposes a Special Use Zone. This recognises that the Proposal and technology is unique (only one other site exists in the world of its type). The re-zoning request concerns only the Development Envelope for this Proposal. The remainder of the nearby area would remain largely zoned for pastoralism, and be unable to be developed without further extensive planning and environmental approval processes. The Proposal also provides opportunity to reduce some aspects of "industrialisation" of Exmouth Gulf, by transferring pipeline installation operations from predominantly marine-based activities, to predominantly land-based activities, providing a net reduction in marine operations within Exmouth Gulf.
Cape Conservation Group. Protect Ningaloo Campaign. Conservation Council WA. Exmouth Community.	Leaks / spills in Exmouth Gulf – concern has been raised regarding the potential for leaks or spills to occur as a result of Bundle towing operations.	General concern has been raised regarding the potential for leaks or spills to occur in Exmouth Gulf during Bundle launch and tow operations. There was a general misunderstanding of the contents of the Bundles. The initial response has been to clarify that the pipelines do not contain hydrocarbons. A full, detailed assessment of the risk potential and consequences of a leak / spill has been undertaken and the outcomes included in the ERD.

STAKEHOLDERS	FEEDBACK RECEIVED	INCORPORATION OF FEEDBACK
Cape Conservation Group. Protect Ningaloo Campaign. Conservation Council WA. Exmouth Community.	Numerous comments and submissions referenced the Proposal as a 'gateway' project, which will lead to a subsequent increase in development and marine operations in the area.	<p>The Exmouth township was founded on the defence industry (both naval and air force defence), in combination with the fishing industry. Pastoralism has also been present throughout this time. Industry has been present in Exmouth Gulf for some time, and continues to be so today, so it is inaccurate to label this Proposal a gateway project.</p> <p>Exmouth Gulf is currently regularly utilised for commercial marine operations, as the majority of residents would realise. The Proposal represents an opportunity for the volume of marine operations in Exmouth Gulf, associated with offshore developments, to be reduced (refer Section 2.4.8.1).</p> <p>Subsea 7's approach for the proposed re-zoning of the site, under the Exmouth local planning scheme, was to request a Special Use Zone to ensure that the site is only able to be utilised for this Proposal. The re-zoning request applies only to the land that is required for this Proposal and would not facilitate other industrial developments.</p>

Table 12: Summary of Feedback relevant to the MFMP Provided by Stakeholders Between November 2016 and May 2019

5. REFERENCES

- 360 Environmental. 2018. Learmonth Level 1 Fauna Survey. Survey report prepared for Subsea7.
- Australian Broadcasting Association (ABC). 2014. Orcas eating baby whales helping World Heritage reef. Available from: <http://www.abc.net.au/local/photos/2014/10/24/4113841.htm>. Accessed 19 July 2017.
- Bejder, L., Allen, S., Brown, A., Cagnazzi, D., Organ, T. and Parra, G. 2011 North West Cape, Exmouth: A hotspot for Indo-Pacific humpback dolphins (*Sousa chinensis*) in Western Australia. In: 48th Annual Conference of the Australian Marine Science Association, 3 - 7 July, Fremantle, Western Australia.
- Biota Environmental Services Pty Ltd (Biota). 2005. Yannarie Salt Project Fauna Survey: Fauna and Fauna Assemblage Survey. Report prepared for Straits Salt Pty Ltd.
- Centre for Whale Research (CWR). 2004. Current State of Knowledge: Humpback Whale (*Megaptera novaeangliae*) Survey Report for Exmouth Gulf 1995-2004.
- Centre for Whale Research (CWR). 2005. Distribution and Abundance of Humpback Whales and Other Mega Fauna in Exmouth Gulf, Western Australia, During 2004/2005. Report prepared for Straits Resources, Perth.
- Department of Conservation and Land Management (CALM). 1999. North West Cape and Muiron Islands Marine Turtle Nesting Populations. Available at: <https://library.dbca.wa.gov.au/static/FullTextFiles/071610.pdf>.
- Department of the Environment and Energy (DoEE). 2015. Biologically Important Areas of Regionally Significant Marine Species. Available at: <http://www.environment.gov.au/fed/catalog/search/resource/details.page?uuid=%7B2ed86f5a-4598-4ae9-924f-ac821c701003%7D>.
- Department of the Environment and Energy (DoEE). 2016. Draft National Strategy for Mitigating Vessel Strike of Marine Mega-fauna.
- Department of the Environment and Energy (DoEE). 2017a. *Eubalaena australis* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: <http://www.environment.gov.au/sprat>. Accessed 17 July 2017.
- Department of the Environment and Energy (DoEE). 2017b. *Caretta caretta* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: <http://www.environment.gov.au/sprat>. Accessed 17 July 2017.
- Department of the Environment and Energy (DoEE). 2017c. Hawksbill turtle (*Eretmochelys imbricata*), Department of the Environment, Canberra. Available from: <http://www.environment.gov.au/marine/marine-species/marine-turtles/hawksbill>. Accessed 18 July 2017.
- Department of the Environment and Energy (DoEE). 2017d. *Natator depressus* — Flatback in Species Profile and Threats Database, Department of the Environment, Canberra. Available from:

http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=59257. Accessed 18 July 2017.

Department of the Environment and Energy (DoEE). 2017e. *Carcharias taurus* (west coast population) — Grey Nurse Shark in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=68752. Accessed 18 July 2017.

Department of the Environment and Energy (DoEE). 2017f. *Carcharodon carcharias* — White Shark, Great White Shark in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64470. Accessed 18 July 2017.

Department of the Environment and Energy (DoEE). 2017g. *Pristis clavata* — Dwarf Sawfish, in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=68447. Accessed 18 July 2017.

Department of the Environment and Energy (DoEE). 2017h. *Pristis zijsron* — Green Sawfish, in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=68442. Accessed 18 July 2017.

Department of the Environment and Energy (DoEE). 2017i. *Aipysurus apraefrontalis* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: <http://www.environment.gov.au/sprat>. Accessed Mon, 17 July 2017.

Department of the Environment and Energy (DoEE). 2018. National Conservation Values Atlas, Environmental Resources Information Network (ERIN). .

Department of the Environment, Water, Heritage and the Arts (DEWHA). 2011. National Conservation Values Atlas, Environmental Resources Information Network (ERIN).

Department of Fisheries (DoF). 2011. Fisheries Fact Sheet – Whale Shark. Department of Fisheries Series No. 22. ISSN 1834-9382

Department of Parks and Wildlife (DPaW). 2013. Whale shark management with particular reference to Ningaloo Marine Park, Wildlife management program no. 57, Department of Parks and Wildlife, Perth, Western Australia.

Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC). 2012. Marine bioregional plan for the North-west Marine Region.

Environmental Protection Authority (EPA). 2018. Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans. Environmental Protection Authority, Perth, Western Australia.

Holmberg, J., Norman, B. and Arzoumanian, Z. 2009. Estimating population size, structure, and residency time for whale sharks *Rhincodon typus* through collaborative photo-identification. *Endangered Species Research* 7: 39-53.

- Hoschke, A., M. and Whisson, G. J. 2016. First aggregation of grey nurse sharks (*Carcharias taurus*) confirmed in Western Australia. *Marine Biodiversity Records*, 9:17.
- Irvine, L. 2019. Marine Fauna Aerial surveys report.
- Irvine, L.G., Thums, M., Hanson, C.E., McMahon, C.R. and Hindell, M.A. 2018. "Evidence for a widely expanded humpback whale calving range along the Western Australian coast". *Marine Mammal Science*, 34(2): 294-310.
- James Cook University (JCU). 1994. Dugong Aerial Survey (cetacean, dugong, turtle) Exmouth and Ningaloo Reef, 1994.
- Jenner, K.C.S., Jenner, M-N. M. and McCabe, K. A. 2001. Geographical and temporal movements of Humpback Whales in Western Australian waters. *APPEA Journal*.
- Kangas, M., McCrea, J., Fletcher, W., Sporer, E. and Weir, V. 2006. Exmouth Gulf Prawn Fishery. ESD Report Series No. 1, January 2006.
- MBS Environmental. 2018. Exmouth Gulf Benthic Communities and Habitat Survey Report. November 2018.
- McCauley, R.D. and Jenner, C. 2010. Migratory patterns and estimated population size of pygmy blue whales (*Balaenoptera musculus brevicauda*) traversing the Western Australian coast based on passive acoustics. Paper submitted for consideration by the IWC Scientific Committee. SC/62/SH26.
- Meekan, M.G., Bradshaw, C.J.A., Press, M., Mclean, C., Richards, A., Quasnichka, S. and Taylor, J.G. 2006. Population size and structure of whale sharks *Rhincodon typus* at Ningaloo Reef, Western Australia. *Marine Ecology Progress Series* 319: 275-285.
- Morgan, D., Whitty, J., Allen, M., Ebner, B., Gleiss, A. & Beatty, S. 2016. Wheatstone Environmental Offsets - Barriers to sawfish migrations. A Freshwater Fish Group & Fish Health Unit (Centre for Fish & Fisheries Research, Murdoch University) report for Chevron Australia and the Western Australian Marine Science Institution.
- Norman, B. M. and Stevens, J. D. 2007. Size and maturity status of the whale shark (*Rhincodon typus*) at Ningaloo Reef in Western Australia. *Fisheries Research* 84 (2007) 81-86.
- Norman, B., Holmberg, J.A., Arzoumanian, Z., Reynolds, S.D., Wilson, R.P., Rob, D., Pierce S.J., Gleiss A.C., De la Parra, R., Glavan, B., Ranierz-Macias D., Robinson, D., Fox, S., Graham, R., Rowat, D., Potenski, M., Levine, M., McKinney, J.A., Hoffmayer, E., Dove, A.D.M., Hueter, R., Ponzo, A., Araujo, G., Aca, E., David, D., Rees, R., Duncan, A., Rohner, C.A., Prebble, C.E.M., Hearn, A., Acuna, D., Berumen, M.L., Vazquez, A., Green, J., Bach, S.S., Schmidt, J.V., Beatty, S.J., and Morgan, D.L. 2017. Undersea Constellations: The Global Biology of an Endangered Marine Megavertebrate Further Informed through Citizen Science. *BioScience* 67:1029-43.
- Oceanica. 2006. Yannarie Salt Project, Marine and Coastal Environment of the eastern Exmouth Gulf, Volume 1. Report prepared for Straits Salt Pty Ltd.
- Oceanwise. 2005. The Dugong (*Dugong dugon*) of Exmouth Gulf, Western Australia, prepared for Straits Salt Pty Ltd.

- Pierce, S.J. and Norman, B. 2016. *Rhincodon typus*. The IUCN Red List of Threatened Species 2016: e.T19488A2365291. Available from: <http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T19488A2365291.en>. Downloaded on 12 December 2018.
- Preen, A.R, Marsh, H., Lawler, I.R., Prince, R.I.T and Shepherd, R. 1997. 'Distribution and Abundance of Dugongs, Turtles, Dolphins and other Megafauna in Shark Bay, Ningaloo Reef and Exmouth Gulf, Western Australia'. Wildlife Research, 24 (2): 185-208.
- Reynolds, S.D., Norman, B.M., Beger, M., Franklin C.E., Dwyer R.G. 2017. Movement, distribution and marine reserve use by an endangered migratory giant. Diversity and Distributions, 23 (11). pp. 1268-1279. ISSN 1366-9516.
- Salgado Kent, C., Jenner, C., Jenner, M.m Bouchet, P. and Rexstad, E. 2012. Southern Hemisphere Breeding Stock D humpback whale population estimates from North West Cape, Western Australia". Journal of Cetacean Research and Management. 12(1): 29-38.
- Sleeman, J.C., Meekan, M.G., Wilson, S.G., Polovina, J.J., Stevens, J.D., Boggs, G.S. and Bradshaw, C.J.A. 2010. To go or not to go with the flow: Environmental influences on whale shark movement patterns. Journal of Experimental Marine Biology and Ecology 390: 84-98.
- Straits. 2006. Yannarie Solar Environmental Review and Management Programme. November 2006.
- Subsea 7. 2019. Learmonth Pipeline Fabrication Facility APFAC017: Public Environmental Review.
- Wild Me. 2016. Wildbook for Whale Sharks. Available at: <http://www.whaleshark.org>.