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Operational and Scientific Monitoring

Bridging Implementation Plan

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Part A – Preparedness

This Plan is presented in two parts:

- **Part A** outlines the relationship between Chevron Australia Pty Ltd.'s (CAPL) environmental management document framework and the Joint Industry Operational and Scientific Monitoring (OSM) Framework (Ref. 1).
- **Part B** provides operationally focussed guidance for CAPL's personnel and OSM Service Providers and subcontracted Monitoring Service Providers to coordinate the implementation of monitoring plans.

1 Introduction

OSM is a key component of the environmental and emergency management document framework for offshore petroleum activities, which also include an Environment Plan (EP) and Oil Pollution Emergency Plan (OPEP). Operational Monitoring (OM) is instrumental in providing situational awareness of a hydrocarbon spill, enabling Emergency Management Teams (EMT) to mount a timely and effective spill response and continually monitor the effectiveness of the response. Scientific Monitoring (SM) is also the principle tool for determining the extent, severity and persistence of environmental impacts from a hydrocarbon spill and for informing resultant remediation activities.

CAPL has elected to use the Joint Industry OSM Framework and supporting operational monitoring plans (OMPs) and scientific monitoring plans (SMPs) (as per Appendix H) as the foundation of its OSM approach. The Joint Industry OSM Framework (Ref. 1) is available on the AEP Environment Publications Webpage.

As outlined in NOPSEMA's Regulatory Advice Statement (RAS) regarding AEPs Joint Industry OSM Framework, each Titleholder is required to develop a Bridging Implementation Plan (this document) that explains how the Framework aligns with their activities, oil spill risks and internal management systems. This plan and the Appendix titled 'Operational and Scientific Monitoring Assessment' in each activity Environment Plan fulfils that requirement.

Appendix A provides guidance on the RAS requirements and reference to the relevant section of this document (or the broader suite of environmental management framework documents) which addresses that requirement.

Table 1-1 lists the key documents that form CAPL's environmental and emergency management document framework. Note: This is not an exhaustive list and additional documents are listed in the ABU Consolidated OPEP (Ref. 2).

Mobilisation of OSM should follow the process listed in Part B: Section 12 Mobilisation and Activation Process.

Table 1-1: Key documents in CAPL's environmental management framework

Document	Description
CAPL activity specific Environment Plans (EP)	These plans describe the activity and the location, the environment, the risks to the environment as a result of the activity and the associated management controls. Of particular relevance to this plan, the activity specific EPs identify credible spill scenarios, sensitive receptors and priorities for protection, potential impacts from hydrocarbon spills and the

Document	Description
	environment that may be affected (EMBA) and response option selection. All of CAPL's EP activities and spill risks have been taken into account in the development of this OSM-BIP. New activities, or changes to existing activities, will include an assessment in each activity-specific EP (as outlined in Appendix B) to determine if the OSM Planning Area, priority monitoring locations and capability requirements are adequately covered by this OSM-BIP. Activities that result in a spill risk that exceeds the capability described in this OSM-BIP will trigger the need for a review of this document (refer to Section 11).
ABU Consolidated OPEP (Ref. 2)	The ABU Consolidated OPEP (Ref. 2) outlines preparedness and response arrangements for worst-case credible spill scenarios described in the activity specific EPs. It describes the relevant oil spill emergency response arrangements and capabilities that are in place for Chevron's ABU activities, details the arrangements and capabilities in place to monitor, evaluate, and survey oil pollution to inform response options and describes response strategies and the appropriateness of available response strategies for the different spill scenarios applicable to CAPL operations. The plan also provides response implementation guidance for each response strategy.
ABU Emergency Response Plan (ERP) (Ref. 3)	This ERP describes the emergency management, governance, and coordination arrangements for the Perth EMT (PEMT) for emergency incidents across the ABU. It also bridges to all activity-specific ERPs (Wheatstone Upstream, Wheatstone LNG Plant, Barrow Island) which describe the emergency management system in place to prevent or mitigate emergency situations; maintain preparedness; respond to incidents safely, rapidly, and effectively; and restore or resume affected operations.
ABU Oil Spill Response Manual (OSRM) (Ref. 4)	The ABU OSRM provides a framework for oil spill response across all CAPL operations, projects, assets, and activities. The OSRM centralises procedures for oil spill response management and is an overarching document that supports the development of CAPLs OPEP. The OSRM is intended for use by Installation EMTs (IEMTs) and the Asset EMT to support oil spill response management and decision-making.
ABU Emergency Contacts Directory (Ref. 5)	This document contains all relevant contact and communications information to enable effective communication amongst the response personnel and external stakeholders, including relevant OSM contacts.

1.1 Scope

This OSM-BIP addresses the requirements of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 and Western Australian Petroleum (Submerged Lands) (Environment) Regulations 2012 for all CAPL activities within the North West Shelf of Western Australia. This includes all activities which have an EP accepted by Commonwealth and State regulators. This Plan supersedes CAPL's Operational and Scientific Monitoring Plan.

This OSM-BIP provides direction and guidance to Level 2 and 3 marine hydrocarbon releases to marine or coastal waters from assets / activities within the north-west region of WA that are under the operational control of the ABU. A summary of CAPL's activities is provided in the ABU Consolidated OPEP (Ref. 2).

For all new activities, there are three main steps for assessing whether this OSM-BIP adequately covers the OSM requirements. These include the following, and are summarised in Appendix B:

1. Determine if the activity specific OSM Exposure Area fits within the Combined OSM Planning Area, as outlined in Section 2.1.
2. Determine activity-specific monitoring priorities and tier rankings for the first 14 days of the spill scenario, in accordance with the tiered prioritisation hierarchy described in Section 2.2
3. Determine whether the capability requirements and monitoring arrangements of the new activity exceed or are met by the capability requirements outlined in Section 8 and capability arrangements described in Sections 9 and 10.

Prior to submission for regulatory approval, each new/revised EP shall assess whether the OSM-BIP adequately covers the OSM requirements as per the three elements described above. If additional operational and/or scientific monitoring capability is required for a new activity above the OSM capability described in Sections 9 and 10, the CAPL EP Management of Change (MoC) process will be followed prior to submission and the OSM-BIP will be updated with the new capability requirements before the activity commences.

CAPL will implement OSM, as applicable, for oil spills across both State and Commonwealth waters. In the event that control of scientific monitoring in WA State waters is taken over by the Western Australian Department of Transport and Major Infrastructure (WA DTMI) under advice from the State Environmental Scientific Coordinator (ESC), CAPL will follow the direction of WA DTMI as Control Agency and provide all necessary resources (monitoring personnel, equipment and planning) to assist as a supporting agency.

2 OSM Planning Area and Monitoring Priorities

2.1 OSM Planning Area

This OSM-BIP provides monitoring guidance and arrangements for all CAPL activities in Western Australia. Therefore, a Combined OSM Planning Area (hereafter referred to as OSM Planning Area) has been prepared to represent the geographical extent of this OSM-BIP. The OSM Planning Area is the area within which OSM activities may be required and is determined using stochastic modelling outputs at the Tier 3 (low) applying the following exposure values:

- 1 grams per square metre (g/m^2) floating oil thickness, which is considered to be below levels which would cause environmental harm and is more indicative of the areas perceived to be affected due to its visibility on the sea-surface
- 10 g/m^2 for accumulated (shoreline) hydrocarbons, which represents the area visibly contacted by the spill
- 10 parts per billion (ppb) for dissolved hydrocarbons, which corresponds generally with potential for exceedance of water quality triggers
- 10 ppb entrained hydrocarbons represents the low exposure zone and corresponds generally with potential for exceedance of water quality triggers.

The OSM Planning Area is based on the above low thresholds as outlined in the NOPSEMA Information Paper: Application of oil spill modelling in Environment Plans (Ref. 6). However, the Environment that May Be Affected (EMBA) for each of the activities covered by this OSM-BIP may be defined by other thresholds, as presented in each relevant EP. The OSM Planning Area (all based on the low thresholds) can be considered as the absolute outer limit of OSM efforts.

The OSM Planning Area has been determined based on the worst-case credible spill scenarios outlined in Table 2-1 and overlaying the activity specific OSM Exposure Areas and identifying the combined outer boundary. These spill scenarios are considered representative of CAPL's worst-case credible scenarios given the hydrocarbon type, proximity to receptors, minimum time to contact and their representation of CAPL's activity locations within the North West Shelf of Western Australia.

Each activity-specific EP will contain an OSM Assessment Appendix, which will confirm that the activity-specific OSM Exposure Area (derived from the activity's worst-case credible spill modelling at the Tier 3 exposure values) fits within the Combined OSM Planning Area. Where an activity-specific OSM Exposure Area does not fit within the Combined OSM Planning Area, this is identified in the activity-specific EP and triggers an update to this OSM-BIP.

The Description of the Environment – Operational and Scientific Monitoring Planning Area (Appendix G) describes the specific environmental receptors, values and sensitivities relevant to the OSM Planning Area. This includes the following pertinent information: protected matters and any associated recovery plans/conservation advice, key ecological features (KEFs), protected areas, significant socio-economic industries, and culturally significant places.

Table 2-1: CAPL's worst-case spill scenarios used to determine the planning area for OSM for the North West Shelf region

Environment Plan	Hydrocarbon Type	Scenario	Release Duration	Volume (m^3)	Receptors predicted by stochastic modelling to be contacted ≥10% probability within 14 days
Gorgon Domestic Gas Pipeline Commissioning, Start-up and Operations EP (GOR-COP-0660)	Marine Diesel Oil (MDO) (Group 2)	Surface MDO release at KP0	6 hours	315	**Contacted 0–7 days** Montebello AMP*+ Barrow Island MP*+ Montebello Islands MP*+ Barrow Island NR Boodie, Double Middle Islands NR Lowendal Islands NR+ Montebello Shoals*+ Poivre Reef*+ **Contacted 7–14 days** Nil
	MDO (Group 2)	Surface MDO release at KP50	6 hours	315	**Contacted 0–7 days** Barrow Island MP*+ Airlie Island NR+ Great Sandy Island NR North Sandy Island NR+ Thevenard Island NR+ Ashworth Shoal*+ Barrow Island Reefs and Shoals*+ Brewis Reef*+ Cod Bank*+ Eliassen Rocks*+ Flinders Shoal*+ Fortescue Reef*+ Herald Reef*+ Lightfoot Reef*+

Environment Plan	Hydrocarbon Type	Scenario	Release Duration	Volume (m^3)	Receptors predicted by stochastic modelling to be contacted ≥10% probability within 14 days
					Little Shoals*+ Mardie Rock*+ McLennan Bank*+ Meda Reef*+ Moresby Shoals*+ Nares Rock*+ O'Grady Shoal*+ Ripple Shoals*+ Sultan Reef*+ Taunton Reef*+ Trap Reef*+ Weeks Shoal*+ West Reef*+ **Contacted 7–14 days** Serrurier Island NR+ Australind Shoal*+ Baylis Patches*+ Dailey Shoal*+ Glennie Patches*+ Gorgon Patch*+ Hastings Shoal*+ Hayman Rock*+ Inner Northwest Patch*+ Koolinda Patch*+ Locker Reef*+ Miles Shoal*+ North West Reef*+ Outer Northwest Patch*+ Paroo Shoal*+

Environment Plan	Hydrocarbon Type	Scenario	Release Duration	Volume (m^3)	Receptors predicted by stochastic modelling to be contacted ≥10% probability within 14 days
					Poivre Reef*+ Roller Shoal*+ Rosily Shoals*+ Saladin Shoal*+ Santo Rock*+ South West Reef*+ Spider Reef*+ Tongue Shoals*+ Web Reef*+
Wheatstone Project Start-up and Operations Environment Plan (WS2-COP-00001)	Trunkline Condensate (Group 1)	Subsea nearshore trunkline major defect	25 hours	3,000	**Contacted 0–7 days** Airlie Island Ashburton Ashburton Island Bessieres Island Direction Island+ Exmouth+ Flat Island+ Fly Island+ Locker Island+ Muiron Island+ Observation Island Peak Island+ Rivoli Islands+ Round Island Serrurier Island+ Sunday Island+ Table Island Thevenard Island Tortoise Island

Environment Plan	Hydrocarbon Type	Scenario	Release Duration	Volume (m^3)	Receptors predicted by stochastic modelling to be contacted ≥10% probability within 14 days
					Australind Shoal* Baylis Patches* Brewis Reef* Combe Reef*+ Curlew Bank* Dailey Shoal*+ Exmouth Reef*+ Fairway Reef* Glennie Patches* Gorgon Patch* Hastings Shoal* Hayman Rock* Hood Reef*+ Inner Northwest Patch* Koolinda Patch*+ Little Shoals*+ Locker Reef* Manicom Bank*+ Miles Shoal* North West Reef*+ Otway Reef*+ Outtrim Patches*+ Paroo Shoal* Ripple Shoals*+ Roller Shoal* Rosily Shoals*+ Saladin Shoal* Santo Rock* Southwest Patch*+ Spider Reef*

Environment Plan	Hydrocarbon Type	Scenario	Release Duration	Volume (m^3)	Receptors predicted by stochastic modelling to be contacted ≥10% probability within 14 days
					Sultan Reef* Taunton Reef*+ Tongue Shoals* Trap Reef*+ Ward Reef* Web Reef*+ Weeks Shoal*+ **Contacted 7–14 days** Nil
	Trunkline Condensate (Group 1)	Subsea mid-trunkline major defect	7 hours	4,000	**Contacted 0–7 days** Nil **Contacted 7–14 days** Nil
	MDO (Group 2)	Surface MDO release within Montebello Marine Park	24 hours	1,063	**Contacted 0–7 days** Nil **Contacted 7–14 days** Nil
Gorgon and Jansz Feed Gas Pipeline and Wells Operations EP (GOR-COP-0902)	MDO (Group 2)	Surface MDO release at Jansz	24 hours	1,750	**Contacted 0–7 days** Gascoyne AMP*+ **Contacted 7–14 days** Nil
	MDO (Group 2)	Surface MDO release at Gorgon	24 hours	1,500	**Contacted 0–7 days** Gascoyne AMP*+ Ningaloo AMP*+ **Contacted 7–14 days** Nil
	MDO (Group 2)	Surface MDO release at State/	24 hours	450	**Contacted 0–7 days** Montebello AMP*

Environment Plan	Hydrocarbon Type	Scenario	Release Duration	Volume (m^3)	Receptors predicted by stochastic modelling to be contacted ≥10% probability within 14 days
		Commonwealth waters boundary			Montebello Islands Barrow Island MMA and MP* Barrow Island Boodie Island Lowendal Island Middle Island Bessieres Island Boodie Island Flat Island Muiron Islands Peak Island Round Island Serrurier Island Sunday Island Table Island Thevenard Island Dailey Shoal*+ Hood Reef*+ Outtrim Patches*+ Brewis Reef*+ Ningaloo Reef*+ Otway Reef*+ Montebello Shoals* Rosily Reef*+ Trap Reef*+ Penguin Bank*+ Poivre Reef*+ Tryal Rocks*+ **Contacted 7–14 days** Nil

Environment Plan	Hydrocarbon Type	Scenario	Release Duration	Volume (m^3)	Receptors predicted by stochastic modelling to be contacted ≥10% probability within 14 days
	Jansz Condensate (Group 1)	Subsea release resulting from major defect at Jansz release location	7.2 hours	276	**Contacted 0–7 days** Nil **Contacted 7–14 days** Nil
	Jansz Condensate (Group 1)	Subsea release resulting from major defect at Jansz Scarp release location	5.8 hours	388	**Contacted 0–7 days** Nil **Contacted 7–14 days** Nil
	Jansz Condensate (Group 1)	Subsea release resulting from major defect at Jansz nearshore release location	12.17 hours	529	**Contacted 0–7 days** Montebello AMP* Montebello Islands **Contacted 7–14 days** Nil
	Gorgon Condensate (Group 2)	Subsea release resulting from major defect at Gorgon release location	4.67 hours	494	**Contacted 0–7 days** Montebello AMP* Montebello Islands Barrow Island **Contacted 7–14 days** Nil
Wheatstone Project – Well Intervention and Infill Drilling EP (ABU-COP-02222)	Iago Condensate (Group 1)	Release at IAG-1E well	90 days	376,323	**Contacted 0–7 days** Gascoyne AMP* Montebello AMP* Montebello Islands MP* Ningaloo AMP & MP* Barrow Island MP & MMA* Muiron Islands MMA & Nearshore* Brewis Reef* Combe Reef*+

Environment Plan	Hydrocarbon Type	Scenario	Release Duration	Volume (m^3)	Receptors predicted by stochastic modelling to be contacted ≥10% probability within 14 days
					Dailey Shoal* Fairway Reef* Hood Reef* Otway Reef* Outtrim Patches* Penguin Bank* Poivre Reef* Rankin Bank* Rosily Shoals*+ Tryal Rocks* Bessieres Island Flat Island Observation Island Peak Island Round Island Serrurier Island Sunday Island Table Island **Contacted 7–14 days** Thevenard Island Barrow Island Beryl Reef*+ Exmouth Reef*+ Hayman Rock*+ Locker Reef*+ Montebello Shoals* Ningaloo Reef* Pearl Reef*+ Santo Rock*

Environment Plan	Hydrocarbon Type	Scenario	Release Duration	Volume (m^3)	Receptors predicted by stochastic modelling to be contacted ≥10% probability within 14 days
					Spider Reef* Sultan Reef* Taunton Reef*+ Trap Reef* Web Reef*+ Boodie Island+ Airlie Island+ Exmouth (Nearshore)+ Fly Island+ Lowendal Island+ Montebello Islands+ Rivoli Islands+ Tortoise Island*
Gorgon and Jansz–Io Drilling Completions Well Maintenance EP (ABU140800133)	Gorgon Condensate (Group 2)	Subsea release at GOR-1A well	90 Days	74,677 (829.8 m^3/day)	**Contacted 0–7 days** Barrow Island Boodie Island Exmouth Middle Island Muiron Islands & Muiron Islands MMA* Gascoyne AMP* Montebello AMP, MP & Shoals* Ningaloo AMP, MP & Reef* Barrow Island MMA & MP* Dailey Shoal* Hood Reef* North West Reef* Outtrim Patches* Penguin Bank* Poivre Reef*+

Environment Plan	Hydrocarbon Type	Scenario	Release Duration	Volume (m^3)	Receptors predicted by stochastic modelling to be contacted ≥10% probability within 14 days
					Rankin Bank* Rosily Shoals* Trap Reef*+ Tryal Rocks* Airlie Island+ Bessieres Island Flat Island Peak Island Round Island Serrurier Island Sunday Island Table Island **Contacted 7–14 days** Thevenard Island+ Montebello Islands+
Gorgon Gas Development Geryon and Eurytion Drilling Environment Plan (GS3-UD00-RGL-PLN-CVX-000-00001-00)	Geryon Condensate (Group 2)	1,220 m subsea release at Geryon and Eurytion (G&E) drill centre	90 days	48,862	**Contacted 0–7 days** Gascoyne AMP*+ Rankin Bank*+ **Contacted 7–14 days** Montebello AMP*+ Muiron Islands MMA*+ Ningaloo MP*+ Ningaloo Coast World Heritage Area+ Tryal Rocks*+ Muiron Islands Serrurier Island

Environment Plan	Hydrocarbon Type	Scenario	Release Duration	Volume (m^3)	Receptors predicted by stochastic modelling to be contacted ≥10% probability within 14 days
	MDO (Group 2)	Surface release (vessel collision) at the G&E drill centre	24 hours	2,350	**Contacted 0–7 days** Gascoyne AMP*+ **Contacted 7–14 days** Ningaloo Coast World Heritage Area+ Ningaloo MP*+
Gorgon Gas Development – Backfill Fields – Offshore Project Proposal (OPP) (SSF-0000-ADM-PLN-CVX-000-00001-00)	Chrysaor Condensate (Group 2)	800 m subsea release at Chrysaor and Dionysus (C&D) drill centre	90 days	18,715	**Contacted 0–7 days** Gascoyne AMP*+ Montebello AMP*+ Ningaloo AMP*+ Ningaloo Coast World Heritage Area Barrow Island MMA*+ Muiron Islands MMA*+ Montebello Islands MP*+ Ningaloo MP*+ Montebello Shoals*+ Ningaloo Reef*+ Rankin Bank*+ Tryal Rocks*+ Exmouth Muiron Islands **Contacted 7–14 days** Montebello Islands Outtrim Patches*+ Peak Island+ Sunday Island+

Environment Plan	Hydrocarbon Type	Scenario	Release Duration	Volume (m^3)	Receptors predicted by stochastic modelling to be contacted ≥10% probability within 14 days
Legacy Wellhead Decommissioning EP (ABU230600356)	MDO (Group 2)	Surface release (vessel collision) at the Blake 1 well location	6 hours	500	**Contacted 0–7 days** Gascoyne AMP*+ **Contacted 7–14 days** Nil
	MDO (Group 2)	Surface release (vessel collision) at the Satyr 5 well location	6 hours	500	**Contacted 0–7 days** Gascoyne AMP*+ **Contacted 7–14 days** Nil
	MDO (Group 2)	Surface release (vessel collision) at the Jansz CDU location	6 hours	607	**Contacted 0–7 days** Gascoyne AMP*+ **Contacted 7–14 days** Nil
	MDO (Group 2)	Surface release (vessel collision) at the Gorgon CDU location	6 hours	607	**Contacted 0–7 days** Gascoyne AMP*+ Ningaloo MP*+ **Contacted 7–14 days** Nil
	MDO (Group 2)	Surface release (vessel collision) at the Wheatstone-2 location	6 hours	500	**Contacted 0–7 days** Rankin Bank*+ **Contacted 7–14 days** Gascoyne AMP*+

** submerged receptor*

+ receptor only contacted by entrained hydrocarbons

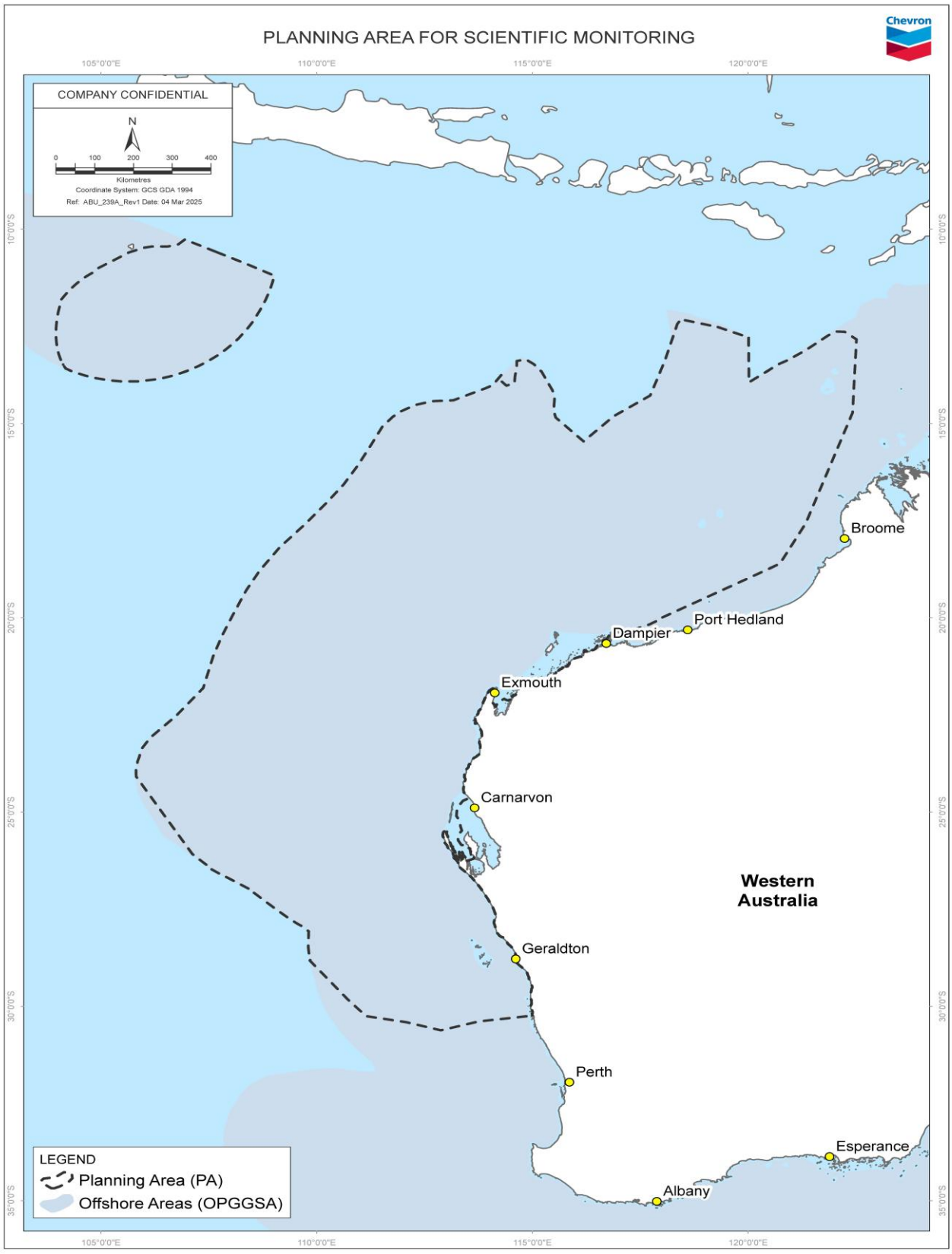


Figure 2-1: CAPL OSM Planning Area

2.2 Monitoring Priorities

Monitoring prioritisation during a spill will focus on sensitive receptors with the highest risk of adverse consequences and where oil spill modelling predicts high probability of rapid contact and at higher exposure values. Two inputs drive this prioritisation:

- *receptor sensitivity* - which captures the ecological, cultural and socio-economic value of a receptor and its vulnerability to hydrocarbon exposure; and
- *modelled exposure* - which captures the probability, timing, concentration (and in some cases persistence) of hydrocarbon contact predicted by oil spill modelling.

CAPL identifies sensitive receptors with high conservation, ecological, or socioeconomic value through its Oil Spill Protection Prioritisation Process (PPP) (Ref. 7), which ranks receptors according to their sensitivity and vulnerability to oil, conservation status, and biological and socioeconomic importance. The PPP generally aligns with the Western Australian DTMI Marine Oil Pollution Risk Assessment Protection Priorities Programme (Ref. 8). The CAPL PPP and the DTMI PPP differ in one respect, in their treatment of broad-scale features. The DTMI PPP assigns each shoreline cell a single overall ranking, taken as the highest ranking across its five categories (including Protection Areas, which covers marine protected areas, KEFs, wetlands and coastal habitats), so every intersecting broad-scale feature is embedded within that cell's ranking. The CAPL PPP retains this embedding for BIAs, through the fauna ranks, but ranks marine protected areas, KEFs, World Heritage Properties and Ramsar wetlands as conservation estates in their own right, giving a finer-grained representation of the receptors nested within large conservation estates. How these features are reflected in the monitoring prioritisation is described in Section 2.2.3.

Oil spill modelling provides a useful tool in assessing monitoring priorities, as it predicts the minimum time to contact, hydrocarbon concentration and exposure duration at each receptor for the worst-case credible spill scenarios. High PPP ranked receptors with a higher probability of rapid contact at higher exposure values will be the priority of a monitoring program, compared to similar sensitive receptors with a lower probability and longer time to contact, and at lower exposure values, where time may permit the collection of reactive (post-spill but pre-contact) baseline data. CAPL applies these two inputs through the structured tiered prioritisation hierarchy described below, which combines exposure value, probability of contact and time to contact into three monitoring priority base tiers, which is then further refined by receptor sensitivity, pathway vulnerability and baseline data adequacy.

At the time of a spill, CAPL will work with its OSM Services Provider, sub-contracted Monitoring Service Providers and key stakeholders in the initial stages of the spill to confirm the tier ranking of the activity-specific monitoring priorities, finalise the monitoring design, and allocate resources appropriately and according to the greatest risk of impact. As the spill evolves and actual exposure data becomes available, the tier ranking may be promoted or demoted through continual re-evaluation (refer to Sections 13 and 18), ensuring monitoring effort remains directed where it is most needed.

2.2.1 Approach to Prioritisation

Monitoring priorities under this OSM-BIP are identified through a tiered prioritisation hierarchy, which transitions from the Combined OSM Planning Area (the absolute outer limit of OSM efforts, defined at the exposure values referred to in Section 2.1) to a defined list of activity-specific receptors at which OM and SM efforts will be focused during the initial 14 days of a spill response, which is the period during which mobilisation urgency is greatest and short contact times constrain operational decisions. The hierarchy reflects the principle that the exposure values referred to in Section 2.1 delineate the area within which monitoring may be needed, whereas the values referred to in Table 2-2 identify where monitoring is needed to support active response decisions and to characterise the locations of potentially higher predicted environmental impact.

The hierarchy is structured around three base tiers, each tied to exposure values (Table 2-2) and the predicted spill footprint produced by stochastic modelling. The criteria for base tier assignment are presented in Table 2-2, and the additional criteria that may promote or demote a receptor between tiers are presented in Table 2-3. The hierarchy approach is presented in this OSM-BIP and the activity-specific tier ranking for each receptor is confirmed in the activity-specific EP's relevant Appendix (Operational and Scientific Monitoring Assessment).

The tiered hierarchy provides the EMT with the spatial and exposure-based information required to support operational NEBA decisions during the initial stages of the spill.

Note: For some activities, stochastic modelling may predict no receptors meet the Tier 1 or 2 criteria, for example, no receptor is predicted to be contacted at the exposure values for medium and high monitoring priorities within 14 days at ≥10% probability. In such cases, the activity-specific EP will only list Tier 3 receptors. However, in the event of a spill, CAPL and its OSM Services Provider will still activate and mobilise monitoring resources to Tier 3 receptors in the absence of any higher ranked receptors.

The decision logic for assigning receptors to a monitoring priority tier is summarised in the flowchart in Figure 2-2.

2.2.2 Base Monitoring Prioritisation Criteria

2.2.2.1 Tier 1 – High Monitoring Priority

Definition: Tier 1 receptors are those predicted to be contacted at the Tier 1 exposure values listed in Table 2-2 within 14 days at a probability ≥10%. These receptors are the EMT and OSM Services Provider's primary focus during initial response, where the modelled exposure is greatest and active spill response strategies (protection, deflection, shoreline clean-up, dispersant application) are both feasible and likely to deliver net environmental benefit.

Monitoring focus: Operational monitoring at Tier 1 receptors is co-located with active response strategies and supports the EMT in confirming that those strategies are delivering the intended benefit. The principal OMPs activated at Tier 1 receptors are likely to include:

- OM1: Hydrocarbon Characterisation
- OM2: Hydrocarbon in Water Assessment where containment and recovery or shoreline protection booms are being used, and also adjacent to active response sites;

- OM3: Hydrocarbon in Sediment Assessment at locations where there is likely to be sediment exposure (i.e. where high dissolved and entrained exposures are predicted);
- OM4a / OM4b: Surface and Subsea Dispersant Effectiveness Monitoring at locations where dispersant strategies are being applied;
- OM5: Rapid Marine Fauna Surveillance at known fauna concentration areas within the active response footprint and/or where oiled wildlife response activities are occurring;
- OM6: Shoreline Clean-up Assessment at protection priority planning areas contacted and targeted for shoreline protection or clean-up; and
- OM7: Air Quality Modelling adjacent to active response and OSM sites.

Scientific monitoring (relevant SMPs) is mobilised at Tier 1 receptors when SMP initiation criteria are met, to characterise impact and support recovery monitoring.

2.2.2.2 Tier 2 - Medium Monitoring Priority

Definition: Tier 2 receptors are those predicted to be contacted at the Tier 2 exposure values listed in Table 2-2 within 14 days at a probability ≥10%.

Monitoring focus: Operational monitoring at Tier 2 receptors provides data the EMT requires to assess the overall benefit of response options, particularly decisions to apply, modify or terminate response activities and to direct response resources to protect higher tier receptors. The principal OMPs likely to be activated at Tier 2 receptors are:

- OM1: Hydrocarbon Characterisation
- OM2: Hydrocarbon in Water Assessment, particularly at locations within the predicted moderate dissolved or entrained exposure footprint;
- OM3: Hydrocarbon in Sediment Assessment at locations where there is likely to be sediment exposure (i.e. where moderate dissolved and entrained exposures are predicted);
- OM5: Rapid Marine Fauna Surveillance at known fauna concentration areas within the predicted moderate exposure footprint; and
- OM6: Shoreline Clean-up Assessment at protection priority planning areas contacted and targeted for shoreline protection or clean-up.

Scientific monitoring (relevant SMPs) is mobilised at Tier 2 receptors when SMP initiation criteria are met, to characterise impact and support recovery monitoring.

2.2.2.3 Tier 3 - Low Monitoring Priority

Definition: Tier 3 receptors are those predicted to be contacted at the Tier 3 exposure values listed in Table 2-2 within 14 days at a probability ≥10%. At these exposure values, ecological impact is generally unlikely for most receptors, with the exception of particularly sensitive biological receptors (e.g. coral and fish larvae) that may be vulnerable to hydrocarbon concentrations at these values. Tier 3 receptors are likely to be the focus of scientific monitoring (rather than operational monitoring), given the low predicted exposure does not generally support active response strategies but does require post-impact characterisation and recovery monitoring.

Monitoring focus: SMPs activated at Tier 3 receptors are selected by the OSM Services Provider in consultation with CAPL and key stakeholders, based on the receptor type and the hydrocarbon phase to which exposure has been predicted (e.g. SM3: Intertidal and Coastal Habitat Assessment for shoreline contact; SM6: Benthic Habitat Assessment for benthic contact; SM7: Marine Fish and Elasmobranch Assemblages Assessment for fish-related exposure; SM8: Fisheries Impact Assessment for socio-economic exposure; SM9 / SM10: Heritage Features Assessment / Social Impact Assessment for heritage and cultural values). Mobilisation is phased to align with predicted contact times and is informed by surveillance and OM results, which may refine the tier ranking in real time (refer to Section 13 and Section 18.1).

Table 2-2: Base tier criteria for the monitoring prioritisation hierarchy

Base tier	Exposure value criterion	Probability and time criterion	Primary monitoring focus
Tier 1 High monitoring priority	Receptor contacted at the following exposure values: • floating ≥50 g/m² • shoreline ≥1,000 g/m2 • entrained ≥1,000 ppb • dissolved ≥300 ppb	≥10% probability within 14 days	OM aligned to active response (OM1, OM2, OM3, OM4a/b, OM5, OM6, OM7); SM mobilised according to initiation criteria
Tier 2 Medium monitoring priority	Receptor contacted at the following exposure values: • floating ≥10 g/m² • shoreline ≥100 g/m² • entrained ≥100 ppb • dissolved ≥50 ppb	≥10% probability within 14 days	OM informing NEBA (OM1, OM2, OM3, OM4a/b, OM6); SM mobilised according to initiation criteria
Tier 3 Low monitoring priority	Receptor contacted at the following exposure values: • floating ≥1 g/m² • shoreline ≥10 g/m² • entrained ≥10 ppb • dissolved ≥10 ppb	≥10% probability within 14 days	Predominantly SM; socio-economic focus, phased mobilisation; characterisation and recovery focus

2.2.3 Additional Monitoring Prioritisation Criteria

Additional monitoring prioritisation criteria are applied as a second-stage assessment that supplements (rather than replaces) the base monitoring tier. The additional criteria reflect that exposure value alone is not sufficient to determine monitoring priority; receptor sensitivity, vulnerability to a specific exposure pathway and baseline data adequacy all influence the overall initial monitoring priority. Where the additional criteria warrant promotion, the receptor's tier is typically refined by one tier only (for example, from base Tier 3 to refined Tier 2, or from base Tier 2 to refined Tier 1). The application of these additional criteria within the tier-ranking process is shown as Steps 3A and 4A in Figure 2-2.

The CAPL PPP[1] (Ref. 7) assigns each receptor a Protection Priority ranking on a five-level scale (1 = Very Low to 5 = Very High), determined separately for floating (surface) and dissolved hydrocarbons, and derived from the receptor's threatened or conservation status under the Environment *Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) and the Biodiversity Conservation Act 2016 (WA) (BC Act), its sensitivity and behavioural vulnerability to each oil phase, its biological importance (with breeding, nesting and resident areas ranked above migratory or transient use), its economic and social value, and its recovery potential. The floating and dissolved PPP rankings for each receptor are provided in Appendix C.

Broad-scale features within the OSM Planning Area are reflected in the monitoring prioritisation according to how the CAPL PPP (Ref. 7) ranks them. Biologically Important Areas (BIAs) are incorporated into the relevant fauna ranking. A BIA is listed as a monitoring priority in its own right, at the tier its modelled exposure warrants against the base criteria (Table 2-2), and is assigned the CAPL PPP fauna ranking (Ref. 7) for the species' listing status under the EPBC Act and its life cycle or behaviour grouping. This includes BIAs contacted only at the Tier 3 base exposure values, which are listed as Tier 3; where several BIAs of the same species and behaviour are contacted only at these values, the activity-specific EP may group them in a single row. Habitat critical to the survival of marine turtles (HCTS) identified in the Recovery Plan for Marine Turtles in Australia (Ref. 16) is treated in the same way as BIAs. As HCTS for marine turtles comprises only nesting and internesting habitat, it is assigned the CAPL PPP fauna ranking for the species' listing status and the breeding grouping (Group A); where an HCTS area is defined for more than one species, the higher ranking is applied, consistent with the CAPL PPP approach for receptors with multiple ranks (Ref. 7). Marine protected areas, KEFs, World Heritage Properties and Ramsar wetlands are each assigned their own conservation-estate ranking: a ranking is assigned to the feature as a whole, reflecting the priority of preventing oil from entering it, while the individual receptors within the feature (for example mangrove or coral communities) carry their own rankings, which apply once oil has entered the feature. Such a feature is captured by the SMPs activated for a named monitoring-priority location where it falls within that location, and by the monitoring unit in which it lies (Table 8-2) where its extent lies beyond the named-receptor footprint (Appendix I).

BIAs are defined for a species undertaking a particular behaviour (for example breeding, internesting, foraging or migration), and many are of significance only during the period in which the species is present or that behaviour occurs (Ref. 15). Tier rankings in the activity-specific EP are derived from stochastic modelling combined across the modelled seasons and are therefore precautionary with respect to seasonal presence. Where a BIA or HCTS area is listed in its own right, the activity-specific EP identifies its period of significance and whether the exposure that sets its tier is predicted in the modelled season that overlaps that

[1] The CAPL PPP aligns with the Western Australian DTMI PPP (Ref. 8) and utilises the same shoreline cells for the broad-scale identification of sensitive areas. Both apply the same five-level ranking scale (Very Low to Very High); both assign separate rankings for floating and dissolved hydrocarbons; and both rank receptors on equivalent factors: sensitivity and vulnerability to oil, conservation status, and biological and socio-economic importance. Using the same shoreline-cell basis enables geospatial layers to be shared and avoids contradictory prioritisation between CAPL and DTMI, including where DTMI acts as Control Agency for scientific monitoring in State waters. The CAPL PPP category set (fauna; shoreline and habitats; conservation estates; heritage; economic; and social, amenity and recreation) corresponds to the five DTMI categories (Protected Fauna; Protection Areas; Cultural Heritage; Economic; and Social, Amenity and Recreation). Where CAPL rankings differ from the DTMI rankings they are generally equal to or higher, reflecting CAPL's use of finer-scale, site-specific information and a conservative approach. The principal differences are that the CAPL PPP is mapped at finer spatial resolution to support post-spill operational decision-making, and that CAPL assigns higher rankings to some tourism, social and amenity receptors.

period. At the time of a spill, the seasonal presence of the species and behaviour for which each BIA is defined is considered when tier rankings are confirmed and re-evaluated (Section 13), and may support the promotion or demotion of a BIA.

Several KEFs in the OSM Planning Area are defined by seafloor features at depth, for example the Exmouth Plateau (800–4,000 m), the Continental Slope Demersal Fish Communities (upper slope at 225–500 m and mid slope at 750–1,000 m) and the Ancient coastline at 125 m depth contour (Ref. 14). Floating hydrocarbons cannot contact the seabed habitats of these features, and entrained and dissolved hydrocarbons from a surface release are mixed predominantly within the surface mixed layer, so direct exposure of their seabed habitats is unlikely except in the vicinity of a subsea release. However, the values of these KEFs apply to both their benthic and pelagic habitats, and several are recognised because the seafloor feature enhances vertical mixing or the upwelling of nutrient-rich water, supporting aggregations of pelagic species such as whale sharks, manta rays, humpback whales, large pelagic fish and seabirds in the overlying water column (Ref. 14). These pelagic and surface-associated receptors may be exposed to floating, entrained and dissolved hydrocarbons in the upper water column. Monitoring of such KEFs therefore focuses on water quality and the fauna they support, with benthic habitat monitoring mobilised in accordance with its initiation criteria.

For the purposes of tier promotion, a ‘High’ CAPL PPP ranking is taken as a CAPL PPP ranking of 4 or 5 (High or Very High) for either floating oil or dissolved oil impacts, applied to the exposure pathway predicted by the modelling. Where CAPL PPP Floating ≥4 is met and floating or shoreline exposure is predicted, promotion via the floating pathway is considered; where CAPL PPP Dissolved ≥4 is met and dissolved or entrained exposure is predicted, promotion via the dissolved pathway is considered.

Vulnerability to specific exposure pathways is also considered as a modifying criterion. For example, coral is highly sensitive to hydrocarbons, but its vulnerability depends on the form of exposure. Floating hydrocarbon during calm conditions may pass over the coral without interaction, whereas dissolved hydrocarbon in the water column with sufficient exposure duration may produce a direct toxic effect. Where receptor vulnerability to a specific exposure pathway is high and the exposure is predicted within the modelling, the receptor may be promoted to a higher tier.

The inclusion of entrained hydrocarbons at the Tier 3 exposure values shown in Table 2-2 is used to denote exposure but does not, of itself, imply toxicity. For entrained whole-oil droplets, the toxic fraction is small as many hydrocarbon constituents remain sequestered and not bioavailable (French-McCay, 2026). Where a receptor is contacted only by entrained hydrocarbons ≥10 ppb (but below the Tier 2 entrained exposure value of 100 ppb) and not by any other phase, it will be ranked as Tier 3, recognising that at this exposure value, the absolute amount of bioavailable toxic material is extremely low.

This preserves the operational meaning of the tier structure, where the base tier reflects the receptor's predicted exposure level and the refined tier reflects that exposure level adjusted for sensitivity, vulnerability and baseline considerations. Promotion by more than one tier (for example, from base Tier 3 to refined Tier 1) is not standard practice and is applied only where the additional criteria are exceptionally strong and the receptor is amenable to the active spill response and active operational monitoring actions associated with Tier 1.

A receptor contacted only at the Tier 3 base exposure values will not normally be promoted directly to Tier 1 regardless of CAPL PPP ranking, because no active response is expected to be mobilised at that receptor. The rationale for any promotion (or for the decision not to promote further) is documented in the receptor-specific monitoring priority assessment table in the activity-specific EP Appendix (OSM Assessment), under the 'Additional monitoring prioritisation criteria' column.

Table 2-3: Additional monitoring prioritisation criteria

Criterion	Effect on base tier	Source
High CAPL PPP ranking (Floating or Dissolved ≥4)	May promote	CAPL PPP (Ref. 7)
Intersecting broad-scale features (BIAs, HCTS, marine protected areas, KEFs, World Heritage, Ramsar wetlands)	BIAs and HCTS listed in their own right at the tier their modelled exposure warrants (Tier 1, Tier 2 or Tier 3), with the CAPL PPP fauna ranking for the species; conservation estates ranked separately and considered where their extent exceeds the receptor footprint (see Section 2.2.3 and Table 8-2)	CAPL PPP (Ref. 7); EP Description of the Existing Environment
High vulnerability to specific exposure pathway predicted by modelling (e.g. coral to dissolved PAH; mangrove to floating oil)	May promote	Receptor vulnerability literature; EP hydrocarbon spill environmental impact assessment sections
Limited or absent baseline data	May promote (for SM purposes)	Section 4; Table 4-3
Receptor first predicted to be contacted beyond the 14-day prioritisation window	Deferred from initial prioritisation but retained in monitoring scope; phased mobilisation will occur	Section 2.2; Section 13; Section 18.1

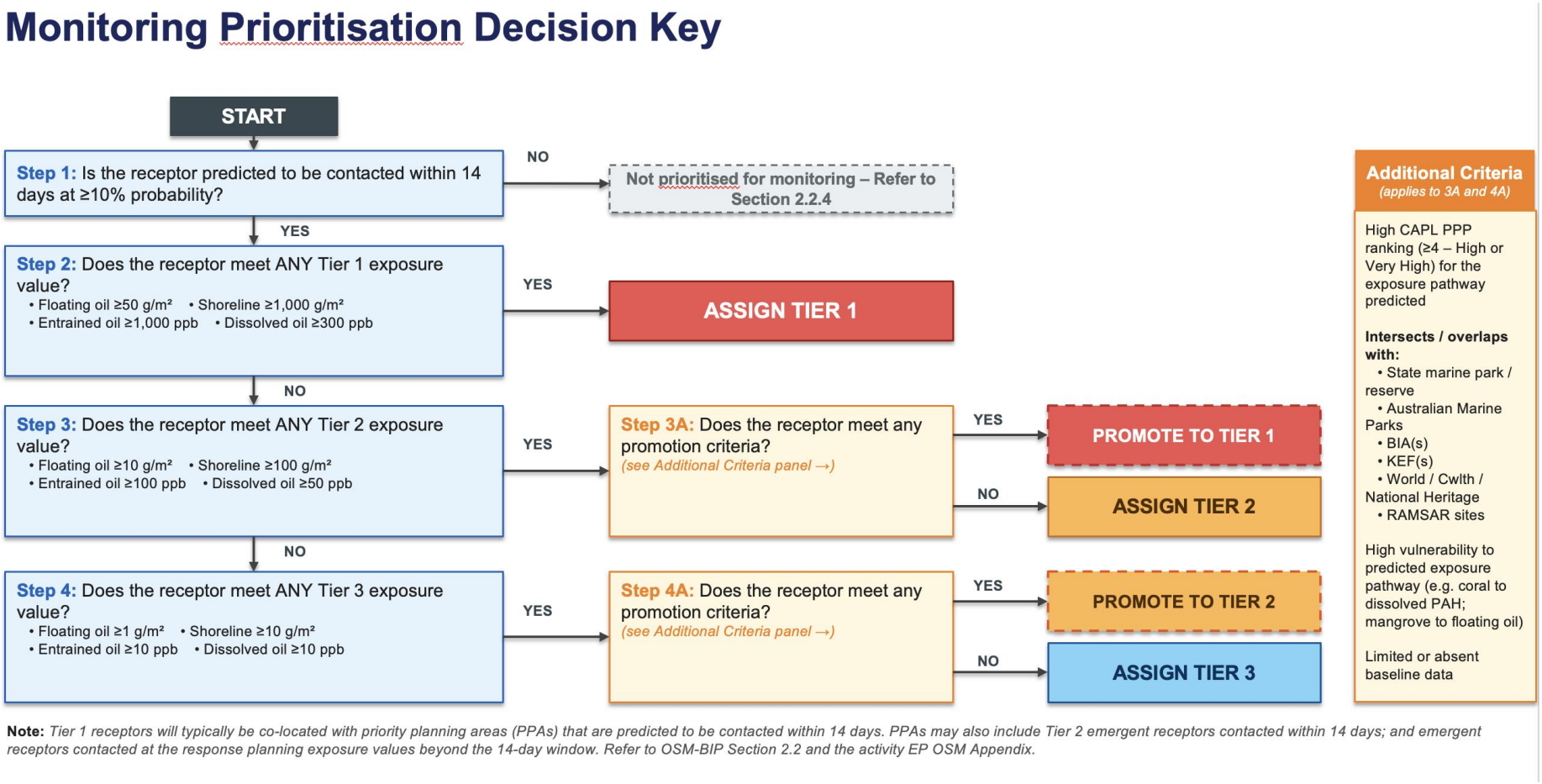


Figure 2-2: CAPL Monitoring Prioritisation Decision Flowchart

2.2.4 Receptors Contacted Beyond the 14-day Initial Prioritisation Window

The tiered monitoring prioritisation hierarchy in Section 2.2 applies within the 14-day initial prioritisation window. Receptors that may be contacted beyond the 14-day window are not pre-assessed for tier ranking on an activity-specific basis. Beyond-14-day receptors are addressed post-spill through the continual re-evaluation of monitoring priorities described in Section 18, informed by monitor and evaluate data and post spill modelling assessment.

Where contact with a receptor is observed or predicted beyond 14 days, the OSM Implementation Lead (in consultation with the Environment Unit Lead, OSM Services Provider and key stakeholders) assigns a tier ranking using the same framework (Tier 1 for high, Tier 2 for medium, Tier 3 for low) based on the predicted/monitored exposure value reached and the additional criteria in Section 2.2.3. Operational and scientific monitoring mobilises in alignment with the predicted arrival of the spill at the receptor, and the tier ranking is reviewed through continual re-evaluation (refer to Section 18.1).

2.2.5 Relationship Between Initial Monitoring Priorities and CAPL Protection Priority Planning Areas

The monitoring priority tiers assigned under this Section are not equivalent to the priority planning areas identified through CAPL's PPP (Ref. 7). The two serve different purposes, are derived on a different basis, and may overlap but are not identical.

Priority planning areas identify where finite spill response resources are directed and where Tactical Response Guides (TRGs) may be developed. Under the PPP, areas with high-value receptors (protection priority ranking of High (4) or Very High (5)) that are at greatest risk of oil contact are designated as priority planning areas. These are identified as shoreline cells with a PPP ranking of 4 or 5 predicted to be contacted at or above the moderate exposure threshold (10 g/m² surface oil; 100 g/m² shoreline accumulation) within 4 days (96 hours), based on stochastic modelling across all seasons. The 4-day timeframe reflects the time assumed for CAPL to develop and implement a TRG before oil reaches the shoreline. The PPP process is therefore response-focused: it identifies where there is both a high-value receptor and sufficient oil loading, arriving quickly enough, to warrant an active shoreline response. Notably, determination of priority planning areas does not apply a probability-of-contact filter.

Monitoring priority tiers, by contrast, identify where operational and scientific monitoring effort is focused to characterise impact, support operational NEBA and inform recovery. They are derived across the full range of exposure values (low, moderate and high; Table 2-2), over a 14-day window, and unlike the priority planning areas determination, apply a probability-of-contact filter of ≥10%. They also extend to receptors that cannot be physically protected by a shoreline response (submerged receptors, and broad-scale features such as KEFs, BIAs and offshore reefs, shoals and banks), and to receptors contacted at exposures below the response threshold - all of which still require post-impact monitoring. Consequently, a priority planning area will generally also be a high monitoring priority (refined Tier 1 or Tier 2) at which operational monitoring is co-located with the active shoreline response, whereas some monitoring priorities (submerged and broad-scale receptors, and receptors contacted only at lower exposures or beyond the 4-day window) are not priority planning areas. Both are re-evaluated during a response as actual exposure data becomes available (Section 13).

3 Relevant Existing Baseline Information Sources

CAPL is part of a Joint Industry Collaborative Group who are working together to determine the extent, quality and suitability of existing baseline data for the marine environments in the North West Shelf, Browse and Timor Sea Regions of Australia.

The Joint Industry Marine Environment Baseline Database includes the following baseline data sources that are relevant to the high value receptors in the OSM Planning Area.

3.1 Titleholder owned baseline environmental data

Titleholders have completed several studies around project and asset sites that would provide suitable quantitative data for comparison with post-spill conditions. Additionally, titleholders also complete ongoing monitoring programs that would also inform baseline state; these relevant studies are included in Appendix E.

3.2 Data.gov.au

Data.gov.au is the central source of Australian open government data published by federal, state and local government agencies. In addition, it includes publicly-funded research data and datasets from private institutions that are in the public interest.

3.3 Australian Ocean Data Network

The Australian Oceans Data Network (AODN) is the primary access point for search, discovery, access and download of data collected by the Australian marine community. Data is presented as a regional view of all the data available from the AODN. Primary datasets are contributed to by Commonwealth Government agencies, State Government agencies, universities, the Integrated Marine Observing System (IMOS – an Australian Government Research Infrastructure project), and the Western Australia Marine Science Institute (WAMSI).

3.4 Western Australian Oil Spill Response Atlas

The Western Australian Oil Spill Response Atlas (OSRA) is a spatial database of environmental, logistical and oil spill response data. Using a geographical information system (GIS) platform, OSRA displays datasets collated from a range of custodians allowing decision makers to visualise environmental sensitivities and response considerations in a selected location. Oil spill trajectory modelling (OSTM) can be overlaid to assist in determining protection priorities, establishing suitable response strategies and identifying available resources for both contingency and incident planning. OSRA is managed by the Maritime Environmental Emergency Response unit within WA DTMI Marine Safety and is part funded through the National Plan for Maritime Environmental Emergencies and the Australian Maritime Safety Authority (AMSA). CAPL EMT members can log in to the OSRA via CAPL's Emergency Management SharePoint.

3.5 The Atlas of Living Australia

The Atlas of Living Australia (ALA) is a collaborative, online, open resource that contains information on all the known species in Australia aggregated from a wide range of data providers. It provides a searchable database when considering species within the OSM Planning Area. The ALA receives support from the

Australian Government through the National Collaborative Research Infrastructure Strategy and is hosted by the Commonwealth Scientific and Industrial Research Organisation (CSIRO).

Access is via the following link https://www.ala.org.au/

3.6 Index of Marine Surveys Assessment

The Index of Marine Surveys for Assessments (IMSA) is an online portal to information about marine-based environmental surveys in Western Australia. IMSA is a project of the WA Department of Water and Environmental Regulation (DWER) for the systematic capture and sharing of marine data created as part of an environmental impact assessment.

3.7 Other Sources

Other sources include:

- the WA Department of Biodiversity Conservation and Attractions (DBCA) Biodiversity and Conservation Science Annual Reports
- Australian Institute of Marine Science (AIMS) Research Data Platform
- WA State of Fisheries Report
- eAtlas.org.au
- North West Atlas
- Western Australian Marine Science Institution (WAMSI)
- Geosciences Australia data and publications
- Australian Marine Parks Science Atlas;
- Birdlife Data Zone
- Recovery Plans made or adopted under the EPBC Act.

Reports and peer reviewed journal articles were also accessed via research and journal databases such as PubMed and Google Scholar, as well as unpublished monitoring reports.

4 Baseline Data Review

Baseline monitoring provides information on the condition of ecological receptors prior to, or spatially independent (e.g. if used as an unaffected control site) of, a spill event and is used for comparison with post-impact scientific monitoring, where required. This is particularly important for scientific monitoring where the ability to detect changes between pre-impact and post-impact conditions and evaluate and quantify environmental impact from the spill (compared to natural variation and/or impacts unrelated to the spill) is necessary. Accordingly, the baseline adequacy assessment described in this section focuses on receptors supported by empirical environmental condition datasets (e.g. benthic habitats, marine fauna, water and sediment quality), for which pre-impact and post-impact comparisons may be undertaken.

Fisheries information is maintained through jurisdictional fisheries management frameworks and datasets, including commercial catch and effort records, recreational fishing surveys, and annual State of the Fisheries reporting. These datasets are highly valuable for fisheries management and spill response planning; however, they are typically broad in spatial scale and, in some cases, confidential or aggregated to protect individual operators, making them unsuitable for integration into a shared industry environmental baseline database. Fisheries baseline considerations are therefore addressed through jurisdictional datasets, consultation and fisheries-specific assessment processes relevant to spill response and monitoring.

Heritage and social/cultural receptors are identified and characterised through recognised heritage registers and mapped datasets, relevant persons consultation, Traditional Owner engagement, socio-economic and cultural use assessments, and consideration of cultural, social and industry values associated with locations that may be affected by a spill, as described in the activity-specific EP. SM9 (Heritage Features Assessment) and SM10 (Social Impact Assessment) are recognised components of OSM; however, these monitoring themes are supported by qualitatively different forms of baseline information and are therefore addressed through separate, fit-for-purpose receptor identification and characterisation processes, rather than the structured environmental baseline adequacy assessment applied to empirical environmental condition datasets.

Understanding the presence or absence, suitability and quality of baseline data for locations and associated receptors predicted to be contacted within 14 days is an important preparatory measure for prioritising monitoring of receptors supported by empirical environmental condition datasets. During a spill event, prioritisation of capability may be given to those receptors with insufficient baseline data, where it is possible to collect baseline data post-spill pre-impact. Further, where post-spill pre-impact monitoring is not feasible due to short contact times, understanding which receptors have insufficient baseline data will help guide finalisation of each SMP design and the need to include alternative designs (e.g. the Gradient Approach and/or Impact versus Control versus Before-After Control-Impact (BACI) design).

The Marine Environment Baseline Database includes available data for receptors relevant to the Joint Industry OSM Framework that are supported by empirical environmental monitoring datasets. Fisheries Impact (SM8), Heritage Features (SM9) and Social/Cultural Impacts (SM10) are addressed through separate, fit-for-purpose approaches consistent with the relevant SMPs and are therefore not incorporated into the structured environmental baseline adequacy assessment.

Using the Marine Environment Baseline Database, CAPL has reviewed the baseline data for all of the receptors listed in Table 2-1 to help determine which receptors and key features have insufficient or no baseline data available and should be given a higher monitoring priority. Appendix E provides a summary of the data sources included in the baseline assessment.

An overview of the process used to assess baseline data is provided in the steps below:

1. **Identification of locations requiring a baseline review:** Receptor locations predicted to be contacted at the low thresholds within 14.0 days, at a probability greater than 10%, are identified and aligned with OMPs and SMPs (as per Table 2-1).
2. **Collection of baseline data:** Environmental baseline monitoring data relevant to the locations and receptors is located (as per sources outlined in Section 3) and included (if it is not already included) in the Marine Environment Baseline Database. Appendix E provides a high-level summary of selected data sources included in the Marine Environment Baseline Database.
3. **Assessment of baseline data:** The relevance of each data source is assessed:
    a. For each data source obtained, a meta-analysis is performed to determine if the parameters and methods align with the key parameters and methods outlined in the Joint Industry SMPs (Table 4-1), the spatial extent of the data, the sampling effort/duration, and the temporal relevance is also noted.
    b. Table 4-2 outlines the overall assessment criteria used for each data source.
4. **Assessment of baseline data:** A qualitative annual evaluation of the adequacy (in terms of the likely ability to detect changes between pre-impact and post-impact conditions) of the collective baseline data for each location and associated receptors is undertaken. This evaluation takes into consideration the following:
    a. Background historical information on the presence, distribution, seasonality, and if applicable, the reproductive state of the receptor (as outlined in Appendix D) is compared with the data available from monitoring within the last 5 years (as available in the Marine Environment Baseline Database). Depending on the receptor and associated Joint Industry SMP, the following is considered:
        i. Does the data collectively cover the required spatial extent of the receptor within a location (taking into consideration any background historical information on the distribution of the receptor)?
        ii. Does the data collectively cover all the species/biological communities required for the relevant Joint Industry SMP and that may be present at the location?
5. **Assessment outcome**: Each location and associated receptor is then categorised as follows, and summarised in Table 4-3:
    a. Comprehensive baseline data or ongoing monitoring collected within the last 5 years. Data align with Joint Industry SMP parameters and methods, cover required species/communities and span the necessary spatial extent; or

b. Historical data (>5 years old) that remain of value, or some current but not extensive baseline data; or

c. No baseline data available, or existing data are inadequate in quality, scope, or relevance.

Once SMP monitoring reports are drafted (post-spill) they will be peer reviewed by an expert panel (Refer to Section 10.10 of the Joint Industry OSM Framework [Ref. 1]).

Table 4-1: Key parameters and key methodology from the Joint Industry SMPs

SMP	Key parameter	Key methodology
SM1: Water quality impact assessment	At least one key parameter: • Total recoverable hydrocarbons (TRH) • Total petroleum hydrocarbons (TPH) • Benzene, toluene, ethylbenzene and xylenes and naphthalene (BTEXN); or • Polycyclic aromatic hydrocarbons (PAH)	In situ UV fluorometer and/or samples analysed at National Association of Testing Authorities (NATA) accredited lab using NATA accredited method
SM2: Sediment quality impact assessment	At least one key parameter: TRH, TPH, BTEXN, PAH, heavy metals	Sediment collected by corer/grab and samples analysed at NATA accredited lab using NATA accredited method
SM3: Intertidal and coastal habitat assessment	At least one key parameter: presence, diversity, distribution	Any of the following, as appropriate to the parameters: • Ground and vessel-based intertidal surveys (e.g. quadrats, transects, including video and still photography) • Remote sensing • Infauna sampling
SM4: Seabirds and shorebirds	At least one key parameter: species present, abundance / counts, behaviour (resting, roosting, foraging, nesting)	Ground surveys and standardised methodology for counting birds
SM5a: Marine megafauna – reptiles	At least one key parameter: species identification, abundance / counts, key behaviour (foraging, mating, nesting, internesting)	As appropriate to the species and behaviour / life stage: • Nesting turtles: ground surveys • In water turtles: vessel and aerial surveys • Sea snakes: manta board and snorkel surveys • Estuarine crocodiles: vessel-based spotlight surveys at night
SM5b: Marine megafauna- whale sharks, dugong and cetaceans	At least one key parameter: species identification, abundance / counts, key behaviour	Aerial or vessel surveys, acoustic monitoring
SM6: Benthic habitat assessment	At least one key parameter: presence, diversity, distribution	Any of the following, as appropriate to the parameters: • Transects • Towed camera • Drop camera • Remotely Operated Vehicle (ROV) camera • Diver-based camera surveys • Remote sensing (coral & seagrass broad scale survey) • Sediment grab for infauna

SMP	Key parameter	Key methodology
SM7: Marine fish and elasmobranch assemblages assessment	At least one key parameter: species identification, abundance, habitat type	Any of the following, as appropriate to the parameters: • Baited remote underwater video stations (BRUVS) • Stereo Baited Remote Underwater Video Stations (SBRUVS) • ROV • Towed video survey

Table 4-2: Assessment criteria for baseline data review*

Year of most recent data capture	Duration of monitoring program	Frequency of data capture	Similarity of methods to Joint Industry SMP	Similarity of parameters to Joint Industry SMP
High = less than 5 years old	High = >4 years	High = 4+ sampling trips per year	High	High
Medium = between 5 and 10 years old	Medium = 2–4 years	Medium = 2–3 sampling trips per year	-	-
Low = greater than 10 years old	Low = <2 years	Low = one-off sampling trip	Low	Low

** Table 4-2 is used to assess the relative relevance and quality of individual baseline datasets only. The assessment criteria do not represent the final determination of baseline adequacy for a receptor or location. Final baseline adequacy is determined through a collective qualitative assessment of all available information (refer Step 4 and Table 4-3), considering receptor ecology, spatial representativeness, species/community coverage and the likely ability to detect change between pre-impact and post-impact conditions.*

Table 4-3: Baseline data assessment versus SMPs for receptors predicted at being contacted >10% probability and <14 days

Receptor	SM1: Water quality impact	SM2: Sediment quality impact	SM3: Intertidal and coastal habitat	SM4: Seabirds and shorebirds	SM5: Marine mega-fauna assessment – reptiles	SM5: Marine mega-fauna assessment – whale sharks, dugong and cetaceans	SM6: Benthic habitat	SM7: Marine fish and elasmobranch assemblages	SM8: Fisheries impact+	SM9 & 10: Heritage and social impact^
Gascoyne AMP*			NA			Whale sharks & pygmy blue whales				
						Other species				
Montebello AMP*			NA		Green & hawksbill turtle	Whale sharks & pygmy blue whales				
					Sea snakes	Other species				
Ningaloo Coast (including Ningaloo WHA)					Turtle	Whale shark				
					Sea snakes					
Muiron Islands & Muiron Islands MP					Turtle					
					Sea snakes					
Exmouth Gulf										
Southern Pilbara Islands & Shoreline (includes	Ashburton Port	Ashburton Port		Seabirds at Urala Station, Onslow, Airlie,	Turtles: Onslow, Thevenard & Airlie Islands			Green sawfish		

Receptor	SM1: Water quality impact	SM2: Sediment quality impact	SM3: Intertidal and coastal habitat	SM4: Seabirds and shorebirds	SM5: Marine mega-fauna assessment – reptiles	SM5: Marine mega-fauna assessment – whale sharks, dugong and cetaceans	SM6: Benthic habitat	SM7: Marine fish and elasmobranch assemblages	SM8: Fisheries impact+	SM9 & 10: Heritage and social impact^
Ashburton and Thevenard Island)				Serrurier & Thevenard Isl. Shorebirds at Gnoorea, Onslow & Mardie						
				Seabirds & Shorebirds elsewhere	Turtles elsewhere					
					Sea snakes					
Middle & Northern Pilbara Islands & shoreline (including Great Sandy Islands NR)	Mardie	Mardie		Seabirds	Turtles			Green sawfish		
				Shorebirds	Sea snakes					
Barrow Island (includes Middle, Boodie and Double Islands) & Barrow Island MP*	Barrow Isl Port	Barrow Isl Port		Double Island: bridled tern and wedge-tailed shearwater	Flatback turtle					
				Seabirds elsewhere	Green & hawksbill turtle					
				Shorebirds	Sea snake					

Receptor	SM1: Water quality impact	SM2: Sediment quality impact	SM3: Intertidal and coastal habitat	SM4: Seabirds and shorebirds	SM5: Marine mega-fauna assessment – reptiles	SM5: Marine mega-fauna assessment – whale sharks, dugong and cetaceans	SM6: Benthic habitat	SM7: Marine fish and elasmobranch assemblages	SM8: Fisheries impact+	SM9 & 10: Heritage and social impact^
Lowendal Islands & Lowendal Islands NR			Mangroves at Varanus Isl.	Seabirds	Turtles at Varanus Isl.					
				Shorebirds	Sea snakes Turtles elsewhere					
Montebello Islands				Wedge-tailed shearwater at Ah Chong Is						
Rankin Bank & Glomar Shoal			NA	NA						
Reefs, Shoals and Banks*			N/A							

Key	
	Comprehensive baseline data or ongoing monitoring collected within the last 5 years. Data align with Joint Industry SMP parameters and methods, cover required species/communities and span the necessary spatial extent.
	Historical data (>5 years old) that remain of value, or some current but not extensive baseline data[2]. Caveat: Additional relevant data may exist but be unknown and therefore not included in the assessment.
	No baseline data available, or existing data are inadequate in quality, scope, or relevance.

[2] Baseline data are considered not extensive where they are limited in spatial and/or temporal coverage, sample size, or representativeness of species and / or the marine environment (e.g. life stages, habitats, seasonality). Such data may not capture natural variability or interannual trends, may be seasonally, taxonomically, or methodologically biased, or may rely on opportunistic or inconsistent datasets with variable data quality.

Receptor	SM1: Water quality impact	SM2: Sediment quality impact	SM3: Intertidal and coastal habitat	SM4: Seabirds and shorebirds	SM5: Marine mega-fauna assessment – reptiles	SM5: Marine mega-fauna assessment – whale sharks, dugong and cetaceans	SM6: Benthic habitat	SM7: Marine fish and elasmobranch assemblages	SM8: Fisheries impact+	SM9 & 10: Heritage and social impact^
	Caveat: Additional relevant data may exist but be unknown and therefore not included in the assessment.									
	N/A: Not applicable									

** Submerged receptor*

+ Locations to be determined in consultation with key stakeholders to reflect current fishing zones/effort

^ Locations to be determined in consultation with key stakeholders

5 OSM Organisational Structure

CAPL uses the Incident Command System (ICS) to respond to incidents and therefore adopts the key roles and responsibilities used in this system, as described in the activity-specific EPs and the ABU Consolidated OPEP (Ref. 2). The Perth Emergency Management Team (EMT) will be responsible for coordinating OSM activities, which will be led by the Planning Section within the EMT, with support from each Section, in particular the Operations and Logistics Sections.

The CAPL EMT structure is shown in the Implementation Strategy section (generally Section 8) of the activity-specific EPs. Where the WA DTMI is the Control Agency, the EMT will be managed through coordinated command and CAPL will still be expected to continue monitoring activities in State waters, with oversight from WA DTMI.

Figure 5-1 illustrates the structure of the OSM Management Team during the response phase. The EMT Incident Commander (IC) is ultimately accountable for managing the response operation, which includes this plan. Several OSM-specific roles are designated through this Plan. Depending on the scale of the event, individual people may perform multiple roles; similarly, multiple people may share the same role.

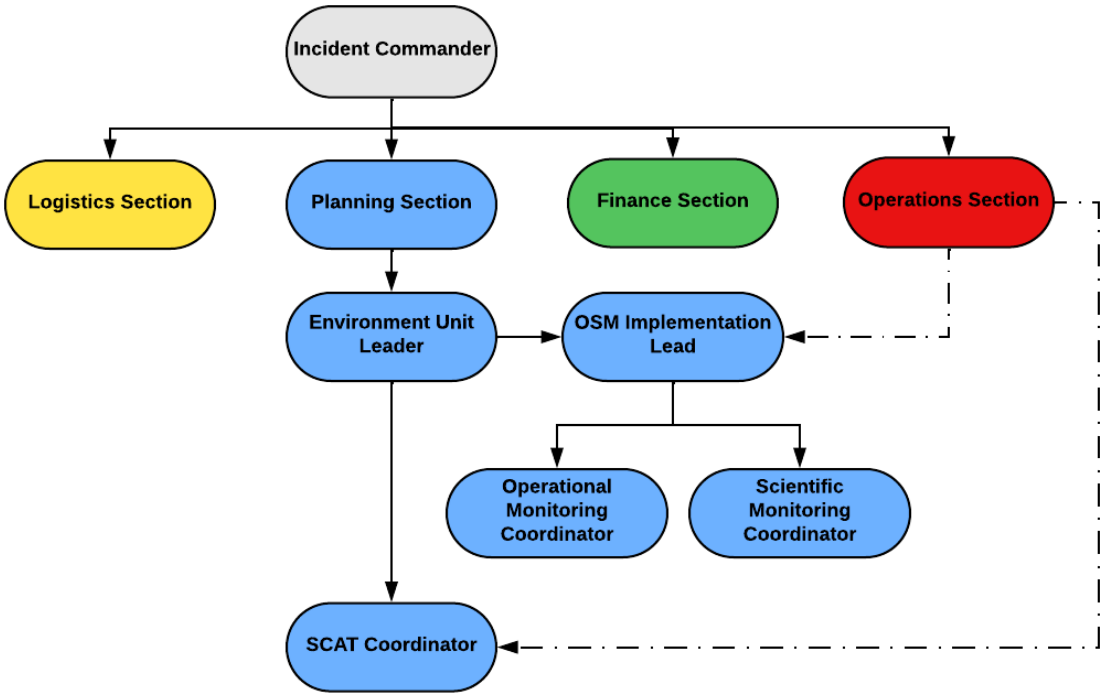


Figure 5-1: CAPL Indicative EMT structure with OSM team

6 OSM Roles and Responsibilities

OSM roles and responsibilities are listed in Section 10.13.2 of the Joint Industry OSM Framework (Ref. 1), which will be adopted by CAPL and its OSM Services Provider. Table 6-1 outlines the roles held by CAPL and the OSM Services Provider.

During the post-response phase the CAPL OSM Implementation Lead and/or OSM Services Provider OSM Implementation Lead will continue to be responsible for the coordination and delivery of monitoring plans.

Table 6-1: Roles and responsibilities for OSM

Role	Held by
Environment Unit Lead	CAPL EMT
OSM Implementation Lead	CAPL to hold position initially (0 to12 hours of notification being made to OSM Services Provider), followed by OSM Services Provider (12 hours from notification to ongoing), if required[3]
Operational Monitoring Coordinator and/or Scientific Monitoring Coordinator	OSM Services Provider
OSM Field Operations Manager	OSM Services Provider
OSM Field Teams	OSM Services Provider
SCAT Coordinator	AMOSC / OSM Services Provider

7 Mobilisation and Timing of OMP and SMP implementation

Table 7-1 provides an indicative implementation schedule for OMs and SMs in the OSM Planning Area and adjacent waters. ‘Implementation’ is defined as being ready, at the point of staging or departure, to mobilise for monitoring. If the monitoring plan is desktop-based, implementation is defined as commencing the work (e.g. computer model inputs). Refer to activity specific EPs for an indication of worst-case minimum contact times based on stochastic modelling (stochastic modelling represents all possible outcomes that could potentially occur, in reality, only a subset of locations will likely be contacted during a spill event).

Through CAPL’s membership in the OSRL OSM Supplementary Agreement, OSM services are available for preparedness, activation, and monitoring (Section 9). This agreement ensures operational monitoring personnel can deploy within 72 hours of notification, and scientific monitoring personnel within 5–7 days, which is reflective of the implementation schedule provided in Table 7-1. In addition to these OSM services, CAPL has personnel trained in Shoreline Clean-up Assessment Technique (SCAT) and aerial surveillance who are available within 24–48 hours of spill notification, as noted in Appendix C of the ABU Consolidated OPEP (Ref. 2) and deployed in a timeframe relevant to assisting the relevant response operations for each activity.

Due to short contact times, there may be instances where post-spill pre-impact monitoring is not feasible. For these locations, and where baseline data does not exist, or may not be recent and applicable, the application of a BACI (Before-After

[3] CAPL may fill the OSM Implementation Lead role throughout the monitoring effort, if it choses to. This will depend upon the individual circumstances of the spill.

Control-Impact) design may not be possible. The finalisation of each SM design will consider this and may need to include alternative designs (e.g. data from an expected BACI design may need to be analysed as an Impact versus Control design and/or Gradient Approach).

Table 7-1: Indicative OMP implementation schedule for OSM activities if initiation criteria are met

Proximity to spill source	0–48 hours from OSM activation	Within 72 hours of OSM activation	~5–7 days from OSM activation	7–14 days from OSM activation	Ongoing
Spill site and surrounding waters	• Activation of OMP Team Leads. • Aerial surveillance – which will also document fauna observations. • Finalise OMPs. • Commence activation and mobilisation of OM personnel.	• OM1: Hydrocarbon Characterisation, where resources are available (e.g. Supply Vessel with onboard sampling equipment). • OM2: Hydrocarbons in Water Assessment • OM3: Hydrocarbons in Sediment Assessment • OM4: Surface Chemical Dispersant Effectiveness (commencing with Tier 1 SMART Protocol) • OM5: Rapid Marine Fauna Surveillance • OM7: Air Quality Modelling • Continue to finalise OMPs • Continue to activate and mobilise OM personnel.	Continued (as per on-going arrangements)	Continued (as per on-going arrangements)	As results from implemented OMPs are available, data are provided to relevant personnel in EMT (e.g. Situation/ Unit Leader) and used in the Incident Action Planning process for the next operational period. OMP is redesigned or reallocated according to the specifics of the actual spill.
Sensitive receptors (including shorelines, reefs, banks and shoals) predicted to be contacted within 7 days	• Activation of OMP Team Leads. • OM6: Shoreline Clean-up Assessment • Finalise OMPs. • Commence activation and mobilisation of OM personnel.	• OM1: Hydrocarbon Characterisation • OM2: Hydrocarbons in Water Assessment • OM3: Hydrocarbons in Sediment Assessment • OM5: Rapid Marine Fauna Surveillance	Continued (as per on-going arrangements)	Continued (as per on-going arrangements)	As results from implemented OMPs are available, data are provided to relevant personnel in EMT (Situation Unit Leader) and used in the Incident Action Planning process for the next operational period. OMP is

Proximity to spill source	0–48 hours from OSM activation	Within 72 hours of OSM activation	~5–7 days from OSM activation	7–14 days from OSM activation	Ongoing
		• Continue to finalise OMPs • Continue to activate and mobilise OM personnel.			redesigned or reallocated according to the specifics of the actual spill until termination criteria are met
Sensitive receptors (including shorelines, reefs, banks and shoals) predicted to be contacted 7–14 days	-	-	• Additional Activation of OMP Team Leads. • Commence activation and mobilisation of additional OM personnel.	• Continue to finalise OMPs. • Continue to activate and mobilise OM personnel. • OM1: Hydrocarbon Characterisation • OM2: Hydrocarbons in Water Assessment • OM3: Hydrocarbons in Sediment Assessment • OM5: Rapid Marine Fauna Surveillance • OM6: Shoreline Clean-up Assessment	As results from implemented OMPs are available, data are provided to relevant personnel in EMT (Situation Unit Leader) and used in the Incident Action Planning process for the next operational period. OMP is redesigned or reallocated according to the specifics of the actual spill until termination criteria are met

Table 7-2: Indicative SMP implementation schedule for OSM activities if initiation criteria are met

Proximity to spill source	0–48 hours from OSM activation	Within 72 hours of OSM activation	~5–7 days from OSM activation	7–14 days from OSM activation	Ongoing
Spill site and surrounding waters	Commence activation and mobilisation process. Activation of SMP Team Leads.	• Continue to activate and mobilise personnel • Work on finalising SMPs.	• SM1: Water Quality Impact Assessment • SM2: Sediment Quality Impact Assessment • SM6: Benthic Habitat Assessment • SM7: Marine fish and elasmobranch assemblages assessment	Continued	Continue SMP monitoring until termination criteria are met
Sensitive receptors predicted to be contacted within 7 days	Activation of SMP Team Leads and finalisation of SMPs	• Continue to activate and mobilise personnel. • Work on finalising SMPs.	• SM1: Water Quality Impact Assessment • SM2: Sediment Quality Impact Assessment • SM3: Intertidal and Coastal Habitat Assessment • SM4: Seabirds and Shorebirds • SM5: Marine Mega-fauna Assessment- Reptiles • SM5: Marine Mega-fauna Assessment- Cetaceans, Whale Sharks, Dugong • SM6: Benthic Habitat Assessment • SM7: Marine Fish and Elasmobranch Assemblages assessment • SM8: Fisheries impact assessment • SM9: Heritage Features Assessment • SM10: Social Impact Assessment	Continued.	Continue SMP implementation until termination criteria are met.
Sensitive receptors predicted to be	-	-	• Additional Activation of SMP Team Leads.	• SM1: Water Quality Impact Assessment	Continue SMP monitoring until

Proximity to spill source	0–48 hours from OSM activation	Within 72 hours of OSM activation	~5–7 days from OSM activation	7–14 days from OSM activation	Ongoing
contacted 7–14 days			• Commence activation and mobilisation of additional SM personnel.	• SM2: Sediment Quality Impact Assessment • SM3: Intertidal and Coastal Habitat Assessment • SM4: Seabirds and Shorebirds • SM5: Marine Mega-fauna Assessment- Reptiles • SM5: Marine Mega-fauna Assessment- Cetaceans, Whale Sharks, Dugong • SM6: Benthic Habitat Assessment • SM7: Marine Fish and Elasmobranch Assemblages assessment • SM8: Fisheries impact assessment • SM9: Heritage Features Assessment • SM10: Social Impact Assessment	termination criteria are met

8 Resourcing Requirements

To guide OSM resourcing requirements, the spill scenarios most likely to require the greatest initial and on-going capability were selected from those informing the OSM Planning Area. Selection was based on stochastic modelling results, focussing on the scenarios with the greatest predicted number of receptors contacted at the low exposure values (Section 2.2) within the 14-day initial prioritisation window at a probability of contact ≥10%, consistent with the tiered prioritisation hierarchy applied throughout this OSM-BIP.

Other factors influencing the selection of the scenario with the highest capability requirements were location of the spill, proximity to receptors, and hydrocarbon properties. The chosen scenarios and reasons for their selection are presented in Table 8-1.

Table 8-1: Scenarios selected for OSM capability analysis

Scenario	Rationale for selection
Gorgon: subsea release of 74,677.9 m^3 (829.8 m^3/day) of Gorgon condensate (Group 2) over 90 days from a LOWC associated with the GOR-1A well	• Represents a light, non-persistent hydrocarbon (Group 2) • Predicted to contact the highest number of receptors for shoreline and dissolved hydrocarbons in the first 14 days • Release location is representative of Gorgon spill scenarios
Wheatstone: subsea nearshore trunkline major defect at the inner location releasing 3,000 m^3 Condensate / Gas trunkline fluids (Group 1) over 25 hours	• Predicted to contact the highest number of receptors in the first 7 days for both surface and dissolved hydrocarbons • Represents a light, non-persistent hydrocarbon (Group 1) • Release location is the closest nearshore location to Wheatstone assets and sensitive mainland receptors

8.1 Monitoring Units

A monitoring unit is a geographic grouping of receptors that may be monitored by a single team or a number of co-mobilised teams. A comprehensive list of monitoring units across the CAPL OSM Planning Area is provided in Table 8-2 and Appendix I. The grouping of receptors into monitoring units is based on:

- access to receptors and distance from the relevant supply ports;
- travel time between receptors within the unit and the time taken to collect samples for each OMP and SMP;
- compatibility of monitoring methods;
- sampling media and laboratory analysis pathways (supporting co-mobilisation);
- minimisation of vessel movements and SIMOPS conflicts; and
- the seasonality of receptors within the unit, including breeding, migration and other key biological activities.

The boundaries of the monitoring units are aligned to the extents of the AMPs, KEFs and BIAs they contain, so that broad-scale receptors that extend or are located away from the named receptors remain within a monitoring unit. The AMPs, KEFs, BIAs and HCTS captured by each unit are identified in Appendix I.

Monitoring units and tier prioritisation are independent concepts. The monitoring units group receptors geographically for logistical deployment and to capture broad-scale receptor extents, while the tiers (Section 2.2) prioritise receptors by exposure risk. A single monitoring unit may therefore contain receptors of any tier (Tier 1, Tier 2 and Tier 3), and may include both initial monitoring priorities and receptors contacted beyond the 14-day window. Within a unit, the monitoring intensity, the monitoring components activated and the timing of activation are determined by the tier ranking of each receptor and not by the unit grouping itself.

Broad-scale BIAs are monitored at the monitoring unit level, not the BIA. For each unit Appendix I identifies the BIAs, HCTS and KEFs that extend away from the named receptors, and where they sit in the unit. When a spill contacts a monitoring unit, OM5 (rapid marine fauna aerial surveillance) is conducted across the unit (or multiple units) including areas away from the named receptors to locate target species. If target species are located, this information is provided to the OSM Implementation Lead who will then incorporate this information into fauna SMP design (SM4 for seabirds and shorebirds, SM5 for marine mega-fauna) and direct resources to those locations (refer to Table 14-1).

The number of teams allocated to each unit during the initial response is determined by the actual extent of the spill, the tier ranking of receptors within the unit (finalised at the time of the spill per Section 13), the operational NEBA, SIMOPS coordination and the surge capacity arrangements. The teams required, including the vessel-based fauna teams that survey BIA areas away from the named receptors under OM5 direction, are resourced in Table 8-7 and Table 8-8.

It should be noted that not all monitoring units will be contacted by a single spill and that the list below has been generated from stochastic modelling results from all receptors identified in Table 2-1.

Table 8-2: Monitoring units relevant to stochastic modelling results

Monitoring Unit	Receptors within Monitoring Unit
Barrow	• Barrow Island (including Boodie and Middle Islands) • Barrow Island MMA and Barrow Island MP (State)* • Lowendal Islands • Lowendal Islands NR • Poivre Reef* • Ancient Coastline at 125 m depth contour KEF* • Continental Slope Demersal Fish Communities KEF* • Exmouth Plateau KEF* • Seabird BIAs • Marine turtle BIAs • Marine turtle HCTS (flatback, green and hawksbill) • Humpback whale (migration) BIA • Pygmy blue whale (migration) BIA • Whale shark (foraging) BIA
Southern Pilbara	• Southern Pilbara – Islands and Shoreline • Ashburton Island • Thevenard Island • Serrurier Island • Bessieres Island • Muiron Islands • Flat Island • Fly Island • Locker Island • Observation Island • Peak Island • Round Island • Table Island • Tortoise Island • Muiron Islands MMA* • Brewis Reef* • Fairway Reef* • Outtrim Patches* • Rosily Shoals* • Spider Reef* • Baylis Patches* • Roller Shoal* • Locker Reef* • Santo Rock* • Tongue Shoals* • Inner Northwest Patch* • Australind Shoal* • Glennie Patches* • Ancient Coastline at 125 m depth contour KEF* • Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula KEF* • Continental Slope Demersal Fish Communities KEF*

Monitoring Unit	Receptors within Monitoring Unit
	• Marine turtle BIAs • Marine turtle HCTS (flatback, green, hawksbill and loggerhead) • Pygmy blue whale (migration) BIA • Humpback whale (resting and migration) BIA • Seabird BIAs • Dugong (breeding, calving, nursing and foraging) BIAs • Whale shark (foraging) BIA • Southern right whale (reproduction and habitat critical to survival) BIA
Middle Pilbara	• Middle Pilbara – Islands and shoreline • Great Sandy Island NR • Airlie Island • Penguin Bank* • Ripple Shoals* • Trap Reef* • Seabird BIAs • Marine turtle BIAs • Marine turtle HCTS (flatback, green and hawksbill) • Humpback whale (migration) BIA
Montebello	• Montebello Islands • Montebello AMP* • Montebello Islands MP* • Tryal Rocks* • Montebello Shoals* • Ancient Coastline at 125 m depth contour KEF* • Continental Slope Demersal Fish Communities KEF* • Seabird BIAs • Marine turtle BIAs • Marine turtle HCTS (flatback, green and hawksbill) • Humpback whale (migration) BIA • Pygmy blue whale (migration) BIA • Whale shark (foraging) BIA
Ningaloo Offshore	• Gascoyne AMP* • Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula KEF* • Continental Slope Demersal Fish Communities KEF* • Exmouth Plateau KEF* • Seabird BIAs • Marine turtle BIAs • Marine turtle HCTS (loggerhead) • Pygmy blue whale (migration and foraging) BIAs • Humpback whale (migration) BIA
Ningaloo Nearshore	• Ningaloo AMP* • Exmouth • Warnangura National Park (Cape Range) • Ningaloo Coast World Heritage • Ningaloo MP (State)* • Ningaloo Reef*

Monitoring Unit	Receptors within Monitoring Unit
	• North West Reef* • Commonwealth waters adjacent to Ningaloo Reef KEF* • Continental Slope Demersal Fish Communities KEF* • Dugong (breeding, calving, nursing and foraging) BIAs • Whale shark (foraging) BIA • Marine turtle BIAs • Marine turtle HCTS (flatback, green and loggerhead) • Humpback whale (resting and migration) BIA • Pygmy blue whale (migration and foraging) BIAs • Southern right whale (migration, reproduction and habitat critical to survival) BIAs • Seabird BIAs
Offshore Environs	• Rankin Bank* • Glomar Shoals* • Ancient Coastline at 125 m depth contour KEF* • Continental Slope Demersal Fish Communities KEF* • Exmouth Plateau KEF* • Pygmy blue whale (migration) BIA • Whale shark (foraging) BIA • Marine turtle BIAs • Marine turtle HCTS (flatback) • Seabird BIAs
Control sites	• Control sites

** Submerged receptor that has no features above the sea surface*

8.2 Deterministic Modelling

To better understand worst-case capability OSM requirements, deterministic modelling was undertaken for the scenarios listed in Table 8-1. The deterministic run with the most receptors contacted by either floating, shoreline or dissolved hydrocarbons at the low thresholds and within 14 days was selected for further analysis. Deterministic modelling enables oil spill planners to assess the results of a single run from the stochastic oil spill modelling results, helping to assess the possible worst-case capability requirements. The results of this deterministic assessment are presented in Table 8-3 and Table 8-4.

The deterministic outputs translate to OSM capability requirements as follows:

- The number of emergent receptors contacted within 14 days informs the initial deployment count for shoreline-focused operational monitoring (OM6: Shoreline Clean-up Assessment). The deployment count for rapid marine fauna surveillance (OM5) is informed by the number of emergent receptors contacted, the surface area of floating oil, and the spatial extent of the dissolved plume, since fauna surveillance is required across the active spill footprint rather than only at named receptors.
- Receptors contacted by entrained and dissolved hydrocarbons help inform resourcing for OM2 (Hydrocarbon in Water Assessment), OM3 (Hydrocarbon in Sediment Assessment), OM4a and OM4b (Surface and Subsea Dispersant

Effectiveness Monitoring, where applicable) and SM1 (Water Quality Impact Assessment).

- Maximum shoreline accumulation (volume in m³ and shoreline length in km at ≥100 g/m²) informs SCAT team sizing, waste management capacity and shoreline clean-up resource requirements coordinated with CAPL's OSR arrangements.

The deterministic results presented for each receptor show what occurs at that receptor in the worst-case trajectories drawn from the stochastic composite. The deterministic outputs are used to size the OSM capability required when contact occurs, not to reassign the tier ranking allocated in the monitoring priority assessment tables in the activity-specific EP OSM Appendix.

A receptor's tier reflects its overall risk profile across the full stochastic suite (typically 100 simulated spill trajectories per season). In any individual deterministic trajectory, the receptor may or may not be contacted within 14 days depending on the prevailing wind, current and weathering conditions in that run. This is expected and reflects the inherent difference between stochastic envelope analysis (which characterises receptor risk and sets pre-spill monitoring priorities as per Section 2.2) and individual trajectory analysis (which characterises capability demand under specific worst-case conditions). The two views are complementary: monitoring prioritisation establishes where OSM is prioritised; Section 8.5 establishes how much capability is needed when those receptors are contacted.

Table 8-3: Deterministic modelling results (run 75) – Gorgon Project subsea release of 74,677.9 m^3 (829.8 m^3/day) of condensate over 90 days from a loss of well control associated with the GOR-1A well

	Dissolved hydrocarbons – minimum arrival time at each exposure value (days), plus peak concentration				Entrained hydrocarbons - minimum arrival time at each exposure value (days), plus peak concentration			Floating hydrocarbons – minimum arrival time at each exposure value (days)			Shoreline accumulation – minimum arrival time at each exposure value and shoreline mass			
Location	**Dissolved hydrocarbons ≥10 ppb (low) (days)**	**Dissolved hydrocarbons ≥ 50 ppb (moderate) (days)**	**Dissolved hydrocarbons ≥ 400 ppb (high) (days)**	**Maximum dissolved hydrocarbon exposure (ppb)**	**Total hydrocarbons entrained ≥10 ppb (days)**	**High hydrocarbons entrained 100 ≥ppb (days)**	**Maximum entrained hydrocarbon exposure (ppb)**	**Floating hydrocarbon contact ≤1 g/m² (low) (days)**	**Floating hydrocarbon contact ≥10g/m² (moderate) (days)**	**Floating hydrocarbon contact ≥50g/m² (high) (days)**	**Shoreline accumulation ≥10 g/m² (days)**	**Shoreline accumulation ≥100g/m² (moderate) (days)**	**Shoreline accumulation ≥1000g/m² (high) (days)**	**Shore maximum mass (kg)**
Montebello AMP	3.04	3.25	13.4	135.1	2.79	7.33	112.0	NC	NC	NC	NA	NA	NA	NA
Rosily Shoals	3.21	4.21	NC	19.9	3.12	38.5	71.8	NC	NC	NC	NA	NA	NA	NA
Penguin Bank	3.38	5.79	NC	75.0	3.08	38.3	67.6	NC	NC	NC	NA	NA	NA	NA
Gascoyne AMP	3.92	3.96	7.54	641.1	3.83	4.00	173.6	NC	NC	NC	NA	NA	NA	NA
Barrow Island MMA	4.00	4.54	NC	136.8	2.88	42.8	49.6	NC	NC	NC	NC	NC	NC	NC
Ningaloo AMP	4.12	4.83	48.7	201.2	4.67	11.9	24.0	NC	NC	NC	NA	NA	NA	NA
Poivre Reef	4.38	NC	NC	42.1	3.83	NC	33.0	NC	NC	NC	NA	NA	NA	NA
Barrow Island (Barrow Island Group)	4.46	9.46	NC	122.9	4.38	NC	32.7	NC	NC	NC	10.2	NC	NC	1,308.8
Barrow Island MP	5.08	10.0	NC	122.9	3.50	NC	32.1	NC	NC	NC	NC	NC	NC	NC
Muiron Islands MMA	5.29	14.7	69.8	3.86	5.00	38.8	15.8	NC	NC	NC	NC	NC	NC	NC
Middle Island (Barrow	5.46	NC	NC	32.4	4.21	NC	37.0	NC	NC	NC	10.2	NC	NC	1,127.3

	Dissolved hydrocarbons – minimum arrival time at each exposure value (days), plus peak concentration				Entrained hydrocarbons - minimum arrival time at each exposure value (days), plus peak concentration			Floating hydrocarbons – minimum arrival time at each exposure value (days)			Shoreline accumulation – minimum arrival time at each exposure value and shoreline mass			
Location	Dissolved hydrocarbons ≥10 ppb (low) (days)	Dissolved hydrocarbons ≥ 50 ppb (moderate) (days)	Dissolved hydrocarbons ≥ 400 ppb (high) (days)	Maximum dissolved hydrocarbon exposure (ppb)	Total hydrocarbons entrained ≥10 ppb (days)	High hydrocarbons entrained 100 ≥ppb (days)	Maximum entrained hydrocarbon exposure (ppb)	Floating hydrocarbon contact ≤1 g/m² (low) (days)	Floating hydrocarbon contact ≥10g/m² (moderate) (days)	Floating hydrocarbon contact ≥50g/m² (high) (days)	Shoreline accumulation ≥10 g/m² (days)	Shoreline accumulation ≥100g/m² (moderate) (days)	Shoreline accumulation ≥1000g/m² (high) (days)	Shore maximum mass (kg)
Island Group)														
Ripple Shoals	6.46	45.3	NC	2.70	4.42	42.7	32.9	NC	NC	NC	NA	NA	NA	NA
Flat Island (Pilbara Coast Islands Group)	6.54	38.4	NC	23.2	5.00	38.4	44.0	NC	NC	NC	7.29	NC	NC	65.8
Serrurier Island (Pilbara Coast Islands Group)	6.79	39.0	39.4	17.8	5.46	38.6	43.3	NC	NC	NC	7.00	NC	NC	762.1
Tryal Rocks	6.83	43.0	NC	18.4	6.25	NC	17.4	NC	NC	NC	NA	NA	NA	NA
Rankin Bank	7.42	8.04	20.4	107.2	5.96	9.54	71.6	NC	NC	NC	NA	NA	NA	NA
Boodie Island (Barrow Island Group)	7.50	NC	NC	21.6	4.17	NC	32.5	NC	NC	NC	10.4	NC	NC	452.6
Bessieres Island (Pilbara Coast Islands Group)	7.54	38.7	NC	17.5	5.50	38.8	87.2	NC	NC	NC	7.29	NC	NC	94.8
Montebello	8.04	38.1	NC	0.61	6.12	NC	17.4	NC	NC	NC	NC	NC	NC	NC

	Dissolved hydrocarbons – minimum arrival time at each exposure value (days), plus peak concentration				Entrained hydrocarbons - minimum arrival time at each exposure value (days), plus peak concentration			Floating hydrocarbons – minimum arrival time at each exposure value (days)			Shoreline accumulation – minimum arrival time at each exposure value and shoreline mass			
Location	**Dissolved hydrocarbons ≥10 ppb (low) (days)**	**Dissolved hydrocarbons ≥ 50 ppb (moderate) (days)**	**Dissolved hydrocarbons ≥ 400 ppb (high) (days)**	**Maximum dissolved hydrocarbon exposure (ppb)**	**Total hydrocarbons entrained ≥10 ppb (days)**	**High hydrocarbons entrained 100 ≥ppb (days)**	**Maximum entrained hydrocarbon exposure (ppb)**	**Floating hydrocarbon contact ≤1 g/m² (low) (days)**	**Floating hydrocarbon contact ≥10g/m² (moderate) (days)**	**Floating hydrocarbon contact ≥50g/m² (high) (days)**	**Shoreline accumulation ≥10 g/m² (days)**	**Shoreline accumulation ≥100g/m² (moderate) (days)**	**Shoreline accumulation ≥1000g/m² (high) (days)**	**Shore maximum mass (kg)**
Islands MP														
Sunday Island (Exmouth Islands Group)	8.46	19.5	NC	0.27	5.88	39.1	11.5	NC	NC	NC	NC	NC	NC	26.0
Montebello Shoals	9.00	69.7	NC	0.38	6.79	NC	16.7	NC	NC	NC	NA	NA	NA	NA
Peak Island (Exmouth Islands Group)	13.2	17.3	52.7	3.36	5.12	38.3	24.6	NC	NC	NC	NC	NC	NC	0.00
Shark Bay AMP	16.7	22.9	NC	41.7	16.2	NC	10.4	NC	NC	NC	NA	NA	NA	NA
Dailey Shoal	16.8	19.5	NC	0.60	5.58	38.7	16.1	NC	NC	NC	NA	NA	NA	NA
Airlie Island (Pilbara Coast Islands Group)	20.0	42.7	NC	3.72	5.29	40.2	24.7	NC	NC	NC	9.50	NC	NC	63.1
Trap Reef	20.3	40.6	NC	3.51	3.92	39.4	32.5	NC	NC	NC	NA	NA	NA	NA
Thevenard Island NR	20.5	41.7	NC	1.71	7.67	40.5	34.8	NC	NC	NC	NC	NC	NC	NC
Thevenard Island	20.5	41.7	NC	1.78	7.75	40.5	32.0	NC	NC	NC	NC	NC	NC	125.1

	Dissolved hydrocarbons – minimum arrival time at each exposure value (days), plus peak concentration				Entrained hydrocarbons - minimum arrival time at each exposure value (days), plus peak concentration			Floating hydrocarbons – minimum arrival time at each exposure value (days)			Shoreline accumulation – minimum arrival time at each exposure value and shoreline mass			
Location	**Dissolved hydrocarbons ≥10 ppb (low) (days)**	**Dissolved hydrocarbons ≥ 50 ppb (moderate) (days)**	**Dissolved hydrocarbons ≥ 400 ppb (high) (days)**	**Maximum dissolved hydrocarbon exposure (ppb)**	**Total hydrocarbons entrained ≥10 ppb (days)**	**High hydrocarbons entrained 100 ≥ppb (days)**	**Maximum entrained hydrocarbon exposure (ppb)**	**Floating hydrocarbon contact ≤1 g/m² (low) (days)**	**Floating hydrocarbon contact ≥10g/m² (moderate) (days)**	**Floating hydrocarbon contact ≥50g/m² (high) (days)**	**Shoreline accumulation ≥10 g/m² (days)**	**Shoreline accumulation ≥100g/m² (moderate) (days)**	**Shoreline accumulation ≥1000g/m² (high) (days)**	**Shore maximum mass (kg)**
(Pilbara Coast Islands Group)														
Brewis Reef	21.0	39.5	NC	1.68	7.50	40.2	32.4	NC	NC	NC	NA	NA	NA	NA
Carnarvon Canyon AMP	22.8	25.0	NC	4.69	22.7	NC	17.5	NC	NC	NC	NA	NA	NA	NA
Hood Reef	23.5	40.2	NC	1.07	6.42	39.4	14.9	NC	NC	NC	NA	NA	NA	NA
Agro-Rowley Terrace AMP	29.4	44.0	NC	1.95	21.2	NC	11.1	NC	NC	NC	NA	NA	NA	NA
Table Island (Pilbara Coast Islands Group)	39.0	39.1	NC	4.35	6.42	39.4	42.8	NC	NC	NC	NC	NC	NC	0.00
Round Island (Pilbara Coast Islands Group)	39.2	39.4	NC	2.08	6.08	39.2	25.7	NC	NC	NC	NC	NC	NC	31.6
Sultan Reef	39.6	44.1	NC	0.83	8.71	101.1	13.8	NC	NC	NC	NA	NA	NA	NA
Tortoise Island (Pilbara Coast	40.4	40.7	NC	0.34	7.46	NC	20.5	NC	NC	NC	NC	NC	NC	0.00

	Dissolved hydrocarbons – minimum arrival time at each exposure value (days), plus peak concentration				Entrained hydrocarbons - minimum arrival time at each exposure value (days), plus peak concentration			Floating hydrocarbons – minimum arrival time at each exposure value (days)			Shoreline accumulation – minimum arrival time at each exposure value and shoreline mass			
Location	**Dissolved hydrocarbons ≥10 ppb (low) (days)**	**Dissolved hydrocarbons ≥ 50 ppb (moderate) (days)**	**Dissolved hydrocarbons ≥ 400 ppb (high) (days)**	**Maximum dissolved hydrocarbon exposure (ppb)**	**Total hydrocarbons entrained ≥10 ppb (days)**	**High hydrocarbons entrained 100 ≥ppb (days)**	**Maximum entrained hydrocarbon exposure (ppb)**	**Floating hydrocarbon on contact ≤1 g/m² (low) (days)**	**Floating hydrocarbon on contact ≥10g/m² (moderate) (days)**	**Floating hydrocarbon on contact ≥50g/m² (high) (days)**	**Shoreline accumulation ≥10 g/m² (days)**	**Shoreline accumulation ≥100g/m² (moderate) (days)**	**Shoreline accumulation ≥1000g/m² (high) (days)**	**Shore maximum mass (kg)**
Islands Group)														
Taunton Reef	40.6	44.3	NC	4.30	5.38	40.6	15.5	NC	NC	NC	NA	NA	NA	NA
Flinders Shoal	42.8	NC	NC	0.21	13.0	46.8	13.6	NC	NC	NC	NA	NA	NA	NA
Mary Anne Group (Pilbara Coast Islands Group)	42.8	NC	NC	0.24	13.0	NC	13.6	NC	NC	NC	14.9	NC	NC	348.3
Abrolhos AMP	43.0	66.4	NC	44.4	32.9	NC	51.8	NC	NC	NC	NA	NA	NA	NA
Great Sandy Island NR	43.8	48.9	NC	0.86	8.00	43.7	23.9	NC	NC	NC	NC	NC	NC	NC
Barrow Island Reefs and Shoals	43.8	48.4	NC	1.36	7.96	43.7	29.5	NC	NC	NC	NA	NA	NA	NA
Little Shoals	44.4	45.3	NC	0.38	16.6	NC	11.0	NC	NC	NC	NA	NA	NA	NA
Lightfoot Reef	46.0	65.1	NC	0.12	14.5	60.5	12.3	NC	NC	NC	NA	NA	NA	NA

Blue = Submerged receptor, Tan = Emergent Receptor
NC: No contact to receptor predicted for specified threshold
NA: Not applicable

Table 8-4: Deterministic modelling results (Run 65) – Wheatstone Project trunkline rupture at the inner location release of 3,000 m^3 of Trunkline Condensate/Gas over 25 hours

	Dissolved hydrocarbons minimum arrival time (days) at each exposure value, plus peak concentration				Maximum entrained hydrocarbon exposure (ppb)	Floating hydrocarbons – minimum arrival time (days) at each exposure value			Shoreline accumulation – minimum arrival time (days) at each exposure value and shoreline mass			
Location	Dissolved hydrocarbons ≥10 ppb (low)	Dissolved hydrocarbons ≥50 ppb (mod)	Dissolved hydrocarbons ≥400 ppb (high)	Maximum dissolved hydrocarbon exposure (ppb)		Floating hydrocarbons ≥1 g/m^2 (low)	Floating hydrocarbons ≥10g/m^2 (moderate)	Floating hydrocarbon contact ≥50g/m^2 (high)	Shoreline accumulation ≥10 g/m^2 (low)	Shoreline accumulation ≥100g/m^2 (moderate)	Shoreline accumulation ≥1000g/m^2 (high)	Shore maximum volume (m^3)
Ashburton Island	0.0	0.1	0.8	357.8	2,484.1	0.04	0.08	NC	0.08	0.08	0.08	114.7
Australind Shoal	0.2	0.3	NC	17.6	19.2	NC	NC	NC	NA	NA	NA	NA
Glennie Patches	0.3	0.6	NC	143.6	370	0.21	NC	NC	NA	NA	NA	NA
Tortoise Island	0.3	0.8	NC	90.8	346.3	NC	NC	NC	NC	NC	NC	NC
Inner Northwest Patch	0.9	1.1	NC	114.1	143.8	NC	NC	NC	NA	NA	NA	NA
Tongue Shoals	1.0	1.2	NC	81.7	367.6	NC	NC	NC	NA	NA	NA	NA
Santo Rock	1.2	2.4	NC	53.2	230	NC	NC	NC	NA	NA	NA	NA
Locker Reef	2.0	2.2	NC	78.6	136.8	NC	NC	NC	NA	NA	NA	NA
Roller Shoal	2.0	NC	NC	14.8	38.6	NC	NC	NC	NA	NA	NA	NA
Serrurier Island	2.0	4	NC	10.3	24.6	NC	NC	NC	NC	NC	NC	NC
Hayman Rock	2.3	3.5	NC	39.1	141.3	NC	NC	NC	NA	NA	NA	NA
Locker Island	2.7	5.6	NC	15.0	6.2	NC	NC	NC	NC	NC	NC	NC
Baylis Patches	2.8	3.5	NC	30.1	39.2	NC	NC	NC	NA	NA	NA	NA
Fairway Reef	3.2	4.4	NC	35.0	152	NC	NC	NC	NA	NA	NA	NA
Spider Reef	3.5	5.1	NC	18.1	97.1	NC	NC	NC	NA	NA	NA	NA
Observation Island	3.5	4.4	NC	31.3	153.4	NC	NC	NC	NC	NC	NC	NC

Location	Dissolved hydrocarbons minimum arrival time (days) at each exposure value, plus peak concentration				Maximum entrained hydrocarbon exposure (ppb)	Floating hydrocarbons – minimum arrival time (days) at each exposure value			Shoreline accumulation – minimum arrival time (days) at each exposure value and shoreline mass			
	Dissolved hydrocarbons ≥10 ppb (low)	Dissolved hydrocarbons ≥50 ppb (mod)	Dissolved hydrocarbons ≥400 ppb (high)	Maximum dissolved hydrocarbon exposure (ppb)		Floating hydrocarbons ≥1 g/m² (low)	Floating hydrocarbons ≥10g/m² (moderate)	Floating hydrocarbon contact ≥50g/m² (high)	Shoreline accumulation ≥10 g/m² (low)	Shoreline accumulation ≥100g/m² (moderate)	Shoreline accumulation ≥1000g/m² (high)	Shore maximum volume (m³)
Otway Reef	4.5	6.9	NC	14.8	78.7	NC	NC	NC	NA	NA	NA	NA
Muiron Islands MMA	4.9	8.1	NC	26.6	66.3	NC	NC	NC	NA	NA	NA	NA
Combe Reef	5.1	NC	NC	15.6	48.1	NC	NC	NC	NA	NA	NA	NA
Ningaloo MP	5.5	NC	NC	26.2	68.3	NC	NC	NC	NA	NA	NA	NA
Muiron Islands	5.9	NC	NC	16.4	21.3	NC	NC	NC	NC	NC	NC	NC
Dailey Shoal	6.5	NC	NC	22.1	27	NC	NC	NC	NA	NA	NA	NA
Sunday Island	7.0	NC	NC	13.6	37.9	NC	NC	NC	NC	NC	NC	NC
Exmouth	7.5	NC	NC	35.7	36.4	NC	NC	NC	NC	NC	NC	NC
North West Reef	8.4	NC	NC	18.5	38.1	NC	NC	NC	NA	NA	NA	NA

Blue = Submerged receptor, Tan = Emergent Receptor

NC: No contact to receptor predicted for specified threshold

NA: Not applicable

8.3 Co-Mobilisation of Monitoring Teams

Where monitoring programs share compatible objectives, spatial footprints, sampling methods or logistical dependencies, co-mobilisation of OMP and/or SMP teams may be undertaken to maximise efficiency and minimise vessel movements, provided that safety, data integrity and analytical objectives are not compromised. Table 8-7 and Table 8-8 outline when co-mobilisation of OMP and/or SMP teams may be undertaken. Co-mobilisation is particularly applicable where monitoring programs:

- target the same or adjacent environmental compartments (e.g. water column and sediment)
- use comparable sampling and analytical techniques (e.g. grab or water sampling, fluorometry, or visual transects)
- operate within the same geographic area or under the same environmental conditions (e.g. similar tidal or meteorological windows)
- are required within a comparable timeframe following the spill (e.g. within 0–14 days post-activation).

Compatibility of OMPs and SMPs arises because many operational and scientific monitoring elements are designed to be complementary rather than sequential. For example, data collected under OM1–OM3 (hydrocarbon characterisation, water and sediment assessments) provide the initial exposure information required to inform SMPs such as SM1 and SM2 (water and sediment impact assessments). These programs use consistent sample media, laboratory protocols and QA/QC chains, enabling co-deployment without compromising scientific rigour. Similarly, concurrent vessel-based aerial or visual surveys for OM5 (Rapid Marine Fauna Surveillance) can support the early stages of SM4 and SM5 (Seabird, Shorebird and Marine Megafauna Assessments) through shared platforms and observation windows.

This approach reduces duplication of mobilisation logistics, minimises transit times between sites and sample transport while maintaining representative spatial and temporal coverage. It also supports ALARP principles by limiting the number of concurrent field assets, thereby reducing SIMOPS, vessel congestion, and overall operational risk. Where subsequent SMP phases require extended sampling or increased replication, these will be implemented independently once initial monitoring is underway.

Co-mobilisation decisions will be confirmed post-spill through the Incident Action Planning process, in consultation with the OSM Services Provider, monitoring specialists and relevant stakeholders, taking into account safety, receptor access, timing and data-quality considerations.

8.4 Coordination with other response operations

OSM operations during a Level 2–3 spill are conducted simultaneously with (and dependent on) other response activities, including source control, monitor and evaluate (vessel and aerial surveillance), mechanical dispersion, offshore containment and recovery, chemical dispersant application (including subsea dispersant injection where applicable to the activity), shoreline protection and deflection, shoreline clean-up, oiled wildlife response, and waste management. The concurrent nature of these activities requires structured coordination to

ensure that OSM effort supports operational decision making without compromising the safety or effectiveness of primary response operations.

CAPL will apply the SIMOPS plan (required for all source control operations per the Australian Offshore Titleholders Source Control Guideline [Ref. 12]) as the framework for managing these competing demands. The pre-incident SIMOPS plan addresses:

- Coordination in the immediate vicinity of the spill source - vessel positioning, exclusion zones, minimum vessel separations and communications protocols.
- Coordination across the broader logistics chain - supply base capacity, port access, airstrip and accommodation availability, and the cascading effects when these are at capacity.

For each activity covered by this OSM-BIP, the activity-specific pre-operations SIMOPS plan will be developed by the EMT during the first weeks of an actual response.

8.4.1 SIMOPS

Within CAPL's EMT, SIMOPS is coordinated by the Operations Section, which is responsible for resolving conflicts between concurrent operations. OSM operations interface with the Operations Section via the Environment Unit Lead (Planning Section), consistent with IPIECA-IOGP good practice for integration of the Monitoring and Sampling Team with the Incident Management System (Ref. 13).

8.4.2 Typical SIMOPS scenarios for OSM

The OSM operations most likely to require SIMOPS coordination, and the resolution approach in each case, are summarised in Table 8-5. Each scenario applies only where the corresponding concurrent response operation is adopted as a response strategy in the relevant activity EP.

Table 8-5: Typical SIMOPS scenarios involving OSM operations and resolution approach

Concurrent response operation	OSM operations affected	Coordination approach
Source control (well intervention, capping stack, ROV operations at wellhead)	OM4b (Subsea Dispersant Injection Effectiveness Monitoring); OM2 (Hydrocarbon in Water Assessment) near-source	OM vessels operate outside the source control exclusion zone but within the subsea plume footprint. Sampling schedules aligned to source control operational windows. Vessel positioning coordinated through the Operations Section
Subsea dispersant injection (SSDI)	OM4b (Subsea Dispersant Effectiveness Monitoring); OM2 / OM3 water and sediment sampling	OM4b vessels tracked in parallel with SSDI application; sampling design aligned to SSDI operating windows. In-water sampling coordinated with dispersant vessel movements to avoid interference
Surface dispersant application	OM4a (Surface Dispersant Effectiveness Monitoring); OM5 (Rapid Marine Fauna Surveillance)	OM4a sequenced with dispersant sorties, using aircraft 'no-spray' windows for pre- and post-application observations. Marine fauna surveillance coordinated with dispersant operations for

Concurrent response operation	OSM operations affected	Coordination approach
		wildlife-in-treatment-area avoidance
Offshore containment and recovery	OM2 (Hydrocarbon in Water Assessment); OM6 SCAT (nearshore boom deployments)	OM2 sampling co-mobilised with C&R vessel operations where safe; sampling positions aligned to boom placement to characterise pre- and post-containment concentrations.
Shoreline clean-up	OM6 SCAT (guides clean-up direction and prioritisation); SM3 (Intertidal and Coastal Habitat Assessment)	SCAT teams precede clean-up crews to characterise the shoreline; SCAT outputs feed clean-up team allocation. SM3 sampling follows clean-up in coordination with the Environment Unit to establish reference conditions.
Oiled wildlife response	OM5 (Rapid Marine Fauna Surveillance); OM6 SCAT; SM3 (Intertidal and Coastal Habitat Assessment); SM4 (Seabirds and Shorebirds Assessment); SM5 (Marine Mega-fauna Assessment)	OM5 aerial and vessel-based surveillance shared with OWR operations for concurrent wildlife observation and rescue-priority identification. Vessel and aircraft resources shared where feasible. OM6 SCAT and SM3 intertidal habitat survey crews coordinate shoreline access with OWR retrieval operations to avoid disturbance of active rescue sites (particularly nesting turtle beaches, seabird colonies and mangrove-fringed shorelines); wildlife encounters recorded during SCAT and SM3 surveys are relayed to OWR via the Environment Unit to inform rescue prioritisation.
Aerial monitor and evaluate (surveillance and plume tracking)	OM1 (Hydrocarbon Characterisation via visual observation); OM5 (Rapid Marine Fauna Surveillance)	Aerial platform time allocated in the daily flight plan; observers cross-trained where practicable to combine roles. Flight tracks coordinated to cover both spill tracking and receptor observation objectives.

8.4.3 Common Operating Picture

Shared situational awareness across response, monitoring and oiled wildlife response is maintained through CAPL's GIS-based Common Operating Picture, accessible to the EMT and to field teams. Real-time plume tracking, observed receptor contact, monitoring sampling locations, response activity locations and OWR operations are integrated on a single spatial platform. The Common Operating Picture is maintained by the Situation Unit Lead within the Planning Section and is a primary input to the operational NEBA process described in Section 13. This approach is consistent with the lessons of the Deepwater Horizon response, where shared situational awareness across response and monitoring teams was identified as a critical enabler of effective incident management (Ref. 13).

8.5 OSM Resourcing Requirements

The OSM resourcing requirements are sized to the worst-case credible spill scenarios (Section 8), informed by the deterministic modelling results in Section 8.2. The resources required to deliver the OSM response in the first 14 days following the spill are presented in three tables:

- Table 8-6 (OSM coordination roles) - the IMT and OSM Services Provider roles required to coordinate and manage the OSM response, drawn from the OSRL OSM Supplementary Service Agreement and CAPL OSM Capability Register (Ref. 11).
- Table 8-7 (Operational monitoring plans) - the team counts required to implement each OMP at the locations indicated by the deterministic outputs. Team counts are presented for Week 1 and Week 2 to reflect phased mobilisation as the response evolves and as receptor contact is observed.
- Table 8-8 (Scientific monitoring plans) - the team counts required to implement each SMP, including dedicated teams for control site characterisation (which is a feature of SMP design and is not required for OMP delivery).

Team counts are based on the monitoring priorities for the presented scenarios and the monitoring units defined in Table 8-2. Co-mobilisation of OMP and SMP teams is applied where feasible (Section 8.3).

Where additional resources are required to be scaled in to support the monitoring effort beyond the first 14 days, this is identified through the IMT process (Section 13) and mobilised via the OSM Services Provider, and/or the CAPL OSM Capability Register (Ref. 11), as described in Section 9. Sampling frequencies and durations for each OMP and SMP are defined in the Joint Industry Framework documents and are not duplicated in this OSM-BIP.

Table 8-6: Resources required for key OSM coordination roles

Role	Resources required	Arrangement
OSM Implementation Lead (CAPL / OSM Monitoring Provider/s)	1 x OSM Implementation Lead	OSRL OSM Supplementary Service Agreement / CAPL internal capability
Operational Monitoring Coordinator and Scientific Monitoring Coordinator (OSM Services Provider)	1 x Operational Monitoring Coordinator 1 x Scientific Monitoring Coordinator	
OSM Field Operations Manager (OSM Services Provider)	1 x OSM Field Operations Manager	

Table 8-7: Resources required for implementing operational monitoring plans#

OMP	Days 0–7 (total)	Days 7–14 (total)	Arrangement
OM1: Hydrocarbon characterisation*^	**Gorgon LOWC scenario** 1 team (spill site and surrounds) 1 team Montebello 1 team Barrow 1 team Southern Pilbara 1 team Ningaloo Offshore/Nearshore **Total 5 teams**	**Gorgon LOWC scenario** 1 team (spill site and surrounds) 1 team Montebello 1 team Barrow 1 team Southern Pilbara 1 team Ningaloo Offshore/Nearshore 1 team Offshore Environs Unit **Total 6 teams**	OSRL OSM Supplementary Service Agreement CAPL Contracted Vessel Providers Laboratory arrangement
	Wheatstone trunkline scenario 1 team (spill site and surrounds) 2 teams Southern Pilbara 1 team Ningaloo Nearshore **Total 4 teams**	**Wheatstone trunkline scenario** 1 team (spill site and surrounds) 3 teams Southern Pilbara 1 team Ningaloo Nearshore **Total 5 teams**	
OM2: Hydrocarbon in water assessment*	Refer to OMP: Hydrocarbon characterisation resourcing* (all sites)		OSRL OSM Supplementary Service Agreement CAPL Contracted Vessel Providers
OM3: Hydrocarbon in sediment assessment*	Refer to OMP: Hydrocarbon characterisation resourcing* (all sites)		OSRL OSM Supplementary Service Agreement CAPL Contracted Vessel Providers
OM4a: Surface chemical dispersant effectiveness and fate	1 team for visual observations, which may be performed by trained aerial observers used during monitor and evaluate if trained in observation and verification of chemical dispersant effectiveness For water quality observations, refer to OMP: Water quality assessment		OSRL OSM Supplementary Service Agreement AMOSC Participant Member Agreement CAPL Contracted Vessel Providers Aviation contractors
OM4b: Subsea dispersant injection monitoring	No subsea dispersant injection until week 2 due to transportation requirements	1 team	OSRL OSM Supplementary Service Agreement OSRL Subsea Well Intervention Services (SWIS) Capping Services Membership AMOSC Participant Member Agreement

OMP	Days 0–7 (total)	Days 7–14 (total)	Arrangement
			CAPL Contracted Vessel Providers
OM5: Rapid marine fauna surveillance^	**Gorgon condensate scenario** 1 team to conduct aerial surveys for spill site, Ningaloo and Southern Pilbara Units (2 observers per aircraft) 1 team to conduct aerial surveys for Montebello, Barrow and Offshore Environs Unit (2 observers per aircraft) **Total 2 teams** Note: Fauna related SMPs are likely to be initiated simultaneously or following aerial assessment with vessel and ground based fauna surveys carried out as part of the relevant fauna SMP.		OSRL OSM Supplementary Service Agreement CAPL Contracted Vessel Providers Aviation contractors
	Wheatstone trunkline scenario 1 team to conduct aerial surveys for spill site, Southern Pilbara and Ningaloo Nearshore Units (2 observers per aircraft) **Total 1 team** Note: Fauna related SMPs are likely to be initiated simultaneously or following aerial assessment with vessel and ground based fauna surveys carried out as part of the relevant fauna SMP.		
OM6: Shoreline clean-up assessment	**Gorgon condensate scenario** (spill scenario predicted to contact highest number of shorelines within 14 days) 2 teams Southern Pilbara Unit (Flat, Serrurier and Bessieres Islands) **Total 2 teams**	**Gorgon condensate scenario** 2 teams Southern Pilbara Unit (Flat, Serrurier and Bessieres Island) 2 teams Barrow Unit (Barrow, Middle and Boodie Islands) **Total 4 teams**	Australian Marine Oil Spill Centre (AMOSC) Participant Member Agreement and/or OSRL OSM Supplementary Service Agreement CAPL Contracted Vessel Providers State/Territory Response Teams and AMSA National Response Team
OM7: Air quality modelling (responder health and safety)	**Any scenario** 1 model	**Any scenario** 1 model	RPS via CAPL contract

** Initial co-mobilisation between OMP: Hydrocarbon characterisation, OMP: Surface chemical dispersant effectiveness and fate, OMP: Subsea dispersant effectiveness monitoring, OMP: Water quality assessment and OMP: Sediment quality assessment*

 # Specific monitoring units are mentioned for planning and guidance purposes based on a worst case planning approach. In the event of an actual spill, other locations and/or receptors may be contacted and the ability to access these locations (i.e. with consideration of safety and simultaneous operations (SIMOPS)) would be assessed. This would be identified and managed as part of implementation as per the guidance in Section 13.

^ These resources may not be required if relevant scientific monitoring components' initiation criteria have been triggered

Table 8-8: Resources required for implementing scientific monitoring plans#

SMP	Days 0–7 (total)	Days 7–14 (total)	Arrangement
SM1: Water quality impact assessment *^	**Gorgon LOWC scenario** 1 team (spill site and surrounds) 1 team Montebello Unit 1 team Barrow Unit 1 team Southern Pilbara Unit 1 team Ningaloo Offshore/Nearshore Unit 1 team control sites **Total 6 teams**	**Gorgon LOWC scenario** 1 team (spill site and surrounds) 1 team Montebello Unit 1 team Barrow Unit 1 team Southern Pilbara Unit 1 team Ningaloo Offshore/Nearshore Unit 1 team Offshore Environs Unit 1 team control sites **Total 7 teams**	OSRL OSM Supplementary Service Agreement CAPL ABU OSM Capability Register CAPL Contracted Vessel Providers Laboratory arrangement
	Wheatstone trunkline scenario 1 team (spill site and surrounds) 2 teams Southern Pilbara Unit 1 team Ningaloo Nearshore Unit 1 team control sites **Total 5 teams**	**Wheatstone trunkline scenario** 1 team (spill site and surrounds) 3 teams Southern Pilbara Unit 1 team Ningaloo Nearshore Unit 1 team control sites **Total 6 teams**	
SM2: Sediment quality impact assessment *	Refer to SMP: Water quality impact assessment* (all sites)		OSRL OSM Supplementary Service Agreement CAPL ABU OSM Capability Register CAPL Contracted Vessel Providers Laboratory arrangement
SM3: Intertidal and coastal habitat assessment	**Gorgon LOWC scenario** (no shoreline contact until days 7–14) 1 team control sites **Total 1 team** **Wheatstone trunkline scenario** 1 team Southern Pilbara Unit 1 team control sites **Total 2 teams**	**Gorgon LOWC scenario** 1 team Barrow Unit 1 team Southern Pilbara Unit 1 team control sites **Total 3 teams** **Wheatstone trunkline scenario** 1 team Southern Pilbara Unit 1 team control sites **Total 2 teams**	OSRL OSM Supplementary Service Agreement CAPL ABU OSM Capability Register CAPL Contracted Vessel Providers Laboratory arrangement

SMP	Days 0–7 (total)	Days 7–14 (total)	Arrangement
SM4: Seabirds and shorebirds^	**Gorgon LOWC scenario** 1 team to conduct initial aerial surveys for Montebello and Barrow Units 1 team to conduct initial aerial surveys for Ningaloo and Southern Pilbara Units **Total 2 aerial teams** 1 team to conduct vessel-based surveys for Montebello Unit 1 team Barrow Unit 1 team Southern Pilbara Unit 1 team Ningaloo Offshore/Nearshore Unit 1 team control site(s) (surveys would include all fauna [birds, reptiles, cetaceans, dugong and whale shark]) **Total 5 vessel-based teams** 1 team to conduct ground-based surveys for Barrow Unit 1 team Southern Pilbara Unit 1 team control site(s) (1 experienced ornithologists per team) **Total 3 ground-based teams**	**Gorgon LOWC scenario** 1 team to conduct initial aerial surveys for Montebello, Barrow and Offshore Environs Units 1 team to conduct initial aerial surveys for Ningaloo and Southern Pilbara Units **Total 2 aerial teams** 1 team to conduct vessel-based surveys for Montebello Unit 1 team Barrow Unit 1 team Southern Pilbara Unit 1 team Ningaloo Offshore/Nearshore Unit 1 team Offshore Environs Unit 1 team control site(s) (surveys would include all fauna [birds, reptiles, cetaceans, dugong and whale shark]) **Total 6 vessel-based teams** 1 team to conduct ground-based surveys for Barrow Unit 1 team Southern Pilbara Unit 1 team control site(s) (1 experienced ornithologists per team) **Total 3 ground-based teams**	OSRL OSM Supplementary Service Agreement CAPL ABU OSM Capability Register CAPL Contracted Vessel Providers Laboratory arrangement
	Wheatstone trunkline scenario 1 team to conduct initial aerial surveys for Southern Pilbara and Ningaloo Nearshore Units **Total 1 aerial team** 2 teams to conduct vessel-based surveys for Southern Pilbara Unit	**Wheatstone trunkline scenario** 1 team to conduct initial aerial surveys for Montebello, Barrow and Offshore Environs Units 1 team to conduct initial aerial surveys for Ningaloo and Southern Pilbara Units **Total 2 aerial teams**	

SMP	Days 0–7 (total)	Days 7–14 (total)	Arrangement
	1 team Ningaloo Nearshore Unit 1 team control site(s) (surveys would include all fauna [birds, reptiles, cetaceans, dugong and whale shark]) **Total 4 vessel-based teams** 1 team to conduct ground-based surveys for Southern Pilbara Unit 1 team control site(s) (1 experienced ornithologists per team) **Total 2 ground-based teams**	2 teams to conduct vessel-based surveys for Southern Pilbara Unit 1 team Ningaloo Nearshore Unit 1 team control site(s) (surveys would include all fauna [birds, reptiles, cetaceans, dugong and whale shark]) **Total 4 vessel-based teams** 1 team to conduct ground-based surveys for Southern Pilbara Unit 1 team control site(s) (1 experienced ornithologists per team) **Total 2 ground-based teams**	
SM5: Marine mega-fauna assessment – whale shark, dugong and cetaceans^	Aerial surveys refer to SMP: Seabirds and shorebirds This SMP may replace the relevant OMP: Marine fauna assessment if the OMPs termination criteria are triggered	Aerial surveys refer to SMP: Seabirds and shorebirds Vessel surveys refer to SMP: Seabird and shorebirds	OSRL OSM Supplementary Service Agreement CAPL ABU OSM Capability Register CAPL Contracted Vessel Providers Laboratory arrangement
SM5: Marine mega-fauna assessment – reptiles^	Aerial surveys refer to SMP: Seabirds and shorebirds Vessel surveys refer to SMP: Seabird and shorebirds Ground based survey refer to SMP: Seabird and shorebirds (including 1 member experienced with ground turtle surveys)	Aerial surveys refer to SMP: Seabirds and shorebirds Vessel surveys refer to SMP: Seabird and shorebirds Ground based survey refer to SMP: Seabird and shorebirds (including 1 member experienced with ground turtle surveys)	OSRL OSM Supplementary Service Agreement CAPL ABU OSM Capability Register CAPL Contracted Vessel Providers Laboratory arrangement

SMP	Days 0–7 (total)	Days 7–14 (total)	Arrangement
SM6: Benthic habitat assessment	**Gorgon LOWC scenario** 1 team (spill site and surrounds) 1 team Montebello Unit 1 team Barrow Unit 1 team Southern Pilbara Unit 1 team Ningaloo Offshore/Nearshore Unit 1 team control sites **Total 6 teams**	**Gorgon LOWC scenario** 1 team (spill site and surrounds) 1 team Montebello Unit 1 team Barrow Unit 1 team Southern Pilbara Unit 1 team Ningaloo Offshore/Nearshore Unit 1 team Offshore Environs Unit 1 team control sites **Total 7 teams**	OSRL OSM Supplementary Service Agreement CAPL ABU OSM Capability Register CAPL Contracted Vessel Providers Laboratory arrangement
	Wheatstone trunkline scenario 1 team (spill site and surrounds) 2 teams Southern Pilbara Unit 1 team Ningaloo Nearshore Unit 1 team control sites **Total 5 teams**	**Wheatstone trunkline scenario** 1 team (spill site and surrounds) 3 teams Southern Pilbara Unit 1 team Ningaloo Nearshore Unit 1 team control sites **Total 6 teams**	
SM7: Marine fish and elasmobranch assemblages assessment	**Gorgon LOWC scenario** 1 team (spill site and surrounds) 1 team Montebello Unit 1 team Barrow Unit 1 team Southern Pilbara Unit 1 team Ningaloo Offshore/Nearshore Unit 1 team control sites **Total 6 teams**	**Gorgon LOWC scenario** 1 team (spill site and surrounds) 1 team Montebello Unit 1 team Barrow Unit 1 team Southern Pilbara Unit 1 team Ningaloo Offshore/Nearshore Unit 1 team Offshore Environs Unit 1 team control sites **Total 7 teams**	OSRL OSM Supplementary Service Agreement CAPL ABU OSM Capability Register CAPL Contracted Vessel Providers Laboratory arrangement
	Wheatstone trunkline scenario 1 team (spill site and surrounds) 2 teams Southern Pilbara Unit 1 team Ningaloo Nearshore Unit 1 team control sites **Total 5 teams**	**Wheatstone trunkline scenario** 1 team (spill site and surrounds) 3 teams Southern Pilbara Unit 1 team Ningaloo Nearshore Unit 1 team control sites **Total 6 teams**	

SMP	Days 0–7 (total)	Days 7–14 (total)	Arrangement
SM8: Fisheries impact assessment	**Any scenario** Total 2 teams to cover all relevant Commonwealth and State fisheries		OSRL OSM Supplementary Service Agreement CAPL Contracted Vessel Providers Laboratory arrangement
SM9: Heritage features assessment	**Any scenario** 1 team	**Any scenario** 1 team	OSRL OSM Supplementary Service Agreement CAPL Contracted Vessel Providers Laboratory arrangement
SM10: Social impact assessment	**Any scenario** 1 team	**Any scenario** 1 team	OSRL OSM Supplementary Service Agreement

[#] *Specific monitoring units are mentioned for planning and guidance purposes based on a worst case planning approach. In the event of an actual spill, other locations and/or receptors may be contacted. This would be identified and managed as part of implementation as per the guidance in Section 13.*

** Initial co-mobilisation between SMP: Water quality impact assessment and SMP: Sediment quality impact assessment.*

^ *This SMP may replace the relevant OMP if the OMPs termination criteria are triggered.*

9 Capability Arrangements

CAPL is a Member of the OSRL OSM Supplementary Service Agreement, which provides shared OSM Annual Services and Response Services to members who have subscribed this supplementary service. This OSM Supplementary Service Agreement includes access to OSRL's sub-contracted Monitoring Service Providers in Australia (who will report through OSRL) to deliver monitoring capability.

Details of OSM services are provided in Table 9-1. In addition, CAPL is a Member of OSRL's Subsea Well Intervention Service (SWIS), enabling access to trained personnel and specialised monitoring equipment for subsea dispersant injection monitoring. CAPL will maintain responsibility for implementing OM7: Air Quality Modelling (responder health and safety).

OSRL (referred to as the OSM Services Provider in this BIP), via the OSM Supplementary Service Agreement is contracted to provide Members with a monthly OSM Capability Register, which details personnel requirements for OMPs/SMPs, numbers of available personnel and competencies for service provider and sub-contracted personnel.

Personnel listed on the monthly update are accessible following a Member's initial activation of OSM Services.

In addition, CAPL has contracts with specialised environmental service providers who perform existing environmental monitoring scopes in the OSM Planning Area and can also be utilised for additional scientific monitoring scopes. CAPL maintains an internal CAPL OSM Capability Register listing CAPL and Global Chevron employed personnel mapped by expertise and competency to specific OSM roles. The CAPL OSM Capability Register also provides the contract details of the additional environmental service providers. Together this CAPL and Global Chevron capability provides additional resource depth alongside the OSRL Capability Register.

Table 9-1: OSM services provider preparedness and activation / monitoring services

OSM Services Provided During Preparedness and Activation / Monitoring Phases
Preparedness[4]
24/7 Duty Manager accessed through 24-hour hotline
Provision of suitably trained operational and scientific monitoring personnel
Monthly reports on personnel and equipment availability
Access to OSM Services Provider's sub-contracted Monitoring Service Providers
Access to OSM Services Provider's network of laboratories and equipment providers
Activation / Monitoring[5]
Provision of an OSM Services Lead and OSM Implementation Lead to the CAPL EMT within 12 hours of notification
Provision of a first-strike monitoring team within 72 hours of notification, ready to deploy from a nominated port(s) or staging location (e.g. Forward Operating Base [FOB])
Assisting CAPL in the finalisation of monitoring plans

[4] Defined as Annual OSM Services in OSM Supplementary Service Agreement

[5] Defined as Response Services in OSM Supplementary Service Agreement

OSM Services Provided During Preparedness and Activation / Monitoring Phases
Provision of scientific monitoring personnel within 5–7 days of notification
Access to OSM Services Provider laboratories and equipment

9.1 Personnel competencies

The training and competencies held by key OSM personnel via the OSRL OSM Supplementary Service Agreement are consistent with the specified training and competencies stated in Table 11-1 of the Joint Industry OSM Framework. In addition, competencies of SMP Field Teams are consistent with Appendix D of the Joint Industry OSM Framework (Ref. 1). Where a key OSM role (i.e. OSM Implementation Lead), or monitoring team role is held by CAPL, this is outlined in the CAPL ABU OSM Capability Register (Ref. 11).

The OSM Supplementary Service Agreement commits to nominated monitoring personnel providing copies of their CVs, along with certificates or evidence meeting the competency requirements. This information is stored in the OSRL Operational and Scientific Monitoring Document Management System for capability tracking and assurance purposes. The Monthly Capability Register is updated so that it reflects changes to personnel availability or gaps in competency and training. The role of the OSM Implementation Lead aligns with the responsibilities listed in the Joint Industry OSM Framework.

In addition, and where practicable, CAPL will engage its most qualified local Environment Specialists in the initial stages of the monitoring program to help activate and mobilise monitoring teams and support the OSM Services Provider in the finalisation of monitoring designs.

9.2 Equipment

Equipment requirements are listed in the individual OMPs and SMPs. A generalised breakdown of equipment types and the source is listed in Table 9-2.

In accordance with the OSRL OSM Supplementary Service Agreement, the OSM Services Provider will provide all specialised field monitoring equipment to implement individual OMPs and SMPs. CAPL will remain responsible for support and field logistics, including monitoring platforms (e.g. vessels, vehicles and aircraft), flights and accommodation for personnel and transportation / couriers for samples to be sent back to laboratories. In addition, CAPL has access to subsea dispersant injection monitoring equipment and personnel via its OSRL SWIS Capping Services Membership.

Availability of key equipment will be listed in the OSM Services Provider's Monthly Capability Register and/or CAPL ABU OSM Capability Register (Ref. 11), depending on the source of the equipment.

Table 9-2: OSM equipment

Equipment type	Source
CAPL equipment	
Desktop equipment (e.g. Oil Spill Response Atlas, GIS)	Geospatial Support coordinated through EMT
Logistical equipment (e.g. in-field accommodation, vessels, aircraft)	Marine contracts, aviation contracts coordinated through EMT

Equipment type	Source
Hydrocarbon characterisation sample kits (e.g. Niskin bottles, sediment grabs, sample bottles, ROV)	Located on-site at Barrow Island
OSM Services Provider Equipment	
In-field specialised monitoring equipment (e.g. fluorometers, sample bottles, ROVs)	Coordinated through the OSM Services Provider's OSM response and implementation services
Subsea dispersant injection monitoring equipment	OSRL SWIS Capping Services Membership

9.3 Exercises

The OSM Services Provider, via the OSM Supplementary Service Agreement, is contracted to maintain an OSM Services Annual Assurance Program. As part of this program, the OSM Services Provider conducts a number of different exercise types, which are outlined in Table 9-3. The purpose of this testing is to confirm that the response arrangements and capability in place are available when needed and function as intended. Following the Notification and Tabletop excises listed in Table 9-3, the OSM Services Provider will prepare exercise reports and track any action items to completion.

In addition, CAPL will conduct an annual notification test of the OSM Services Provider, outlined in the ABU EM 5 Year Training and Exercise Schedule (Ref. 10).

Table 9-3: Minimum Exercise Requirements

Exercise Type	Responsibility	Description	Frequency
Assurance Program Workshop	OSRL, Industry Member Technical Advisory Group (IMTAG) and Monitoring Service Providers	The outputs from the annual OSM Services and Assurance Program Workshop will form the basis of the OSM Annual Services and Assurance Program for the coming Contract Year.	Annually
Notification exercise	CAPL with OSRL	Test procedures to notify and activate the OSM Services, including subcontracted monitoring service providers.	Annually
Tabletop exercise	IMTAG and OSRL to agree a lead Titleholder for each Calendar Year	A discussion-based exercise that involves no physical deployment of personnel or equipment. The exercise will simulate all actions to validate the enactment of plans, procedures, protocols, roles and tasks during a simulated incident.	Annually
Desktop review	Monitoring Service Providers & OSRL	A desktop review of capability for any OMP and/or SMP not tested during the annual table-top exercise. The review can also be based on the outcomes/findings of the OMPs and/or SMPs that were tested.	Annually

10 Capability Assessment

Table 10-1 provides a comparison of CAPL's worst-case OSM capability requirements (as outlined in Table 8-7 and Table 8-8) with the OSRL OSM Supplementary Service Agreement capability to implement each OMP and SMP. Where there are synergies between OMPs and SMPs, the same personnel may implement multiple OMPs/SMPs simultaneously, as identified in Table 10-1. For example, personnel assigned to the OMP for Hydrocarbon Characterisation can also carry out the OMPs for Water Quality Assessment and Sediment Quality Assessment concurrently (Refer to Section 8.3).

Table 10-1: OSM capability

Component	Maximum No. Personnel Required (Days 0–14)[6]	Personnel available via OSM Service Provider #	Personnel available via OSROs	CAPL	Total Personnel Available
OSM Personnel embedded in EMT	1 OSM Implementation Lead 1 OM Coordinator 1 SM Coordinator 1 Field Operations Manager	1 OSM Implementation Lead 1 OM Coordinator 1 SM Coordinator 1 Field Operations Manager	-	1 OSM Implementation Lead (initial)	2 OSM Implementation Leads 1 OM Coordinator 1 SM Coordinator 1 Field Operations Manager
OMPs					
OM1: Hydrocarbon characterisation*	6 teams	6 teams		-	6 teams
OM2: Hydrocarbon in water assessment*	Refer to OMP: Hydrocarbon characterisation				
OM3: Hydrocarbon in sediment assessment*	Refer to OMP: Hydrocarbon characterisation				
OM4a: Surface chemical dispersant effectiveness and fate	Visual observations: 1 team Water quality assessment – refer to OMP: Water quality assessment	1 visual observation team Refer to OMP: Water quality assessment	4 AMOSC Staff 2 AMOSC Core Group trained personnel	-	1 visual observation team 4 AMOSC Staff 2 AMOSC Core Group trained personnel
OM4b: Subsea dispersant injection monitoring	1 team (week 2 onwards)	1 team	1 team via OSRL SWIS Capping Services Membership	-	2 teams
OM5: Rapid marine fauna surveillance	2 aerial teams	2 teams	-	-	2 teams
OM6: Shoreline clean-up assessment	4 teams	18 OSRL personnel	60 + AMOSC Core Group	-	60 + AMOSC Core Group

[6] If additional resources are required for day 14 onwards then this will be identified early in the monitoring process and CAPL will activate additional contracted resources through its OSM Services Provider to increase capacity

Component	Maximum No. Personnel Required (Days 0–14)[6]	Personnel available via OSM Service Provider #	Personnel available via OSROs	CAPL	Total Personnel Available
			12 AMOSC staff trained in SCAT		12 AMOSC staff 18 OSRL
OM7: Air quality modelling (responder health and safety)	1 model	-	-	RPS Contract for Air Quality Modelling held by CAPL	RPS Contract for Air Quality Modelling held by CAPL
SMPs					
SM1: Water quality impact assessment[+]	7 teams	6 teams	-	2 teams (internal staff and contractors)	8 teams
SM2: Sediment quality impact assessment	Refer to SMP: Water quality impact assessment* (all sites)				
SM3: Intertidal and coastal habitat assessment	3 teams	6 teams	-	1 team (internal staff and contractors)	7 teams
SM4: Seabirds and shorebirds[+]	2 aerial teams 6 vessel teams (surveys would include all fauna [birds, reptiles, cetaceans, dugong and whale shark]) 3 ground-based teams	2 aerial teams 6 vessel teams 4 ground based teams (plus 1 team member per team experienced with ground turtle surveys – see Marine mega-fauna assessment [reptiles])	-	2 teams (internal staff and contractors)	2 aerial teams 6 vessel teams 6 ground based teams (plus 1 team member per team experienced with ground turtle surveys – see Marine mega-fauna assessment [reptiles])
SM5: Marine mega-fauna assessment (whale shark, dugong, and cetaceans) [+]	Refer to SMP: seabirds and shorebirds				
SM5: Marine mega-fauna assessment (reptiles) [+]	Aerial and vessel – Refer to SMP: seabirds and shorebirds Ground surveys – Refer to SMP: seabirds and shorebirds (plus 1 team member per team experienced with ground turtle surveys)				
SM6: Benthic habitat assessment	7 teams	6 teams	-	1 team (internal staff and contractors)	7 teams
SM7: Marine fish and elasmobranch assemblages assessment	7 teams	6 teams	-	1 team (internal staff and contractors)	7 teams

Component	Maximum No. Personnel Required (Days 0–14)[6]	Personnel available via OSM Service Provider #	Personnel available via OSROs	CAPL	Total Personnel Available
SM8: Fisheries impact assessment	2 teams	2 teams	-	-	2 teams
SM9: Heritage features assessment	1 team	1 team	-	-	1 team
SM10: Social impact assessment	1 team	1 team	-	-	1 team

** Initial co-mobilisation between OMP: Hydrocarbon characterisation, OMP: Surface chemical dispersant effectiveness and fate, OMP: Water quality assessment and OMP: Sediment quality assessment*

 # During capability assessment, available personnel were allocated to one monitoring team only.

+ Can initially be performed by the same team as the relevant OMP. This SMP may replace the relevant OMP, if the relevant OMP's termination criteria are triggered.

11 Review of Plan

As part of the Environment Plan review cycle, this document will be reviewed annually and revised, if required (as per the criteria in Appendix B), in accordance with the management of change process outlined in the relevant Environment Plan. This could include changes required in response to one or more of the following:

- when major changes have occurred which affect Operational and/or Scientific Monitoring coordination or capabilities (e.g. new activities; change of services provider)
- changes to the activity that affect Operational and/or Scientific Monitoring coordination or capabilities (e.g. a significant increase in spill risk)
- changes to legislative context related to Operational and/or Scientific Monitoring (e.g. *Environment Protection and Biodiversity Conservation Act 1999* [EPBC Act] protected matters requirements)
- following routine testing of the OSM if improvements or corrections are identified; or
- after a Level 2/3 spill incident.

The extent of changes made to this OSM Bridging Implementation Plan and resultant requirements for regulatory resubmission will be informed by the relevant Commonwealth regulations, i.e. the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 Regulations (OPGGS (E) Regulations).

Part B – Implementation

Control Agencies and Jurisdictional Authorities

Section 2 of the CAPL ABU Consolidated OPEP (Ref. 2) provides detailed information on Control Agency responsibilities and should be referred to when planning operational and scientific monitoring activities, particularly in WA State Waters and along WA shorelines. Where the WA DTMI is the Control Agency, OM6: Shoreline Clean-up Assessment will be implemented under their direction, with resources provided by CAPL.

In addition, Section 4 of the CAPL ABU Consolidated OPEP (Ref. 2) provides regulatory and stakeholder notification and reporting requirements. Whilst all notification and reporting will be performed by CAPL EMT personnel, monitoring personnel should be aware of these requirements and confirm all relevant notifications and reporting have been completed prior to undertaking monitoring activities.

12 Mobilisation and Activation Process

CAPL's EMT Environment Unit Lead is responsible for activating OSM components, subject to approval from the Incident Commander. Table 12-1 outlines CAPL OSM activation process.

Mobilisation of personnel is coordinated through the OSRL Capability Register and the CAPL OSM Capability Register (Section 9) via the CAPL Environment Unit Lead.

Table 12-1: OSM mobilisation and activation process

Responsibility	Task	Timeframe[7]	Complete
CAPL Environment Unit Lead (or delegate)	Review initiation criteria of OMPs and SMPs (provided in Table 9-1 (OMPs) and Table 9-2 (SMPs) of the Joint Industry Operational and Scientific Monitoring Framework) during the preparation of the initial Incident Action Plan (IAPs) and subsequent IAPs; and if any criteria are met, activate relevant OMPs and SMPs	Within 4 hours of spill notification	❑
	Obtain approval from Incident Commander to activate OSM Services Provider	Within 4 hours of spill notification and/or if initiation criteria are met	❑
	Notify Chevron Emergency Information Centre (CEIC)[8] of need to activate OSM Services Provider. The Enterprise Emergency Management (EEM) On Call Duty person will also need to confirm the OSRL activation by Australian BU for incident purposes[9].	Within 4 hours of spill notification	❑
	Contact OSM Services Provider and verbally notify their Duty Manager of the incident, requesting provision of OSM Implementation Lead (if required by CAPL) to the EMT.	Within 4 hours of spill notification	❑

[7] All timeframes stated in Part B are based on best endeavours as per the OSRL OSM Supplementary Service Agreement.

[8] Contact details are provided in the ABU Emergency Contacts Directory (Ref. 5)

[9] CAPL personnel to proceed with completing the Call Off Order Form (Appendix F) whilst waiting for authorised signatory from CEIC/EEM. Completed Call Off Order Form can be sent through without signatory first, as this will not delay the activation process while OSRL waits for the singed form.

Responsibility	Task	Timeframe[7]	Complete
	Complete Call Off Order Form (Appendix F) and submit to OSM Services Provider[10] to confirm activation of OSM Services		
	Provide MES data (e.g. aerial surveillance, fate and weathering modelling, tracking buoy data) to OSM Services Provider	Within 1 hour of data being received by EMT	❑
	Liaise with CAPL's Logistics Section Chief to identify potential staging and departure location/s for monitoring activities. Provide this information to OSM Services Provider	Within 4–6 hours of spill notification	❑
	Record tasks in Personal Log	At time of completion of task	❑
CAPL Logistics Section Chief	Commence arrangements for vessels, accommodation and transport to mobilise monitoring teams	Within 24 hours of spill notification	❑
OSM Services Provider	Duty Manager to activate relevant sub-contracted Monitoring Service Providers	Within 30 minutes of Call Off Order Form being received by OSM Services Provider	❑
	OSM personnel (OSM Implementation Lead and OM/SM Coordinators) requested by CAPL (via Call Off Order Form) to be sent to Titleholder's EMT	Within 12 hours of notification being made to OSM Services Provider	❑
	Liaise directly with the CAPL Environment Unit Lead to confirm which OMPs and SMPs are to be fully activated	Within 4 hours of monitor and evaluate data being received from EMT	❑
	Confirm availability of initial personnel and equipment resources	Within 5 hours of monitor and evaluate data being received from EMT	❑

13 Monitoring Priorities

The tiered monitoring prioritisation hierarchy described in Section 2.2 is applied at the activity-specific level in the OSM Assessment Appendix in each activity-specific EP. The activity-specific Tier assignments (derived from stochastic and deterministic spill trajectory modelling (where applicable), the CAPL PPP rankings (Section 2.2), and the baseline data assessment described in Section 4) provide the starting point for monitoring priorities at the time of a spill.

At the time of a spill, the tier rankings are confirmed and refined by the CAPL Environment Unit Lead (or delegate) in consultation with the OSM Services Provider, sub-contracted Monitoring Service Providers, and key stakeholders, applying the Monitoring Prioritisation Decision Key (Figure 2-2) to the actual spill conditions and current monitor and evaluate data. Tier rankings may be promoted or demoted through continual re-evaluation as the spill evolves and as actual exposure data becomes available. Receptors observed or predicted to be contacted beyond the 14-day initial prioritisation window are addressed as per Section 2.2.4. Table 13-1 provides a checklist to assist in the confirmation of monitoring priorities for individual spills.

[10] A copy of the Call Off Order Form is provided in Appendix F, however a copy of the Call-off Order Form will also be available via OSRL Duty Manager upon request.

Table 13-1: Checklist for determining monitoring priorities

Responsibility	Task	Timeframe	Complete
CAPL Environment Unit Lead	Evaluate monitoring priorities in consultation with key stakeholders, including the appointed State Environmental Scientific Coordinator	Within 12 hours of monitor and evaluate data being received from EMT	❑
CAPL Environment Unit Lead with input from CAPL and/or OSM Services Provider's OSM Implementation Lead	Confirm tier rankings allocated to receptors in the OSM Assessment Appendix of the activity-specific EP using the three-tier framework provided in Section 2.2, and as refined by the additional criteria provided in Section 2.2.3 (CAPL PPP ranking, pathway vulnerability, baseline data adequacy)	Within 12 hours of monitor and evaluate data being received from EMT	❑
	Apply spill-specific information to refine the receptor list and validate or update tier rankings against the actual spill, including: • actual nature of the release (subsea or surface, hydrocarbon type, volume, weathering behaviour); • situational awareness from monitor and evaluate strategy outputs (aerial / vessel surveillance, tracking buoys, satellite imagery); • current seasonality and presence of sensitive receptors; and • current operational considerations (weather, logistics). Promote or demote tier rankings where the actual spill diverges from the modelled worst-case scenario, and recording the reasoning for the change in ranking	Within 12 hours of monitor and evaluate data being received from EMT	❑
	Determine receptors for initial post-spill, pre-impact monitoring based on the confirmed tier rankings and the baseline data assessment (Section 4; OSM Assessment Appendix of the activity-specific EP); confirm any additional reactive baseline data needs and suitable control or reference sites, noting these may sit outside the OSM Planning Area	Within 12 hours of monitor and evaluate data being received from EMT	❑
	Re-evaluate monitoring priorities at the start of each operational period in consultation with relevant key stakeholders throughout spill response. Use updated surveillance / OM / SM data, and updated operational considerations	Ongoing	❑
	Confirm that OM activities are co-located with active spill response strategies at priority planning areas and any other receptors targeted by spill response activities, to support operational NEBA and confirm response effectiveness (e.g. SCAT informing shoreline clean-up; water quality sampling at dispersant application sites; rapid marine fauna surveillance for OWR decisions)	Ongoing	❑

14 Protected Matters Requirements

Table 14-1 provides a checklist to ensure monitoring personnel consider protected matters requirements in the finalisation of OMPs and SMPs.

The Description of the Environment – Operational and Scientific Monitoring Planning Area (Appendix G) outlines the management plans, recovery plans and conservation advice statements relevant for the protected matters within the OSM Planning Area that are likely to be relevant to the final design of the OMPs and SMPs. The Description of the Environment – Operational and Scientific Monitoring Planning Area (Appendix G) and Appendix D also include relevant priority monitoring locations where these receptors are known to occur in order to expedite consideration of relevant information into finalised monitoring designs.

Table 14-1: Checklist for inclusion of protected matters into monitoring designs

Responsibility	Task	Complete
CAPL Environment Unit Lead with input from CAPL and/or OSM Services Provider's OSM Implementation Lead	Review Monitoring, Evaluation and Surveillance data and available OMP data to determine likely presence and encounter of protected species in predicted trajectory of the spill	❑
	Review the relevant recovery plan/conservation advice/management plan in the Description of the Environment – Operational and Scientific Monitoring Planning Area (Appendix G) and online protected matters search tool and determine if there have been any updates to the relevant conservation threats/actions. Integrate relevant considerations into the final monitoring design for affected OMPs and SMPs	❑
	Review restrictions on marine fauna buffer distances in SMP: Marine mega-fauna and ensure this is included in all relevant response and monitoring IAPs (e.g. Shoreline Protection Plan, Shoreline Clean-up Plan, OSM Plan), so that response and monitoring field teams maintain required buffer distances from fauna during operations	❑
OSM Services Provider	Conduct OM5: Rapid marine fauna aerial surveillance across the contacted Monitoring Unit(s), including known BIAs and other documented species locations away from the named receptors, to locate target species associated with SM4 (seabirds and shorebirds) and SM5 (marine mega-fauna). Provide identified species locations to the OSM Implementation Lead.	❑
	Incorporate OM5 identified target species locations into the final SM4 (Seabirds and shorebirds) and SM5 (Marine mega-fauna) monitoring designs and direct survey and sampling resources to those locations.	❑

15 Finalising Monitoring Design

The methods presented in the Joint Industry OMPs and SMPs are designed to allow the OSM Services Provider and their sub-contracted Monitoring Service Providers with the flexibility to modify the standard operating procedures, so that the latest research, technologies, equipment, sampling methods and variables may be used. Monitoring designs may also be varied in-situ, according to the factors presented in Section 10.6 of the Joint Industry OSM Framework.

CAPL's checklist for finalising monitoring designs post-spill is provided in Table 15-1. The OSM Implementation Lead, in liaison with the Environment Unit Lead will be responsible for approving the finalised monitoring design used in the OMPs and SMPs upon first deployment and ongoing monitoring.

Table 15-1: Checklist for finalising monitoring design

Responsibility	Task	Timeframe	Complete
CAPL and/or OSM Services Provider's OSM Implementation Lead in consultation with Environment Unit Lead	Confirm survey objectives, sampling technique, for each initiated OMP and SMP	Within 48 hours of initial monitoring priorities being confirmed by EMT	❑
	Determine suitable sampling frequency	Within 48 hours of initial monitoring priorities being confirmed by EMT	❑
	Review Table 10-4 of the Joint Industry OSM Framework to ensure potential impacts from response activities are considered and incorporated into relevant OMP/SMP designs	Before finalising monitoring designs	❑
	Liaise with the CAPL Environment Unit Leader to review the Environmental Performance Standards listed in the ABU Consolidated OPEP (Ref. 2) and activity EP and integrate checks into the monitoring design that will help determine if relevant Environmental Performance Standards are being met	Before finalising monitoring designs	❑
	Finalise standard operating procedures	Within 48 hours of initial monitoring priorities being confirmed by EMT	❑
	Scientific monitoring: • Establish benchmarks and guidelines to be used • Confirm indicator species • Confirm parameters and metrics	Within 96 hours of initial monitoring priorities being confirmed by EMT	❑

16 Mobilisation of Monitoring Teams

When the monitoring design has been finalised for each OMP and SMP, the OSM Services Provider shall work in conjunction with CAPL to develop and execute a monitoring mobilisation plan, which will be incorporated into the Incident Action Planning process.

The OSM Services Provider will be required to coordinate the availability of personnel and equipment for all monitoring programs. CAPL will be responsible for flights, accommodation and victualing for field personnel. CAPL will also be required to procure all vessels, aerial platforms and vehicles for OMP and SMP implementation.

A checklist for mobilising monitoring teams is provided in Table 16-1.

Table 16-1: Checklist for mobilisation of monitoring teams

Responsibility	Task	Complete
CAPL and/or OSM Services Provider's OSM Implementation Lead with input from CAPL Environment Unit Lead	Confirm availability of all monitoring personnel (noting required competencies in Section 9.1 and individual OMPs/SMPs)	❑
	Allocate number of teams, personnel, equipment and supporting resource requirements	❑
	If additional resources are likely to be required for monitoring from day 14 onwards, this should be raised by the OSM Implementation Lead with the Environment Unit Leader and arranged via the OSM Services Provider	❑
	As part of the Incident Action Planning Process, liaise with the EMT regarding co-mobilisation of monitoring teams, giving due consideration to safety, access to sensitive receptors, timing, and data quality requirements	❑
	Undertake HAZIDs as required and consolidate/review field documentation including safety plans, emergency response plans, and daily field reports	❑
	Develop site-specific health and safety plans which is compliant with health safety and environment systems (including call in timing and procedures)	❑
	Conduct pre-mobilisation meeting with monitoring team/s on survey objectives, logistics, safety issues, reporting requirements and data management collection requirements	❑
	Determine data management delivery needs of the EMT and process requirements, including data transfer approach and frequency/timing	❑
	Confirm data formats and metadata requirements with personnel receiving data	❑
	Logistics	
	Confirm CAPL Logistics Section have arranged flights, accommodation, and car hire arrangements are in place	❑
	Develop field survey schedules, detailing staff rotation	❑
	Equipment	
	Confirm CAPL Logistics Section have arranged survey platforms (vessel, vehicle, aircraft) as required to survey or access survey sites and ensure they are equipped with appropriate fridge and freezer space for transportation of samples (and carcasses if collecting)	❑

Responsibility	Task	Complete
	Confirm CAPL Logistics Section have arranged vessels with correct fit-out specifications (e.g. winches, Geographic Positioning System (GPS), satellite, deck crane, sufficient deck space, water supplies (fresh and/or salt), accommodation)	❑
	Confirm consumables (including personal protective equipment [PPE]) have been purchased and will be delivered to required location	❑
	Liaise with NATA-accredited laboratories to confirm availability, limits of detection, sampling holding times, transportation, obtain sample analysis quotes and arrange provision of appropriate sample containers, Chain of Custody (CoC) forms and suitable storage options for all samples. Make arrangements for couriers (if necessary)	❑
	Confirm specialist equipment requirements and availability (including redundancy)	❑
	Check GPS units and digital cameras are working and that sufficient spare batteries and memory cards are available	❑
	Confirm sufficient equipment to allow integration of survey software and navigational systems (e.g. GPS, additional equipment and adaptors), and additional GPS units prepared	❑
	Confirm GPS survey positions (where available) have been Quality Assurance and Quality Control (QA/QC) checked and pre-loaded into navigation software/positioning system	❑
	Check field laptops, ensuring they have batteries (including spares), power cable, and are functional	❑
	Check if a first aid kit or specialist PPE is required	❑
	Confirm arrangements for freight to mobilisation port is in place	❑

17 Permits and Access Requirements

Permit and access requirements apply to Marine Parks, Marine Protected Areas, restricted heritage areas, operational areas of industrial sites, defence locations, certain fauna and managed fisheries, as listed in Table 17-1. For a list of all relevant locations and fisheries refer to the CAPL Description of the Environment (Appendix G) and activity EPs.

The OSM Services Provider will work with CAPL to request access and permit applications to all relevant Jurisdictional Authorities to conduct monitoring for OMPs and SMPs.

Table 17-1: Permits required in OSM Planning Area

Receptor	Jurisdictional Authority	Relevant information on permits
Permits for monitoring fauna	Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) DBCA	Any interactions involving nationally listed threatened fauna may require approval from DCCEEW - https://www.dcceew.gov.au/environment/biodiversity/threatened/permits WA: appropriate permits can be found at: https://www.dbca.wa.gov.au/licences-and-permits/fauna
State Marine Protected Area	DBCA	No specific permitting requirements exist for monitoring in WA marine protected areas, but additional information is available at: https://www.dbca.wa.gov.au/management/marine-planning
Ramsar wetland	DCCEEW	Additional information on Ramsar wetlands and how they are protected as a matter of national environmental significance under the EPBC Act is available at: https://www.dcceew.gov.au/environment/epbc/our-role/what-is-protected
Australian (Commonwealth) Marine Parks	Director of National Parks Parks Australia	Permit and licence application information for Marine Protected Areas (including monitoring) can be found at: https://onlineservices.environment.gov.au/parks/australian-marine-parks/permits Additional information on permitting requirements in Australian Marine Parks can be obtained through Parks Australia via email marineparks@environment.gov.au or phone 1800 069 352 Information on permits to access biological resources in Commonwealth areas can be found at: https://www.dcceew.gov.au/science-research/australias-biological-resources/access-biological-resources-commonwealth
State Managed Fisheries	Department of Primary Industries and Regional Development (DPIRD)	No specific permitting requirements exist for WA Fisheries, but additional information is available at: https://www.fish.wa.gov.au/Fishing-and-Aquaculture/Pages/default.aspx
Commonwealth Managed Fisheries	Australian Fishing Management Authority	Commonwealth Managed Fisheries (scientific permit for research/monitoring in an Australian Fishing Zone): https://www.afma.gov.au/fisheries-services/fishing-rights-permits
Indigenous Cultural Heritage	Department of Planning, Lands and Heritage (DPLH)	Entry access permits to Aboriginal Lands in WA: https://www.wa.gov.au/service/aboriginal-affairs/aboriginal-heritage-conservation/apply-permit-access-or-travel-through-aboriginal-land Aboriginal heritage sites in WA: https://www.wa.gov.au/service/aboriginal-affairs/aboriginal-cultural-heritage/search-aboriginal-sites-or-heritage-places
Defence/restricted military area	Department of Defence	Unexploded ordnance (mapping information): https://www.defence.gov.au/UXO/default.asp Maritime military firing practice and exercise areas: https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.hydro.gov.au/n2m/2010/annual/n2m/9.pdf&ved=2ahUKEwi08LDJ_c-PAxWiamwGHUmjCiQQFnoECB0QAQ&usg=AOvVaw0A_L5br6pqJx_IZgW7N15M

Receptor	Jurisdictional Authority	Relevant information on permits
Industry (e.g. operational zone of offshore oil or gas platform)	Operating company	Safety zones (up to 500 m from outer edge of well or equipment): https://www.nopsema.gov.au/safety/safety-zones/
Shipwrecks	DCCEEW	Refer to the Underwater Cultural Heritage Act 2018 (Commonwealth): https://www.dcceew.gov.au/parks-heritage/heritage/underwater-heritage/underwater-cultural-heritage-act

18 Use of Data in Response Decision Making

18.1 Operational Monitoring to Inform Response Activities

The OSM Services Provider is responsible for the collection of data by field teams, which shall be QA/QC checked by the Field Team Lead in accordance with the requirements listed in the finalised OMPs and SMPs (where applicable). Table 18-1 provides a checklist to assist in utilising OM data to inform decision making.

The Field Team Lead will be responsible for communicating data back to the OSM Implementation Lead via field reporting forms, debriefs and reports. Laboratory analysis reports should also be directed to the OSM Implementation Lead.

The OSM Implementation Lead is responsible for the interpretation and analysis of data. OM data should be analysed rapidly so that it may be used to inform response planning and decisions in the current and/or next operational period. SMP data is designed to be more scientifically robust and long-term in nature and is not relied upon by the EMT for decision making. Therefore, SMP data will be analysed more thoroughly by the OSM Implementation Lead.

Once OM data is analysed and checked by the Field Team Lead, it will be provided to the Planning Section, who will then distribute the data from each monitoring component to the relevant EMT Unit and/or Section. Table 18-2 provides guidance on the type of data generated from each OMP, which EMT Section/Unit requires the data and how the data may be used during a response. During a response, all SM data received will also be provided to the Planning Section, when available.

Analysed data will then be incorporated into the Common Operating Picture (managed by the Situation Unit Lead) and used by the Environment Unit Lead during development of the operational Net Environmental Benefit Analysis (NEBA), which would be included in the IAP for the current or next operational period.

The continual re-evaluation of monitoring priorities required by Section 13 also applies to receptors that fall outside the initial 14-day prioritisation window but are predicted to be contacted later in the response (as per Section 2.2.4), including those identified as priority planning areas in the activity-specific EP. For each operational period, the OSM Implementation Lead, in consultation with the Environment Unit Lead, will review updated monitor and evaluate strategy outputs, the response strategies in the upcoming IAP, and the receptors predicted to be contacted in the next operational period(s); confirm or update the tier ranking of those receptors using the three-tier framework (Section 2.2) refined by the additional criteria in Section 2.2.3; and confirm whether OMPs and SMPs need to be activated, scaled or relocated to maintain co-location with active response strategies.

Decisions to activate additional monitoring components must be recorded in the IAP for the relevant operating period. This process ensures that all receptors targeted by response activities (whether contacted during the initial 14 days or later in the response) are captured in OM resourcing with confirmed tier rankings, and that operational NEBA inputs (e.g. SCAT, water quality, rapid marine fauna surveillance) are available to the EMT to inform response decisions throughout the duration of the spill.

Where co-location of response and monitoring resources is required, the OSM Implementation Lead will liaise with the Logistics Section before each operational

period to identify opportunities to share logistics resources (for example, vessels, offshore accommodation, aviation assets and shoreline access) between OM/SM teams and response personnel. Sharing logistics resources aims to provide efficiency and reduce the cumulative footprint of response and monitoring activities at sensitive locations and minimises the potential for additional impacts arising from co-located teams operating independently.

As ultimately responsible for the IAPs, the Planning Section Chief will be required to utilise the OM data to aid in decision making and determine if the response strategies can be commenced, continued, escalated, terminated, or if controls need to be put in place to manage impacts of the response activities. These decisions will be communicated to the broader EMT during regular situation debriefs.

Table 18-1: Checklist for utilising OM data to inform EMT decision making

Responsibility	Task	Timeframe	Complete
OSM Services Provider – Field Team Lead	Data collected whilst implementing OMPs and SMPs is checked that it aligns with the requirements listed in the finalised OMPs and SMPs (where applicable)	Ongoing	❑
	OM data provided to the EMT Situation Unit Leader	Daily and ongoing	❑
SCAT Coordinator / Field Teams	Reports from OM6: Shoreline Clean-up Assessment will be provided to the EMT daily, detailing the assessed areas to maximise effective utilisation of resources	Daily reporting	❑
CAPL Situation Unit Lead	Incorporate OM data into Common Operating Picture	Daily and ongoing	❑
CAPL Environment Unit Lead	Incorporate OM data into operational NEBA and IAP for the next operational period	Each operational period	❑
CAPL Environment Unit Lead	Review updated monitor and evaluate strategy outputs; response strategies in the upcoming IAP; and the receptors that are predicted to be contacted in the next operational period(s). Confirm or update the tier ranking of these receptors using the three-tier framework (Section 2.2) and the additional criteria (Section 2.2.3). Confirm whether OMPs and SMPs need to be activated, scaled or relocated to maintain co-location with active response strategies. Decisions to activate additional monitoring components need to be recorded in the IAP.	Each operational period	❑
CAPL Environment Unit Lead in consultation with Logistics Section	Identify opportunities to share logistics resources (e.g. vessels, offshore accommodation, aviation assets, vehicle and shoreline access, staging locations) between OM/SM teams and response personnel for locations where co-location of response and monitoring activities is required, Resource sharing aims to provide efficiency and reduce the cumulative footprint of response and monitoring activities at sensitive locations and minimises the potential for additional impacts (e.g. vessel disturbance to fauna, repeated shoreline access, redundant aviation movements).	Each operational period	❑

Table 18-2: Data generated from each OMP and how this may be used by EMT in decision-making

Operational Monitoring Plan	Data generated[11]	EMT Section requiring data	How data may be used by EMT
OM1: Hydrocarbon characterisation	Hydrocarbon physical characteristics (e.g. viscosity, asphaltene content, fingerprinting, weathering ratios of hydrocarbon chains)	Planning Section to aid in response option selection / modification	Changes to the hydrocarbon properties will affect the window of opportunity for particular responses and the associated logistical requirements of these responses, such as use of chemical dispersants, recovery and pumping equipment suitability, hydrocarbon storage and hydrocarbon disposal requirements.
OM2: Hydrocarbon in water assessment	Distribution of oil in water column and change in hydrocarbon concentrations (e.g. total recoverable hydrocarbons, BTEXN, PAH), physio-chemical parameters and dispersant detection	Situation Unit Lead to validate surveillance and modelling data; Planning Section for use in IAP	Confirm spatial extent of spill within the water column and verify spill modelling and surveillance data; extent of spill can in turn influence location of other OMP and SMP monitoring components and sites. Data can also influence ongoing use of dispersant through ongoing operational NEBA.
OM3: Hydrocarbon in sediment assessment	Distribution of oil in sediment and change in hydrocarbon concentrations (e.g. Total recoverable hydrocarbons, BTEXN, PAH)	Situation Unit Lead to validate surveillance and modelling data; Planning Section for use in IAP	Confirm spatial extent of spill; extent of spill can in turn influence location of other OMP and SMP monitoring components and sites.
OM4a: Surface dispersant effectiveness monitoring	Visual observations of dispersant efficacy; fluorometric readings in water column (see also water quality assessment);	Environment Unit for use in operational NEBA; Planning Section to aid in IAP development; Operations Section to confirm dispersant effectiveness for decision-making purposes in current operations period.	Determine the effectiveness of dispersant in removing oil from sea surface and how dispersed oil is being distributed through the water column. This information can be used in NEBA to help decide if dispersants are being effective at minimising oil reaching sensitive receptors (NEBA to evaluate any trade-offs between receptors).
OM4b: Subsea dispersant injection effectiveness monitoring	Visual observations of dispersant efficacy; fluorometric readings in water column (see also water quality assessment)	Source Control Branch to aid decision-making for other source control operations; Environment Unit for use in operational NEBA; Planning Section to aid in IAP development.	Determine efficacy of subsea dispersant in treating oil to help understand if injection should continue or be modified; understand the nature and extent of the subsea plume; and provide an initial assessment of potential ecological effects. This information can be used in NEBA to help decide if dispersants are being effective at minimising oil reaching sensitive receptors (NEBA to evaluate any trade-offs between receptors) and also if subsea dispersants are

11 Summary only. For additional detail, please refer to individual OMPs. Also note data outputs will be reliant on finalised monitoring design.

Operational Monitoring Plan	Data generated[11]	EMT Section requiring data	How data may be used by EMT
			effectively reducing volatile organic compound (VOC) levels so that operations are within lower explosive limits (LEL).
OM5: Rapid marine fauna surveillance	Rapid assessment of presence and distribution of marine fauna; evaluate impact of spill and response activities on fauna	Planning Section for use in IAP; Oiled Wildlife Unit/Division to help in developing Wildlife Response Sub-plan	Understanding of species, populations and geographical locations at greatest risk from spill impacts. EMT can use this information to help qualify locations with highest level of protection priority (e.g. dugong nursery area is at risk of high contact therefore dispersant use closest to spill source may be a preferred option); understanding the impacts of spill response activities can help EMT to modify or terminate activities if they are assessed as creating more harm than the oil alone (e.g. large shoreline clean-up teams and staging areas may disturb shorebird nesting resulting in adults abandoning chicks). Information also feeds directly into EMT decision making for oiled wildlife response
OM6: Shoreline clean-up assessment	Assessment of shoreline character; assessment of shoreline oiling; recommendations for response activities; post-treatment surveys	Planning Section to aid in IAP development and response option selection / modification	• Confirmation of shoreline character, habitats and fauna present which may influence selection of response tactics (e.g. no mechanical recovery if turtles are known to be nesting); • Oil deposition and/or removal rate for a shoreline sector will help determine effectiveness of relevant tactics (e.g. shoreline protection and/or clean-up operations); • Informs the EMT on the effectiveness of shoreline clean-up at priority planning areas and identifies where method changes are required; • Assessment teams provide ground truthing of sites that are not possible via satellite imagery, therefore the EMT can rely on the recommendations of Assessment Teams (e.g. flagging access issues, suitable tactics, likely resourcing needs).
OM7: Air quality modelling (responder health and safety)	Modelled outputs of VOCs	Operations Section to help determine safe zones in close vicinity of spill; Planning Section for use in IAP	Determine safe distances from spill source for response personnel; determine the presence and persistence of volatile organic compounds to know if response areas are safe for personnel.

18.2 Impacts from Response Activities

Table 10-4 of the Joint Industry OSM Framework outlines the potential impacts from response activities and the relevant OMP/SMP for monitoring impacts. For example, if shoreline clean-up was being considered as a response option, then possible impacts resulting from that activity could include physical presence, ground disturbance, water/sediment quality decline and lighting/noise impacts to fauna.

When finalising monitoring designs, the OSM Implementation Lead shall review Table 10-4 of the Joint Industry OSM Framework and the relevant activity EP to ensure potential impacts from response activities are considered and incorporated into relevant OMP/SMP designs.

18.3 Operational Monitoring of Effectiveness of Control Measures and to Ensure EPS are Met

As stated in Table 15-1, when finalising monitoring designs, the OSM Implementation Lead and Environment Unit Lead (or delegate) shall review the Environmental Performance Standards listed in the CAPL Consolidated OPEP and integrate checks into the monitoring design that will help determine if relevant Environmental Performance Standards are being met.

Table 18-3 provides relevant Environmental Performance Standards listed in CAPL's Consolidated OPEP and how operational monitoring may be able to confirm they are being met.

Table 18-3: Environmental performance standards

Environmental Performance Standard	Confirmation that Environmental Performance Standard is being met
Dispersant application	
EPS E5.6 Surface dispersant application will continue for the duration of the event in accordance with the IAP, until operational NEBA determines there is no net environmental benefit, and termination criteria has been met, consistent with Section 8 of the CAPL OPEP	Ongoing implementation of OM4a: Surface chemical dispersant effectiveness and fate and/or OM4b: Subsea dispersant injection monitoring will inform operational NEBAs and help quantify the net environmental benefit of continued dispersant operations
Shoreline Protection and Deflection	
EPS E7.4 Shoreline protection and deflection will continue for the duration of the event in accordance with the IAP, until operational NEBA determines there is no net environmental benefit, and termination criteria has been met, consistent with Section 8 of the CAPL OPEP	OM6: Shoreline Clean-up Assessment will provide information to the EMT regarding effectiveness of shoreline protection activities in reducing impacts to sensitive shorelines
Shoreline clean-up	
EPS E8.3 If shoreline clean-up is selected, CAPL ORT will complete initial evaluation of shoreline segments, establish clean-up priorities, and identify suitable tactics within 6 hours of assessment completion	OM6: Shoreline Clean-up Assessment will provide guidance to assessment teams and will involve teams evaluating shoreline segments, establishing clean-up priorities and identifying suitable tactics

19 Data Management

Minimum standards for data management are provided in Section 10.11 of the Joint Industry OSM Framework and will be adopted by CAPL and the OSM Services Provider.

20 Quality Assurance and Quality Control

Refer to Section 10.11 of the Joint Industry OSM Framework for QA/QC minimum standards which will be adopted by CAPL and the OSM Serviced Provider.

Once SMP monitoring reports are drafted (post-spill) they will be peer reviewed by an expert panel (Refer to Section 10.10 of the Joint Industry OSM Framework).

21 Communication Protocols

21.1 OSM Services Provider/s

Communication protocols between CAPL, its OSM Services Provider, and local environmental specialists with respect to delivery of the OMPs and SMPs (during both preparedness and implementation) are intentionally defined to ensure clear and consistent information is provided in both directions.

The following communication protocols must be observed:

- Communication between CAPL and its OSM Services Provider during the preparedness phase (pre-spill) will be between the nominated Industry Member Technical Advisory Group representative and the OSM Services Provider
- Communication between CAPL and its OSM Services Provider during activation (prior to deployment) will be between the CAPL Environment Unit Lead or CAPL OSM Implementation Lead and the OSM Services Provider OSM Implementation Lead.
- During implementation (post deployment), primary communication occurs via the following pathways:
  - Environment Unit Lead and the OSM Services Provider Duty Manager for contractual, management, scientific and general direction matters;
  - Environment Unit Lead / OSM Implementation Lead and the OSM Services Provider's Field Team Leaders for direction regarding monitoring implementation (i.e. priorities, design);
  - CAPL On-Scene Commander and the OSM Services Provider's Field Team Leaders for on-site matters; and
  - OSM Services Provider's Field Team Leaders to OM and SM Monitoring Coordinators for data transfer back into the PEMT.
- All key OSM operational decisions should be logged in an ICS 214 Log maintained by the OSM Implementation Lead
- All key OSM tasks, actions and requirements should be documented in an IAP during the response phase of the spill

- The CAPL On-Scene Commander and OSM Field Operations Manager will provide regular field updates to the CAPL Environment Unit Lead and OSM Implementation Lead
- The CAPL Environment Unit Lead will keep the Planning Section Chief, Operations Section Chief and Logistics Section Chief briefed of the OSM status as required
- All correspondence (copies of emails and records of phone calls) between CAPL and the OSM Services Provider during a response should be recorded and kept on file
- All communication received by OSM Services Provider not in line with these protocols should be reported to the CAPL Environment Unit Lead who will seek guidance on the accuracy of the information received
- Unless related to safety (e.g. evacuation), any direction or instruction received by the OSM Services Provider outside of these protocols should be confirmed via the CAPL Environment Unit Lead or On-Scene Commander prior to implementation.

During the post-response phase all communications shall be between the relevant CAPL OSM Implementation Lead and the OSM Services Provider.

21.2 External Stakeholders

Results of OMPs and SMPs will be discussed with relevant stakeholders. Information will be shared with regulatory agencies/authorities as required and inputs received from stakeholders will be evaluated and where practicable, will be used to refine the ongoing spill response and/or ongoing operational and/or scientific monitoring.

CAPL EMT Public Information Officer and/or Liaison Officer (initially be will same individual) will be the focal point for external engagement during the response operation.

Stakeholder communications post-response will be managed by CAPL External (Government) Relations Team.

22 Stand-down Process

Monitoring for each component will continue until termination criteria for individual components are reached. Typically, OMPs will terminate when agreement has been reached with the Jurisdictional Authorities relevant to the spill to terminate the response or a relevant SMP has been activated. SMPs will continue after the spill response has been terminated and until such time as their termination criteria are also reached. A list of criteria is provided in the OSM Framework.

After OMPs are terminated, the OMP monitoring teams will be advised to stand down. Following this stage, CAPL is responsible for coordinating a lessons-learnt meeting between the OSM Services Provider, sub-contracted Monitoring Service Providers and other relevant stakeholders. It is the responsibility of CAPL to ensure that lessons learnt are communicated to the relevant stakeholder groups. The lessons discussed should include both positive actions to be reinforced and lessons for actions that could be improved in future standby or response campaigns.

Table 22-1: Checklist for terminating monitoring components

Responsibility	Task	Complete
CAPL Environment Unit Lead / Environment Specialist with input from OSM Services Provider	Review termination criteria of OMPs and SMPs (provided in Table 9-1 (OMPs) and Table 9-2 (SMPs) of the Joint Industry Operational and Scientific Monitoring Framework) to ensure OMPs and SMPs are terminated in accordance with these criteria	❑
	Ensure all SMP monitoring reports are peer reviewed by an expert panel (refer to Section 10.10 of the Joint Industry OSM Framework)	❑
	Conduct lessons-learnt meeting	❑

23 Acronyms and Abbreviations

Table 23-1 defines the acronyms and abbreviations used in this document.

Table 23-1: Acronyms and Abbreviations

Acronym / Abbreviation	Definition
AEP	Australian Energy Producers (formerly Australian Petroleum Production and Exploration Association [APPEA]; from 13 September 2023)
ALA	Atlas of Living Australia
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Park
AMSA	Australian Marine Safety Authority
AODN	Australian Ocean Data Network
BACI	Before-After Control-Impact
BIA	Biologically Important Areas
BIP	Bridging Implementation Plan
BRUVS	Baited Remote Underwater Video Stations
BTEXN	Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene
CEIC	Chevron Emergency Information Centre
CoC	Chain of Custody
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DBCA	Department of Biodiversity Conservation and Attractions
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DEPWS	Department of Environment, Parks and Water Security
DPIRD	Western Australian Department of Primary Industries and Regional Development
DPLH	Western Australian Department of Planning, Lands and Heritage
DTMI	Western Australian Department of Transport and Major Infrastructure
DWER	Western Australian Department of Water and Environmental Regulation
EEM	Enterprise Emergency Management
EMBA	Environment that may be Affected
EMT	Emergency Management Team
EP	Environment Plan
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EPS	Environmental Performance Standard
ERP	Emergency Response Plan
ESC	Environmental Scientific Coordinator
FOB	Forward Operating Base
GIS	Geographic Information System
GPS	Geographic Positioning System
g/m^2	Grams per square metre

Acronym / Abbreviation	Definition
HDD	Horizontal Directional Drill
HSE	Health, Safety and Environment
IAP	Incident Action Plan
IC	Incident Commander
ICS	Incident Command System
IEMT	Installation Emergency Management Team
IMOS	Integrated Marine Observing System
IMSA	Index of Marine Surveys for Assessments
IMTAG	Industry Member Technical Advisory Group
KEF	Key Ecological Feature
LNG	Liquid Natural Gas
LOWC	Loss of Well Control
MDO	Marine Diesel Oil
MES	Monitor, Evaluation and Surveillance
MMA	Marine Management Area
MoC	Management of Change
Monitoring Service Providers	The subcontracted specialist monitoring service providers subcontracted by OSRL to perform certain operational and scientific monitoring services
MP	Marine Park
NATA	National Association of Testing Authorities
NEBA	Net Environmental Benefit Analysis
NR	Nature Reserve
OM	Operational Monitoring
OMP	Operational Monitoring Plan
OPEP	Oil Pollution Emergency Plan
OPGGS (E)R	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023
OSM	Operational and Scientific Monitoring
OSRA	Oil Spill Response Atlas
OSRL	Oil Spill Response Limited
OSRM	Oil Spill Response Manual
OSTM	Oil spill trajectory modelling
OWR	Oiled wildlife response
PAH	Polycyclic aromatic hydrocarbons
PEMT	Perth Emergency Management Team
PPE	Personal protective equipment
ppb	Parts per billion
PPP	Protection Prioritisation Process
QA/QC	Quality assurance and quality control

Acronym / Abbreviation	Definition
ROV	Remotely Operated Vehicle
SBRUVS	Stereo Baited Remote Underwater Video Stations
SM	Scientific Monitoring
SMART	Special Monitoring of Applied Response Technologies
SMP	Scientific Monitoring Plan
SSDI	Subsea dispersant injection
SWIS	Subsea Well Intervention Services
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
UAV	Uncrewed Aerial Vehicle
VOC	Volatile Organic Compound
WA	Western Australia
WAMSI	Western Australian Marine Science Institution

24 References

The following documentation is either directly referenced in this document or is a recommended source of background information.

Table 24-1: References

Ref No	Description	Document ID
1.	Australian Petroleum Production and Exploration Association (APPEA). 2021. Joint Industry Operational and Scientific Monitoring Plan Framework. Rev D. Report prepared by BlueSands Environmental for APPEA Marine and Environmental Science Working Group. Available at: https://energyproducers.au/policy/environment/publications/	-
2.	Chevron Australia. 2025. Chevron ABU: Consolidated Oil Pollution Emergency Plan (OPEP). Chevron Australia, Perth, Western Australia.	ABU-COP-02788
3.	Chevron Australia. 2011. ABU Emergency Response Plan. Chevron Australia, Perth, Western Australia.	OE-11.01.11
4.	Chevron Australia. 2014. Oil Spill Response Manual – Standardised OE Procedure. Rev. 4.0. Chevron Australia, Perth, Western Australia	OE-11.01.101
5.	Chevron Australia. 2021. ABU Emergency Contact Directory. Rev. 2.0. Chevron Australia, Perth, Western Australia	ABU-COP-01631
6.	NOPSEMA Information Paper: Application of oil spill modelling in Environment Plans, December 2025	-
7.	Chevron Australia. 2020. ABU Oil Spill Protection Prioritisation Process – North West Shelf Chevron Australia, Perth, Western Australia.	ABU180500232
8.	Department of Transport. 2017. Provision of Western Australian Marine Oil Pollution Risk Assessment – Protection Priorities. Protection Priority Assessment for Zone 2: Pilbara – Final Report. 16 October 2017. Report prepared by Advisian. Available at: https://www.transport.wa.gov.au/marine/maritime-environmental-emergencies/preparedness-reponse-resources	-
9.	French-McCay D (2026) Considerations for Development of Entrained Oil Thresholds for Oil Spill Risk Assessments. RPS Ocean Science. Australian Energy Producers. Available at: https://energyproducers.au/hubfs/Oil-in-Water%20Threshold%20Review_French-McCay-2026Mar18.pdf	-
10.	ABU Emergency Management 5 Year Training and Exercise Schedule	ABU230300030
11.	CAPL ABU OSM Capability Register	ABU181001264
12.	APPEA (2021b) Australian Offshore Titleholders Source Control Guideline	-
13.	IPIECA-IOGP (2020) Oil Spill Monitoring and Sampling - IOGP Report 639	-
14.	Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC). 2012. Marine bioregional plan for the North-west Marine Region, prepared under the Environment Protection and Biodiversity Conservation Act 1999. Commonwealth of Australia, Canberra.	-
15.	Department of Climate Change, Energy, the Environment and Water (DCCEEW). 2026. Biologically Important Areas for Protected Marine Species (spatial dataset, last updated 11 September 2026). Commonwealth of Australia, Canberra.	-
16.	Commonwealth of Australia. 2017. Recovery Plan for Marine Turtles in Australia 2017–2027. Department of the Environment and Energy, Canberra.	-

Appendix A Demonstration of Meeting OSM Framework Regulatory Requirements

RAS Requirement	Relevant Section of Documentation that Addresses the Requirement
Conducted an appropriate risk assessment of worst-case oil pollution scenario(s) supported by spill modelling.	CAPL has analysed all of its worst-case oil pollution scenario(s), including volumes, hydrocarbon types and spill locations in its OSM Modelling and Baseline Register (ABU211000045) which is updated to include each new activity. As part of this assessment, CAPL reviews the stochastic spill modelling results for each activity to determine spill risk relevant to OSM planning (Appendix – Operational and scientific monitoring assessment). A comprehensive assessment of worst-case oil pollution scenario(s) for each activity is also included in the activity EP.
Evaluated and adopted all reasonably practicable measures to reduce oil pollution risks by preventing incidents and preparing for a timely and effective response to pollution events.	The control measures for reducing oil pollution risks are included in the activity EP in the unplanned activities risk assessment section. Information pertaining to response preparedness is provided in the Consolidated OPEP.
Identified monitoring arrangements and resource requirements based on the worst-case oil pollution scenario(s).	Section 8 Resourcing Requirements outlines the process for determining the greatest OSM resource requirements based on the worst-case scenarios for CAPL activities, including the use of deterministic modelling. Monitoring arrangements, including contracted and internal capability are presented in Sections 9 Capability Arrangements and 10 Capability Assessment.
Presented monitoring arrangements and capability that are scalable and adaptable and will provide timely information.	Section 9 Capability Arrangements outlines CAPL' monitoring arrangements via OSRL's OSM Supplementary Service Agreement, including scalable resourcing, if it is required.
Identified suitably qualified personnel who will be in decision making roles and implementing the monitoring and who are prepared for their responsibilities in advance of the incident occurring.	Section 6 OSM Roles and Responsibilities outlines personnel who will fill key OSM decision making roles. Roles filled by the OSM Services Provider are managed via the OSRL OSM Supplementary Services Agreement which specifies responsibilities for OSM response.
Established operational monitoring requirements based on the response needs and capacity reasoning applied to demonstrate ALARP for the response control measures detailed in the OPEP	CAPL has assessed its OSM control measures and required capability in preparing this OSM-BIP. In addition, CAPL has undertaken an OSM ALARP assessment in the 'spill response environmental risk assessment' section of the activity EP to determine if any improvements could be made to the existing suite of control measures.
Demonstrated all feasible preparatory actions to improve reliability, effectiveness and timeliness of response arrangements and capability (including operational monitoring), have been implemented where costs are not grossly disproportionate to the environmental benefit gained	The 'spill response environmental risk assessment' section of the activity EP demonstrates a detailed control measure options analysis was undertaken and all feasible control measures for OSM have been implemented.

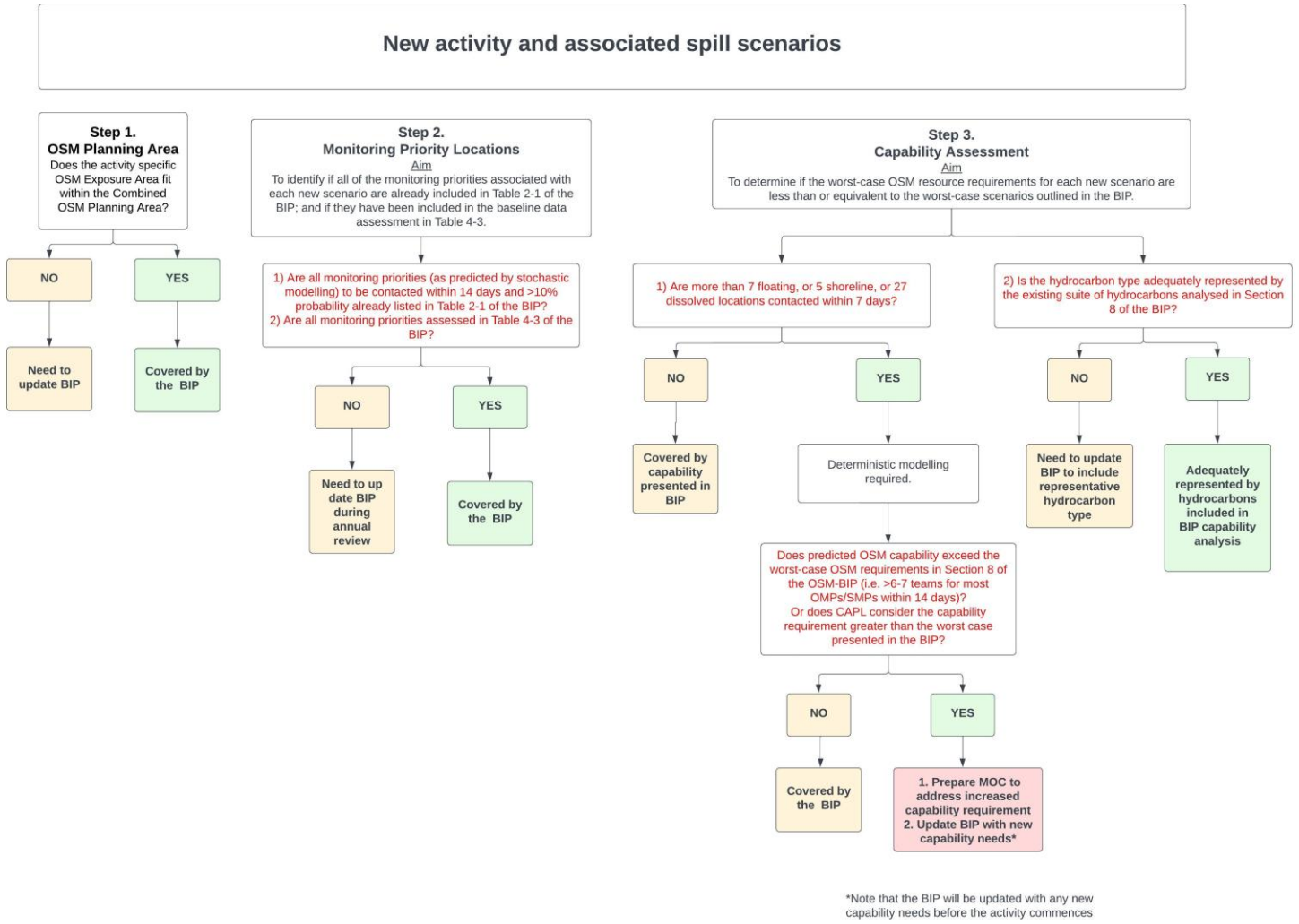
RAS Requirement	Relevant Section of Documentation that Addresses the Requirement
Set environmental performance standards that reflect the level of performance required of the response control measures (including monitoring) to achieve the defined environmental performance outcomes.	The Consolidated OPEP includes a table titled 'Environmental performance – operational and scientific monitoring', which details all OSM control measures and performance standards, many of which relate directly to the RAS Requirements. Section 18.3 Operational Monitoring of Effectiveness of Control Measures and to Ensure EPS are Met outlines tasks for the OSM Implementation Lead and Environment Unit Leader to ensure environmental performance standards are met via operational monitoring activities.
The EP clearly commits to initiate all OMPs as listed in Table 5-1 as per initiation criteria listed in Table 9-1.	Table 12-1: OSM mobilisation and activation process provides guidance during mobilisation, and in the Consolidated OPEP, the table 'Environmental performance – operational and scientific monitoring' commits to OM activation in accordance with the initiation criteria in the Framework.
The EP clearly commits to initiate all SMPs as listed in Table 6-1 as per initiation criteria listed in Table 9-2.	Table 12-1: OSM mobilisation and activation process provides guidance during mobilisation, and in the Consolidated OPEP, the table 'Environmental performance – operational and scientific monitoring' commits to SM activation in accordance with the initiation criteria in the Framework.
The EP clearly commits to the Termination Criteria listed in Table 9-1 for operational monitoring and Table 9-2 for scientific monitoring.	Table 22-1: Checklist for terminating monitoring components provides guidance during termination of monitoring, and in the Consolidated OPEP, the table 'Environmental performance – operational and scientific monitoring' commits to termination in accordance with the termination criteria in the Framework.
The EP clearly commits to the quality assurance and quality control items listed in Section 10.11 of the framework.	Section 20 Quality Assurance and Quality Control commits that CAPL and the OSM Services Provider will use Section 10.11 of the Joint Industry OSM Framework for QA/QC minimum standards.
The EP includes a clear commitment to use the same description of the roles and responsibilities for key emergency response personnel presented in the framework in Table 10-6.	Section 6 OSM Roles and Responsibilities commits that CAPL and the OSM Services Provider will use the key roles and responsibilities provided in Section 10.13.2 of the Framework.
The EP clearly commits to emergency response personnel having the competencies outlined in Table 11-1. However, Titleholders need to ensure that regardless of the university qualifications that personnel may have, ultimately the monitoring undertaken must be of suitable experimental design, and with personnel who are trained and competent in experimental design and in situ monitoring implementation, irrespective of their qualifications, this may not be achieved.	Section 9.1 Personnel competencies commits that CAPL and the OSM Services Provider will use the competencies outlined in Table 11-1 of the Framework.
The EP clearly commits to the minimum standards identified in Appendix A, with the addition of replacing language in the form of "should" and "where possible" with "will". EPs that commit to the standards identified in this appendix without	In the Consolidated OPEP, the table 'Environmental performance – operational and scientific monitoring' commits that CAPL will comply with the minimum standards listed in Appendix A of the Joint Industry OSM Framework. In addition, all of the minimum

RAS Requirement	Relevant Section of Documentation that Addresses the Requirement
replacing the text described above with more definitive language will likely to be subject to a more comprehensive assessment of the arrangements in accordance with the risk factors particular to the EP and receive requests for clarification from NOPSEMA during the assessment process.	standards have been reviewed and integrated into this OSM-BIP and/or Consolidated OPEP.
The EP clearly commits to meet the competencies identified for teams in Appendix D Table D1.	Section 9.1 Personnel competencies commits that CAPL and the OSM Services Provider will use the competencies for SMP Field Teams as outlined in Appendix D of the Framework.
The EP clearly commits to an annual review and reviews where all the suggested triggers apply as advised in the template.	Section 11 Review of Plan and in the Consolidated OPEP, the table 'Environmental performance – operational and scientific monitoring' commit to conducting an annual review of the OSM-BIP, providing the criteria for the review.
The EP uses the process described in Sections 2 and 13 of the template to identify the environment that may be affected and the protection and monitoring priorities, including the application of oil concentration thresholds consistent with the exposure values for oil spill modelling presented in NOPSEMA's oil spill modelling bulletin, and fully justifies the outcome.	Section 2 OSM Planning Area and Monitoring Priorities demonstrates that CAPL has applied the NOPSEMA oil spill modelling bulletin thresholds for determining the Consolidated Scientific Monitoring Planning Area. This section also outlines CAPL's process for identifying monitoring priorities, as required by Section 2 of the BIP Template (step 3). This process incorporates the key elements listed in the BIP Template, including analysis of spill modelling results with receptors of high conservation value (especially receptors predicted to be contacted at higher probabilities and a rapid timeframe) and availability of baseline data. This process is then applied in each EP (Appendix – Operational and scientific monitoring assessment) to confirm activity-specific monitoring priorities. As noted in Section 2 of the BIP template, the monitoring priorities listed are for planning purposes only and CAPL and its OSM Services Provider will follow the process outlined in Section 13 Monitoring Priorities when confirming monitoring priorities in the event of a spill.
The EP adheres to the process described in Sections 3 and 4 of the template to undertake baseline data analysis and fully justifies the outcome.	Sections 3 Relevant Existing Baseline Information Sources and 4 Baseline Data Review follow the guidance provided in the BIP Template, with the addition of more information to support continuous improvement in this area. In addition, the EP (Appendix – Operational and scientific monitoring assessment) provides a baseline assessment for identified monitoring priorities for that activity. Noting this, CAPL is part of a Joint Industry Collaborative Group who are working together to determine the extent, quality and suitability of existing baseline data for the marine environments in the North West Shelf, Browse and Timor Sea Regions of Australia. The Marine Environment Baseline Database includes available data for all receptors relevant to the Joint Industry OSM Framework and has assessed the spatial and temporal relevance of this data and comparison of methods and parameters to

RAS Requirement	Relevant Section of Documentation that Addresses the Requirement
	those outlined in the Joint Industry SMPs, as recommended in Section 7 and Appendix A of the Framework and Section 4 of the BIP Template.
The EP makes clear, unambiguous commitment that scientific monitoring reports "will be" peer reviewed by an expert panel (Section 4, p10).	In the Consolidated OPEP, the table 'Environmental performance – operational and scientific monitoring' commits that draft OSM data reports will be peer reviewed by an expert panel for data integrity. This is also stated in Section 20 Quality Assurance and Quality Control.
The EP includes clear, unambiguous activation, mobilisation, and implementation timeframes, which are relevant to the predicted time to contact of the pollution with sensitive receptors, baseline data available, sensitivities affected, practicability of implementation and/or other factors. Indicative mobilisation timeframes for OSM activities presented as worked examples in the template, for example, activation timeframes in Table 7-1 and Section 12 and implementation timeframes in Sections 13 and 15, should be revised to reflect each activity's oil pollution scenario(s) and specific response requirements.	Section 12 Mobilisation and Activation Process provides the mobilisation and activation process and timeframes for the OSRL OSM Supplementary Services Agreement. Section 7 Mobilisation and Timing of OMP and SMP implementation provides timeframes for mobilisation and activation that are relevant to CAPL' activities, including predicted time to contact to sensitive receptors (from spill modelling), availability of baseline data and practicability of implementation (i.e. remote environments, timeframes for mobilising specialised equipment and personnel). The CAPL ABU Consolidated OPEP commits to aerial surveillance within 8 hours of EMT activation and shoreline assessment within 12 hours of receipt of modelling predicting shoreline contact, addressing any rapid contact with sensitive receptors.
Monitoring implementation timeframes consider any time requirements to finalise SMPs prior to implementation being required or take actions to reduce timeframes during the pre-spill (preparedness) phase.	The timeframes for finalising SMPs have been accounted for in the timeframes provided in Part B of the OSM-BIP, in particular, Section 15 Finalising Monitoring Design.
The EP includes OMPs that are sufficiently developed and/or finalised to ensure that they are ready to implement in the identified timeframes for operational monitoring to provide information to support initial and ongoing response decision-making.	The Joint Industry Framework includes well developed OMPs that have been socialised with the OSM Services Provider and will be finalised in the event of a spill. The timeframe for finalising the OMPs is factored into the implementation timeframes provided in Section 7 Mobilisation and Timing of OMP and SMP implementation.
The EP identifies that operational monitoring detailed in the OMPs will be initiated, monitoring teams deployed, and information provided to the emergency management team (EMT) in timeframes that match those identified and applied to the oil pollution emergency response planning in the development of the OPEP.	As described in Section 7 Mobilisation and Timing of OMP and SMP implementation, the Consolidated OPEP describe additional operational monitoring and monitor and evaluate activities that may be required to support the implementation of response strategies. This includes SCAT teams to support shoreline protection and clean-up; aerial surveillance to support oiled wildlife activities and marine fauna monitoring; and tier 1 SMART monitoring for surface dispersant application.
The EP identifies monitoring resources in the BIP that match the monitoring and response needs in terms of numbers of personnel, teams, equipment, sites etc. Tables 8-2, 8-3 and 10-1 in the template provide a suitable method of presenting the number of personnel and teams required to resource a monitoring program, however, the content of these tables will be assessed by NOPSEMA in the context of the oil pollution scenario(s), response needs analysis and capacity reasoning presented in the EP.	Section 8 Resourcing Requirements presents the spill scenarios most likely to require the greatest initial and on-going capability for CAPL on the North West Shelf, which have been used in the capability assessment. As per Section 8 of the BIP Template, CAPL has based its resourcing requirements on spill modelling, implementation timeframes and its monitoring priorities. However, in keeping with continuous improvement in this area and alignment to how capability is determined for oil spill response strategies (i.e. shoreline clean-up), CAPL has utilised deterministic modelling

RAS Requirement	Relevant Section of Documentation that Addresses the Requirement
	to help define its capability requirements. In addition, CAPL has included the use of 'Monitoring Units' for the reasons stated in Section 8.1 Monitoring Units, and also to enable demonstration of how BIAs, KEFs and broadscale features are included in the capability assessment.
The EP adheres to the exercise and testing process described in Section 9.3. Additionally, the BIP should identify the specific objectives of the testing of monitoring arrangements, ensure the frequency of the schedule of testing is consistent with the regulatory requirements and provide information on any aspects of the testing of monitoring that differ to the OPEP testing arrangements described elsewhere in the EP.	Section 9.3 Exercises is aligned to the BIP Template, outlining the types of exercises that shall be conducted by the OSM Services Provider, as per the OSRL OSM Supplementary Services Agreement; and also by CAPL.
The EP confirms that the aims and objectives of the OMPs and SMPs are appropriate for a Titleholder's monitoring requirements and address the potential impacts and risks and response activities.	In the activity EP, the Appendix 'Operational and Scientific Monitoring Assessment' confirms which OMPs and SMPs are relevant to the activity and that the aims and objectives of these monitoring plans are appropriate to the needs of the spill, its risks and response activities.
The EP uses the method provided in the template for Titleholders to ensure special requirements for Matters Protected Under Part 3 of the EPBC Act are met through the proposed monitoring (Section 14). However, the method indicates that this would be done prior to finalisation of OMPs and SMPs, which may not be completed in a Titleholder's EP. Titleholders should ensure that relevant requirements are at least identified in the EP. This process would also be repeated during finalisation of OMPs and SMPs in the event of an oil pollution emergency to ensure any changes to requirements since submission of the EP or the latest review are included.	CAPL lists special requirements for Matters Protected Under Part 3 of the EPBC Act in Section 3 of the activity EPs. The process for ensuring all relevant Protected Matters are integrated into the final monitoring design is outlined in Section 14 Protected Matters Requirements.
The EP sets environmental performance outcomes, standards and measurement criteria that relate to the environmental impacts and risks and required level of performance of the proposed monitoring arrangements (preparedness and implementation) defined in the BIP.	In the Consolidated OPEP, the table 'Environmental performance – operational and scientific monitoring' outlines a number of environmental performance outcomes, standards and measurement criteria committing CAPL to OSM preparedness and implementation performance relevant to this OSM-BIP.

Appendix B Process for assessing new activities against OSM-BIP



Appendix C CAPL Protection Prioritisation Process Rankings

Receptor	Key sensitivities / values[12][13]	Relevant key periods	CAPL Ranking (Floating oil)	CAPL Ranking (Dissolved oil)
Northern Pilbara – Islands and Shoreline	**Mangroves**	N/A	5	5
	Turtles Flatback turtle (*Natator depressus*) (vulnerable), green turtle (*Chelonia mydas*) (vulnerable), and hawksbill turtle (*Eretmochelys imbricata*) (vulnerable). Island habitats are particularly important for nesting.	Oct to Mar	4	3
	Marine mammals Humpback whale (*Megaptera novaeangliae*) (migratory) migration area. Australian humpback dolphin (*Sousa sahulensis*) (vulnerable), Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) (not threatened) and dugong (*Dugong dugon*) (migratory) utilise the shallow intertidal waters around islands.	Humpback whale migration: Jun to Oct	3	2
	Birds Staging point/feeding area for migratory shore birds. Seabird nesting, resting and foraging on and around islands.	Migratory shorebirds: Aug to Apr	4	TBD
	Fish Green sawfish (*Pristis zijsron*) (vulnerable).	Unknown	3	4
	Coral and other subsea benthic habitats	Coral spawning: Mar & Oct	4	5
	Socio-economic Recreational fishing/ charter boats, tourism related to water-based activities and nature. National Heritage. Aboriginal sites.	Year-round	4	3

[12] Conservation status is the listing status under the EPBC Act (threatened category, or migratory where the species is not listed as threatened)

[13] Where migratory shorebirds are known to occur, it was assumed that at least one endangered species was present thus resulting in the highest possible CAPL ranking

Receptor	Key sensitivities / values[12][13]	Relevant key periods	CAPL Ranking (Floating oil)	CAPL Ranking (Dissolved oil)
	Camping beaches.			
Southern Pilbara – Islands and Shoreline	**Mangroves**	N/A	5	5
	Turtles Critical nesting habitat for green turtle (*Chelonia mydas*) (vulnerable), flatback turtle (*Natator depressus*) (vulnerable), hawksbill turtle (*Eretmochelys imbricata*) (vulnerable) and loggerhead (*Caretta caretta*) (endangered).	Oct to Apr	5	4
	Marine mammals Humpback whale (*Megaptera novaeangliae*) (migratory) migration area. Australian humpback dolphin (*Sousa sahulensis*) (vulnerable), Indo-Pacific bottlenose dolphin (not threatened) and dugong (*Dugong dugon*) (migratory) utilise the shallow intertidal waters around islands.	Humpback whale migration: Jun to Oct	3	2
	Birds Staging point/feeding area for migratory shore birds. Seabird nesting, resting and foraging on and around islands.	Migratory shorebirds: Aug to Apr Seabirds: Species dependant	4	TBD
	Fish Green sawfish (*Pristis zijsron*) (vulnerable).	Unknown	3	4
	Coral and other subsea benthic habitats	Coral spawning: Mar & Oct	4	5
	Socio-economic Recreational fishing/ charter boats, tourism related to water-based activities and nature. Camping beaches.	Year-round	4	3
Montebello Islands	**Mangroves** Montebello Islands' mangrove communities are regarded as globally unique.	N/A	5	5
	Turtles Nesting area for green (*Chelonia mydas*) (vulnerable), flatback (*Natator depressus*) (vulnerable), and hawksbill (*Eretmochelys imbricata*) (vulnerable)	Turtle nesting Nov to Mar	4	3

Receptor	Key sensitivities / values[12][13]	Relevant key periods	CAPL Ranking (Floating oil)	CAPL Ranking (Dissolved oil)
	turtles. The islands are recognised as critical habitat for flatback turtles and for hawksbill turtles, with key sites for the latter including Ah Chong Island, South East Island, and Trimouille Island.			
	Marine mammals Pygmy blue whale (endangered) and humpback whale (*Megaptera novaeangliae*) (migratory) migration area. Resident populations of Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) (not threatened) and Australian humpback dolphins (*Sousa sahulensis*) (vulnerable). Dugong (*Dugong dugon*) (migratory) foraging.	Pygmy blue whale migration: late Mar to mid-Sep (north bound; peak late May to Jun) and early Oct to late Jan (south bound; peak late Nov to early Dec) Humpback whale migration: Jun to Oct	4	3
	Birds Significant seabird nesting and foraging areas. Staging point/feeding area for migratory shore birds.	Seabirds: Species dependant Migratory shorebirds: Aug to Apr	4	TBD
	Coral and other subsea benthic primary producers	Coral spawning: Mar & Oct	4	5
	Socio-economic Pearling (inactive/pearling zones). Very significant for recreational fishing and charter boat tourism (Marine Management Area). Social amenities and other tourism. Nominated place (National Heritage).	Year-round	2	2
Montebello AMP	**Coral and other subsea benthic primary producers** A prominent seafloor feature in the Marine Park is Tryal Rocks consisting of two close coral reefs. The reefs are emergent at low tide.	Coral spawning: Mar & Oct	4	5
	Turtles Biologically important internesting, foraging, mating, and nesting habitat for turtles.	Nesting green and flatback turtles: Oct to Mar (hawksbill can nest all year)	5	4

Receptor	Key sensitivities / values[12][13]	Relevant key periods	CAPL Ranking (Floating oil)	CAPL Ranking (Dissolved oil)
	Birds Biologically important breeding habitat for seabirds.	Species dependant	3	2
	Whale shark Biologically important habitat for whale shark (*Rhincodon typus*) (vulnerable)		2	3
	Marine mammals Humpback whale (*Megaptera novaeangliae*) (migratory) migration area.	Jun to Oct	2	1
	Socio-economic Pearling (inactive/pearling zones). Very significant for recreational fishing and charter boat tourism (Marine Management Area). Shipwreck (Tryal).	Year-round	4	3
Barrow Island	**Mangroves**	N/A	4	5
	Turtles Regionally and nationally significant green turtle (*Chelonia mydas*) (vulnerable) (western side) and flatback turtle (*Natator depressus*) (vulnerable) (eastern side) nesting. Small numbers of hawksbill turtle (*Eretmochelys imbricata*) (vulnerable) nesting.	Year round, peaking Oct to Jan	4	3
	Marine mammals Humpback whale (*Megaptera novaeangliae*) (migratory) migration area. Resident populations of bottlenose dolphins and Australian humpback dolphin (*Sousa sahulensis*) (vulnerable). Dugong (*Dugong dugon*) (migratory) foraging.	Humpback whale migration: Jun to Oct	3	2
	Birds Nationally significant site for migratory shorebirds, serving both as a key staging area during migration and as a non-breeding destination. Double Island has important bird nesting sites (shearwaters and sea eagles).	Migratory shorebirds: Aug to Apr	4	TBD
	Coral and other subsea benthic primary producers	Coral spawning: Mar & Oct	4	5

Receptor	Key sensitivities / values[12][13]	Relevant key periods	CAPL Ranking (Floating oil)	CAPL Ranking (Dissolved oil)
	Socio-economic Significant for recreational fishing and charter boat tourism, Nominated place (National heritage), Industry – Reverse Osmosis Plant and port operations. Petroleum Activities such as Barrow Island petroleum production.	Year-round	4	5
Lowendal Islands	**Mangroves**	N/A	4	5
	Coral and other subsea benthic primary producers	Coral spawning: Mar and Oct	4	5
	Turtles Flatback turtle (*Natator depressus*) (vulnerable), hawksbill turtle (*Eretmochelys imbricata*) (vulnerable), and green turtle (*Chelonia mydas*) (vulnerable) nesting.	Nesting all year, Hawksbill nesting peak Oct to Jan Flatback turtles nesting peaks Dec to Jan	4	3
	Birds Significant seabird nesting and foraging areas.	Year-round	3	2
	Marine mammals Humpback whale (*Megaptera novaeangliae*) (migratory) migration area. Dugong (*Dugong dugon*) (migratory) foraging.	N/A	2	1
	Socio-economic and heritage Social amenities and other tourism, very significant for recreational fishing and charter boat tourism.	N/A	2	2
Muiron Islands	**World Heritage Area**	N/A	5	5
	Turtles Turtle nesting – major loggerhead (*Caretta caretta*) (endangered) site, significant green turtle (*Chelonia mydas*) (vulnerable) nesting site, low density hawksbill turtle (*Eretmochelys imbricata*) (vulnerable) nesting, occasional flatback (*Natator depressus*) (vulnerable) presence	Loggerhead peak nesting: Nov to Jan Green peak nesting Dec to Jan	5	4
	Coral and other subsea benthic primary producers	Coral spawning: Mar & Oct	4	5

Receptor	Key sensitivities / values[12][13]	Relevant key periods	CAPL Ranking (Floating oil)	CAPL Ranking (Dissolved oil)
	Birds Seabird nesting and foraging. Internationally important shorebird area	Seabird nesting: approximately Sep–Feb Migratory shorebirds: Aug to Apr	4	TBD
	Marine mammals Humpback whale (*Megaptera novaeangliae*) (migratory) migration area.	Humpback whale migration: Jun to Oct	2	1
	Fish Shallow macroalgal habitats identified as important juvenile habitat for blue-spotted emperor (*Lethrinus punctulatus*) (not threatened).	Year-round	2	3
	Socio-economic and heritage Exmouth gulf prawn fishery (Muiron is western boundary); significant for recreational fishing and charter boat tourism	Prawn fishery – April to November	4	5
Ningaloo Coastline, WHA and Exmouth	**World Heritage Area**	N/A	5	5
	Mangroves	N/A	4	5
	Turtles Loggerhead (*Caretta caretta*) (endangered) site, green turtle (*Chelonia mydas*) (vulnerable), hawksbill turtle (*Eretmochelys imbricata*) (vulnerable) nesting	Main nesting: Hawksbill July-Mar Green Sept-Mar Flatback Sept-Mar Loggerhead Sept-Mar	5	4
	Marine mammals Pygmy blue whales (*Balaenoptera musculus brevicauda*) (endangered) foraging area. Humpback whale (*Megaptera novaeangliae*) (migratory) migration area. Australian humpback dolphin (*Sousa sahulensis*) (vulnerable), Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) (not threatened) and orca (*Orcinus orca*) (migratory). Dugongs (*Dugong dugon*) (migratory) breeding and foraging.	Pygmy blue whale migration: Apr to Aug (north bound) and Nov to late Dec (south bound) Humpback whale migration: Jun to Oct	4	3

Receptor	Key sensitivities / values[12][13]	Relevant key periods	CAPL Ranking (Floating oil)	CAPL Ranking (Dissolved oil)
	Sharks and rays Seasonal aggregations of whale sharks (*Rhincodon typus*) (vulnerable) and manta rays	Whale sharks – Mar to Jul	2	3
	Birds Internationally important shorebird area	Aug to Apr	4	TBD
	Coral and other subsea benthic primary producers	Coral spawning: Mar & Oct	4	5
	Socio-economic and heritage Tourism – significant fishing/charter boat tourism, camping and use of nearshore sanctuary zones (fishing, snorkelling)	Year-round	4	3
Rankin Bank	**Benthic habitat** Benthic communities dominated by hard corals, macroalgae and filter feeders, particularly sponges and octocorals, with assemblage patterns strongly influenced by depth and seabed rugosity.	Coral spawning: Mar & Oct	4	5
	Fish Rankin Bank supports diverse and abundant demersal fish assemblages strongly associated with hard coral and sponge habitats. Fish abundance and diversity are higher than at nearby Glomar Shoal, with the greatest richness occurring in shallow hard coral habitats.	Year round	2	3
Gascoyne AMP	**Birds** Biologically important breeding habitat for seabirds: wedge-tailed shearwater (*Ardenna pacifica*) (migratory); roseate tern (*Sterna dougallii*) (migratory)	Species specific	2	1
	Turtle Biologically important internesting habitat for turtles	Main nesting: Hawksbill July-Mar Loggerhead Sept-Mar	4	3
	Marine mammals Humpback whale (*Megaptera novaeangliae*) (migratory) migration area. Pygmy blue whales (*Balaenoptera musculus brevicauda*) (endangered) foraging and migration area.	Humpback whale migration: Jun to Oct Pygmy blue whale migration: Apr to Aug (north bound) and Nov	4	3

Receptor	Key sensitivities / values[12][13]	Relevant key periods	CAPL Ranking (Floating oil)	CAPL Ranking (Dissolved oil)
		to late Dec (south bound)		
Reefs, shoals and banks	**Coral and other subsea benthic primary producers**	Coral spawning: Mar & Oct	4	5
	Marine mammals Humpback whale (*Megaptera novaeangliae*) migration area.	Humpback whale migration: Jun to Oct	2	1

Appendix D Background information for key sensitivities

Understanding the historical presence, distribution, seasonality, and reproductive state (where applicable) of a receptor is important for planning and implementing OSM. Table D-1 provides a brief summary of this background information for key sensitivities at locations predicted to be contacted within 7 days at a probability greater than 10%, which require a baseline review. This information is also one factor in assessing baseline data available in the Marine Environment Baseline Database from the past 5 years, specifically whether the receptors included and the spatial and temporal extent of that data are adequate

Table D-1: Background information for key sensitivities for locations predicted to be contacted within 7 days, at a probability >10%, and requiring a baseline review

Location	Receptor	Background	Key locations	Seasonality
Barrow Island	Birds	Barrow Island is recognised as a nationally significant site for migratory shorebirds, serving both as a key staging area during migration and as a non-breeding destination. It qualifies as an Important Bird Area (IBA) under the East Asian–Australasian Flyway for supporting more than 1% of the flyway populations of Grey-tailed Tattler (*Tringa brevipes*) and Ruddy Turnstone (*Arenaria interpres*) (Weller et al. 2020). The island also meets national significance thresholds for several other species, including the Red-necked Stint (*Calidris ruficollis*), Greater Sand Plover (*Charadrius leschenaultii*), Lesser Sand Plover (*Charadrius mongolus*), and Sanderling (*Calidris alba*) (Weller et al. 2020). High shorebird counts recorded outside peak migration periods suggest the island also provides important overwintering habitat for non-breeding individuals (Bamford et al. 2011). Foraging area for seabirds.	Extensive intertidal mudflats occur along the southern and south-eastern shores of Barrow Island, where sheltered coastal areas allow sand or mud to accumulate over rocky platforms. These largely unvegetated flats offer important foraging habitat for migratory shorebirds (Weller et al. 2020). Beyond the shoreline, offshore intertidal reefs also contribute valuable habitat. Notably, Bandicoot Bay in the island's south contains a large intertidal reef that provides important shorebird habitat (Weller et al. 2020).	Migratory shorebird abundances increase on the island as the birds arrive from the north during September to December. The abundances of some migratory shorebirds continue to increase in January and February, suggesting local movements of birds from the mainland to Barrow Island. Abundances decrease as the migratory species leave the region to return north at the end of summer.

Location	Receptor	Background	Key locations	Seasonality
				Summer Seabird foraging (Terns and Shearwaters)
	Turtles	The reproductive population of green turtles on Barrow Island is estimated at around 20,000 females, with nesting concentrated on high-energy beaches along the west and northeast coasts. In contrast, the flatback turtle (*Natator depressus*) nests predominantly on the east coast, where deep, low-energy sandy beaches with wide intertidal zones provide suitable habitat. Track-count data indicate a population of ~3,600 adult female flatbacks, of which 1,800–1,900 are estimated to nest in any given year (Chevron, n.d.). Only a small proportion of green turtles nest on the south and east coast beaches (Pendoley Environmental, 2018). Green turtle nesting abundance is also known to fluctuate cyclically in response to El Niño–Southern Oscillation (ENSO) events (Limpus & Nicholls, 2000). Hawksbill turtle (Eretmochelys imbricata) nesting populations were estimated at ~100 individuals on Barrow Island, with a further 1,000 in the Lowendal Islands and 1,300 in the Montebello Islands, based on track count surveys from 1998 to 2005 (Pendoley 2005). Hawksbill nesting on Barrow Island is more temporally and spatially diffuse than flatback or green turtle nesting.	Flatback: nesting activity is concentrated on the east coast of the island on sandy, low-sloped, low-energy beaches with wide, shallow intertidal zones (Pendoley 2005; Pendoley et al. 2014). Limited nesting activity has also been recorded on the south-west, south-east, north, and north-east beaches of Barrow Island (Pendoley Environmental 2010). The approximate internesting interval (duration between a successful nest and subsequent nest or nesting attempt) of Flatback Turtles on Barrow Island is similar to other Flatback Turtle rookeries in the Pilbara region with a mean of ~14 days, and varying year to year (Pendoley et al. 2014). Satellite tracking of 33 Flatback Turtles from Barrow Island identified four patterns of inter-nesting movement, including interesting periods where turtles travelled East, south-east, or to the Mainland from Barrow Island. The slight majority of movements stayed in the nearshore area surrounding Barrow Island, within 10 km (Whittock et al. 2014). Green Turtle nesting usually occurs on the west and north-east coasts of Barrow Island. The west coast nesting beaches are high-energy, steeply sloped, sandy, and with an unobstructed foreshore approach (Chevron Australia 2005), in contrast to the low-energy beaches preferred by nesting Flatback Turtles (Pendoley 2005). Annually, only a very small percentage of these Green Turtles nest on the south and east coast beaches of Barrow Island (Pendoley Environmental 2018). Shallow foraging habitat used by adult and juvenile Green Turtles typically comprises seagrass beds or algae mats, and both juvenile and adult Green Turtles have been observed feeding year-round on algae-covered, rocky intertidal and subtidal platforms, off the west and east coasts of Barrow Island (DoE 2015a; Chevron Australia 2005). Analysis of satellite tracking data for Barrow Island Green Turtles suggests interesting habitat occurs throughout the rocky intertidal and subtidal platforms common on the west	Flatback: nesting on Barrow Island occurs between October and March, with peak nesting activity occurring between December and January (Chevron Australia 2015; Chevron Australia 2016) Substantial aggregations of mating Green Turtles can occur in waters and on beaches along the west, north, and north-east coasts of Barrow Island between September and December (Chevron Australia 2005). Green Turtle nesting usually occurs between October and March each year, with a remigration interval of approximately five years (Bjorndal 1997) and peak nesting activity

Location	Receptor	Background	Key locations	Seasonality
			coast, around to the north-eastern beaches and waters (Chevron Australia 2005; Pendoley 2005) Surveillance of Barrow Island Hawksbill Turtle nesting has found that nesting activity is more temporally and spatially diffuse than Flatback and Green Turtle nesting activity and occurs predominantly on small, rocky, north-east coast beaches, extending down to Mushroom Beach. Very low numbers of Hawksbill Turtles nest further south along the east coast (Chevron 2015).	occurring between December and February (Chevron Australia 2005; Pendoley 2005). Hawksbill Turtle nesting in WA occurs from September/October to January, peaking in October, but the entire breeding season remains undefined (DCCEEW 2024; Pendoley 2005). Hawksbill Turtles typically have an internesting interval of ~14 days and a remigration interval of approximately three years (Chevron Australia 2005; DoE 2015b).
	Marine mammals	Humpback whales (*Megaptera novaeangliae*) are regularly observed in the waters around Barrow Island during both their northward and southward migrations. Other whale species that may occasionally visit the area include the short-finned pilot whale (*Globicephala macrorhynchus*), false killer whale (*Pseudorca crassidens*), killer whale (*Orcinus orca*), minke whale (*Balaenoptera acutorostrata*), Bryde's whale (*Balaenoptera edeni*), sei whale (*Balaenoptera borealis*), pygmy blue whale (*Balaenoptera musculus brevicauda*), fin whale (*Balaenoptera physalus*), melon-headed whale (*Peponocephala electra*), sperm	Spinner dolphins, common dolphins, and striped dolphins are generally oceanic species and are likely to be most abundant on the west coast of the island (DEC 2006).	Humpback whale migration: June to end of October

Location	Receptor	Background	Key locations	Seasonality
		whale (*Physeter macrocephalus*), and blue whale (*Balaenoptera musculus musculus*) (DEC 2006). Resident populations of bottlenose dolphins (*Tursiops truncatus*) and Australian humpback dolphins (*Sousa sahulensis*) are present in the shallow coastal waters of the inner Rowley Shelf, including the Barrow Island region (DEC 2006). Spinner dolphins (*Stenella longirostris*), common dolphins (*Delphinus delphis*), and striped dolphins (*Stenella coeruleoalba*) are also considered abundant in surrounding waters (DEC 2006). Additionally, significant sightings of dugongs (*Dugong dugon*) have been recorded near Barrow Island (Bancroft et al. 2000).		
	Fish	The Montebello/Barrow Islands region hosts exceptionally diverse fish communities, with over 450 species recorded, most of which occur widely across the Indo–West Pacific (Allen 2000; DEC 2007). The region's fauna is closely linked to that of the Dampier Archipelago, benefiting from larval recruitment via the Leeuwin Current, and potentially acting as a recruitment source for areas further south (Hutchins 2004; DEC 2007). Surveys around Barrow Island have documented strong habitat associations: coral reefs support the greatest diversity, dominated by damselfish, parrotfish, snappers, and groupers; macroalgae habitats serve as important nurseries; sand habitats host large transient predators such as mackerel and trevally alongside smaller benthic species; and areas rich in sessile invertebrates are frequented by emperors, threadfin bream, and trevally (Chevron Australia 2012).		
	Intertidal	Restricted areas of stunted *Avicennia marina* occurring in narrow fringing strips in embayments (DEC 2006).	*Avicennia marina* grows in sparse stands only on the east coast of Barrow Island. It is distributed in a narrow band along soft sediment and rock substrates in the upper-littoral and supra-littoral zones of the intertidal area. Mangroves are recorded at Little Bandicoot Bay and Pelican Island, as well as further east at Bandicoot Bay, where a small number of trees extend further down the intertidal zone to the mid-littoral zone. Sparse stands of trees are recorded on the rocky intertidal shoreline from Stokes Point along the coast up to Shark Point. Stands of mangroves are also recorded	*Avicennia marina* flowering often occurs between December and January while propagules mature mostly in March (Duke 2006).

Location	Receptor	Background	Key locations	Seasonality
			further north at Mattress Bay, Ant Point, and Square Bay. No mangrove stands are recorded on the west coast of Barrow Island (Chevron Australia 2015)	
	Benthic	Surveys around Barrow Island have identified 96 species of hard coral in 48 genera from the order Scleractinia and seven soft coral genera from the suborder Alcyoniina (Chevron 2015).	The most significant coral reefs around Barrow Island are Biggada Reef on the west coast, Dugong Reef and Batman Reef off the south-east coast and along the edge of the Lowendal Shelf on the east side of Barrow Island (DEC 2007).	There are two distinct coral recruitment periods: autumn and spring (Chevron 2015).
		The habitats on the east and west coasts of Barrow Island support different benthic macro-invertebrate assemblages. Of the 316 species of molluscs recorded from Barrow Island, less than one third occur on both coasts (Chevron Australia 2005). The muddier habitats on the east coast support a greater proportion of bivalve species, whilst the west coast supports a greater proportion of coral reef gastropod species (Chevron Australia 2005). The gastropod *Amoria macandrewi*, is endemic to sandbars within the Montebello/Barrow Islands region (Chevron Australia 2005).		
		Macroalgal-dominated limestone reef and subtidal reef platform/sand mosaic are the most extensive habitat types in the Montebello/Barrow Islands region (DEC 2007). The extensive subtidal macroalgae communities are major benthic primary producers, significantly contributing to the productivity of the region, as well as providing refuge areas for fish and invertebrates (DEC2007). The macroalgal assemblages are typically dominated by species of brown algae, particularly of the genera *Sargassum*, *Turbinaria* and *Padina* (Chevron Australia 2005; DEC 2007). Other common taxa include *Halimeda*, *Dictyopteris*, *Dictyota*, *Cystoseira*, *Codium* and *Laurencia*.	These communities are most commonly found on shallow limestone pavement in depths of 5–10 m (DEC 2007). Green algae from the genera Caulerpa and *Cladophora* and red algae from the genera *Centroceras, Ceramium, Champia, Chondria, Gelidiopsis*, and *Hypnea* are dominant or widespread off the east coast of Barrow Island (Chevron Australia 2005; DEC 2007; RPS Bowman Bishaw Gorham 2007). Some species, such as *Avrainvillea* sp. and *Halimeda macroloba*, appear to be restricted to the east coast of Barrow Island (Chevron Australia 2005).	Macroalgal habitats in the Montebello/Barrow Islands region vary seasonally in response to water temperature, day length, reproductive cycles, physical disturbance and regrowth (DEC 2007).
		Seven species have been recorded to date from the Montebello/Barrow Islands region: *Cymodocea angustata, Halophila ovalis, H. spinulosa, Halodule uninervis, Thalassia hemprichii, Thalassodendron ciliatum* and	Seagrass do not appear to form extensive beds in the area, but rather are sparsely interspersed between macroalgae, extending from the intertidal zone to ~15 m water depth (DEC 2007).	

Location	Receptor	Background	Key locations	Seasonality
		Syringodium isoetifolium (DEC 2007). Of these, *Halophila* spp. Are the most common on shallow soft substrates and sand veneers throughout the region (DEC 2007).	Ephemeral seagrass are widespread on the east coast of Barrow Island (Chevron Australia 2005). Seagrass, most often *Halophila* spp., are patchily distributed on sandy subtidal habitats, and areas of bare sand devoid of seagrass are also common along the east coast of Barrow Island.	
Lowendal Islands	Birds	Nesting and forging area for seabirds.	Abutilon, Beacon, Bridled, Parakeelya, and Varanus islands	Seabird nesting all year, peak Oct – Jan. Pied cormorant (*Phalacrocorax varius*) nests in winter (Nicholson 2002). Wedge-tailed shearwater (*Ardenna pacifica*) and Bridled tern (*Onychoprion anaethetus*) nest in Summer (Nicholson 2002). Silver gull (*Larus novaehollandiae*) nests in summer and Autumn (Nicholson 2002). Crested tern (*Thalasseus bergii)*, Lesser crested tern (*Thalasseus bengalensis*) and Roseate tern (*Sterna dougallii*) nest in Autumn (Nicholson 2002).

Location	Receptor	Background	Key locations	Seasonality
	Turtle	Green (*Chelonia mydas*), flatback (*Natator depressus*), and hawksbill (*Eretmochelys imbricata*)	All beaches on Beacon, Bridled, Varanus, Abutilon, Parakeelya Islands Significant hawksbill nesting on Varanus Island (DSEWPC 2012a). Hawksbill foraging around the Lowendal Island group (DSEWPC 2012a).	Hawksbill nesting in spring and early summer (peak October) with a 20 km internesting buffer. Flatback nesting peak late December – early January with a 20 km internesting buffer (DSEWPC 2012a).
	Marine mammals	Humpback whales (*Megaptera novaeangliae*) are regular visitors to the region during their annual migration. Other whale species that may occasionally visit the area include the short-finned pilot whale (*Globicephala macrorhynchus*), false killer whale (*Pseudorca crassidens*), killer whale (*Orcinus orca*), minke whale (*Balaenoptera acutorostrata*), Bryde's whale (*Balaenoptera edeni*), sei whale (*Balaenoptera borealis*), pygmy blue whale (*Balaenoptera musculus brevicauda*), fin whale (*Balaenoptera physalus*), melon-headed whale (Peponocephala electra), sperm whale (*Physeter macrocephalus*), and blue whale (*Balaenoptera musculus musculus*) (DEC 2006). The seagrass beds around the Lowendal Islands are thought to provide a valuable food source for dugong (*Dugong dugon*) (DEC 2006).		
	Intertidal	Mangroves occupy less than 0.1% of the coastline (DEC 2006).		
Montebello Islands	Birds	According to Datazone by Birdlife the Montebello Islands were last surveyed and assessed in 2008 and 2009 by Birldife Australia, respectively, with three species meeting IBA/KBA criteria: sooty oystercatcher (*Haematopus fuliginosus*), roseate tern (*Sterna dougallii*) and fairy tern (*Sternula nereis*).		Wedge-tailed shearwater and bridled tern nest in summer (Nicholson 2002). Silver gull nest in summer and

Location	Receptor	Background	Key locations	Seasonality
		Historical surveys undertaken in the late 1980s and 1990s documented that the Montebello Islands support a diverse range of breeding seabirds (Burbidge & Fuller 1998), although the size, distribution, and breeding activity of these populations may have changed considerably since that time. Wedge-tailed Shearwaters (*Puffinus pacificus*) were recorded breeding extensively across many islands, including Ah Chong, Alpha, 'Beaufortia', Brooke, Gardenia, 'Gossypium', Kingcup, Flag, Pansy, and South East, with colonies ranging from small groups to very large aggregations. Pied Cormorants (*Phalacrocorax varius*) maintained small nesting colonies on islands such as the 'Karri Islands', while Eastern Reef Egrets (Egretta sacra) nested sporadically on 'Bloodwood' and Buttercup. The Beach Stone-curlew (*Esacus neglectus*) appeared resident on several islands, including the 'Marri Islands', with occasional nesting observed. Both Pied (*Haematopus longirostris*) and Sooty Oystercatchers (*H. fuliginosus*) bred on multiple islands, including Alpha, 'Renewal', Hollyhock, Bluebell, and Flag. Silver Gulls (*Larus novaehollandiae*) formed large colonies on Brooke, 'Birthday', Gardenia, 'Renewal', and South East. Terns were well-represented, with Caspian Terns (*Sterna caspia*) breeding on numerous islands, including Ah Chong, Alpha, Bluebell, Dandelion, Flag, Foxglove, Gardenia, an islet south of Hermite, Ivy, 'Kunzea', Marri Islands, Primrose, 'Renewal', and Trimouille. Crested Terns (*S. bergii*) formed very large colonies in some years on Daisy, Epsilon, 'Birthday', and Bluebell Islet, while Roseate Terns (*S. dougallii*) bred on Dahlia, Dandelion, 'Pimelia', 'Myoporum', Gannet, an islet north of Gannet, 'Fig Islands', and 'Bloodwood'. Fairy Terns (*S. nereis*) were common breeders on 'Fairy Tern Island' and 'Hibbertia', and Bridled Terns (*S. anaethetus*) were presumed summer breeders based on evidence from Dahlia, 'Gossypium', and South East. Lesser Crested Terns (*S. bengalensis*) may also have bred among Crested Tern colonies on Daisy and Epsilon, although this was not confirmed (Burbidge & Fuller 1998).		Autumn (Nicholson 2002). Caspian tern nest in autumn and winter (Nicholson 2002). Crested tern, lesser crested tern, roseate tern and sooty tern nest in Autumn (Nicholson 2002). Fairy tern nest in winter and spring (Nicholson 2002).

Location	Receptor	Background	Key locations	Seasonality
	Turtle	The Montebello Islands support nesting by green (*Chelonia mydas*), flatback (*Natator depressus*), and hawksbill (*Eretmochelys imbricata*) turtles. The islands are recognised as critical habitat for flatback turtles and for hawksbill turtles, with key sites for the latter including Ah Chong Island, South East Island, and Trimouille Island. Within the recovery plan's classification framework, the Montebello Islands are identified as a *major important nesting area* for green turtles, a *minor important nesting area* for flatback turtles, and a *major important nesting area* for hawksbill turtles (Commonwealth of Australia 2017).	Hawksbill- Ah Chong Island, South East Island, Trimouille and elsewhere.	Green turtle- major nesting Nov – Mar (peak: Dec-May) on locations with sandy beaches (recovery plan) Flatback- minor nesting occurs Oct-Mar (peak: Nov-Jan) Hawksbill- major nesting occurs all year (peak Oct-Jan)
	Marine mammals	A recent study by Thums et al. (2025) investigated the diving behaviour and foraging patterns of Eastern Indian Ocean pygmy blue whales (*Balaenoptera musculus brevicauda*) using data from nine individuals tagged between 2021 and 2023 across Perth Canyon and Ningaloo. The study combined satellite-linked GPS and pop-up archival dive tags to validate movement-model inferences of foraging behaviour. The aim of the study was to identify where and when whales forage during migration and to assess how well putative foraging inferred from movement models aligned with actual foraging and lunge-feeding dives. Using classified dive types merged with spatial tracks, the study identified three main foraging areas: (1) from Perth Canyon to offshore of Jurien Bay, (2) adjacent to Geraldton and the Abrolhos Islands (noting only one whale used this area), and (3) offshore of Ningaloo, extending from near Coral Bay to offshore of the Montebello Islands. These findings demonstrate that pygmy blue whales routinely forage in multiple discrete areas along Western Australia's coastline, including both well-established hotspots such as Perth Canyon and more northerly areas such as Ningaloo to the Montebello Islands, where foraging occurred during both migration and transit (Thums et al. 2025).	Anecdotal reports suggest that sheltered waters to the west of Trimouille Island in the Montebello group may be used as a resting area for females humpbacks with calves, although the importance of this site remains uncertain (DEC, 2007).	

Location	Receptor	Background	Key locations	Seasonality
		Humpback whales (*Megaptera novaeangliae*) are regular visitors to the region during their annual migration. Several whale species are known to occasionally visit the Montebello/Barrow Islands region, including the short-finned pilot whale (*Globicephala macrorhynchus*), false killer whale (*Pseudorca crassidens*), killer whale (*Orcinus orca*), minke whale (*Balaenoptera acutorostrata*), Bryde's whale (*Balaenoptera edeni*), sei whale (*Balaenoptera borealis*), pygmy blue whale (*Balaenoptera musculus brevicauda*), fin whale (*Balaenoptera physalus*), melon-headed whale (*Peponocephala electra*), sperm whale (*Physeter macrocephalus*), and the blue whale (*Balaenoptera musculus musculus*) (DEC, 2007). Australian humpback dolphins (*Sousa sahulensis*) were first recorded in the Montebello Islands Marine Protected Area (MPA) in June 2015 and were subsequently sighted in summer, autumn, and winter of 2017, with repeated observations in nearshore waters suggesting a year-round presence. In 2017, a five-day vessel-based photo-identification survey of fringing coral reefs and shallow, sheltered sandy lagoons (generally <10 m deep, maximum <20 m) identified 28 individuals, including six calves (one a neonate). Despite the limited survey effort, this represents a relatively high number of individuals compared with other Pilbara sites where more intensive monitoring has occurred. No matches were found between Montebello dolphins and those from mainland Pilbara waters (Exmouth, Onslow, Dampier) or nearshore islands in the Western Australian Humpback Dolphin Catalogue, suggesting possible population separation. While nearshore habitat is clearly important to the species, it is unknown whether the open waters between the Montebello Islands and the mainland act as a barrier to movement. The authors note that increased survey effort in favourable conditions would likely identify more individuals and improve understanding of abundance, range, and connectivity (Raudino et al. 2018). In addition to cetaceans, dugongs (*Dugong dugon*) are frequently recorded in the shallow, warm waters around the		

Location	Receptor	Background	Key locations	Seasonality
		Montebello Islands, Lowendal Islands, and Barrow Shoals (DEC, 2007).		
	Fish	Historic surveys of the Montebello Islands have recorded 456 fish species across 75 families, a composition representative of reef communities on the mid-continental shelf of north-western Australia (Allen 2000). Most species are associated with coral reef habitats, with the ten most species-rich families; Gobiidae, Labridae, Pomacentridae, Blenniidae, Apogonidae, Serranidae, Chaetodontidae, Carangidae, Lutjanidae, and Acanthuridae comprising 54% of the total assemblage. These families are widely distributed and typically abundant throughout the tropical Indo-Pacific. The Montebello Islands support a slightly higher species richness than the more inshore Dampier Archipelago.		
	Intertidal	Six species of mangroves occur in the Montebello Islands: white mangrove (*Avicennia marina*), ribbed-fruit orange mangrove (*Bruguiera exaristata*), yellow-leaf spurred mangrove (*Ceriops tagal*), red mangrove (*Rhizophora stylosa*), club mangrove (*Aegialitis annulata*), and river mangrove (*Aegiceras corniculatum*). The occurrence of lagoonal mangrove assemblages in an oceanic island setting is unusual and of high scientific value, with the Montebello Islands' mangrove communities regarded as globally unique (Semeniuk 1997). The largest stand, covering ~15 ha, is located in Stephenson Channel on Hermite Island, where individual trees reach heights of up to 5 m (DEC 2007).	Stephenson Channel on Hermite Island.	
	Benthic	There is a high diversity of hard coral present and they are generally in an undisturbed condition (DEC 2007).	The best developed coral reef communities are in the relatively clear water and high energy conditions of the fringing reefs to the west and south-west of the Montebello Islands, and bommies and patch reefs in the more turbid and lower energy waters along the eastern edge of the Montebello Islands (DEC 2007).	
		Macroalgal-dominated limestone reef and subtidal reef platform/sand mosaic are the most extensive habitat types in the Montebello/Barrow Islands region (DEC 2007).	These communities are most commonly found on shallow limestone pavement in depths of 5–10 m (DEC 2007).	Macroalgal habitats in the Montebello/Barrow

Location	Receptor	Background	Key locations	Seasonality
		The macroalgal assemblage is typically dominated by species of brown algae, particularly of the genera *Sargassum*, *Turbinaria* and *Pandina*. Green algae from the genera *Caulerpa*, *Cladophora* and *Rhodophyta* are also quite common.		Islands region vary seasonally in response to water temperature, day length, reproductive cycles, physical disturbance and regrowth (DEC 2007).
		Seven species have been recorded to date from the Montebello/Barrow Islands region: *Cymodocea angustata, Halophila ovalis, H. spinulosa, Halodule uninervis, Thalassia hemprichii, Thalassodendron ciliatum* and *Syringodium isoetifolium* (DEC 2007). Of these, *Halophila* spp. Are the most common on shallow soft substrates and sand veneers throughout the region (DEC 2007).	Seagrass do not appear to form extensive beds in the area, but rather are sparsely interspersed between macroalgae, extending from the intertidal zone to ~15 m water depth (DEC 2007).	
Exmouth Gulf (part of Exmouth sector)	Intertidal	Hickey et al. (2025) present the first comprehensive multidecadal mapping of arid intertidal ecosystems along ~400 km of the Pilbara coastline, spanning Exmouth Gulf to Karratha. The study aimed to model the size and distribution of habitats within the high intertidal zone of this internationally significant hypersaline ecosystem, providing an essential baseline for understanding how climate influences these environments. To achieve this, high-resolution true-colour aerial imagery from Landgate (Western Australian Land Information Authority), Google Earth Pro, and the ESRI satellite basemap spanning image availability from 2000–2023 was used to label ground-truth points in the absence of historical field data. A limited field sampling campaign, conducted concurrently with May 2023 aerial imagery, enabled direct comparison between field observations and image-based classifications. The mapping revealed a dynamic mosaic of habitats including mangroves, saltmarsh, cyanobacterial mats, and salt flats with marked spatial and temporal shifts over multiple time points. Saltmarsh extent was approximately five times greater than previously estimated, and algal mats occupied	Flats extend ~1,026 km^2 from Locker Point to Sandalwood Peninsula, and range from the 4.5–13 km wide (Brunskill et al. 2001; D.C. Blandford and Associates Pty Ltd and Oceanica Consulting Pty Ltd 2005). Extensive blue-green algal mats (*cyanobacterial mats*) occupy the high intertidal zone along the eastern (~85 km^2) and southern margins (~20 km^2) of Exmouth Gulf (Sutton and Shaw, 2021). Saltmarshes (namely samphire) occur extensively along the eastern intertidal margin of Exmouth Gulf, and also along the southern and western margins (Fitzpatrick et al. 2019). They also often line tidal creeks along with mangroves (Oceanica 2006). Mangroves are extensive from Bay of Rest and Gales Bay to all along the eastern margin of Exmouth Gulf (Humphreys et al. 2005; Lyne et al. 2006; Oceanica 2006; EPA 2008; Fitzpatrick et al. 2019). Low relief subtidal reef is extensive around Bundegi and North West Cape across to Muiron Islands (Bancroft and Sheridan 2000; Beckley and Lombard 2012; van Keulen and	

Location	Receptor	Background	Key locations	Seasonality
		about twice the area of mangroves. These results provide a critical baseline for monitoring change and assessing the impacts of climate and other pressures on remote arid intertidal ecosystems.	Langdon 2011). It is likely that subtidal reef flats are found around many of the islands, such as Eva and Fly Islands, which have shallow reef flats off the northern edges (Dee et al. 2020). Oyster beds are present on intertidal pavements around Heron Point (Fitzpatrick et al. 2019).	
	Benthic	Richards et al. (2025) synthesise verified specimen records and photographic observations of shallow-water (<30 m) sessile benthic invertebrates across Ningaloo Reef, the Muiron Islands and Exmouth Gulf. Within this framework, Exmouth Gulf is shown to support a comparatively modest but still ecologically significant assemblage of sessile invertebrates, with 135 verified species recorded across major taxa including sponges, octocorals, bryozoans, scleractinian corals, anemones, zoanthids and tunicates. The dataset for Exmouth Gulf is heavily influenced by limited historical sampling, and many taxonomic groups remain poorly represented, reflecting both lower survey effort and the predominance of soft-sediment habitats in parts of the Gulf. Richards et al. (2025) emphasise that the Exmouth Gulf inventory likely underestimates true diversity, as many specimens remain identified only to morphospecies and several groups have minimal verified records. The synthesis therefore provides a conservative, taxonomy-supported baseline for the region and highlights the need for further targeted surveys to better document sessile invertebrate communities, particularly in structurally complex or under-sampled habitats.	Macroalgae beds are a common vegetated habitat across Exmouth Gulf, occurring along the central, eastern, southern, and western margins, as well as around many of the islands to the north of Exmouth Gulf (Cassata and Collins 2004; Lyne et al. 2006; Cassata and Collins 2008; van Keulen and Langdon 2011; McLean et al. 2016; BMT 2020). Seagrass meadows have been known to occur along the eastern, southern and western margins of Exmouth Gulf, and around islands such as Muiron Islands, Burnside Island and Tent Island (Hutchins et al. 1996; RPS Bowman Bishaw Gorham 2004; Lyne et al. 2006; Oceanica 2006; Vanderklift et al. 2016). Coverage estimates for seagrasses are variable across Exmouth Gulf, noting that the extent and abundance of seagrass meadows across the whole Gulf has not been comprehensively mapped (Sutton and Shaw, 2021). Soft and hard coral communities are spread around the coastal margins of Exmouth Gulf, as well as around islands inside and outside Exmouth Gulf (Lyne et al. 2006; Babcock et al. 2008b; Twiggs and Collins 2010; 360 Environmental 2017).	
	Turtles	Marine turtles are consistently present in Exmouth Gulf, with evidence of both year-round foraging and seasonal nesting by several species (Sutton and Shaw 2021). Observations of turtles in shallow waters (<100 m) across a broad temperature range (25–33 °C) were consistent with previous reports (Jenner and Jenner 2005; Sleeman et al. 2007). Satellite tagging of 35 flatback turtles showed small inter-nesting ranges and extensive post-nesting migrations to foraging areas up to 1,326 km away, confirming Exmouth	Nesting activity has been observed at Y Island, Locker Island, and Urala Beach during aerial surveys (Fossette et al. 2021). Historical surveys in July–August 2009 reported high densities of green turtles foraging in reef areas around Flat and Locker islands (>50 individuals/km²) (RPS 2010). Additional aerial surveys between August and November 2018 recorded 1,472 turtles, with most sightings along the southern and eastern Gulf margins (Irvine and Salgado Kent 2019).	Observed within the gulf year-round

Location	Receptor	Background	Key locations	Seasonality
		Gulf as a key inter-nesting and transit habitat (Thums et al. 2018).		
	Marine mammals	Exmouth Gulf is included in the Ningaloo Reef to Montebello Islands Important Marine Mammal Area, assigned by the IUCN Marine Mammal Protected Areas Task Force (IUCN-MMPATF 2021). The qualifying species include the dugong (*Dugong dugon*), Australian humpback dolphin (*Sousa sahulensis*) and humpback whale (*Megaptera novaeangliae*). Exmouth Gulf is recognised as a critical resting and nursery habitat for Breeding Stock D humpback whales during their southbound migration along the Western Australian coast. Long-term aerial survey data collected between 2000 and 2010 identified the highest encounter rates of mother–calf pairs in Exmouth Gulf, particularly during October, with mean group encounter rates of 0.0447 ± 0.0082 groups/km significantly higher than those recorded in adjacent areas such as North West Cape and the Pilbara coast (Sprogis et al. 2024). Spatial modelling also revealed a consistent density hotspot across the central to western edge of the Gulf, further confirming its role as a key resting area for migrating whales (Sprogis et al. 2024). Additional aerial surveys conducted in 2018 recorded 2,772 whales in 1,661 groups, including 688 calves and 23 neonates, reinforcing the Gulf's function as a calving and resting zone (Irvine and Salgado Kent 2019). Identified as a southern right whale (*Eubalaena australis)* reproduction BIA (DCCEEW 2024). Strong evidence of dugong population connectivity between Shark Bay and Exmouth Gulf (Gales et al. 2004). Bayliss et al. (2019) assessed dugong (*Dugong dugon*) aerial surveys in the Ningaloo–Exmouth Gulf region conducted in 1989, 1994, 1999, 2007, and 2018 as part of broader monitoring also covering Shark Bay. Across these decades, population estimates remained relatively stable (~1,000 dugongs in Ningaloo/Exmouth).	Dugongs mainly observed in shallow waters (<100m) in Exmouth Gulf and around the North West Cape (Jenner and Jenner 2005, Sleeman et al. 2007; RPS 2010)	Humpback whale: June through to the end of October Dugongs were reported to be more frequent in Exmouth Gulf in August (RPS 2010).

Location	Receptor	Background	Key locations	Seasonality
	Birds	Identified as an internationally important shorebird area (Weller et al. 2020).	Exmouth Gulf Mangroves is an Important Bird Area (IBA) and a Key Biodiversity Area (Dutson et al. 2009; Key Biodiversity Areas Partnership 2020). It extends 70 km from Giralia Bay to Turbridgi Point. The three bird species triggering the KBA criteria include the dusky gerygone (*Gerygone tenebrosa*), pied oystercatcher (*Haematopus longirostris*) and grey-tailed tattler (*Tringa brevipes*) (Key Biodiversity Areas Partnership 2020). The entire Exmouth Gulf coastline, islands (in particular Sunday Island and Muiron Islands), and the coastline from North West Cape to Point Billie are identified as an internationally important shorebird area (Weller et al. 2020). Exmouth Gulf and islands meet the 'species criteria' for International Significance (supporting >1% of the flyway population) for grey-tailed tattler, eastern curlew (*Numenius madagascariensis*) and ruddy turnstone (*Arenaria interpres*) (Onton et al. 2013; Weller et al. 2020).	Juvenile shorebirds can be found year-round. Adults usually between August and April.
Muiron Islands	Birds	Nesting area for seabirds Wedge-tailed shearwater (*Ardenna pacifica*) nesting colony, birds forage at sea in large aggregations. Crested tern (*Thalasseus bergii*) nesting colony (Department of Parks and Wildlife, 2014) Identified as an internationally important shorebird area (Weller et al. 2020). In 2015, the Muiron Islands were reported to support a nesting colony of more than half a million wedge-tailed shearwaters (*Ardenna pacifica*) (DPaW 2015). In 2019, Cannell et al. (2019) estimated that there were more than 200,000 wedge-tailed shearwaters. Cannell et al. (2019) investigated the foraging behaviour of wedge-tailed shearwaters around the Muiron Islands using satellite tracking. Thirty individuals were tagged, and their movements revealed foraging trips ranging from 9 km to 1,854 km from the colony.		Wedge-tailed shearwater are believed to stay in the area year-round, but undertake significant flights away from the islands around May. Returning around June, they nest in burrows on both islands spending several months preparing and re-excavating the burrows. At about 1 m long and not very deep, the burrows are subject to collapse by foot traffic. A single egg

Location	Receptor	Background	Key locations	Seasonality
				is laid around October and the chicks hatch in January (DPaW 2015).
	Turtle	Major loggerhead turtle (*Caretta caretta*) nesting site, significant green turtle (*Chelonia mydas*) nesting site, low density hawksbill turtle (*Eretmochelys imbricata*) nesting site, occasional flatback turtle (*Natator depressus*) presence 1987–2001, the Western Australian Marine Turtle Program operated on South Muiron Island, documenting that loggerhead (*Caretta caretta*), green (*Chelonia mydas*), and hawksbill (*Eretmochelys imbricata*) turtles nest on the island's beaches (Prince, 1993). Rob et al. (2019) conducted targeted on-beach surveys on North and South Muiron Islands from 6–12 January 2018, supported by aerial photographic surveys conducted between 6 and 8 January, which covered all island beaches and nearby Sunday Island. Four turtle species were observed nesting on the Muiron Islands: green turtles, which were the most abundant, followed by loggerhead, hawksbill, and a single flatback (*Natator depressus*) nest recorded on South Muiron Island. The surveys confirmed the importance of the Muiron Islands as a key nesting site for both green and loggerhead turtles.		Loggerhead turtle peak nesting: November to January (Waayers 2010). Green turtle peak nesting December to January (Waayers 2010).
Ningaloo (part of Exmouth sector)	Intertidal	Mangroves are not extensive	On the east side of the Cape Range peninsula, a fringing mangal of *Avicennia marina* occurs to the south of Cape Murat, between Bundegi Reef and Exmouth. On the west side of the Peninsula, mangals occur at Mangrove Bay (*A. marina*, *Rhizophora stylosa* and *Bruguiera exaristata*), Low Point (*Avicennia marina*) and Yardie Creek (*A. marina* and *R. stylosa*)	
	Benthic	Richards et al. (2025) present a regional synthesis of shallow-water (<30 m) sessile benthic invertebrate biodiversity across Ningaloo Reef, the Muiron Islands and Exmouth Gulf, drawing on verified specimen records and		

Location	Receptor	Background	Key locations	Seasonality
		photographic observations from museum collections and past surveys. For Ningaloo Reef, the study documents the highest diversity within the region, with 587 verified species spanning scleractinian corals, sponges, octocorals, bryozoans, tunicates, anemones, zoanthids and hydrozoans. Species richness is strongly concentrated in the northern part of the reef, reflecting both ecological patterns and uneven sampling effort, while the southern sector remains comparatively under-surveyed. The authors highlight that many specimens, particularly sponges and octocorals, remain identified only to morphospecies, indicating that the true diversity of Ningaloo Reef is likely underestimated. This synthesis provides the most current, taxonomy-supported baseline for shallow sessile invertebrates at Ningaloo Reef and identifies several taxonomic and spatial gaps that should be addressed through future targeted surveys.		
	Manta rays			Ningaloo Reef is considered an important area for Manta Rays in autumn and winter (Preen et al. 1997).
	Whale sharks	Whale Sharks aggregate in the waters of the Ningaloo Marine Park, frequently close to the Ningaloo Reef front. The aggregations coincides with the period when the Leeuwin Current is strongest. (Sleeman et al. 2010). The whale sharks that visit Ningaloo are mostly immature males (Sequerira et al. 2016).		Peak visibility April to July (noting that whale sharks may be present throughout the year)
	Turtle	Four species of turtle nest in Ningaloo: green turtle (*Chelonia mydas*), flatback turtle (*Natator depressus*), hawksbill turtle (*Eretmochelys imbricata*), loggerhead turtle (*Caretta caretta*)	The most concentrated area of green turtle nesting is along the northern beaches and Muiron Islands, while loggerhead nesting is concentrated along beaches further south (Bungelup, Jane's Bay, Gnaraloo) and on South Muiron Island (Whiting 2016)	Main nesting: Hawksbill July-Mar Green Sept-Mar Flatback Sept-Mar Loggerhead Sept-Mar

Location	Receptor	Background	Key locations	Seasonality
	Marine mammals	Two species of dolphins are resident at Ningaloo, the Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) and the Australian humpback dolphin (*Sousa sahulensis*) (Allen et al. 2012, Jefferson & Rosenbaum 2014). Humpback whales (*Megaptera novaeangliae*) and pygmy blue whales (*Balaenoptera musculus brevicauda*) migrate past Ningaloo each year on their way to breeding grounds further north, and back again (Jenner et al. 2001; Double et al. 2014). (Note: an increasing number of humpback calves are being born at or near Ningaloo each year (Irvine et al. 2018). The waters off Ningaloo are a possible foraging Biologically Important Area (BIA) for pygmy blue whales (Thums et al. 2022). Killer whales (*Orcinus orca*) prey on humpback whale calves and are regularly present during the southern migration of humpback whales each year (Pitman et al. 2014). Bayliss et al. (2019) assessed dugong (*Dugong dugon*) aerial surveys in the Ningaloo–Exmouth Gulf region conducted in 1989, 1994, 1999, 2007, and 2018 as part of broader monitoring also covering Shark Bay. Across these decades, population estimates remained relatively stable (~1,000 dugongs in Ningaloo/Exmouth).	Indo-Pacific bottlenose dolphins have been found to be primarily associated with the 20 m contour and the Muiron Islands (Hanf, 2015). A relatively dense population of have been observed around the North West Cape, suggesting that this region is of high importance to this species (Haughey et al. 2020) Humpback dolphins tend to be associated with intertidal and shallow coastal waters, as well as offshore islands (Hanf, 2015). Dugong mostly inhabit the shallow 90–5 m) waters fringing the coast and offshore islands, occurring in close conjunction with the seagrass and algae beds on which they feed.	Humpback whales: June through to the end of October Pygmy blue whales: April to June
	Birds	Identified as an internationally important shorebird area (Weller et al. 2020). Approximately 30 bird species listed under (JAMBA), China–Australia Migratory Bird Agreement (CAMBA) and/or Republic of Korea- Australia Migratory Bird Agreement (ROKAMBA) have been recorded in the Cape Range National Park (DEC 2010). Habitats including the shallow sandy intertidal beaches and rocky shorelines of the Ningaloo coast are important for seabirds and waders to breed, rest and feed (Shire of Exmouth et al. 1999).	Significant seabird rookeries include Cape Farquhar, Pelican Point, Point Maud and Winderabandi Point (Shore of Exmouth et al. 1999).	Juvenile shorebirds can be found year-round. Adults shorebirds usually between August and April.

Location	Receptor	Background	Key locations	Seasonality
Middle and Northern Pilbara and associated islands	Intertidal	Characterised by wide intertidal mud and sand flats, limestone ridge barrier coasts, active coastal dunes and extensive arid-climate mangrove systems associated with major river deltas and embayments, including the Ashburton, Robe, Fortescue, and Cape Preston delta areas (Stul et al. 2014). Hickey et al. (2025) present the first comprehensive multidecadal mapping of arid intertidal ecosystems along ~400 km of the Pilbara coastline, spanning Exmouth Gulf to Karratha. The study aimed to model the size and distribution of habitats within the high intertidal zone of this internationally significant hypersaline ecosystem, providing an essential baseline for understanding how climate influences these environmentsThe mapping revealed a dynamic mosaic of habitats including mangroves, saltmarsh, cyanobacterial mats, and salt flats with marked spatial and temporal shifts over multiple time points. Saltmarsh extent was approximately five times greater than previously estimated, and algal mats occupied about twice the area of mangroves.		
	Fish	The Fish and Sharks project used ~1,900 stereo-BRUVs and ~1,200 stereo-DOV transects to record about 550 species from Coral Bay and Ningaloo north to the Dampier Archipelago. Surveys focused on three themes: assemblage dynamics, habitat dependencies, and management effectiveness (CSIRO, 2017). Results showed that southern offshore islands including North and South Muiron, Serrurier, Bessieres, Thevenard, and Airlie supported the richest and most abundant assemblages of both targeted and protected species. These were linked to structurally complex reefs and oceanic influences. Shallow macroalgal habitats were identified as important juvenile habitat for blue-spotted emperor (*Lethrinus punctulatus*). Comparisons between no-take sanctuary zones (e.g. Muiron Islands, Montebello Islands) and fished areas showed higher abundances and shifts in community composition within protected zones, providing empirical		

Location	Receptor	Background	Key locations	Seasonality
		evidence to guide marine park monitoring and management (CSIRO, 2017; CSIRO, 2021).		
	Turtle	Many of the islands provide nesting and foraging habitat for green turtles (*Chelonia mydas*), flatback turtles (*Natator depressus*) and hawksbill turtles (*Eretmochelys imbricata*) (DBCA 2020). The Mardie Salt Project's Marine Turtle Monitoring Program was established to collect baseline data and provide ongoing monitoring of turtle nesting activity in areas potentially affected by the project in the Pilbara region of Western Australia (BCI, 2023). The program surveys both mainland and island habitats, including Mardie Beach (the primary site), adjacent beaches to the east and west, and nearby islands Mardie Creek, Sholl Island, Long Island, Middle Passage Island, Angel Island, Stewart Island, Fortescue Island, Mardie Island, South Passage Island, and Solitary Island. Initiated in 2017, with additional baseline surveys in 2018 and 2019, the program has been conducted annually since the 2021/22 nesting season during construction. Surveys target the peak nesting period of the flatback turtle (*Natator depressus*) from October to January, extending into February to record late nesting and hatchling emergence. Flatback turtles are the predominant nesting species across most sites, with green turtles (*Chelonia mydas*) occasionally recorded and hawksbill turtles (Eretmochelys imbricata) rarely observed.	Higher nesting activity has been documented at Mardie Beach, Mardie Island, Sholl Island, and South Passage Island, while Solitary Island was the only surveyed location where no turtle activity was recorded. These results confirm that nesting occurs across a range of mainland and island habitats in the region, though not all sites are used (BCI 2023).	Flatback peak nesting: October to January
	Marine mammal	Dolphins such as Australian humpback dolphins (*Sousa chinensis*) and Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) and dugong (*Dugong dugon*) use the shallow intertidal waters around islands (DBCA 2020).		
	Bird	Several islands offer important resting and feeding habitat for threatened migratory shorebirds present in internationally significant numbers, including the grey-tailed tattler (*Tringa brevipes*), bar-tailed godwit (*Limosa lapponica*), ruddy turnstone (*Arenaria interpres*), sanderling (*Calidris alba*), greater sand plover (*Charadrius*		

Location	Receptor	Background	Key locations	Seasonality
		leschenaultii) and roseate tern (*Sternula dougallii*) (DBCA 2020).		
Southern Pilbara and associated islands (Ashburton sector and Pilbara Coast Islands Group)	Sediment	The Department of Environment and Conservation (DEC) investigated background contaminants in sediments of the Pilbara in 2005 (DEC 2006). Sediment samples were collected from coastal waters at Port Hedland, Dampier Archipelago, Onslow, Ashburton River Mouth and Exmouth Gulf. Samples were analysed for TBT, PAHs, TPH, BTEXN, organochlorine pesticides, PCBs, total metals and metalloids. Background sediment quality was found to be high. Total arsenic were found in high concentrations in one site off Onslow (considered natural and likely to be related to geology of the region).		
	Benthic	Long-term coral reef monitoring by DBCA formed the basis of a study on reef condition and recovery across the western Pilbara coast, from 2009–2018. Funded by the Chevron-operated Wheatstone Project and administered by DBCA, the research examined island fringing reefs and submerged shoals along a natural cross-shelf turbidity gradient (Evans et al. 2020). Baseline surveys in 2009 recorded mean hard coral cover at 45%, but three severe heatwave bleaching events in 2010/11, 2013, and 2014 caused a sharp decline to 5% by 2014, with losses dominated by *Acroporidae*, *Agaricidae*, *Pectinidae*, and *Pocilloporidae*. From 2014–2018, mean coral cover doubled from 5% to 10%, although recovery varied substantially between sites (0–13%) and remained well below pre-disturbance levels (Evans et al. 2020). Offshore, low-turbidity sites showed the strongest recovery, driven primarily by *Acroporidae*, while inshore, high-turbidity sites recovered more slowly and were dominated by slower-growing genera such as *Porites*, *Mussidae*, and *Faviidae*. Sites near dredging operations, where turbidity levels and plume exposure were high, exhibited little to no recovery over the monitoring period. Coral recruitment to settlement tiles was generally low, with slightly higher rates at more turbid inshore sites, but did not strongly predict recovery trajectories (Evans et al. 2020). In		

Location	Receptor	Background	Key locations	Seasonality
		contrast, juvenile coral densities particularly of *Acroporidae* increased markedly between 2014–2015 and 2016–2018, and were a better indicator of subsequent recovery. Recovery was positively associated with higher abundances of herbivorous fish, shallower depths, and lower macroalgal cover, and negatively influenced by turbidity, macroalgae, and greater depths. Overall, the study demonstrated that repeated bleaching events, combined with high turbidity and local stressors such as dredging, substantially constrained coral recovery in the west Pilbara (Evans et al. 2020).		
	Intertidal	Hickey et al. (2025) present the first comprehensive multidecadal mapping of arid intertidal ecosystems along ~400 km of the Pilbara coastline, spanning Exmouth Gulf to Karratha. The study aimed to model the size and distribution of habitats within the high intertidal zone of this internationally significant hypersaline ecosystem, providing an essential baseline for understanding how climate influences these environmentshe mapping revealed a dynamic mosaic of habitats including mangroves, saltmarsh, cyanobacterial mats, and salt flats with marked spatial and temporal shifts over multiple time points. Saltmarsh extent was approximately five times greater than previously estimated, and algal mats occupied about twice the area of mangroves. These results provide a critical baseline for monitoring change and assessing the impacts of climate and other pressures on remote arid intertidal ecosystems. Mangroves in the area form small but sometimes complex communities in embayments and on the sheltered shores of many offshore islands.	Juvenile green turtles are known to forage on mangroves and have been recorded in both Urala Creek North and Urala Creek South (AECOM 2022).	
	Fish	The Fish and Sharks project used ~1,900 stereo-BRUVs and ~1,200 stereo-DOV transects to record about 550 species from Coral Bay and Ningaloo north to the Dampier Archipelago. Surveys focused on three themes: assemblage dynamics, habitat dependencies, and management effectiveness (CSIRO, 2017).		

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		Results showed that southern offshore islands including North and South Muiron, Serrurier, Bessieres, Thevenard, and Airlie supported the richest and most abundant assemblages of both targeted and protected species. These were linked to structurally complex reefs and oceanic influences. Shallow macroalgal habitats were identified as important juvenile habitat for blue-spotted emperor (*Lethrinus punctulatus*). Comparisons between no-take sanctuary zones (e.g. Muiron Islands, Montebello Islands) and fished areas showed higher abundances and shifts in community composition within protected zones, providing empirical evidence to guide marine park monitoring and management (CSIRO, 2017; CSIRO, 2021).		
	Turtle	Recovery Plan for Marine Turtles in Australia 2017–2027 (Commonwealth of Australia 2017) has listed critical nesting habitat in this area for green turtle (*Chelonia mydas*), flatback turtle (*Natator depressus*), hawksbill turtle (*Eretmochelys imbricata*) and loggerhead turtle (*Caretta caretta*). Flatback BIA for nesting and internesting (DCCEEW 2023). Internesting BIA for green and loggerhead turtle (DCCEEW 2023).	Thevenard Island is an important nesting area (Commonwealth of Australia 2017).	Nesting and hatching takes place between October and April. Flatback turtle nesting in the Ashburton area occurs between October and February, with peak nesting activity in December (Imbricata 2013).
	Marine mammals	Key species (O2 Marine, 2021) : humpback whale (*Megaptera novaeangliae*), dugong (*Dugong dugon*), Australian humpback dolphin (*Sousa sahulensis*), Indo-Pacific bottlenose dolphin (*Tursiops aduncus*). Dugongs are resident in coastal waters of the Pilbara coast and are sighted year-round, having a strong association with seagrass habitat. BIAs (DCCEEW 2023): Humpback whale- migration and resting.		

Location	Receptor	Background	Key locations	Seasonality
	Birds	Key species (O2 Marine, 2021): Australian fairy tern (*Sternula nereis*), bar-tailed godwit- critically endangered (*Limosa lapponica menzbieri*), curlew sandpiper – critically endangered (*Calidris ferruginea*), eastern curlew – critically endangered (*Numenius madagascariensis*) Breeding and foraging BIA of Wedge-tailed shearwater (DCCEEW 2023).		Juvenile shorebirds can be found year-round. Adults shorebirds usually between August and April.

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Appendix E Baseline Data Sources

Table E-1: Baseline data sources

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
Water quality	Chevron (2019) Wheatstone Effluent Quality Validation Report, Rev 0- 20200909 (ABU200900381)	Chevron	Onslow
	Chevron: Marine Environment Quality Monitoring Program (MEQMP)	Chevron	Barrow Island
	Chevron (2022) Wheatstone Platform Environmental Monitoring Program – draft report. 60672341 Wheatstone 5 Yearly Monitoring Technical Report- Rev A	Chevron	Wheatstone Platform
	Chevron (2018) Wheatstone Platform Waste Water Discharges Model Verification Report (ABU190601699)	Chevron	Wheatstone Platform
	Chevron (2022) Gorgon Backfill Fields Benthic Survey 2022 (ABU230100068)	Chevron	Gorgon Backfill Fields
	Pilbara Ports Authority (2019) Marine Environmental Quality Program	Pilbara Ports Authority	Dampier Dampier Archipelago Port Hedland
	O2 Marine (2020) Mardie Project- Marine Water Quality. Prepared for Mardie Minerals Pty Ltd. Report Number R190056	O2 Marine	Mardie
	Chevron (2024) Wheatstone Permanent Marine Outfall Marine Water Quality Monitoring (ABU 241200313)	Chevron	Ashburton Port
Sediment quality	Chevron (2019) Wheatstone LNG Project Mangrove Monitoring Program 2019 (ABU200800053)	Chevron	Onslow
	Chevron: MEQMP	Chevron	Barrow Island
	Chevron (2022) Wheatstone Platform Environmental Monitoring Program – DRAFT REPORT 60672341, Wheatstone Platform 5 Yearly Monitoring Technical Report-Rev A	Chevron	Wheatstone Platform
	Chevron (2022) Gorgon Backfill Fields Benthic Survey 2022 (ABU230100068)	Chevron	Gorgon Backfill Fields
	Chevron (2025) Enpoint Environmental Asset Management W24028_02 Enpoint. WA Oil Decommissioning Sediment Assessment	Chevron	Barrow Island
	BMT (2022) Nearshore Benthic Survey – Middle and Boodie Islands	Chevron	Middle Island

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Boodie Island
	Pilbara Ports Authority (2019) Marine Environmental Quality Program	Pilbara Ports Authority	Dampier Dampier Archipelago Port Hedland
	O2 Marine (2019). Mardie project- Sediment Sampling and Analysis Plan Results. Prepared for Mardie Minerals Pty Ltd. Report Number R190033	O2 Marine	Mardie
	Jones R, Wakeford M, Currey-Randall L, Miller K, Tonin H (2021) Drill cuttings and drilling fluids (muds) transport, fate and effects near a coral reef mesophotic zone. Marine Pollution Bulletin 172, 112717	AIMS	Glomar Shoal Rankin Bank
	O2 Marine (2021) Ashburton Infrastructure Project Sediment Sampling and Analysis Plan, Fremantle, WA. Prepared for Mineral Resource Limited	O2 Marine	Ashburton Onslow
	Advision (2023) Thevenard Island Decommissioning Sediments Baseline Quality Assessment 2023	Chevron	Thevenard Island
Intertidal and coastal habitats	Chevron: Wheatstone LNG Project Mangrove Monitoring Program	Chevron	Onslow
	DBCA (long term-monitoring) Ningaloo Reef Program	DBCA	Ningaloo
	360 Environmental (2017) Learmonth Habitat Surveys. Prepared for Subsea 7	Subsea 7	Exmouth Gulf
	AECOM (2022) Assessment of Benthic Communities and Habitats Ashburton Salt Project. Prepared for K + S Australian Pty Ltd. Doc No. 60692048_4.	K + S Australian Pty Ltd	Ashburton Onslow
	Reef R and Lovelock C (2019). Characteristics of landward expansion of mangrove forests with sea level rise. Geophysical Research Abstracts 21(1), 1.	Monash University	Exmouth Gulf
	Sutton AL and Shaw JL (2021) Cumulative Pressures on the Distinctive Values of Exmouth Gulf. First draft report to the Department of Water and Environmental Regulation by the Western Australian Marine Science Institution, Perth, Western Australia. 272 pages.	WAMSI	Exmouth Gulf
	DBCA (2023) DBCA Annual Report 2022–23, Department of Biodiversity, Conservation and Attractions, Perth. Primary productivity and energy transfer between marine ecosystems (SP 2020-002)	DBCA	Dampier Archipelago
	Astron Environmental Services (2021) Varanus and Bridled Islands Mangrove Monitoring – Annual Report 2020, unpublished report to Santos WA Energy Limited	Santos	Varanus Island Bridled Island

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Ground-truthing satellite imagery that is utilised to monitor mangrove extent/density at Montebello Islands	DBCA	Montebello Islands
	WAMSI- Mardie Off Set Plan	WAMSI	Pilbara Coast Gnoorea Yammadery Onslow Giralia Bay
	DBCA (long term monitoring) Ningaloo Reef Program	DBCA	Ningaloo Coast World Heritage Area
	Hadiyanto H, Prince J, Hovey RK (2025) Modelling present and future distribution of intertidal macroalgae to evaluate the efficacy of Western Australia's marine protected areas. Biodiversity and Conservation 34:1335–1363. https://doi.org/10.1007/s10531-025-03020-1	UWA	Western Australia Broome Port Hedland Ningaloo Coast World Heritage Area Gnaraloo Kalbarri Port Denison Geraldton Perth Margaret River
	Hickey, S. M., Stone, A., Radford, B., & Lovelock, C. E. (2025). Multidecadal mapping of arid intertidal ecosystems reveals a dynamic mosaic of habitats north-western Australia. Estuarine, Coastal and Shelf Science, 323, Article 109401. https://doi.org/10.1016/j.ecss.2025.109401	UWA	Pilbara Coast Exmouth Gulf Onslow Pilbara- Southern Pilbara Islands and Coast Pilbara- Northern Pilbara Islands and Coast Karratha Dampier Archipelago

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	BMT (2024) Spill Baseline -eDNA Infauna Pilot Program	Chevron	Barrow Island Onslow
	EOMAP (2019) Atmospheric correction and land cover classification, NW Cape. Prepared for Woodside	Woodside	Barrow Island Montebello Islands Group Pilbara Coast Exmouth Gulf Ningaloo Coast World Heritage Area Shark Bay Houtman Abrolhos Islands Dampier Archipelago
Benthic habitat	Chevron (2019) Jansz-Io Subsea Compression Benthic Video Footage Review (G7-NT-REPX0000239)	Chevron	Jansz-Io Field
	Chevron (2022) WHS Platform Environmental Monitoring Program – DRAFT REPORT 60672341, Wheatstone Platform 5 Yearly Monitoring Technical Report-Rev A	Chevron	Wheatstone Platform
	Chevron (2022) Gorgon Backfill Fields Benthic Survey (ABU230100068)	Chevron	Gorgon Backfill Fields
	Chevron (2023) Thevenard Island Retirement Project Heavy Lift Vessel Anchor Spread Benthic Habitat Mapping- Survey Report	Chevron	Thevenard Island
	DBCA (long term-monitoring) Ningaloo Reef Program	DBCA	Ningaloo
	Wahab MA, Radford B, Cappo M, Colquhoun J, Stowar M, Depczynski M, Miller K, Heyward A (2018) Biodiversity and spatial patterns of benthic habitat and associated demersal fish communities at two tropical submerged reef ecosystems. Coral Reefs, 37, 327–343, 10.1007/s00338-017-1655-9	AIMS	Glomar Shoal Rankin Bank
	O2 Marine (2019). Mardie project- Sediment Sampling and Analysis Plan Results. Prepared for Mardie Minerals Pty Ltd. Report Number R190033	O2 Marine	Mardie
	O2 Marine (2019). Mardie Project – Subtidal Benthic Communities and Habitat Baseline Assessment. Prepared for Mardie Minerals Pty Ltd. Report Number R190045.	O2 Marine	Mardie
	Jones R, Wakeford M, Currey-Randall L, Miller K, Tonin H (2021) Drill cuttings and drilling fluids (muds) transport, fate and effects near a coral reef mesophotic zone. Marine Pollution Bulletin 172, 112717	AIMS	Glomar Shoal Rankin Bank

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	O2 Marine (2021) Benthic Communities and Habitat Ashburton Infrastructure Project, Fremantle, WA. Prepared for Mineral Resources Limited	O2 Marine	Ashburton Onslow
	O2 Marine (2021). Onslow Seawater Desalination Plant. Benthic Communities and Habitat. Report No. R200065. Prepared for the Water Corporation.	O2 Marine	Onslow
	360 Environmental (2017) Learmonth Habitat Surveys. Prepared for Subsea 7	Subsea 7	Exmouth Gulf
	AECOM (2022) Assessment of Benthic Communities and Habitats Ashburton Salt Project. Prepared for K + S Australian Pty Ltd. Doc No. 60692048_4.	K + S Australian Pty Ltd	Ashburton Onslow
	BMT (2020) Technical Note. Learmonth Benthic Habitat Survey. Prepared for MBS Environmental	BMT	Exmouth Gulf
	Advisian (2019) Montebello Marine Park Benthic Habitat Survey ROV Analysis of the Scarborough Pipeline Route. Prepared for Woodside	Woodside	Montebello Australian Marine Park
	Moustaka M, Mohring M, Holmes T, Evans R, Thomson D, Nutt C, Stoddart J, Wilson S (2019) Cross-shelf Heterogeneity of Coral Assemblages in Northwest Australia, Diversity, vol. 11, 15pp.	DBCA Marine Science	Dampier Archipelago Regnard Island Eaglehawk Island Dockrell Reef Enderby Island Goodwyn Island Malus Island Conzinc Island Gidley Island Hammersley Shoal Legendre Island Delambre Island
	Thompson DP, Babcock RC, Evans RD, Feng M, Moustaka M, Orr M, Slawinski D, Wilson S, Hoey A (2021) Coral larval recruitment in north-western Australia predicted by regional and local conditions. Marine Environmental Research 168: 105318	CSIRO	Dampier Archipelago Regnard Island Eaglehawk Island Dockrell Reef Enderby Island Goodwyn Island

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Malus Island Conzinc Island Gidley Island Hammersley Shoal Legendre Island Delambre Island
	Adam A., Thomas L, Underwood J, Gilmour J, Richards Z (2022) Population connectivity and genetic offset in the spawning coral Acropora digitifera in Western Australia. Molecular Ecology.	Curtin University	Ashmore Reef Lalang-garram Marine Park Reefs Beagle Reef Adele Island Clerke Reef Mermaid Reef Imperieuse Reef Ningaloo Station Gnaraloo Quobba
	McLean D and Birt M. (2021) Enhanced ROV survey of tropical fish and benthic communities associated with shallow oil and gas platforms. Research Square	AIMS	Varanus Island
	Sutton AL and Shaw JL (2021) Cumulative Pressures on the Distinctive Values of Exmouth Gulf. First draft report to the Department of Water and Environmental Regulation by the Western Australian Marine Science Institution, Perth, Western Australia. 272 pages.	WAMSI	Exmouth Gulf
	National Reef Monitoring Network	The IMOS National Reef Monitoring Network sub-Facility	Houtman Abrolhos Islands Ningaloo Coast World Heritage Area Exmouth Gulf Dampier Archipelago Island Group Barrow Island Montebello Islands Group

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Ashmore Reef Cartier Island Darwin Harbour Arafura Arnhem Marmion Rottnest Island Geographe Bay
	Ningaloo Outlook	CSIRO	Ningaloo Coast World Heritage Area
	Gilmour JP, Cook KL, Ryan NM, Puotinen ML, Green, RH, Shedrawi G, Hobbs J-P A, Thompson, DP, Badcock, R, Buckee J, Foster T, Richards ZT, Wilson SK, Barnes PB, Coutts TB, Radford BT, Piggott CH, Depczynski M, Evans SN, Schoepf V, Evans RD, Halford AR, Nutt CD, Bancroft KP, Heyward AJ, Oades D (2019) The state of Western Australia's coral reefs. Coral Reefs https://doi.org/10.1007/s00338-019-01795-8	AIMS	Western Australia Cocos Keeling Islands Ashmore Reef Scott Reef Rowley Shoals Montebello Islands Group Barrow Island Ningaloo Reef Shark Bay
	Port of Broome- Ongoing Marine Monitoring Program. By O2 Marine for Kimberley Ports Authority	Kimberley Ports Authority	Broome Kimberley
	Evans RD, Wilson SK, Fisher R, Ryan NM, Babcock R, Blakeway D, Bond T, Dorji P, Dufois F, Fearns P, Lowe RJ, Stoddart J, Thomson DP (2020) Early recovery dynamics of turbid coral reefs after recurring bleeching events. Journal of Environmental Management 268 110666	DBCA	West Pilbara
	Doropoulos C, Gomez-Lemos LA, Salee K, McLaughlin MJ, Tebben J, Van Koningsveld M, Feng M, Babock R (2021). Limitations to coral recovery along an environmental stress gradient. Ecological Applications. 2022;32:e2558.	CSIRO	Exmouth Gulf Ningaloo Coast World Heritage Area Coral Bay

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Keesing JK, Mortimer N, Hellmrich L, Godoy D, Babcock RC, Heyward A, Paton D, Harvey ES (2023) The short spined crown-of-thorns starfish Acanthaster brevispinus is a corallivore too. Coral Reefs 42:pp. https://doi.org/10.1007/s00338-023-02354-6	CSIRO	Ningaloo Reef Great Barrier Reef
	Mula C, Brooker RM, Fulton CJ, Parsons MJG, Wilson SK, Azofeifa-Solano JC (2025) Unique soundscapes reflect the diversity of habitats in a tropical seascape. SSRN 5243868. https://doi.org/10.2139/ssrn.5243868	UWA	Ningaloo Coast World Heritage Area Coral Bay
	MBS Environmental (2018) Exmouth Gulf Benthic Communities and Habitat Survey Report. Prepared for Subsea 7	Subsea 7	Exmouth Gulf
	BMT (2024) Spill Baseline -eDNA Infauna Pilot Program	Chevron	Barrow Island Onslow
	EOMAP (2019) Atmospheric correction and land cover classification, NW Cape. Prepared for Woodside	Woodside	Barrow Island Montebello Islands Group Pilbara Coast Exmouth Gulf Ningaloo Coast World Heritage Area Shark Bay Houtman Abrolhos Islands Dampier Archipelago
	BMT (2022) Nearshore Benthic Survey – Middle and Boodie Islands	Chevron	Middle Island Boodie Island
	Astron (2025) WA Oil Decommissioning Baseline Benthic Habiat Mapping Final Report	Chevron	Barrow Island
	Enpoint (2025) WA Oil Decommissioning Sediment Assessment	Chevron	Barrow Island
	DBCA Monitoring	DBCA	Montebello Islands Group Barrow Island North Bunsen Channel (Montebello Islands) Trimouille Island

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			North West Island (Montebello Islands) Stephenson Channel (Montebello Islands) Ah Chong Island (Montebello group) Wonnich Reef Dugong Reef
	DBCA (2018) Gorgon Dredge Offset Monitoring Evaluation and Reporting Project, Department of Biodiversity, Conservation and Attractions, Perth.	DBCA	Barrow Island Lowendal Islands Montebello Islands
	Advision (2023) Thevenard Island Decommissioning Sediments Baseline Quality Assessment 2023	Chevron	Thevenard Island
Marine fish and elasmobranchs	Chevron (2019) Jansz-Io Subsea Compression Benthic Video Footage Review (G7-NT-REPX0000239)	Chevron	Jansz-Io field
	Chevron (2021) Wheatstone Sawfish Progress Report	Chevron	Onslow
	Chevron (2022) Gorgon Backfill Fields Benthic Survey 2022 (ABU230100068)	Chevron	Gorgon Backfill Fields
	DBCA (long term-monitoring) Ningaloo Reef Program	DBCA	Ningaloo
	Wahab MAA, Radford B, Cappo M, Colquhoun J, Stowar M, Depczynski M, Miller K, Heyward A (2018) Biodiversity and spatial patterns of benthic habitat and associated demersal fish communities at two tropical submerged reef ecosystems Coral Reefs, 37, 327–343, 10.1007/s00338-017-1655-9	AIMS	Glomar Shoal Rankin Bank
	Jones R, Wakeford M, Currey-Randall L, Miller K, Tonin H (2021) Drill cuttings and drilling fluids (muds) transport, fate and effects near a coral reef mesophotic zone. Marine Pollution Bulletin 172, 112717	AIMS	Glomar Shoal Rankin Bank
	Morgan D, Lear K, Norman B (2020) Sawfish surveys Urala Creek, Exmouth Gulf, February 2019. Report to AECOM. Centre for Sustainable Aquatic Ecosystems, Harry Butler Institute, Murdoch University, Perth, Western Australia	Murdoch University	Ashburton Exmouth Gulf
	Schramm KD, Marnane MJ, Elsdon TS, Jones CM, Saunders BJ, Newman SJ, Harvey ES (2021) Fish associations with shallow water subsea pipelines compared to surrounding reef and soft sediment habitats. Sci Rep 11, 6238. https://doi.org/10.1038/s41598-021-85396-y	Curtin University	Thevenard Island

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Galaiduk R, Radford B, Case M, Bond T, Taylor M, Cooper T, Smith L and McLean D (2022) Regional patterns in demersal fish assemblages among subsea pipelines and natural habitats across north-west Australia. Front. Mar. Sci. 9:979987. doi: 10.3389/fmars.2022.979987	AIMS	Rankin Bank Glomar Shoal Thevenard Island
	Currey-Randall LM, Galaiduk R, Stowar M, Vaughan BI, Miller KJ (2021) Mesophotic fish communities of the ancient coastline in Western Australia. PLoS ONE 16(4): e0250427. https://doi.org/10.1371/journal.pone.0250427	AIMS	Locations associated with the ancient coastline Key Ecological Feature (KEF) at depths greater than 125 m
	McLean D and Birt M. (2021) Enhanced ROV survey of tropical fish and benthic communities associated with shallow oil and gas platforms. Research Square	AIMS	Varanus Island
	McLean DL, Vaughan BI, Malseed BE, Taylor MD (2020) Fish-habitat associations on a subsea pipeline within an Australian Marine Park, Marine Environmental Research 123, 104813	AIMS	Montebello Australian Marine Park
	Sutton AL and Shaw JL (2021) Cumulative Pressures on the Distinctive Values of Exmouth Gulf. First draft report to the Department of Water and Environmental Regulation by the Western Australian Marine Science Institution, Perth, Western Australia. 272 pages.	WAMSI	Exmouth Gulf
	DBCA (2023), Biodiversity and Conservation Science Annual Report 2022–23, Department of Biodiversity, Conservation and Attractions, Perth. Benefits of marine parks for marine fishes in a changing climate (SP 2021-040)	DBCA	Ningaloo
	National Reef Monitoring Network	The IMOS National Reef Monitoring Network sub-Facility	Houtman Abrolhos Islands Ningaloo Coast World Heritage Area Exmouth Gulf Dampier Archipelago Island Group Barrow Island Montebello Islands Group Ashmore Reef Cartier Island Darwin Harbour Arafura Arnhem

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Marmion Rottnest Island Geographe Bay
	Lear KO, Ebner BC, Fazeldean T, Bateman RL, Morgan DL (2024) Effects of coastal development on sawfish movements and the need for marine animal crossing solutions. Conservation Biology, e14263. https://doi.org/10.1111/cobi.14263	Murdoch University	Onslow
	Heupel M, Simpfendorfer C, Chin A, Appleyard S, Barton D, Green M, Johnson G, McAuley R and White W (2020) Examination of connectivity of hammerhead sharks in northern Australia. Report to the National Environmental Science Program, Marine Biodiversity Hub. Australian Institute of Marine Science.	AIMS	Exmouth Gulf Broome
	Aston C, Langlois T, Navarro M, Gibbons B, Spencer C, Goetze J (2024). Baited rather than unbaited stereo- video provides robust metrics to assess demersal fish assemblages across deeper coastal shelf marine parks. Estuarine, Coastal and Shelf Science 304: 108823	UWA and DBCA	Ningaloo Coast World Heritage Area Houtman Abrolhos Islands
	Bessey C, Depczynski M, Goetze JS, Moore G, Fulton CJ, Snell M, Wilson S (2023) Cryptic biodiversity: a portfolio-approach to coral reef fish surveys. Limnology and Oceanography: Methods 21:594–605.	UWA	Ningaloo Coast World Heritage Area
	Thomson D, Vanderklift M, Pillans R, Keesing J, Donovan A, Hardiman L, Slawinski D, Orr M, Doropoulos C, Roff G, Mortimer N, Mayne B, Gunasekera R, Bessey C, Bradford R, Feutry P, Patterson T, DeGroot B. (2024) Ningaloo Outlook Phase 2 – 2024 Annual Report (Year 4)	CSIRO	Ningaloo Coast World Heritage Area
	Wilson, S.K., Depczynski, M., Fulton, C.J., Holmes, T.H., Goetze, J.S., Birt, M.J., Radford, B., Tinkler, P., Evans, R.D., Moustaka, M., Faubel, C., Noble, M., (2024). Can juvenile supply predict future abundance of large-bodied reef fishes? Mar. Environ. Res. 199, 106607. https://doi.org/10.1016/j.marenvres.2024.106607	AIMS	Ningaloo Reef
	Ingelbrecht J, Allen MG, Bateman RL, Ebner BC, Fazeldean T, Krispyn KN, Lear KO, Lee T, Lymbery AJ, McAuley RB, Phillips NM, Whitty JM, Wueringer BE and Morgan DL (2024) Evidence of long-distance movement of green sawfish (*Pristis zijsron*) in Western Australia. Marine and Freshwater Research 75, MF24154. https://doi.org/10.1071/MF24154	Murdoch University	Bay of Rest (Exmouth Gulf) Ashburton River (Southern Pilbara) Fortescue River (Northern Pilbara) Cape Keraudren Broome Fitzroy River

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	DBCA (2018) Gorgon Dredge Offset Monitoring Evaluation and Reporting Project, Department of Biodiversity, Conservation and Attractions, Perth.	DBCA	Barrow Island Lowendal Islands Montebello Islands
	Keesing, J.K. (Ed.) (2019). Benthic habitats and diodiversity of the Dampier and Montebello Australian Marine Parks. Report for the Director of National Parks. CSIRO, Australia	AIMS	Montebello Australian Marine Park
	Lear, K., Ebner, B., Fazeldean, T., Bateman, R. & Morgan, D. (2023). Movement patterns of Green Sawfish. In Morgan, D. & Lear, K. (eds) (2023). Wheatstone Sawfish Project: An investigation into the movement patterns, habitat utilisation, growth, kinship and catch rates of Green Sawfish (Pristis zijsron) in a globally important nursery area 2019–2022. A Freshwater Fish Group & Fish Health Unit (Centre for Sustainable Aquatic Ecosystems), Harry Butler Institute, Murdoch University reportfor Chevron Australia	Murdoch University	Onslow Pilbara coast
	Sawfish Monitoring Project- Wheatstone	Chevron	Onslow
Fisheries	Sutton AL and Shaw JL (2021) Cumulative Pressures on the Distinctive Values of Exmouth Gulf. First draft report to the Department of Water and Environmental Regulation by the Western Australian Marine Science Institution, Perth, Western Australia. 272 pages.	WAMSI	Exmouth Gulf
	DBCA (2023), Biodiversity and Conservation Science Annual Report 2022–23, Department of Biodiversity, Conservation and Attractions, Perth. Benefits of marine parks for marine fishes in a changing climate (SP 2021-040)	DBCA	WA State Marine Parks
	DBCA (2023), Biodiversity and Conservation Science Annual Report 2022–23, Department of Biodiversity, Conservation and Attractions, Perth. Do marine reserves adequately represent high diversity cryptobenthic fish assemblages in a changing climate? (SP 2019-031)	DBCA	Ningaloo
	National Reef Monitoring Network	The IMOS National Reef Monitoring Network sub-Facility	Houtman Abrolhos Islands Ningaloo Coast World Heritage Area Exmouth Gulf Dampier Archipelago Island Group Barrow Island Montebello Islands Group Ashmore Reef Cartier Island

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Darwin Harbour Arafura Arnhem Marmion Rottnest Island Geographe Bay
	State of the Fisheries Report (Western Australia)	DPIRD	WA's major commercial and recreational fisheries
	Bartes S and Braccini JM (2021) Potential expansion in the spatial distribution of subtropical and temperate west Australian sharks. Journal of Fish Biology. doi:10.1111/jfb.14822	DPIRD	Fisheries included: Bigeye sixgill (*Hexanchus nakamurai*) Tiger shark (*Galeocerdo cuvier*) Spinner shark (*Carcarhinus brevipinna*) Scalloped hammerhead (*Sphyrna lewini*) Broadnose sevengill sharks (*Notorhyncus cepedianus*) Southern sawsharks (*Pristiophorus nudipinnis*)
	Langlois TJ, Wakefield CB, Harvey ES, Boddington DK and Newman SJ (2021). Does the benthic biota or fish assemblage within a large targeted fisheries closure differ to surrounding areas after 12 years of protection in tropical north-western Australia? Marine Environmental Research 170: 105403.	DPIRD	Fishery: Pilbara demersal scalefish fisheries
	Yeoh D, Johnston D and Harris D (2021) Squid and cuttlefish resources of Western Australia. Fisheries Research Report No. 314 Department of Primary Industries and Regional Development, Western Australia. 101pp	DPIRD	Squid and cuttlefish
	DPIRD (2020) Western Australian Marine Stewardship Council Report Series No. 17: Ecological Risk Assessment of the Exmouth Gulf Prawn Managed Fishery. DPIRD, Western Australia.	DPIRD	Exmouth Gulf

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Ryan KL, Lai EKM, Smallwood CB (2022) Boat-based recreational fishing in Western Australia 2020/21. Fisheries Research Report No. 327 Department of Primary Industries and Regional Development, Western Australia. 221pp.	DPIRD	
	Lynch TP, Smallwood CB, Ochwada-Doyle FA, Lyle J, Williams J, Ryan KL, Devine C, Gibson B, Jordan A (2020) A cross continental scale comparison of Australian offshore recreational fisheries research and its applications to Marine Park and fisheries management. – ICES Journal of Marine Science, 77 (3): 1190–1205.	CSIRO	Australia wide
Reptiles	Chevron: Gorgon Gas Development – Marine Turtle Monitoring Program	Chevron	Barrow Island Mundabullangana
	Wilson P, Thums M, Pattiaratchi C, Whiting S, Pendoley K, Ferreira L, Meekan M (2019) High predation of marine turtle hatchlings near a coastal jetty. Biological Conservation, 236	UWA/DBCA	Thevenard Island
	Rob D, Barnes P, Whiting S, Fossette S, Tucker T and Mongan T (2019) Turtle activity and nesting on the Muiron Islands and Ningaloo Coast: Final Report 2018, Ningaloo Turtle Program. Report prepared for Woodside Energy Limited. Department of Biodiversity, Conservation and Attractions, Exmouth, pp.51.	DBCA	Cape Range National Park North West Cape Muiron Islands North Muiron Island South Muiron Island Sunday Island Bungelup
	Tucker T, Whiting S, Fossette S, Rob D, Barnes P (2020). Inter-nesting and migrations by marine turtles of the Muiron Islands and Ningaloo Coast. Final Report. Prepared for Woodside Energy Limited. Department of Biodiversity, Conservation and Attractions, Perth. pp. 1–93	DBCA	Muiron Islands North Muiron Island South Muiron Island North West Cape Cape Range National Park Bungelup
	Ferreira LC, Thums M, Fossette S, Wilson P, Shimada T, Tucker A, Pendoley K, Waayers D. Guinea ML, Loewenthal G, King J, Speirs M, Rob D, Whiting SD (2020) Multiple satellite tracking datasets inform green turtle conservation at a regional scale. Diversity and Distribution 27: 249–266	AIMS	Rosemary Island Legendre Island Middle Passage Island Barrow Island Muiron Islands

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Ningaloo Coast World Heritage Area Montebello Islands Group Lacepede Islands Maret Island Scott Reef
	Fossette S, Loewenthal G, Peel LR, Vitenbergs A, Hamel MA, Douglas C, Tucker AD, Mayer F, Whiting SD (2021) Using Aerial Photogrammetry to Assess Stock-Wide Marine Turtle Nesting Distribution, Abundance and Cumulative Exposure to Industrial Activity. Remote Sens, 13, 1116.	DBCA	Y Island Locker Island Onslow Ashburton Island Thevenard Island Barrow Island Long Island Dampier Rosemary Island West Mid Intercourse Island East Lewis Island Legendre Island Hauy Island Delambre Island Karratha Downes Island Bedout Island Port Hedland Mundabullangana Cape Lambert Exmouth Gulf
	Pendoley Environmental (2018). Marine turtle survey of Mardie Salt Project Area – December 2017. January 2018. Prepared for Phoenix Environmental	Pendoley Environmental	Mardie

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Pendoley Environmental (2019). Mardie Salt Project: Marine turtle monitoring program 2018/2019. April 2019. Prepared for BCI Minerals Ltd.	Pendoley Environmental	Mardie Angle Island Long Island Middle Island Round Island Sholl Island
	Ningaloo Turtle Program	DBCA	North West Cape Cape Range National Park Bungelup
	Rosemary Island Turtle Monitoring Program	DBCA	Rosemary Island
	North West Shelf Flatback Turtle Monitoring Program	DBCA	Thevenard Island Delambre Island Karratha Port Hedland Eighty Mile Beach Echo Beach Cable Beach Cape Domett
	AECOM (2022) Marine Fauna Impact Assessment Ashburton Salt Project. Doc No. 60597242_3	AECOM	Ashburton Locker Island
	Keesing, J.K. (Ed.) (2019). Benthic habitats and biodiversity of the Dampier and Montebello Australian Marine Parks. Report for the Director of National Parks. CSIRO, Australia	CSIRO	Dampier Marine Park Montebello Australian Marine Park
	Gammon M, Whiting S, Fossette S (2023) Vulnerability of sea turtle nesting sites to erosion and inundation: A decision support framework to maximize conservation. Ecosphere, 14(6), e4529. https://doi.org/10.1002/ecs2.4529	UWA/DBCA	Y Island Locker Island Onslow Ashburton Island Thevenard Island

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Barrow Island Long Island Dampier Rosemary Island West Mid Intercourse Island East Lewis Island Legendre Island Hauy Island Delambre Island Karratha Downes Island Bedout Island Port Hedland Mundabullangana Cape Lambert
	FitzSimmons N N, Pittard SD, McIntyre N, Jensen MP, Guinea M, Hamann M, Kennett R, et al. (2020). Phylogeography, Genetic Stocks, and Conservation Implications for an Australian Endemic Marine Turtle. Aquatic Conservation 30 (3): 440–60. https://doi.org/10.1002/aqc.3270	Griffith University/DBCA	Barrow Island Delambre Island Mundabullangana Port Hedland Eighty Mile Beach Echo Beach Cape Domett
	Thums M, Udyawer V, Galaiduk R, Ferreira L, Streten C, Radford B (2021) Using Marine Turtles to Identify Habitat and Assess Connectivity of the North and North-West Marine Park Networks and Sea Country: Exploration Study of Data and Partnerships. Report prepared for Parks Australia. Australian Institute of Marine Science, Perth. 48pp.	AIMS	Miaboolya Beach Quobba Shark Bay Ningaloo Coast World Heritage Area Muiron Islands Barrow Island Great Sandy Island

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Eighty Mile Beach Scott Reef Kimberley Roebuck Bay Joseph Bonaparte Gulf Lalang-garram Marine Park Reefs Oceanic Shoals Thevenard Island Echo Beach Montebello Islands Group Camden Sound Horizontal Falls
	Sutton AL and Shaw JL (2021) Cumulative Pressures on the Distinctive Values of Exmouth Gulf. First draft report to the Department of Water and Environmental Regulation by the Western Australian Marine Science Institution, Perth, Western Australia. 272 pages.	WAMSI	Exmouth Gulf
	Fossette S, Ferreira L C, Whiting SD, King J, Pendoley K, Shimada T, Speirs M, Tucker A D, Wilson P, Thums M (2021) Movements and distribution of hawksbill turtles in the Eastern Indian Ocean. Global Ecology and Conservation, 29, e01713. https://doi.org/10.1016/j.gecco.2021.e01713	DBCA	Beacon Island Delambre Island Rosemary Island Varanus Island Montebello Islands Group
	Pillans RD, Whiting S, Tucker T, Vanderklift MA (2022) Fine-scale movement and habitat use of juvenile, subadult, and adult green turtles (Chelonia mydas) in a foraging ground at Ningaloo Reef, Australia. Aquatic Conservation: Marine and Freshwater Ecosystems 32 1323–1340	CSIRO	Ningaloo
	Ferreira LC, Thums M, Whiting S, Meekan M, Andrews-Goff V, Attard CRM, Bilgmann K, Davenport A, Double M, Falchi F, Guinea M, Hickey SM, Jenner C, Jenner M, Loewenthal G, McFarlane G, Möller LM, Norman B, Peel L, Pendoley K, Radford B, Reynolds S, Rossendell J, Tucker A, Waayers D, Whittock P, Wilson P and Fossette S (2023) Exposure of marine megafauna to cumulative anthropogenic threats in north-west Australia. Front. Ecol. Evol. 11:1229803. doi: 10.3389/fevo.2023.1229803	AIMS	Pilbara coast Kimberley Northern Territory coastline

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Ningaloo Outlook	CSIRO	Ningaloo Coast World Heritage Area
	Lambourne RN (2019) Classifying the diving behaviour of flatback turtles (*Natator depressus*) from multi-sensor tags. Honours thesis, Murdoch University	Murdoch university	Thevenard Island
	Udyawer V, D'Anastasi B, McAuley R, Heupel M (2016) Exploring the status of Western Australia's sea snakes. National Environmental Science Programme	AIMS	Shark Bay Ningaloo Coast World Heritage Area Port Hedland Rowley Shoals Oceanic Shoals
	Bayliss P, Raudino H, Hutton M, Murray K, Waples K and Strydom S (2019) Modelling the spatial relationship between dugon (*Dugong dugon*) and their seagrass habitat in Shark Bay Marine Park before and after the marine heatwave of 2010/11. Department of Agriculture, Water and the Environment Final Report 2.	CSIRO DBCA	Shark Bay Ningaloo Reef Exmouth Gulf
	Schneider L, Tucker AD, Vincent K, Fossette S, Young EJ and Whiting SD (2022) First Assessment of Mercury (Hg) Concentrations in Skin and Carapace of Flatback Turtles (*Natator depressus*) (Garman) From Western Australia. Front. Environ. Sci. 10:843855. doi: 10.3389/fenvs.2022.843855	DBCA	Thevenard Island Eighty Mile Beach
	Avenant C, Fossette S, Whiting S, Hopkins AJM, HyndesGA (2024). Sea turtle eggs and hatchlings are a seasonally important food source for the generalist feeding golden ghost crab (*Ocypode convexa*).Estuaries and Coasts 47 821–838	ECU DBCA	Ningaloo Coast World Heritage Area
	Avenant C, Whiting S, Fossette S (2024) Extreme predation of eggs and hatchlings for loggerhead turtles in eastern Indian Ocean. Biodiversity and Conservation 33:135–159. https://doi.org/10.1007/s10531-023-02739-z	ECU DBCA	Gnaraloo Bungelup
	Thomson D, Vanderklift M, Pillans R, Keesing J, Donovan A, Hardiman L, Slawinski D, Orr M, Doropoulos C, Roff G, Mortimer N, Mayne B, Gunasekera R, Bessey C, Bradford R, Feutry P, Patterson T, DeGroot B. (2024)	CSIRO	Ningaloo Coast World Heritage Area
	Vanderklift MA, Pillans RD, Rochester W, Stubbs JL, Skrzypek G, Tucker AD and Whiting SD (2023) Ontogenetic changes in green turtle (Chelonia mydas) diet and home range in a tropical lagoon. Front. Ecol. Evol. 11:1139441. doi: 10.3389/fevo.2023.1139441	CSIRO	Ningaloo State Marine Park Mangrove Bay
	Peel LR, Whiting SD, Pendoley K, Whittock PA, Ferreira LC, Thums M, Whiting AU, Tucker AD, Rossendell J, McFarlane G, Fossette S (2024) I still call Australia home: Satellite telemetry informs	DBCA	Ashburton Island Thevenard Island

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	the protection of flatback turtles in Western Australian waters. Ecosphere 15:e4847. https://doi.org/10.1002/ecs2.4847		Locker Island Montebello Islands Group Barrow Island Delambre Island Bells Beach (Karratha) Port Hedland Bedout Island Eighty Mile Beach Cable Beach Slate Island Maret Island West Govenor Island Cape Domett
	Gammon M, Bentley B, Fossette S, Mitchell NJ (2024) Reconstructed and projected beach temperatures reveal where flatback turtles are most at risk from climate change. Global Ecology and Conservation 51:e02866. https://doi.org/10.1016/j.gecco.2024.e02866	UWA	Port Hedland Cemetery Beach Mundabullangana Point Samson Delambre Island Cleaverville Rosemary Island Trimouille Island Hermite Island Barrow Island Thevenard Island Montebello Islands Group Dampier Archipelago Pilbara Coast
	Santos Turtle Monitoring	Santos	Varanus Island Airlie Island

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Chevron Wheatstone Flatback Turtle Monitoring Program	Chevron	Onslow Ashburton Delta Ashburton North
	Pendoley Environmental (2023) Mardie Salt Project: marine turtle monitoring program. Prepared for BCI Minerals	BCI Minerals	Mardie Creek Sholl Island Long Island (Pilbara) Middle Passage Island Angel Island Stewart Island Fortescue Island Mardie Island South Passage Island Solitary Island
Marine megafauna (whale shark, dugong and cetaceans)	Chevron (2019) Soundscape monitoring at JIC site (G1-NT-REPX0000361)	Chevron	Barrow Island
	Chevron (2023) Soundscape Monitoring at the JIC Site 2021–2023	Chevron	Barrow Island
	Raudino HC, Hunt TN, Waples KA (2018) Records of Australian humpback dolphins (*Sousa sahulensis*) from an offshore island group in Western Australia. Marine Biodiversity Records 11:14	DBCA	Montebello Islands
	Raudino HC, Douglas CR, Waples KA (2018) How many dolphins live near a coastal development? Regional Studies in Marine Science 19: 25–32	DBCA	Onslow Thevenard Island
	Sprogis K and Parra G (2022) Coastal dolphin and marine megafauna in Exmouth Gulf, Western Australia: informing conservation management actions in an area under increasing human pressure. Wildlife Research, 50(6): 435–450	UWA	Exmouth gulf
	Thums M, Ferreira LC, Jenner C, Jenner M, Harris D, Davenport A, Andrews-Goff V, Double M, Moller L, Attard CRM, Bilgmann K, Thomson PG, McCauley R (2022) Pygmy blue whale movement, distribution and important areas in the Eastern Indian Ocean. Global Ecology and Conservation 35 e02054	AIMS	Western Australia

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	ECOCEAN Whale Shark Photo-Identification Library	ECOCEAN	Ningaloo
	AIMS (2021) Individual haplotyping of whale sharks from seawater environmental DNA.	AIMS	Ningaloo
	Lester E, Meekan MG, Barnes P, Raudino H, Rob D, Waples K, Speed CW (2020) Multi-year patterns in scarring, survival and residency of whale sharks in Ningaloo Marine Park, Western Australia. Mar Ecol Prog Ser 634:115–125.	UWA	Ningaloo
	Irvine L and Salgado Kent C (2018) The distribution and relative abundance of marine mega-fauna, with a focus on humpback whales (*Megaptera novaeangliae*), in Exmouth Gulf, Western Australia.	Ocean Blueprint	Exmouth Gulf
	NESP MaC Project 3.10 – A partnership approach to filling key knowledge gaps on dugongs in northern Australia using novel technologies, 2023–2026 (JCU, CDU, DBCA)	AIMS	Exmouth Gulf Ningaloo Shark Bay
	AIMS research on whale sharks	AIMS	Ningaloo
	Sprogis KR, Sutton AL, Jenner MN, McCauley RD, Jenner KCS (2022) Occurrence of cetaceans and seabirds along the Indian Ocean 110 E meridian from temperate to tropical waters. Deep-Sea Research II 205. 105184	Centre for Whale Research/UWA	Indian Ocean 110 E meridian from temperate to tropical waters
	Haughey R, Hunt TN, Hanf D, Passadore C, Baring R and Parra GJ (2021) Distribution and Habitat Preferences of Indo-Pacific Bottlenose Dolphins (*Tursiops aduncus*) Inhabiting Coastal Waters With Mixed Levels of Protection. Front. Mar. Sci. 8:617518. doi: 10.3389/fmars.2021.617518	Flinders University	North West Cape Exmouth Gulf Ningaloo
	Cleguer C, Kelly N, Tyne J, Wieser M, Peel D and Hodgson A (2021) A Novel Method for Using Small Unoccupied Aerial Vehicles to Survey Wildlife Species and Model Their Density Distribution. Front. Mar. Sci. 8:640338. doi: 10.3389/fmars.2021.640338	Murdoch University	Exmouth Gulf
	Sutton AL and Shaw JL (2021) Cumulative Pressures on the Distinctive Values of Exmouth Gulf. First draft report to the Department of Water and Environmental Regulation by the Western Australian Marine Science Institution, Perth, Western Australia. 272 pages.	WAMSI	Exmouth Gulf
	Raudino HC, Bouchet PJ, Douglas C, Douglas R, Waples K (2023) Aerial abundance estimates for two sympatric dolphin species at a regional scale using distance sampling and density surface modelling. Front. Ecol. Evol. 10:1086686. doi: 10.3389/fevo.2022.1086686	DBCA	Exmouth Gulf Onslow Ashburton Dampier Area Dampier Archipelago Karratha

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Porth Hedland Area Eighty Mile Beach Southern Pilbara Islands Northern Pilbara Islands Great Sandy Island
	Lester E, Canon T, Arujo G (2023) Whale sharks (*Rhincodon typus*) feed on baitfish with other predators at Ningaloo Reef. Pacific Conservation Biology 29 86–87	DBCA	Coral Bay Ningaloo
	Palmer C, Martien KK, Raudino H, Robertson KM, Withers A, Withers E, Risk R, Cooper D, D'Cruz E, Jungine E, Barrow D, Cuff N, Lane A, Keynes D, Waples K, Malpartida A and Banks S (2023) Evidence of resident coastal population(s) of false killer whales (*Pseudorca crassidens*) in northern Australian waters. Front. Mar. Sci. 9:1067660. doi: 10.3389/fmars.2022.1067660	Charles Darwin University	Exmouth Gulf Pilbara Coast Islands Southern Pilbara Islands and Coast Eighty Mile Beach Broome Lalang-garram Marine Park Reefs Darwin Harbour Tiwi Islands Groote Archipelago
	Ferreira LC, Thums M, Whiting S, Meekan M, Andrews-Goff V, Attard CRM, Bilgmann K, Davenport A, Double M, Falchi F, Guinea M, Hickey SM, Jenner C, Jenner M, Loewenthal G, McFarlane G, Möller LM, Norman B, Peel L, Pendoley K, Radford B, Reynolds S, Rossendell J, Tucker A, Waayers D, Whittock P, Wilson P and Fossette S (2023) Exposure of marine megafauna to cumulative anthropogenic threats in north-west Australia. Front. Ecol. Evol. 11:1229803. doi: 10.3389/fevo.2023.1229803	AIMS	Shark Bay Ningaloo Coast World Heritage Area Kimberley
	Ningaloo Outlook	CSIRO	Ningaloo Coast World Heritage Area
	Thomson D, Vanderklift M, Pillans R, Keesing J, Donovan A, Hardiman L, Slawinski D, Orr M, Doropoulos C, Roff G, Mortimer N, Mayne B, Gunasekera R, Bessey C, Bradford R, Feutry P, Patterson T, DeGroot B. (2024) Ningaloo Outlook Phase 2 – 2024 Annual Report (Year 4)	CSIRO	Ningaloo Coast World Heritage Area Ningaloo Reef

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
	Jarolimek CV, King J J, Apte SC., Hall J, Gautam A, Gillmore M, Doyle C (2023) A review of inorganic contaminants in Australian marine mammals, birds and turtles. Environmental Chemistry 20, 147–170. https://doi.org/10.1071/EN23057	CSIRO	Australia wide
	Bayliss P, Raudino H, Hutton M, Murray K, Waples K and Strydom S (2019) Modelling the spatial relationship between dugong (*Dugong dugon*) and their seagrass habitat in Shark Bay Marine Park before and after the marine heatwave of 2010/11. Department of Agriculture, Water and the Environment Final Report 2.	CSIRO DBCA	Shark Bay Ningaloo Reef Exmouth Gulf
	Raudino H, D'Cruz E, Waples K, Menzies J, Murdoch J, Quartermaine T and Mathews D (2020) Dry season dreaming Snubfin census on Yawuru sea country. Landscope 36, 41–44	DBCA	Roebuck Bay
	Brown AM, Allen SJ, Kelly N, Hodgson A (2022) Using Unoccupied Aerial Vehicles to estimate availability and group size error for aerial surveys of coastal dolphins. Remote Sensing in Ecology and Conservation. doi: 10.1002/rse2.313	Murdoch University	Ningaloo Reef Exmouth Gulf
	Meekan MG, Taylor BM, Lester E, Ferreira LC, Sequeira AMM, Dove ADM, Birt MJ, Aspinall A, Brooks K and Thums M (2020) Asymptotic Growth of Whale Sharks Suggests Sex-Specific Life-History Strategies. Front. Mar. Sci. 7:575683. doi: 10.3389/fmars.2020.575683	AIMS	Ningaloo Reef
	Haughey, R., Hunt, T. ., Hanf, D., Passadore, C., Baring, R. and Parra, G. . (2025), Behavioural Processes Underlying the Habitat Selection of Indo-Pacific Bottlenose Dolphins (*Tursiops aduncus*) in the Ningaloo Marine Park and Exmouth Gulf, at the North West Cape, Western Australia. Aquatic Conserv: Mar Freshw Ecosyst, 35: e70114. https://doi.org/10.1002/aqc.70114	DBCA	North West Cape Exmouth Gulf Mangrove Bay Ningaloo State Marine Park
	D'Antonio B, Ferreira L, Fisher R, Thums M, Pattiaratchi CB, Sequeira AMM, Faubel S, Norman B, Meekan M (2025) Natural and artificial structures influence the movement and habitat connectivity of whale sharks (*Rhincodon typus*) across seascapes. Diversity and Distributions 31:e13950. https://doi.org/10.1111/ddi.13950	UWA AIMS	Ningaloo Reef Shark Bay
	Hutchings MJ, Parra GJ, Totterdell JA, Wellard R, Donnelly DM, Sandoval-Castillo J, Möller L (2025) Species distribution modeling of killer whales (*Orcinus orca*) in Australian waters. Ecology and Evolution 15:e71359. https://doi.org/10.1002/ece3.71359	Flinders University	Australia wide Ningaloo Reef
	Thums M, Ferreira LC, Davenport A, Jenner M, Moller L, Russell G, McCauley RD, Jenner C (2025) Tracking pygmy blue whale diving behaviour and validation of foraging areas defined from horizontal movement data. Global Ecology and Conservation 57:e03362. https://doi.org/10.1016/j.gecco.2024.e03362	AIMS	Western Australia Perth Jurien Bay Houtman Abrolhos Islands Geraldton

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Ningaloo Reef Coral Bay Montebello Islands Group Shark Bay Dirk Hartog Island
	Edwards CM, Syme J, Parra GJ (2025) Association patterns of Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) in waters off the North West Cape, Western Australia. Marine Mammal Science. https://doi.org/10.1111/mms.70017	Flinders University	North West Cape Ningaloo State Marine Park Ningaloo Reef Exmouth Gulf
	Bignell CJ, Patterson TA, Donovan A, Vanderklift MA, Rochester W, Semmens JM, Pillans RD (2025) Satellite tracking reveals sex-specific differences in the geographical and vertical habitat use of whale sharks, Rhincodon typus, in the Eastern Indian Ocean. Marine Biology 172:105. https://doi.org/10.1007/s00227-025-04616-5	CSIRO	Ningaloo Reef
	Tucker J (2023) Extending aerial surveys beyond target marine mammal species: an application of strip transect methodology to humpback whale and dugong abundance estimation in Exmouth Gulf, Western Australia. Edith Cowan University. https://doi.org/10.25958/n9g8-sh89	Edith Cowan University	Exmouth Gulf
	Sprogis KR and Waddell TLR (2022) Marine mammal distribution on the western coast of Exmouth Gulf, Western Australia. Report to the Australian Marine Conservation Society. Aarhus University and Carijoa, Rivervale, WA, Australia. 17 pp.	UWA	Exmouth Gulf
	Hanf D, Hodgson AJ, Kobryn H, Bejder L and Smith JN (2022) Dolphin Distribution and Habitat Suitability in North Western Australia: Applications and Implications of a Broad-Scale, Non-targeted Dataset. Front. Mar. Sci. 8:733841. doi: 10.3389/fmars.2021.733841	O_2Marine	North West Cape Exmouth Gulf Muiron Islands Onslow Area Mainland Coast Thevenard Island Barrow Island
Seabirds and shorebirds	Chevron: Gorgon Bridled Tern Monitoring Program	Chevron	Double Island North Double Island South Parakeelya Island
	Chevron: Gorgon Wedge-tailed Shearwater Monitoring Program	Chevron	Double Island North Double Island South

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Ah Chong Island (Montebello group) Boodie Island
	Dunlop JN. and Greenwell C (2021) Seasonal movements and metapopulation structure of the Australian fairy tern in Western Australia. Pacific Conservation Biology, 27, 47–60	Conservation Council of Western Australia	Stewart Island Fortescue Island Mardie Island Regnard Island Scholl Island Shark Bay Exmouth Gulf Somerville Island Tent Island Hope Point Houtman Abrolhos Islands Ningaloo Coast
	Weller D, Kidd L, Lee C, Klose S, Jaensch R, Driessen J (2020) Directory of Important Habitat for Migratory Shorebirds in Australia. Prepared for Australian Government Department of Agriculture, Water and the Environment by BirdLife Australia, Melbourne	Birdlife Australia	Barrow Island Carnarvon Coral Bay Exmouth Gulf Houtman Abrolhos Islands Karratha Ningaloo Onslow Port Hedland Adele Island Lacepede Islands Dampier Peninsula
	Australia's National Shorebird Monitoring Program	Birdlife Australia	Dampier Port Hedland

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Shark Bay Eighty Mile Beach Barrow Island Exmouth Gulf Ningaloo Reef Ningaloo Roebuck Bay
	Birdata: https://birdata.birdlife.org.au/	Birdlife Australia	Western Australia
	eBird: https://ebird.org/hotspots?hs=L5713406&yr=all&m=	eBird	Western Australia
	Astron (2020) Thevenard Island Retirement Project Terrestrial Ecological Monitoring Report June 2020. Prepared for Chevron	Chevron	Thevenard Island
	Biota (2022) Ashburton Salt Project Migratory Shorebird Assessment. Prepared for K + S Salt Australia	K + S Salt Australia	Ashburton Exmouth Gulf
	Cannell B, Hamilton S, Driessen J (2019) Wedge- tailed shearwater foraging behaviour in the Exmouth region. Report for Woodside Energy Ltd. University of Western Australia and Birdlife Australia.	UWA	Muiron Islands
	Sutton AL and Shaw JL (2021) Cumulative Pressures on the Distinctive Values of Exmouth Gulf. First draft report to the Department of Water and Environmental Regulation by the Western Australian Marine Science Institution, Perth, Western Australia. 272 pages.	WAMSI	Exmouth Gulf
	Woodside Case Study: Ningaloo Region Migratory Shorebirds of Exmouth Gulf (Birdlife)	Woodside Birdlife Australia	Exmouth Gulf Giralia Station
	DBCA shorebird surveys of Montebello Islands and Bedout Island in 2017 and 2018 mentioned in: Australian National Report to the 19th JAMBA, 13th CAMBA and 6th ROKAMBA Consultative Meetings, Commonwealth of Australia 2018	DBCA	Bedout Island Montebello Islands
	Pendoley Environmental (2021) Varanus and Airlie Islands Shearwater Monitoring Annual Report 2020	Santos	Lowendal Islands Group Airlie Island Serrurier Island
	Bancroft W and Bamford M (2018) ANSIA Stage 2 Fauna Assessment	MJ and AR Bamford	Pilbara

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
		Consulting Ecologists	
	Phoenix Environmental Sciences (2023) Long-term migratory shorebird monitoring program for the Optimised Mardie Project. Prepared for Mardie Minerals Pty Ltd	Phoenix Consultants	Mardie
	Studying seabirds: recording biodiversity above ocean waves	CSIRO	Australia wide
	BirdLife Australia (2018) Seabird and Shorebird Baseline Studies, Ningaloo Region – Report on January 2018 bird surveys. Interim Report for Woodside Energy Ltd.	Birdlife Australia	Ningaloo State Marine Park Cape Range National Park Exmouth Gulf Coral Bay Muiron Islands North Muiron Island South Muiron Island Brown Island (Exmouth Gulf) Burnside Island (Exmouth Gulf) Islam Islands (Exmouth Gulf) Doole Island (Exmouth Gulf) Dummy Spit Island (Exmouth Gulf) Roberts Island (Exmouth Gulf) Shag Rock (Exmouth Gulf) Simpson Island (Exmouth Gulf) Tent Island (Exmouth Gulf) Victor Island (Exmouth Gulf) West Doole Island (Exmouth Gulf) Whalebone Island (Exmouth Gulf)

Receptor	Existing baseline monitoring	Source / Data Custodian	Spatial extent
			Whitmore Island (Exmouth Gulf) Wilderness Island (Exmouth Gulf) Y Island (Exmouth Gulf) Wagtail Island (Exmouth Gulf)
	Santos Seabird Monitoring Program	Santos	Varanus Island Abutilion Island Beacon Island Bridled Island Parakeelya Island Airlie Island
	Santos Varanus Island Contaminated Groundwater and Soil Investigative Work Program	Santos	Varanus Island
	Santos Varanus Island Wedge-tailed Shearwater Fledgling Interaction Study	Santos	Varanus Island
	Santos Integrated Shearwater Monitoring Program	Santos	Varanus Island Airlie Island Serrurier Island Bridled Island

Appendix F OSM Services Provider Call Off Order Form

OSRL

Operational and Scientific Monitoring (OSM) Services Call-Off Order Form

Please do not hesitate in contacting the Duty Manager at the earliest opportunity in the event of an incident or potential incident. Please ensure you telephone the Duty Manager before e-mailing or faxing this completed form

Oil Spill Response Limited's safety policy requires us to work closely with the mobilising party to ensure all aspects of safety and security are addressed for our personnel.

To	Duty Manager
OSRL Base	Southampton, UK Loyang, Singapore Fort Lauderdale, USA
Telephone	+65 6266 1566
Emergency Fax	+65 6266 2312
Email	dutymanagers@oilspillresponse.com, osm@oilspillresponse.com

Details of Authorised Contact				
Mobilising Company				
Name of Person Authorising OSRL				
Position of Authorising Representative				
Direct Phone Number	Country Code	+	Number	
Email Address				

Operational Monitoring service to be activated (X)		**Scientific Monitoring service to be activated (X)**	
OM1 Hydrocarbon Properties and Weathering Behaviour at Sea		**SM1** Water Quality Impact Assessment	
OM2 Water Quality Assessment		**SM2** Sediment Quality Impact Assessment	
OM3 Sediment Quality Assessment		**SM3** Intertidal and Coastal Habitat Assessment	
OM4a Surface Chemical Dispersant Effectiveness and Fate Assessment		**SM4** Seabirds and Shorebirds	
OM4b Subsea Dispersant Injection Monitoring		**SM5** Marine Mega-fauna Assessment	
OM5 Marine Fauna Surveillance		**SM6** Benthic Habitat Assessment	
OM6 Shoreline Clean-up Assessment		**SM7** Marine Fish and Elasmobranch Assemblages Assessment	
		SM8 Fisheries Impact Assessment	
		SM9 Heritage Features Assessment	
		SM10 Social Impact Assessment	

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Location of Port of Staging/ Departure – Port (X)		Additional Information
Ashburton		
Barrow Island		
Broome		
Cape Preston		
Dampier		
Darwin		
Derby		
Exmouth		
Onslow		
Port Hedland		
Port Walcott		
Varanus Island		
Wyndham		
Yampi Sound		
Others (*To be Agreed)		

Location of Port of Staging/ Departure – Airport (X)		Additional Information
Barrow Island		
Broome		
Cape Preston		
Darwin		
Derby		
Karratha		
Learmonth		
Lombardina		
Onslow		
Pardoo		
Perth		
Port Hedland		
Roebourne		
Wallal Downs		
Others (*To be Agreed)		

Request for OSM position to IMT/EMT (X)		IMT/EMT Address
OSM Implementation Lead		
OSM Field Operations Manager		
SM Coordinator		
OM Coordinator		

Invoice Address if available	
Purchase Order Number	

I, the above-named Authorising Representative for the Mobilising Company, approve activation of Oil Spill Response Limited and its resources for OSM Services under the terms of the SUPPLEMENTARY SERVICE AGREEMENT FOR OPERATIONAL AND SCIENTIFIC MONITORING (OSM) SERVICES Agreement in place between the above stated Company and Oil Spill Response PTY Limited.

Signature:		Date / Time (UTC+8):		

Please telephone the Duty Manager to confirm receipt the completed form after sending this completed form.

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Appendix G Description of the Environment – Operational and Scientific Monitoring Planning Area



human energy®

description of the environment - operational and scientific monitoring

planning area

Document ID:	**ABU-COP-02890**
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Revision Date:	**20 August 2026**
Information Sensitivity:	**Company Confidential**

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1 introduction

1.1 Overview

This document describes the environment within Chevron Australia Pty Ltd's (CAPL's) Combined Operational and Scientific Monitoring (OSM) Planning Area (PA) (Figure 1-1), which is the 'offshore area' in which CAPL's activities may interact with the environment. Offshore areas are defined under section 8 of the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* Commonwealth (Cth) (OPGGS Act). This document applies to all CAPL operations and may be used to support Environment Plans (EPs) (specifically including the Operational and Scientific Monitoring Programs [OSMPs]), submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

Each EP will define an environment that may be affected (EMBA) and OSM Exposure Area for its specific petroleum activity. The EMBA and Planning Area for OSM for each activity will most likely be based on conservative stochastic spill modelling for a worst case credible scenario. If an EMBA or Planning Area for OSM from an individual EP extends into an offshore area that is beyond the existing PA, this document will be revised, and the PA extended to incorporate the additional 'offshore area'.

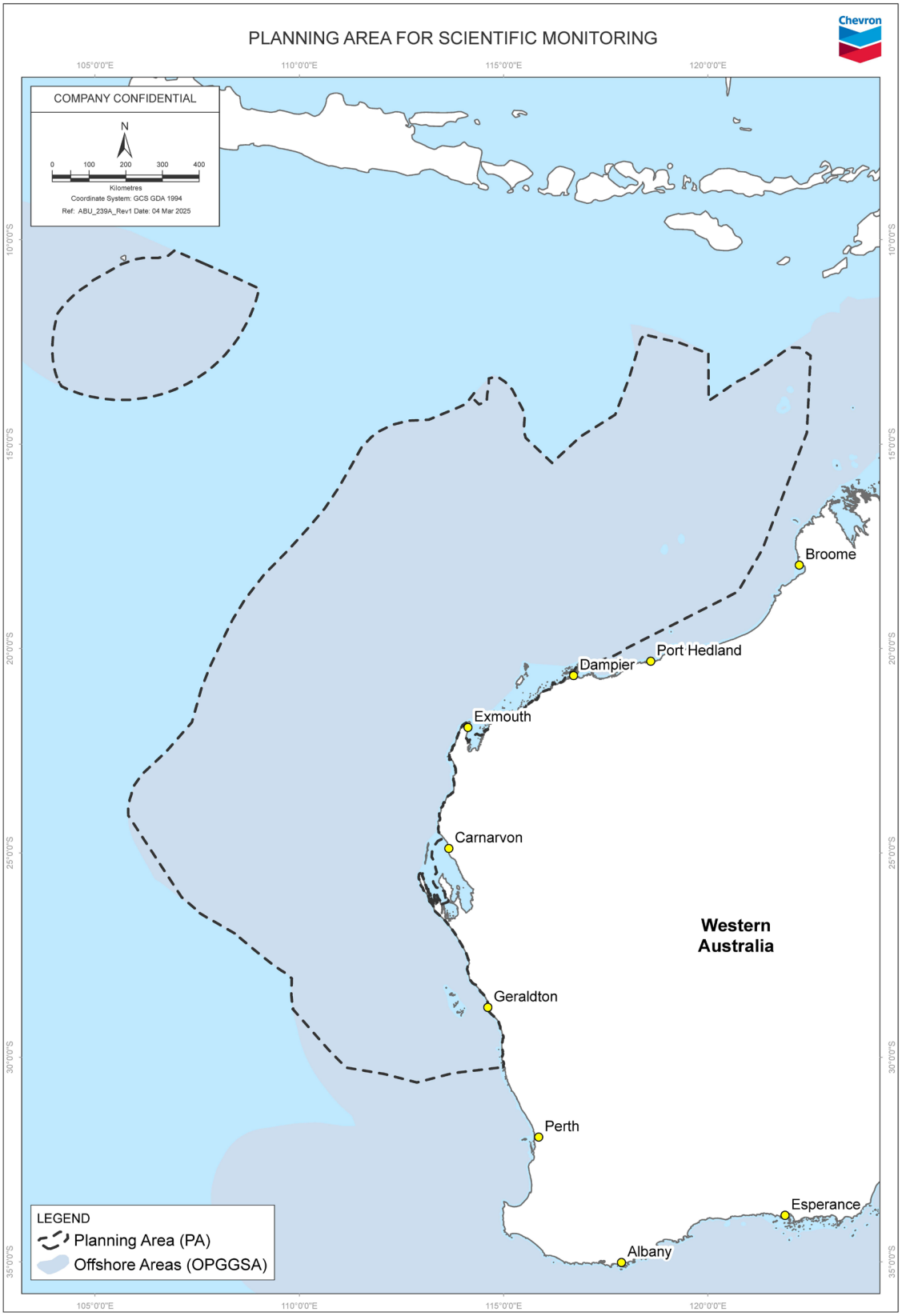

Figure 1-1: CAPL's planning area

1.2 Regulatory context

The Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth) (OPGGS(E)R) detail the information that must be included in an EP. Specifically, regulation 21(2) states that the environment plan must:

- describe the existing environment that may be affected by the activity; and
- include details of the particular relevant values and sensitivities (if any) of that environment.

Regulation 5 defines the environment as:

a. ecosystems and their constituent parts, including people and communities; and

b. natural and physical resources; and

c. the qualities and characteristics of locations, places and areas; and

d. the heritage value of places; and includes the social, economic and cultural features of the matters mentioned in paragraphs (a), (b), (c) and (d).

Regulation 21(3) further provides that, without limiting paragraph (2)(b) of regulation 21(2), relevant values and sensitivities may include any of the following:

a. the world heritage values of a declared World Heritage property

b. the national heritage values of a National Heritage place

c. the ecological character of a declared Ramsar wetland

d. the presence of a listed threatened species or listed threatened ecological community

e. the presence of a listed migratory species

f. any values and sensitivities that exist in, or in relation to, part or all of:

– a Commonwealth marine area; or

– Commonwealth land.

Specific to the description of the environment, NOPSEMA's Environment Plan Content Requirement guidance (Ref. 1) states:

"The level of detail within the plan should be appropriately scaled to the nature of the impacts and risks to the particular values and sensitivities. For example, the environment that may be affected by planned operations will need to be described in a greater level of detail than areas exposed to low levels of hydrocarbon in the unlikely event of a worst-case hydrocarbon release."

Consequently, CAPL has taken the approach that this document provides information suitable for summarising the values and sensitivities in order to inform the Planning Area for OSM under an OSMP for CAPL operations.

If additional information is available for specific locations (typically an Operational Area for a specific activity) and if this information can be used to further influence or inform the impact and risk assessment, this additional information will be included in the 'Description of the Environment' section of the individual EP.

1.3 Document review

This document will be reviewed on an annual basis. The review will incorporate changes in knowledge relating to values and sensitivities within the PA where relevant, including but not limited to:

- relevant statutory instruments (e.g. environmental legislation, recovery plans, conservation advice, wildlife conservation plans and threat abatement plans)
- management plans for World Heritage properties, Australian Marine Parks and State Marine Parks, Management Areas and Reserves
- environmental scientific literature and monitoring data
- First Nations cultural heritage.

2 matters of national environmental significance

Matters of National Environmental Significance (MNES) are protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Cth). The presence of MNES within the PA has been determined from the Australian Government's online Protected Matters Search Tool (PMST) (Ref. 2). The presence of relevant marine and/or coastal MNES within the PA are summarised in Table 2-1. The full PMST report[1] is included as appendix a.

It should be noted that the EPBC Act PMST is a general database that conservatively identifies areas in which protected species have the potential to occur.

Table 2-1: Presence of MNES within the PA

MNES	PA
World Heritage properties	✓
National Heritage places	✓
Wetlands of international importance (Ramsar wetlands)	✓
Nationally listed threatened species and communities	✓ species ✓ communities
Nationally listed migratory species	✓
Commonwealth marine area	✓
Great Barrier Reef Marine Park	×
Nuclear actions (including uranium mining)	—
Water resources (in relation to coal seam gas or large coal mining development)	—

Where ✓ = present, × = not present, and — = not relevant to the petroleum activity.

[1] The PMST is a general database that includes all MNES, including species or features (such as terrestrial based species or features) that are not expected to credibly occur within the PA.

3 planning area

The PA is primarily located within the North-West Marine Region (NWMR), with its southern extent overlapping the South-West Marine Region (SWMR) and north-western extent overlapping the waters surrounding Christmas Island.

The NWMR is divided into three large-scale marine ecological systems—Kimberley, Pilbara, and Ningaloo–Leeuwin—based on the influence of major ocean currents, seafloor features, and eco-physical processes (e.g. climate, tides, freshwater inflow) within the Region (Ref. 6). The SWMR is divided into six large-scale marine ecological systems, which extend from offshore Cape Inscription in WA to the eastern end of Kangaroo Island in SA (Ref. 7).

Further details about the marine regions are provided in Section 4.6.

In alignment with these marine ecological systems, the PA has been divided into the following sections: Kimberley, Pilbara, Ningaloo, West Coast, and Christmas Island (Figure 3-1). Since CAPL's activities are concentrated within the Pilbara section, further detailed information will be provided for this region where relevant.

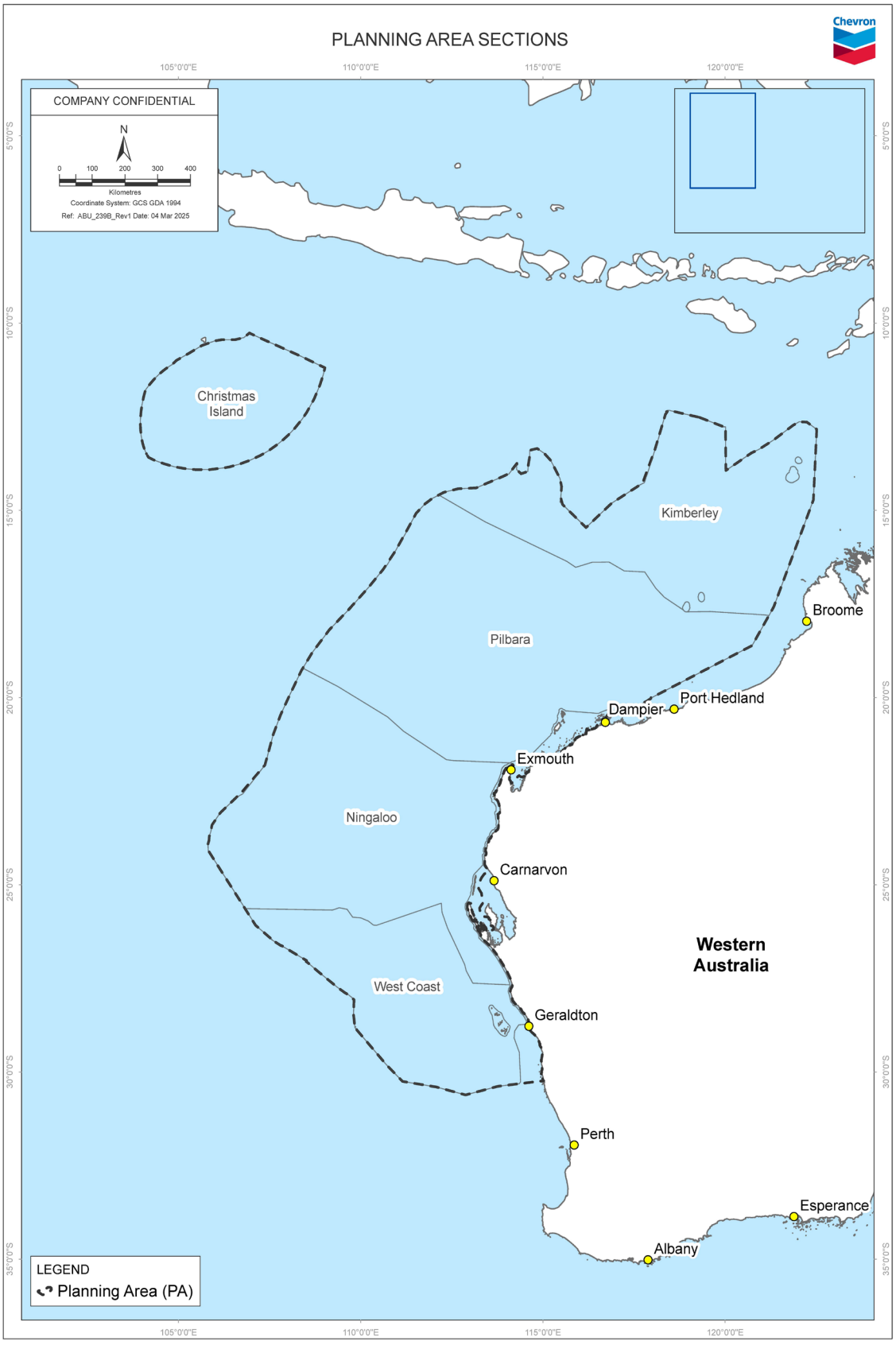

Figure 3-1: CAPL's planning area sections

4 ecosystems and their constituent parts, including people and communities

4.1 Benthic communities and habitats

Benthic communities are biological communities that inhabit the seabed and are important for primary or secondary production. Benthic habitats are areas of seabed that do, or can, support these communities. Benthic communities play an important role in maintaining the integrity of marine ecosystems and the supply of ecological services. There is strong evidence that benthic communities are also important for the maintenance of biological diversity as they provide structurally complex and diverse habitat, refuge for vulnerable life stages and a varied and increased food supply (Ref. 8).

The geomorphology of Australia's continental margin is varied with several geomorphic features present, including basins, canyons, terraces, seamounts, ridges, and plateaus. Based on Geoscience Australia's geomorphic classification of seabed within Australia's exclusive economic zone (EEZ) (Ref. 9), the PA overlaps with the features outlined in Table 4-1.

Table 4-1: Geomorphic features[2]

Feature	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Abyssal-plain/deep ocean floor	✓	✓	✓	✓	✓
Apron/fan	✓	—	✓	✓	—
Bank/shoals	✓	✓	✓	✓	—
Canyon	✓	✓	✓	✓	✓
Continental-rise	✓	✓	—	✓	—
Deep / hole / valley	✓	✓	✓	✓	✓
Escarpment	✓	—	—	—	—
Knoll / abyssal-hills / hills / mountains / peak	—	✓	✓	✓	✓
Pinnacle	✓	—	✓	✓	✓
Plateau	—	✓	✓	✓	✓
Reef	✓	✓	—	✓	—
Ridge	—	✓	✓	✓	✓
Saddle	—	✓	✓	—	✓
Seamount / guyot	—	—	—	—	✓
Shelf	✓	✓	✓	✓	✓
Slope	✓	✓	✓	✓	✓
Terrace	✓	✓	✓	✓	✓
Trench/through	—	—	✓	—	✓
Tidal-sandwave/sand-bank	—	✓	✓	—	—

[2] The table is based exclusively on data from Geoscience Australia's geomorphic classification of the seabed within Australia's Exclusive Economic Zone (EEZ) (Ref. 9).

The composition, distribution, and movement of marine sediments is an important component of a marine ecosystem. These sediments can influence the primary biological production in the water column as well as the evolution and distribution of benthic habitats. The north-west WA comprises bio-clastic, calcareous, and organogenic sediments deposited from relatively slow and uniform sedimentation rates (Ref. 10). Sediments in the NWMR generally become finer with increasing water depth, ranging from sand and gravels on the continental shelf to mud on the continental slope and abyssal plain (Ref. 11). Sediments in the northern section of the SWMR are predominantly cool-water carbonates, with shelf-parallel cool-water carbonate facies on the shelf and warm-water tropical carbonate facies on reef platform (Ref. 12).

Based on CSIRO's marine benthic substrate database (Ref. 13), the predominant seafloor sediment types within the PA are "calcareous gravel, sand and silt", "calcareous ooze", "mud and calcareous clay", and "biosiliceous marl and calcareous clay". It is noted that the database does not provide information for the Christmas Island section.

The Integrated Marine and Coastal Regionalisation of Australia (IMCRA) is a biogeographic regionalisation of oceanic waters within Australia's EEZ (Ref. 14). Provincial bioregions were classified based on fish, benthic (seabed) habitat and oceanographic data at a scale that is useful for regional conservation planning and management (Ref. 4). Table 4-2 identifies and summarises the geomorphology characteristics and biological communities for each of these bioregions, as described in the Marine Bioregional Plans – Bioregional Profile (Ref. 4, Ref. 15). There is currently no Marine Bioregional Plan for the Christmas Island section so other available information has been used to populate Table 4-2.

Listed threatened ecological communities (TECs) are a MNES under the EPBC Act, and a relevant value and sensitivity under the OPGGS(E)R. Refer to Section 4.2.1 for further details.

Table 4-2: Features of provincial bioregions

IMCRA Provincial Bioregion	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Christmas Island Province^	—	—	—	—	✓
Characteristics of the geomorphology and biological communities of Christmas Island Province (Ref. 775, Ref. 776, Ref. 777): • Christmas Island is a remote island which rises sharply from the deep tropical waters of the Indian Ocean • the bioregion varies in depth from shallow coastal areas to steep, rugged slopes and deep oceanic trenches, with depths ranging from 0–6000 m. • result of an emergence of a series of geological uplifts over 10s of millions of years. The ocean eroded cliffs forming the terraces and inland cliffs on the islands central plateau • is the peak of a basalt volcanic seamount which rose an estimated 60 million years ago ~5,000 m from the ocean floor • marine environment includes ocean waters, sand flats, caves, coral reefs and walls, and coral heads or 'bommies' • significant features such as reefs, seamounts, trench, plateau and abyssal-plain • high species endemism.					
Central Western Province*	✓	—	—	—	—
Characteristics of the geomorphology and biological communities of the Central Western Province:					

IMCRA Provincial Bioregion	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
• it is characterised by a narrow continental slope incised by many submarine canyons and the most extensive area of continental rise in any of Australia's Marine Regions. The continental rise is located on the edge of the Perth Abyssal Plain (103,911 km^2) • a significant feature in the bioregion is the Perth Canyon, the largest of Australia's submarine canyons, which coincides with a distinct change in the distribution of marine organisms and marks the southernmost boundary for numerous tropical and sub-tropical species (note the PA intersects the northern section of the Central Western Province and does not intersect the Perth Canyon) • the bioregion includes several eddies hundreds of kilometres in diameter that spin in an anti-clockwise direction that form off the Leeuwin Current at predictable locations • the density of demersal fish in this bioregion is low, especially when compared with the South-east Marine Region: – fish density is highest at the shelf break and uppermost parts of the slope (~200-300 m water depth) where large adult snappers dominate – at greater depth on the slope (below 400 m water depth) demersal fish communities are dominated by many relatively small, benthic species (grenadiers, dogfish and cucumber fish) • the submarine canyons of this bioregion are key ecological features because they are thought to be linked to the localised small periodic upwellings that enhance productivity and attract aggregations of marine life Features and areas of ecological importance within the Central Western Province have been identified as: • demersal slope fish communities • West Coast Canyons and adjacent shelf break • meso-scale eddies (predictable locations south-west of Shark Bay, west of the Houtman Abrolhos Islands, southwest of Jurien Bay and west of Perth Canyon) • waters off the mid-west coast, WA.					
Central Western Shelf Province^	—	✓	—	—	—
Characteristics of the geomorphology and biological communities of the Central Western Shelf Province include: • the bioregion itself varies in depth from 0–100 m and in width from less than 20 km in the north to around 125 km in the vicinity of Shark Bay • a small area of reef and tidal sandwaves or sandbanks occur at the entrance to Shark Bay and within its vicinity • the banks and shoals in this bioregion are of note because they occur at latitudes significantly south of banks and shoals elsewhere in the NWMR • sand is the dominant component of the sediments of the Central Western Shelf Province, with small amounts of gravel and muds. The substrate within Shark Bay itself is predominantly sandy, with a small area of temperate reef at the opening of the bay • This bioregion is a transitional zone between the predominantly tropical flora and fauna of the north and temperate flora and fauna further south • the fish communities predominantly comprise temperate species with very little distinction between coastal and shelf communities • biological communities of the shelf are likely to include a sparse invertebrate assemblage of sea cucumbers, urchins, crabs and polychaetes on sandier substrates • harder substrate areas are likely to contain sessile invertebrates such as sponges, gorgonians and more diverse fish than sandy habitats • coastal fish species include jewfish and periodic/seasonal swarms of hardy heads that are food for a wide variety of species, including larger fish and whales • the biological communities within Shark Bay have been studied extensively and the bay itself is a declared World Heritage Area:					

IMCRA Provincial Bioregion	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
– the bay includes a diversity of habitats including areas of seagrass, sandy plains and rocky shoreline, in both high and low energy zones – shallow fringing coral reefs occur on the eastern side of many of the bay's islands – there are extensive sponge gardens and communities of bivalves and other mollusc species that are associated with finer sediments and mobile shifting banks – it is an important site for dugongs and it also supports the largest breeding population of loggerhead turtles in Australia, a substantial population of bottlenose dolphins, and significant numbers of whales (primarily humpbacks) and manta rays occur in northern and western Shark Bay in winter – Shark Bay and the adjacent shelf are also important areas for shallow water snapper (*Pagrus auratus*), which comprise three distinct breeding populations in the area, one in each inner gulf of Shark Bay and a third in the adjacent oceanic waters. Features and areas of ecological importance within the Central Western Shelf Province have been identified as: • Shark Bay–Dirk Hartog Island and surrounding waters.					
Central Western Shelf Transition^	—	✓	✓	—	—
Characteristics of the geomorphology and biological communities of the Central Western Shelf Transition include: • the bioregion is located entirely on the continental shelf and is comprised mainly of sandy sediments • this bioregion includes both State and Commonwealth waters between water depths of 0 m to ~80 m – Commonwealth waters in this bioregion represent <1% of the total area of the NWMR • the benthic ecological communities of the bioregion, include both tropical and temperate species transitioning along a north-south gradient • Ningaloo Reef[3] is the most significant geomorphic feature of this bioregion: – it extends along the Cape Range Peninsula for over 260 km, and is the only example in the world of an extensive fringing coral reef on the west coast of a continent – it is marked by a well-developed spur and groove system of fingers of coral formations penetrating into the ocean with coral sand channels in between – a lagoon on the inshore side separates Ningaloo Reef from the mainland – the biological communities of the Ningaloo Reef differ from the hard coral reefs located elsewhere in the NWMR • a large proportion of this bioregion is covered by the State and Commonwealth Ningaloo Marine Parks, which are one of the most significant hotspots of biodiversity within the NWMR • the Ningaloo Marine Parks incorporate a diversity of habitats including the seabed of the continental slope and shelf that supports demersal and benthic plants and animals including fish, molluscs, algae, sponges, soft corals and burrowing bivalves; as well as coral reefs and intertidal areas such as rocky shores and mangroves in State waters. Features and areas of ecological importance within the Central Western Shelf Transition have been identified as Ningaloo Marine Park – North West Cape.					
Central Western Transition^	—	✓	—	—	—
Characteristics of the geomorphology and biological communities of the Central Western Transition include: • the bioregion is characterised by large areas of continental slope, with sediments dominated by muds and sands that decrease in grain size with increasing depth					

[3] Ningaloo Reef also extends into the Northwest Province, Central Western Transition Province, and a small portion of the Northwest Shelf Province. The geomorphology and biological communities of Ningaloo Reef are discussed in this bioregion summary.

IMCRA Provincial Bioregion	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
• about 40% of the bioregion occurs in waters depths greater than 4,000 m and the deepest areas of the bioregion occur within the Cuvier Abyssal Plain at ~5,330 m • a large part of the bioregion comprises the Cuvier Abyssal Plain • Wallaby Saddle is another important topographic feature within this bioregion and is the most extensive area of this type of topographic feature in the NWMR • the benthic slope communities of this bioregion comprise both tropical and temperate species along a north-south gradient • the biological communities of the Central Western Transition are thought to be distinctive owing to the proximity of deep ocean areas to the continental slope and shelf, resulting in close interaction between pelagic species of the Cuvier Abyssal Plain and those of the slope and shelf • the harder substrate of the slope in waters of 200–2,000 m deep is likely to support populations of epibenthos such as bryozoans, sponges and encrusting coralline algae; these support larger infauna and benthic animals such as crabs, cephalopods, echinoderms and other suspension-feeding epibenthic organisms • in the deeper waters of the abyss, the benthic communities are likely to be sparse and include meiofauna (e.g. nematodes). Features and areas of ecological importance within the Central Western Transition have been identified as: • Wallaby Saddle • Cape Range Canyon and Cloates Canyon.					
Northwest Province^	—	✓	✓	—	—
Characteristics of the geomorphology and biological communities of the Northwest Province include: • bioregion occurs entirely on the continental slope and is comprised of muddy sediments • distinguished by a number of topographic features, such as the Exmouth Plateau, terraces and canyons (including the Swan and Cape Range canyons), as well as deep holes and valleys on the inner slope (including the Montebello Trough) • the benthic shelf and slope communities of this bioregion comprise both tropical and temperate species with a north-south gradient • the continental slope between North West Cape and the Montebello Trough has been identified as one of the most diverse slope habitats of Australia • the Exmouth Plateau is also likely to be an important area for biodiversity as it provides an extended area offshore for communities adapted to depths of ~1,000 m • information available on sediments in the bioregion indicates: – benthic communities are likely to include filter feeders and other epifauna – soft-bottom environments are likely to support patchy distributions of mobile epibenthos, such as sea cucumbers, ophiuroids, echinoderms, polychaetes and sea pens – biological communities within canyons in the bioregion are also poorly understood. Features and areas of ecological importance within the Northwest Province have been identified as: • Exmouth Plateau • canyons on the slope, including the Cape Range Canyon • demersal fish communities associated with the slope.					
Northwest Shelf Province^	—	—	✓	✓	—
Characteristics of the geomorphology and biological characteristics of the Northwest Shelf Province include: • bioregion occurs almost entirely on the continental shelf, except for a small area to the north of Cape Leveque that extends onto the continental slope • this bioregion includes more than 60% of the continental shelf in the NWMR					

IMCRA Provincial Bioregion	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
• continental shelf gradually slopes from the coast to the shelf break, but displays a number of seafloor features such as banks/shoals and holes/valleys, including: – Glomar Shoals occur in ~26–70 m water depth and are distinguished by highly fractured molluscan debris, coralline rubble and coarse carbonate sand – Leveque Rise (large plateau), which is one of only two shelf plateaux within the NWMR – significant areas of tidal sandwaves or sandbanks (ranging in height ~5–10 m) occur on the inner-most reaches of Exmouth Gulf, and are one of only three major occurrences of this type of feature in the NWMR – shelf also contains several terraces and steps that extend into adjacent bioregions and reflect ancient coastlines from when the sea level in the NWMR was lower; the most prominent of these occurs at a water depth of ~125 m • sediment differentiation occurs on a north-south gradient – south of Broome, sediment is relatively homogenous and dominated by sands with small proportion of gravel – north of Broome, sediment is highly variable with sand or gravel dominance in no discernable spatial pattern – mud increases within ~100 km of the coast, and within ~100 km of the shelf break, but is mostly absent from other areas • sandy substrates on the shelf within this bioregion are thought to support low density benthic communities of bryozoans, molluscs, and echinoids • sponge communities are also sparsely distributed on the shelf, but are found only in areas of hard substrate Features and areas of ecological importance within the Northwest Shelf Province have been identified as: • Browse Island and surrounding waters • Lacepede Islands and surrounding waters • Quondong Point, north of Broome and surrounding waters • West coast of the Dampier Peninsula, including Beagle and Pender bays and surrounding waters • Pilbara coast (between Exmouth and Broome) and surrounding waters • Exmouth Gulf—Muiron Islands and surrounding waters • ancient coastline at 125 m depth contour • Glomar Shoals.					
Northwest Transition^	—	—	✓	✓	—
Characteristics of the geomorphology and biological communities of the Northwest Transition include: • around half (52%) of the bioregion occurs on the continental slope, with smaller areas in the north-west of the bioregion located on the Argo Abyssal Plain and continental rise • encompasses a range of water depths, from the shelf break (~200 m water depth) to ~5,980 m over the Argo Abyssal Plain • other topographic features within the bioregion include areas of rise, ridges, canyons and apron/fans • sediments of the slope are dominated by sands, whereas the sediments of the abyssal plain/deep ocean floor are dominated by muds • the bioregion also has reefs such as Mermaid, Clerke, and Imperieuse reefs, which are collectively known as the Rowley Shoals • the benthos of the deep ocean areas are likely to support meiofauna (e.g. nematodes), larger infauna (e.g. polychaete worms, isopods), and sparsely distributed epibenthic communities (e.g. sea pens)					

IMCRA Provincial Bioregion	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
• mobile benthic species (e.g. deepwater sea cucumbers, crabs, polychaetes) are likely to be associated with the seafloor, and bioregion may support sparse populations of bentho-pelagic fish and cephalopods in low densities Features and areas of ecological importance within the Northwest Transition have been identified as: • Rowley Shoals—Mermaid Reef Marine National Nature Reserve, Clerke and Imperieuse reefs and surrounding waters • fish communities associated with the slope.					
Southwest Shelf Transition*	✓	—	—	—	—
Characteristics of the geomorphology and biological communities of the Southwest Shelf Transition: • Water depth in this bioregion ranges from 200 m near the shelf break to 5,920 m on the Argo Abyssal Plain • the Leeuwin Current has a significant influence on the biodiversity of this bioregion as it pushes subtropical water southward along the western edge of the bioregion • ridges and inshore lagoons characterise the seafloor of the continental shelf of this area • the bioregion contains a diversity of tropical and temperate marine life including a large number of endemic fauna species • species diversity of seagrasses in this bioregion is the highest in the world, with 14 species occurring • the inner shelf of the bioregion, extending between 0-50 m deep, includes distinct ridges of limestone reef with extensive beds of macroalgae • benthic communities on the outer shelf and shelf break are dominated by adult snapper, while filter feeding sponges and bryozoans dominate the hard bottom • inshore lagoons are thought to be important areas for benthic productivity and recruitment for a range of marine species – the shallow water, sheltered environments are located between the shore and the inner shelf ridge system and extend south well into the Southwest Shelf Province – these lagoons are characterised by extensive beds of macroalgae, interspersed with areas of seagrass which provide the primary source of benthic production inside the 50 m depth contour – they provide important habitat for the breeding and nursery aggregations of a number of species Features and areas of ecological importance within the Southwest Shelf Transition have been identified as: • coastal reefs around Kalbarri • Houtman Abrolhos Islands and surrounding waters • inshore lagoons • Fisherman Islands • Beagle Islands • Penguin Island • Lancelin Island • waters off the mid-west coast, WA • Jurien Bay south to Rottnest Island • western rock lobster • small pelagic fish.					
Timor Province^	—	—	—	✓	—
Characteristics of the geomorphology and biological communities of the Timor Province:					

IMCRA Provincial Bioregion	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
• water depth in this bioregion ranges from 200 m near the shelf break to 5,920 m on the Argo Abyssal Plain • the Timor Province is located on the continental slope and includes topographic features such as the Scott Plateau, the Ashmore Terrace, and part of the Rowley Terrace, as well as a portion of the Argo Abyssal Plain • the Scott Plateau is a significant geomorphic feature. It occurs in water depths of 2,000–3,000 m and is fringed by numerous spurs and valleys. It is separated from the Rowley Terrace by canyons including the Bowers Canyon • almost half of the reefs in the North-west Marine Region occur in the Timor Province • one of the most significant aspects of the reefs of the Timor Province is that they reflect a transition in reef type from algal-dominated reefs north of Ashmore Reef to hard-coral-dominated reefs south of, and including, Ashmore Reef • shallow reefs on the shelf break occur in close proximity to adjacent deep water muddy seabeds on the slope • the reefs and islands of the bioregion are regarded as biodiversity hotspots and include a range of important pelagic and benthic ecological communities • the reefs and islands in this bioregion are thought to be important biological stepping-stones between centres of biodiversity in the Indo–Pacific and reef ecosystems further south • coral reefs in this bioregion support a high biomass of fish species, including tropical reef fish, small pelagic fish, parrotfish and groupers as well as larger species. These reefs and their surrounding waters are also important habitats for cetaceans and seabirds • it is likely that important demersal communities also occur in the canyons, banks and deep holes of the bioregion, as well as on the Ashmore and Rowley terraces and Scott Plateau • It is likely that southern bluefin tuna travel through the bioregion on their way to and from spawning grounds between Java and Australia. Migrating whales may ‘ride’ the northward flows of the Eastern Gyral Current and South Equatorial Current enroute to breeding grounds off the Kimberley. Features and areas of ecological importance within the Timor Province have been identified as: • Ashmore Reef National Nature Reserve and Carter Island Marine Reserve and surrounding waters • Scott Reef and Seringapatam Reef and surrounding waters • Demersal fish communities associated with the upper and mid-slope • Canyons in the slope between the Argo Abyssal Plain and Scott Plateau and the north of Scott Reef.					

^*Source: Ref. 4.*

**Source: Ref. 15.*

4.2 Coastal communities and habitats

Coastal communities are biological communities that inhabit the coastal zone. Coastal habitats are areas of shoreline types that do or can support these communities. Similar to benthic communities (as described in Section 4.1), coastal communities are likely to play roles in maintaining the integrity and diversity of coastal ecosystems, and the supply of ecological services.

Based on Smartline (Ref. 16), a spatial database containing geomorphic classifications for Australia’s coasts, the shoreline types within the PA include various classifications along the coast (Table 4-3). It is noted that the database does not include information for the Christmas Island and Kimberley sections.

Table 4-3: Types of shorelines

Feature	Section				
	West Coast	Ningaloo	Pilbara	Kimberley ^	Christmas Island*
Hard bedrock shore	✓	✓	✓	—	—
Hard rock cliff (>5 m)	—	✓	—	—	
Muddy tidal flats	—	✓	✓	—	—
Sandy beach	✓	✓	✓	—	—
Sandy tidal flats	—	✓	—	—	—
Tidal flats	—	✓	✓	—	—

^ *The Smartline database categorises shoreline features within the Kimberley region as 'unclassified.'*

**There is currently no available data for Christmas Island in the Smartline database.*

The Seamap Australia spatial database collates and classifies marine and coastal habitats on the Australian continental shelf (Ref. 17). Table 4-4 outlines sensitive marine or coastal habitats (such as mangroves) within the PA as identified in the Seamap Australia spatial database. It is noted that the database does not include information for the Christmas Island section.

Table 4-4: Marine and coastal habitats

Feature	Brief overview of location
West Coast	Mangroves: • patches along the coast
Ningaloo	Mangroves: • Exmouth Gulf • Coral Bay • Shark Bay Saltmarsh: • Exmouth Gulf • Shark Bay Seagrass: • Shark Bay • Dorre Island • Bernier Island
Pilbara	Mangroves: • patches along the coast • presence around Forestier, North, Middle, South, Muiron, Bessieres, Barrow and Montebello Islands • west coast of Weerdee Island • east coast of Dixon and East Islands
Kimberley	Mangroves: • northeast coast of West Island
Christmas Island	N/A

4.2.1 Threatened ecological communities

Listed TECs are MNES under the EPBC Act, and a relevant value and sensitivity under the OPGGS(E)R. In Australia, three categories exist for listing TECs under the EPBC Act: critically endangered, endangered, and vulnerable.

A search of the TEC spatial database (Ref. 18) and searches of the online PMST (appendix a) identified one TEC, Subtropical and Temperate Coastal Saltmarsh classified as vulnerable, within the PA[4]. This TEC is present only in the Ningaloo section.

The Subtropical and Temperate Coastal Saltmarsh ecological community occurs within a relatively narrow margin of the Australian coastline, within the subtropical and temperate climatic zones south of the South-east Queensland IBRA bioregion boundary at 23° 37′ latitude along the east coast and south of (and including) Shark Bay at 26° on the west coast (Ref. 19).

The physical environment of this ecological community consists of coastal areas subject to regular or intermittent tidal influence Ref. 19). It is typically restricted to the upper intertidal zone, occurring within the astronomical tidal limit, often between the elevations of the mean high tide and the mean spring tide (Ref. 20). However, exceptions exist where areas maintain a regular or intermittent tidal connection; these are still considered part of the ecological community (Ref. 19). The Coastal Saltmarsh ecological community may also include areas with groundwater connectivity to tidal water bodies (Ref. 19).

Western Australian coastal areas support a diverse range of saline coastal wetlands that are closely linked to typical coastal saltmarshes. These include saline lakes on the coast and offshore islands, coastal lagoons (both open and closed), and the birridas (gypsum claypans) of Shark Bay (Ref. 19).

The Coastal Saltmarsh ecological community is predominantly associated with soft substrate shores of estuaries and embayments, such as sandy and/or muddy environments, and occasionally with low wave-energy open coasts (Ref. 21). The associated sediments are typically poorly sorted, anoxic sandy silts and clays, and often exhibit salinity levels significantly higher than seawater due to evaporation (Ref. 22).

The Coastal Saltmarsh ecological community primarily consists of salt-tolerant vegetation (halophytes), including grasses, herbs, sedges, rushes, and shrubs. This community is generally dominated by succulent herbs, shrubs, and grasses, with vegetation typically <0.5 m in height, although some reeds and sedges may exceed this height (Ref. 23).

A notable characteristic of this community is the high degree of endemism at the species level (Ref. 24; Ref. 25), although it also supports a variety of non-endemic species (Ref. 19).

A review of the Conservation Advice and/or Recovery Plans identified key threats associated with the Subtropical and Temperate coastal saltmarsh TEC. Where relevant to petroleum activities, these threats and relevant management advice are listed in Table 4-5.

[4] Only TECs with a coastal and/or marine interface have been identified and described.

Table 4-5: Summary of relevant conservation plans

Relevant Plan / Advice	Key threats	Relevant management advice
Conservation Advice for Subtropical and Temperate coastal saltmarsh (Ref. 19)	Invasive species	• manage shipping practices to minimise potential invasion of exotic macroinvertebrates, fish, meiofauna, and pathogen species; and include Coastal Saltmarsh in the sites monitored for such arrival
	Climate change	• enhance the resilience of the ecological community to the impacts of climate change by reducing other pressures
	Pollution/litter	• Identify Coastal Saltmarsh as important habitat in all oil spill contingency planning at national and State levels, and monitor the application of protocols on the management of spills involving saltmarshes
	Eutrophication	• none identified

4.2.2 Wetlands of international importance (listed under the Ramsar Convention)

Wetlands of international importance (Ramsar wetlands) are MNES under the EPBC Act, and a relevant value and sensitivity under the OPGGS(E)R.

At the time of writing this document, Australia has 67 Ramsar wetlands that cover >8.3 million ha. Ramsar wetlands are those that are representative, rare, or unique wetlands, or that are important for conserving biological diversity (Ref. 26). These are included on the List of Wetlands of International Importance held under the Ramsar Convention (Ref. 26).

A search of the Ramsar Wetlands of Australia spatial dataset (Ref. 27) and searches of the online PMST (appendix a) identified the presence of two Ramsar wetlands within the PA[5]. (Table 4-6), both of them in the Christmas Island section. The Ramsar Convention defines ecological character as the combination of the ecosystem components, processes, benefits, and services that characterise the wetland at a given point in time (Ref. 28). A summary of the ecological character of the wetlands is described in Table 4-6.

Table 4-6: Ramsar wetlands

Description	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Hosnies Spring	—	—	—	—	✓
Hosnies Spring Ramsar site is located on the eastern side of Christmas Island in the Indian Ocean ~2,800 km west of Darwin and ~900 km northeast of the Cocos Islands. The site is located within the Christmas Island National Park. At the time of listing (1990) Hosnies Spring comprised <1 ha of freshwater spring. In 2010 the boundary of Hosnies Spring was expanded from 0.33 ha to 202 ha (Ref. 29; Ref.30). Hosnies Spring Ramsar site is an area of permanent, shallow freshwater wetland, fed by a natural spring system located ~30 metres above sea level and 120 metres inland of the seaward cliff (Ref. 29). The Ramsar site includes surrounding terrestrial areas with rainforest grading to coastal scrub and includes an area of shoreline and coral reef (Ref. 31). The following summary of ecosystem components, processes and services has been extracted from Hale and Butcher (Ref. 30). *Ecosystem components and processes*					

[5] Only TECs with a coastal and/or marine interface have been identified and described.

Description	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
• climate: warm tropical climatic zone; high rainfall (2,000 mm per year); warm to hot year round • geomorphology settings: site is located within shore terrace on gravel overlying phosphoric soils; spring is situated at the base of the inland cliffs where spring water flows over a limestone flowstone • hydrological regime: groundwater is dominant, source for Hosnies Spring in a perched, unconfined aquifer that, discharges where impermeable volcanic rocks are close to the surface, flow rate is not known, but is expected to be low • water quality[6]: typical of limestone karst systems with alkaline conditions and relatively high concentrations of calcium; trace elements and metals are all low; nitrogen is predominantly in the form of nitrate; high concentrations of sulphate result in a sulphurous odour • mangroves: stand of mangroves from the genus *Bruguiera* covers the majority of the wetland, comprises a range of age classes with evidence of active regeneration, a number of very large trees (large than typical for the species), with the largest tree measuring 82 cm diameter at breast height and exceeding 40 m, between 300 and 600 trees in total (>2.5 cm diameter at breast height) and a density of between 10 and 20 trees per 100 m^2 • land crabs: supports large populations of at least three species: red crab (*Gecarcoidea natalis*), robber crab (*Birgus latro*), blue crab (*Discoplax hirtipes*). *Ecosystem services* • recreation and tourism: while the site is open to the public, tourism is not promoted at the site. Rather, the site is managed to provide a limited number of visitors an opportunity to visit a unique wetland that is largely undisturbed by humans • scientific and educational: the unique nature of the site and the pristine condition, provide excellent opportunities for research • supports near-natural wetland types: the spring at the Ramsar site is in near-natural condition and significant within the bioregion • food webs: interactions between land crabs and mangroves form an important food web at the site • distinct wetland species: blue crabs are reliant on the few permanent freshwater sites on Christmas Island (including Hosnies Spring) for reproduction, and for survival in the dry season • biodiversity: supports a variety of wetland species, communities and habitats including marine, terrestrial and freshwater dependent species • ecological connectivity: red crabs migrate from the plateau to the ocean to breed each year.					
The Dales	—	—	—	—	✓
The Dales, Christmas Island Ramsar site (The Dales) is located on Christmas Island in the Indian Ocean approximately 2,800 km west of Darwin, 2,600 km north-west of Perth, Australia, 900 km northeast of the Cocos Islands (Ref. 32). The Dales is located entirely within the Christmas Island National Park, in the west of the island, with the western boundary of the site extending to 50 m seaward from the low water mark. The site was listed as a Ramsar site in 2002. The Dales Ramsar site includes a series of seven watercourses, of which three support permanent springs and four support intermittent streams (Ref. 29; Ref. 32). The following summary of ecosystem components, processes and services has been extracted from Butcher and Hale (Ref. 32). *Ecosystem components and processes* • climate: warm tropical climatic zone. High rainfall (2,000 mm per year); warm to hot year round					

[6] Limited information (two snap shot surveys only).

Description	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island

- water quality[7]: water quality is good, with higher concentrations of some trace metals and major ions compared to upstream reference sites, due to the presence of volcanic rocks and significant crab populations
- terrestrial vegetation[8]: general descriptions provided by Mitchell (1985) and Du Puy (1993) for vegetation associations indicate five major associations, with tall rainforest the dominant type
- coral reef: The coral reef is limited and dominated by abiotic and hard corals of low diversity
- fish: community predominantly of Indo-Pacific origin. Endemism is low, seven endemic or near endemic species or sub-species. One endemic freshwater species recorded from the site.
- invertebrates (non-crab fauna): the site supports a low diversity of benthic marine invertebrates, but may also support anchialine fauna although no site specific data has been sourced to confirm this
- geomorphic setting: the island is a karstic landscape with key geomorphic features including the terrace formations, sea cliffs, and caves and other karst features
- hydrology: karstic drainage system of groundwater and surface ephemeral stream flow post heavy rainfall events during the wet season. Spring outflow of groundwater at three of the Dales is permanent
- land crabs: all 20 species of land crab occur within the boundary of the site. The Dales provide a major migration pathway for crabs to and from the ocean during spawning. The site is important for blue crabs in particular
- waterbirds: 11 waterbirds, including nine endemic species, one nationally listed vulnerable and one endangered species are found at the site. The site supports breeding seabirds including Abbott's booby and red-footed booby.

Ecosystem services

- recreation and tourism: The Dales is a popular recreational area for both tourists and locals. Two timber board walks have been installed. The Dales is the most popular sight-seeing destination on the island with the waterfall at Hugh's Dale being the greatest attraction
- science and education: Parks Australia undertakes and supports a range of research programs across the National Park, many of which are directly relevant to The Dales
- food webs: crab spawning provides a rich food supply to marine biota including whale sharks. In addition, the land crabs play a significant role in the energy dynamics of the forest affecting seedling recruitment and ultimately the structure of the forest. The invasion of the yellow crazy ant has significantly affected trophic relationships on Christmas Island
- provides physical habitat (for breeding waterbirds): terrestrial vegetation provides roosting and breeding sites for several species of waterbirds
- biodiversity: supports a variety of wetland species, communities and habitats including marine, terrestrial and freshwater dependent species
- special ecological, physical or geomorphic features: provides critical habitat for the Blue Crabs and Freshwater Crabs, provides examples of karst features such as tufa deposits at the Hugh's Dale waterfall, and possibly anchialine cave communities
- distinct or unique wetland species: red crabs are considered keystone species on the island
- threatened wetland species, habitats and ecosystems: The Dales Ramsar site supports nesting sites for the endangered Abbotts booby. The Christmas Island frigatebird has also been recorded from the site
- priority wetland species: Christmas Island supports a number of vagrant species listed under various international agreements
- supports near-natural wetland types: springs and karst systems are representative of the bioregion and considered in near natural condition at the time of listing

[7] Limited site-specific data, information from one survey in 2003 for Hugh's Dale may provide baseline data for time of listing

[8] Limited site specific data; descriptions of the vegetation are limited.

Description	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
• ecological connectivity: the streams of The Dales provide critical migration pathways for downward migration red, blue and robber crabs and return pathways for juvenile blue crabs in particular.					

4.3 Marine fauna

Listed threatened or migratory species are MNES under the EPBC Act, and a relevant value and sensitivity under the OPGGS(E)R. The following sections identify the presence of these species within the PA.

The Biologically Important Areas (BIAs) (Ref. 33) are located anywhere within the Australian marine environment including state, Commonwealth, and adjacent waters. They can also be designated over terrestrial areas used for biologically important behaviours, for example, nesting habitats for marine turtles and seabirds which are found on land. BIAs are spatially defined areas where aggregations of individual species are known to display biologically important behaviours (including breeding, foraging, resting, or migration) (Ref. 33).

The following information was generated from searches of the online PMST (appendix a), noting that the Commonwealth Climate Change, Energy, Environment and Water (DCCEEW) Australian Marine Spatial Information System (AMSIS) Map View (Ref. 34) and the dataset from the DCCEEW website (Ref. 35) were used to verify the presence of BIAs and habitat critical to survival of the species within the PA.

4.3.1 Marine mammals

Table 4-7 lists the threatened and/or migratory marine mammals that may be present within the PA. Additional information on these species is provided in the following subsections. The full list of marine species identified from the PMST is provided in appendix a.

Table 4-8 lists the individual BIAs for marine mammals and their known seasonal presence within the PA.

A review of the Conservation Advice and/or Recovery Plans identified key threats associated with threatened and/or migratory marine mammals that may be present within the PA. Where relevant to petroleum activities, these threats and relevant management advice are listed in Table 4-9.

In addition to the threatened and/or migratory marine mammal species identified in the tables below, an additional 28 listed marine mammal species (27 cetaceans, one pinniped) were identified as having the potential to occur within the PA (appendix a)

Table 4-7: Threatened and/or migratory marine mammals

Common name	Scientific name	Threatened status	Migratory status	Presence				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Cetaceans (whales)								
Antarctic Minke whale	*Balaenoptera bonaerensis*	—	Migratory	SLO	SLO	SLO	—	—
Blue whale	*Balaenoptera musculus*	Endangered	Migratory	MRKO	MRKO	MRKO	MRKO	SLO
Bryde's whale	*Balaenoptera edeni*	—	Migratory	SLO	SLO	SLO	SLO	SLO
Fin whale	*Balaenoptera physalus*	Vulnerable	Migratory	FBLO	FBLO	FBLO	FBLO	SLO
Humpback whale	*Megaptera novaeangliae*	—	Migratory	SKO	BKO	BKO	BKO	SMO
Pygmy right whale	*Caperea marginata*	—	Migratory	SMO	—	—	—	—
Sei whale	*Balaenoptera borealis*	Vulnerable	Migratory	FBLO	FBLO	FBLO	FBLO	SLO
Southern right whale	*Eubalaena australis*	Endangered	Migratory	SLO	SLO	SLO	—	—
Sperm whale	*Physeter macrocephalus*	—	Migratory	SMO	SMO	SMO	SMO	SMO
Cetaceans (dolphins)								
Australian humpback dolphin	*Sousa sahulensis*	Vulnerable	Migratory	—	SKO	SKO	SKO	—
Australian snubfin dolphin	*Orcaella heinsohni*	Vulnerable	Migratory	—	SMO	SKO	SKO	—
Killer whale	*Orcinus orca*	—	Migratory	SMO	SMO	SMO	SMO	SMO
Spotted bottlenose dolphin (Arafura / Timor sea populations)	*Tursiops aduncus (Arafura/Timor Sea populations)*	—	Migratory	—	SKO	SKO	SLO	—
Pinnipeds								
Australian sea lion	*Neophoca cinerea*	Endangered	—	BKO	SMO	—	—	—
Sirenians								
Dugong	*Dugong dugon*	—	Migratory	—	BKO	BKO	FBLO	—

Common name	Scientific name	Threatened status	Migratory status	Presence				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Legend: *BKO: Breeding known to occur within area* *FBLO: Foraging, feeding or related behaviour likely to occur within area* *MRKO: Migration route known to occur within area* *SKO: Species or species habitat known to occur within area* *SLO: Species or species habitat likely to occur within area* *SMO: Species or species habitat may occur within area*								

Table 4-8: BIAs for regionally significant marine mammals

Common name	Behaviour	Seasonal presence	Occurrence description	Section				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Cetaceans (whales)								
Humpback whale	Calving	Winter	Known to occur	—	—	—	✓	—
	Migration	Northern migration, late July to September	Known to occur	✓	—	—	—	—
	Migration	Winter	Known to occur	—	—	—	✓	—
	Migration (north)	Northern migration, late July to September	Known to occur	✓	—	—	—	—
	Migration (north and south)	Northern migration, late July to September	Known to occur	✓	✓	✓	✓	—
	Migration (north and south)	Northern peak July and southward peak October to November (Ref. 36)	Known to occur	✓	—	—	—	—
	Migration (north and south)	Southbound peak late September to mid-October. Northward peak mid-June to mid-July	Known to occur	✓	—	—	—	—
	Nursing	Winter	Known to occur	—	—	—	✓	—

Common name	Behaviour	Seasonal presence	Occurrence description	Section				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
	Resting	Winter	Known to occur	✓	✓	✓	✓	—
Pygmy blue whale	Foraging	Not identified in dataset	Known to occur	—	✓	✓	✓	—
	Known foraging area	Not identified in dataset	Known to occur	✓	—	—	—	—
	Migration	Northern migration (enter Perth canyon January to May; pass Exmouth April to August; continue north to Indonesia). Southern migration (follow WA coastline from October to late December)	Known to occur	✓	✓	✓	✓	—
Southern right whale	Migration	Approximately from April to October	Not identified in dataset	✓	✓	✓	—	—
	Reproduction	Approximately from May to September	Not identified in dataset	—	✓	✓	—	—
Pinnipeds								
Australian sea lion	Foraging (male)	Year-round	Likely to occur	✓	—	—	—	—
	Foraging (male and female)	Year-round	Known to occur	✓	—	—	—	—
	Breeding site	Not identified in dataset	Not identified in dataset	✓	—	—	—	—
	Haul out site	Not identified in dataset	Not identified in dataset	✓	—	—	—	—
Sirenians								
Dugong	Breeding	May to September	Known to occur	—	✓	—	—	—
	Breeding	Year-round	Known to occur	—	✓	✓	—	—
	Calving	Year-round	Known to occur	—	✓	✓	—	—
	Foraging	May to September	Known to occur	—	✓	—	—	—

Common name	Behaviour	Seasonal presence	Occurrence description	Section				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
	Foraging	June to November	Known to occur	—	✓	—	—	—
	Foraging (high density seagrass beds)	June to November	Known to occur	—	✓	—	—	—
	Foraging (high density seagrass beds)	October to April	Known to occur	—	✓	—	—	—
	Foraging (high density seagrass beds)	Year-round	Known to occur	—	✓	✓	—	—
	Migration	June to November	Known to occur	—	✓	—	—	—
	Nursing	Year-round	Known to occur	—	✓	✓	—	—

Table 4-9: Summary of relevant conservation plans—marine mammals

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
Blue whale	Conservation Management Plan for the Blue Whale 2015–2025 (Ref. 37)	Climate variability and change	• Continue to meet Australia's international commitments to reduce greenhouse gas emissions
		Noise interference	• assessing the effect of anthropogenic noise on blue whale behaviour • anthropogenic noise in biologically important areas will be managed such that any blue whale continues to utilise the area without injury, and is not displaced from a foraging area • EPBC Act Policy Statement 2.1— Interaction between offshore seismic exploration and whales is applied to all seismic surveys • ensuring behavioural impacts are considered when developing and updating policy documents on the management of cetaceans and anthropogenic noise
		Habitat modification	• none identified
		Vessel disturbance	• ensure all vessel strike incidents are reported in the National Ship Strike Database • ensure the risk of vessel strikes on blue whales is considered when assessing actions that increase vessel traffic in areas where blue whales occur and, if required, appropriate mitigation measures are implemented.
Fin whale	Conservation Advice for the Fin Whale (Ref. 38)	Climate and oceanographic variability and change	• continue to meet Australia's international commitments to reduce greenhouse gas emissions
		Anthropogenic noise and acoustic disturbance	• once the spatial and temporal distribution (including BIAs) of fin whales is further defined, an assessment of the impacts of increasing anthropogenic noise (including seismic surveys, port expansion, and coastal development) should be undertaken on this species • if required, additional management measures should be developed and implemented to ensure the ongoing recovery of fin whales.
		Habitat degradation including coastal development, port expansion and aquaculture	• none identified
		Pollution (persistent toxic pollutants)	• none identified

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
		Vessel strike	• ensure all vessel strike incidents are reported in the National Vessel Strike Database.
Humpback whale	Listing Advice for the Humpback Whale (Ref. 39)	Climate and oceanographic variability and change	• none identified
		Vessel disturbance and strike	• none identified
		Entanglement	• none identified
		Noise interference	• none identified
		Habitat degradation	• none identified
Sei whale	Conservation Advice for the Sei Whale (Ref. 40)	Climate and oceanographic variability and change	• continue to meet Australia's international commitments to reduce greenhouse gas emissions
		Anthropogenic noise and acoustic disturbance	• once the spatial and temporal distribution (including BIAs) of sei whales is further defined, an assessment of the impacts of increasing anthropogenic noise (including seismic surveys, port expansion, and coastal development) should be undertaken on this species • if required, additional management measures should be developed and implemented to ensure the ongoing recovery of sei whales.
		Habitat degradation including coastal development, port expansion and aquaculture	• none identified
		Pollution (persistent toxic pollutants)	• none identified
		Vessel strike	• ensure all vessel strike incidents are reported in the National Vessel Strike Database.
Southern right whale	National Recovery Plan for the Southern Right Whale (Ref. 41)	Anthropogenic climate change and climate variability	• continue to meet Australia's international commitments to address causes of climate change including greenhouse gas emissions • increase understanding of the effects of anthropogenic climate change on environmental conditions, including the impacts on prey availability in high latitude foraging areas and links with southern right whale foraging ecology, health, and

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
			population demographics (e.g. reproductive success).
		Entanglement - Marine debris	• none identified
		Habitat degradation	• coastal and offshore development actions are assessed according to principles of ecological sustainable development to ensure the risk of injury, auditory impairment and/or disturbance to southern right whales is minimised • baseline surveys and monitoring undertaken during activity implementation are conducted in accordance with best practice standards and guidelines to ensure standardised datasets are obtained and suitable to inform environmental management decision making that can reduce the risk of threats to southern right whales • current information on species' occurrence, particularly in HCTS, BIAs, and historic high use areas, are used to inform planning, assessment, and decision-making on marine infrastructure development actions.
		Anthropogenic underwater noise	• improve baseline understanding of southern right whale acoustic communication to better inform potential impacts from anthropogenic underwater noise • actions within and adjacent to southern right whale BIAs and HCTS should demonstrate that it does not prevent any southern right whale from utilising the area or cause auditory impairment • actions within and adjacent to southern right whale BIAs and HCTS should demonstrate that the risk of behavioural disturbance is minimised • ensure environmental assessments associated with underwater noise generating activities include consideration of national policy (e.g. EPBC Act Policy Statement 2.1) and guidelines related to managing anthropogenic underwater noise and implement appropriate mitigation measures to reduce risks to southern right whales to the lowest possible level • quantify risks of anthropogenic underwater noise to southern right whales, including studies aimed to measure physiological effects, behavioural disturbance, and changes to acoustic communication (e.g., masking of vocalisations) to whales.
		Collision	• assess risk of vessel strike to southern right whales in BIAs.

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
			• improve understanding of the behavioural response of southern right whales in close vicinity to vessels (e.g. type, number, distance) in BIAs to inform risk assessments of vessel strike • ensure environmental impact assessments and associated plans consider and quantify the risk of vessel strike and associated potential cumulative risks in BIAs and HCTS • ensure all vessel strike incidents are reported in the National Ship Strike Database managed through the Australian Marine Mammal Centre, Australian Antarctic Division.
		Disturbance from vessels and water activities	• none identified
		Pollution	• none identified
		Cumulative effects from threats	• none identified
Australian snubfin dolphin	Conservation Advice for *Orcaella heinsohni* (Australian snubfin dolphin) (Ref. 783)	Climate change	• undertake actions to reduce other anthropogenic stressors and pressures on the marine environment to facilitate resilience in vulnerable marine ecosystems that are considered suitable habitat
		Habitat loss and degradation	• Comprehensively assess coastal development that is likely to have a significant impact on Australian humpback dolphins. For example, in areas identified as habitat critical for the survival or inhabited by important populations of the species
		Anthropogenic underwater noise: • Industrial noise • Vessel noise	• ensure behavioural impacts are considered when developing and updating policy documents on the management of inshore dolphins and underwater anthropogenic noise • further understand what noise levels cause physiological damage and subsequent mortality to snubfin dolphins • further understand how the acoustic propagation of anthropogenic activities overlaps with snubfin dolphin hearing thresholds • further understand the impact of noise pollution from increasing vessel traffic and coastal construction on dolphin distribution and behaviour.
		Vessel strike	• ensure all vessel strike incidents are reported in the National Vessel Strike Database.

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
			• ensure the risk of vessel strike in Australian snubfin dolphins is considered when assessing actions that increase vessel traffic on areas the Australian snubfin dolphin occur and, if required mitigation measures are implemented.
Australian humpback dolphin	Conservation Advice for *Sousa sahulensis* (Australian humpback dolphin) (Ref. 784)	Climate change	• undertake actions to reduce other anthropogenic stressors and pressures on the marine environment to facilitate resilience in vulnerable marine ecosystems that are considered suitable habitat
		Habitat loss and degradation	• Comprehensively assess coastal development that is likely to have a significant impact on Australian humpback dolphins. For example, in areas identified as habitat critical for the survival or inhabited by important populations of the species
		Anthropogenic underwater noise: • Industrial noise • Vessel noise	• ensure behavioural impacts are considered when developing and updating policy documents on the management of inshore dolphins and underwater anthropogenic noise • further understand what noise levels cause physiological damage and subsequent mortality to Australian humpback dolphins • further understand how the acoustic propagation of anthropogenic activities overlaps with Australian humpback dolphin hearing thresholds • further understand the impact of noise pollution from increasing vessel traffic and coastal construction on dolphin distribution and behaviour.
		Vessel strike	• ensure all vessel strike incidents are reported in the National Vessel Strike Database • ensure the risk of vessel strike in Australian humpback dolphins is considered when assessing actions that increase vessel traffic on areas the Australian humpback dolphin occur and, if required mitigation measures are implemented.
Australian sea lion	Conservation Advice for the Australian Sea Lion (Ref. 42)	Marine debris	• assess the impacts of marine debris on Australian sea lion populations, and identify the sources of marine debris which have an impact • develop and implement measures to mitigate the impacts of marine debris on the species (including reducing the amount of these marine debris entering the oceans), noting linkages with the

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
			Threat Abatement Plan for the Impact of Marine Debris on Vertebrate Marine Life.
		Habitat degradation and pollution	• investigate the nature, extent and consequence of interactions between Australian sea lions and aquaculture activities, and mitigate any impacts (e.g. reduced habitat availability) • require all vessels to have oil spill mitigation measures in place, and implement jurisdictional oil spill response strategies as required • protect all sea lion habitat from habitat degradation due to onshore and offshore developments.
		Human disturbance	• monitor and mitigate impacts (including cumulative impacts) of human interactions on Australian sea lion colonies • control access to breeding colonies to minimise the impacts of disturbance on Australian sea lions.
		Climate change	• none identified
	Recovery Plan for the Australian Sea Lion (*Neophoca cinerea*) (Ref. 43)	Key threats listed are limited to fisheries related activities	• none identified
		Other factors that may be contributing to the lack of recovery include: • habitat degradation • pollution and oil spills • climate change.	• none identified

4.3.1.1 Antarctic minke whale

The Antarctic minke whale (*Balaenoptera bonaerensis*) is known to occur from approximately 21° S off Australia's east coast (Ref. 44) to 65° S in the Australian Antarctic Territory (Ref. 45). Records show sightings off all Australian states, except the Northern Territory (NT) (Ref. 44). In high-latitude winter breeding grounds outside Australia, these whales are typically found along the continental shelf edge (Ref. 46; Ref. 47), which may suggest a similar winter distribution in Australian Antarctic waters.

There are currently no population estimates for this species in Australian waters (Ref. 49), and information on their timing of presence, distribution, and behaviours, including migration and breeding patterns within Australian waters, is unknown. In Western Australian the species habitat is shown to potentially occur within the west coast, Ningaloo and southern border of the Pilbara PA boundaries (Ref. 49). The species is not known to occur within waters surrounding Christmas Island.

Antarctic minke whales are generally solitary or found in pairs, though large feeding aggregations of up to 400 individuals may form in high-latitude feeding areas (Ref. 48). The distribution of newly weaned calves is unknown, but likely to be in lower latitudes (Ref. 49).

In winter breeding grounds, Antarctic minke whales appear to occupy pelagic waters exceeding 600 m depth (Ref. 47). During the summer, they migrate to higher latitudes for feeding, primarily on Antarctic krill (*Euphausia superba*), but also on smaller krill species (*E. spinifera and E. crystallorophias*) and occasional copedods (Ref. 50; Ref. 51). Krill are pelagic and tend to occur in the upper layers of Antarctic waters, suggesting that Antarctic minke whales do not require deep diving to forage (Ref. 49).

Whaling data suggest that mature male Antarctic minke whales arrive in high-latitude Antarctic waters earlier than mature females, indicating possible sexual segregation in feeding grounds (Ref. 50; Ref. 52; Ref. 53; Ref. 54). Calls of Antarctic minke whales have been recorded in the Perth Canyon in July–August and December (Ref. 55).

No Biologically Important Areas (BIAs) have been identified in Australian waters.

4.3.1.2 Bryde's whale

Bryde's whale (*Balaenoptera edeni*) occur in temperate to tropical Australian waters, with two recognised provisional subspecies: the smaller coastal form, known as Eden's whale, and the larger oceanic form, the Bryde's whale (Ref. 56, Ref. 57). Both forms are typically distributed within latitudes of 40° N and 40° S, or the 20 °C isotherm (Ref. 44). The coastal whale is generally limited to the 200 m depth isobar and moves along the coast based on prey availability (Ref. 58), while the offshore form resides in deeper waters (500 m to 1,000 m) (Ref. 59). Their relatively short dive times suggest that these whales use the ocean's upper layers, making them pelagic (Ref. 59).

Bryde's whales have been recorded in all Australian states except the NT (Ref. 44). In Australian waters, data on the distribution, ecology, and behaviour of Bryde's whales remain limited (Ref. 61). Foraging behaviour has only been documented along the east coast of Australia (Ref. 61). McCauley (Ref. 67) detected Bryde's whales through acoustic loggers around Scott Reef WA (Kimberley section) from 2006 to 2009, noting year-round presence in low

numbers and a slight peak in calling density in April to May. Acoustic signals attributed to Bryde's whales have been recorded from north of Darwin to off Exmouth, showing consistent patterns without clear seasonality (Ref. 67).Individuals have also been observed feeding in winter off the coast of Carnarvon, WA (Ref. 44).

Currently, insufficient data exists to support comprehensive findings regarding Bryde's whale populations around Christmas Island. However, it is established that the species' habitat is known to occur within the region (Ref. 2 and Ref. 788).

Bryde's whale are typically solitary or found in pairs, with occasional groupings likely related to shared activities such as feeding (Ref. 59, Ref. 60). Bryde's whales are known to be income breeders (i.e. feed year-round in less productive waters), using adaptable foraging capabilities to exploit abundant and time-sensitive resources (Ref. 61). Coastal Bryde's whales primarily feed on schooling fish, while the offshore form consumes small crustaceans and cephalopods (Ref. 62, Ref. 63; Ref. 64).

The offshore Bryde's whale may migrate seasonally, moving to warmer tropical waters in winter (Ref. 59). Limited data suggest a possible preference for lower latitudes during breeding season (Ref. 65).

No BIAs have been identified for Bryde's whales in Australian waters.

4.3.1.3 Fin whale

Fin whales (*Balaenoptera physalus*) occur globally, from polar to tropical waters, but rarely in inshore waters (Ref. 68). Their distribution spans both hemispheres between latitudes 20–75° S (Ref. 69), and they exhibit well-defined migratory patterns moving between polar, temperate, and tropical waters (Ref. 70). Fin whales may travel in groups of 6 to 10, though solitary individuals and pairs are more common (Ref. 71).

In Australian waters, fin whale distribution is primarily known through stranding events and historical whaling records, with occurrences reported in Western Australia (WA), South Australia (SA), Victoria, and Tasmania (Ref. 44). Migration likely involves movement between Australian waters, warm breeding grounds, and cold feeding grounds (Ref. 72). Group size and movement are thought to adapt to long-term food availability rather than short-term environmental changes (Ref. 73).

Migration times are not well-documented, but sightings in Australian waters have occurred during summer and autumn (Ref. 72). Fin whales have been observed inshore near the Bonney Upwelling, Victoria, in summer and autumn during aerial surveys (Ref. 74). Acoustic detections have also been reported off the Perth Canyon, WA, between January and April 2000 (Ref. 75) and at Cape Leeuwin in April (Ref. 76, Ref. 77). Fin whales typically inhabit the Perth Canyon from May to late October, with peak activity in July, before returning to Antarctic waters (Ref. 77).

Fin whales may occur within the waters surrounding Christmas Island, however the full extent of their distribution is uncertain (Ref. 44).Passive acoustics monitoring (Ref. 76, Ref. 77) indicate that fin whales migrate northward along the WA coast from Cape Leeuwin to the Perth Canyon, with some individuals reaching as far north as Dampier (19°S). However, no fin whale vocalizations have been detected at Scott Reef, Onslow, or Montebello Islands (Ref. 76).

Sightings of fin whales feeding in the Bonney Upwelling suggest it may be a significant feeding ground (Ref. 72). Additionally, the Perth Canyon is likely an important feeding area (Ref. 76) due to its high zooplankton density (Ref. 78).

The total abundance and population trends of fin whales in Australian waters remain unknown (Ref. 68; Ref. 72). There are no known mating or calving areas, nor are any BIAs identified for fin whales in Australian waters.

4.3.1.4 Humpback whale

Humpback whales (*Megaptera novaeangliae*) (WA subpopulation) migrate annually between their feeding grounds in Antarctic waters and their calving grounds in Kimberley waters (Ref. 79). The exact timing of the migration period can vary from year-to-year, however in general the species are sighted in southern Australian waters in May, they then migrate northwards and southwards along the coast, with sightings rare after November (Ref. 80; Ref. 81).

Northbound humpback whales tend to remain around the 200 m water depth contour, while southbound humpback whales tend to travel closer to Barrow Island and generally occur between 50 m and 200 m water depths (Ref. 79). The migration (north and south) BIA corridor extends from the coast to out to ~100 km offshore in the Kimberley and Pilbara regions, reducing to ~50 km offshore south of North West Cape.

Humpback whales may occur within the waters surrounding Christmas Island as they are known to occur in all ocean basins worldwide (Ref. 81), however there is limited data available about the species distribution in these waters. .

The humpback whale breeding and calving grounds in the southern Kimberley region extend from Broome to the northern end of Camden Sound, particularly between Lacepede Islands and Camden Sound (Ref. 79). Breeding and calving occur in the region between mid-August and early-September (Ref. 79), followed by the start of the southern migration. Exmouth Gulf and Shark Bay are both important resting areas for migrating humpback whales, particularly for cow-calf pairs on the southern migration (Ref. 79). The southerly migration, from around the Lacepede Islands (north of Broome) extends parallel to the coast on approximately the 20–30 m depth contour (Ref. 79, Ref. 82). Southbound migration is more diffuse and irregular, lacking an obvious peak. An increase in southerly migrating individuals may be observed between the North West Cape and the Montebello Islands between August to early September (Ref. 79). The predicted peaks in humpback whale migration in the Montebello Islands region are late-July (northern migration) and early-September (southern migration) (Ref. 79). Females and calves are known to stop and rest in Exmouth Gulf and Shark Bay (Ref. 79). Peak densities of lactating females were observed in late September to early October around Exmouth Gulf (Ref. 79).

Calving, migration, nursing and resting BIAs for the humpback whale have been identified in the PA (Table 4-8,Figure 4-1)

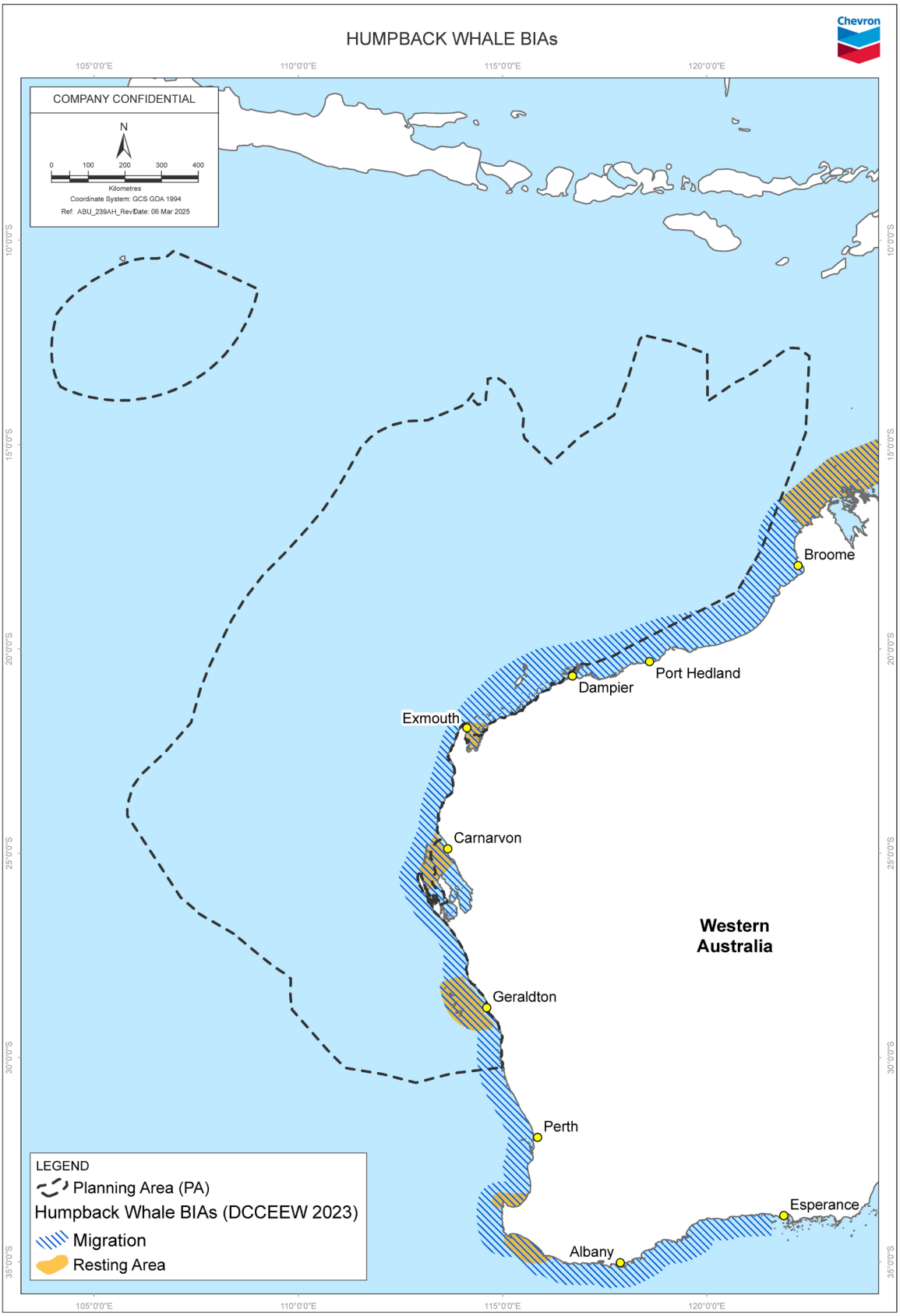

Figure 4-1: Biologically important areas for humpback whales

4.3.1.5 Omura's whale

Omura's whale (*Balaenoptera omurai*) was first described in 2003 and is distributed globally in tropical waters, though there remains limited knowledge of the species' behaviour and ecology, particularly in Australian waters (Ref. 83). The population of Omura's whales studied off northwest Madagascar is understood to be resident and non-migratory, with movements confined to a restricted range (Ref. 83).

A higher presence of Omura's whales has been identified in tropical to subtropical waters (Ref. 83, Ref. 84). Browne et. al. (Ref. 83) used passive acoustic monitoring from 2005 to 2023 in Australian waters to identify Omura's presence. The findings include:

- the southerly detection was at North West Cape, while the northerly was in the Timor Sea
- vocalisations were detected year-round near Browse Island and Scott Reef in the Kimberley region
- around the Montebello islands, vocalisations were present from October to June, and near Barrow Island, vocal presence was noted from December to May. In the Pilbara and Gascoyne regions, acoustic presence mostly peaked from February to April but was not observed during austral winter (June–August) and early spring (September)
- in nearshore areas (e.g. Thevenard Island, Port Hedland, Onslow), vocalisations were low or not detected
- most detections were from the continental shelf, with some in deeper waters, aligning with global observations.

The Omura whale is not known to occur within waters surrounding Christmas Island (Ref. 2).

An offshore trial of Distributed Acoustic Sensing (DAS) from December 2023 to mid-January 2024 recorded Omura's whales along the outer edge of the North West Shelf (Ref. 85). Similarly, soundscape monitoring in the Janz-lo field has identified the presence of Omura's whales.

No BIAs have been identified for Omura's whales in Australian waters.

4.3.1.6 Blue whale

4.3.1.6.1 Antarctic blue whale

The Antarctic blue whale (*Balaenoptera musculus intermedia*) is the largest animal to exist on the planet (Ref. 778). It migrates seasonally along Australia's west coast, traveling between its high-latitude feeding grounds in the Southern Ocean and breeding areas off the coast of WA (Ref. 773). These mammals primarily feed on krill during the austral summer in the nutrient-rich waters of the Southern Ocean, before embarking on their long migration northward to calve in the warmer waters off Australia's coast during the winter months (Ref. 774). The WA coastline, particularly around the Augusta and Albany regions, provides an important migratory habitat for these whales, offering a vital stopover for rest and rejuvenation before they return to the colder southern waters (Ref. 774).

Antarctic blue whales are classified as endangered, and their population is still recovering from the historical impacts of whaling (Ref. 778). As a result, Australian waters, including those off WA, are important to their protection (Ref. 778).

No BIAs have been identified for the Antarctic blue whale in the PA.

4.3.1.6.2 Pygmy blue whale

Pygmy blue whales (*Balaenoptera musculus brevicauda*) migrate along the west coast of Australia in the northern direction to their breeding grounds near the Indonesian Archipelago from mid-February to early-June, and in the southern direction to the feeding grounds in the Southern Ocean from mid-November to early-January (Ref. 86). Recent information collected from satellite tags shows that the Banda and Molucca seas in Indonesia are the likely destination for the northern migration of whales that feed off the Perth Canyon (Ref. 87; Ref. 88; Ref. 89). These seas are considered the northern terminus of the migration and potentially the breeding and calving ground, but may also act as a feeding area (Ref. 90; Ref. 91).

Acoustic monitoring conducted by McCauley and Jenner (Ref. 92) in the Exmouth and northern Montebello Islands region identified a peak period in the northern migration of pygmy blue whales from May to June, and from November through to late-December during the southern migration. It was estimated by McCauley and Jenner (Ref. 92) that between 700 and 1,500 pygmy blue whales migrated southward past Exmouth in 2004.

It is known the pygmy blue whales tend to follow the WA continental shelf edge between their feeding grounds at the Perth Canyon and the North West Cape. However, the migratory pathway of whales north of the North West Cape is less defined.

The migration BIA for pygmy blue whales has been historically described as occurring along the continental shelf edge between 500 m and 1,000 m water depths (Ref. 3; Ref. 37). However, more recent studies (e.g. Ref. 86; Ref. 87) suggest that pygmy blue whales are likely to transit through deeper and further offshore waters north of the North West Cape. Satellite tracking data showed pygmy blue whales on their northern migration travelled relatively near to the Australian coast (100±1.7 km) in water depths of 1,369.5±47.4 m, until reaching the North West Cape, after which they travelled further offshore (238±14 km) into progressively deeper water (2,617±143.5 m) (Ref. 87). Data from tagged pygmy blue whales also indicates that during their northern migration, the width of the migration path increases north of Montebello Islands, from ~175 km to ~690 km at its widest point (Ref. 93). Gavrilov et al. (Ref. 86) conducted a study using an array of ocean bottom seismographs to detect pygmy blue whales traversing the area to the northwest of the North West Cape during their southern migration. This study found that pygmy blue whales migrated southward much further from the WA coast compared to the northbound migration, at distances of up to 400 km from shore (Ref. 86). Pygmy blue whales have demonstrated extensive use of continental slope habitat off WA and only limited use of shelf waters (Ref. 93). This contrasts with southern Australia, where use of the shelf and shelf break by pygmy blue whales is more common.

McCauley and Jenner (Ref. 92) recorded 24-hour average counts of pygmy blue whales along the WA coast during their migrations periods and found that the migratory habits are short and sharp pulses for the southbound pygmy blue whales and a more protracted pulse of northbound pygmy blue whales. This

suggests that the southern migration pygmy blue whales are swimming purposefully through the area to reach their southern feeding grounds, thus resulting in the data collected for pygmy blue whales migrating through the area is not confounded by lingering pygmy blue whales but they are swimming steadily past. A difference in travel speed was also reported by Thums et al (Ref. 93), where median speed during northward migration was 2.4 km/h (<0.1–15.4 km/h, n=22), and southward migration was 4.0–5.0 km/h (n=2).

A recent study incorporating data collected from both passive acoustic monitoring and satellite telemetry data, was analysed and determined the 'most important areas' for migration[9] along the WA coast as an almost continuous stretch from southern WA to around the latitude of Rowley Shoals, and thereafter was more dispersed (Ref. 93).

Ferreira et. al (Ref. 94) compiled satellite tracking data for 38 pygmy blue whales and used movement models to distinguish between low and high move persistence and correlated the data with environmental variables. Typically, high move persistence is indicative of migration, while low move persistence is generally indicative of foraging or reproduction (Ref. 93). In alignment with other studies, the continental slope off the north-west Australian coast was predicted to be suitable habitat for migration (Ref. 94). Predictions from modelling based on passive acoustic data indicate greatest numbers of pygmy blue whales during April and June/July (northern migration), and November and December (southern migration) (Ref. 93). Monthly spatial predictions indicated higher densities around the Montebello Island region during May and June (northern migration) and November and December (southern migration) (Ref. 93; Ref. 94).

Pygmy blue whales aggregate in the Austral summer to feed at known locations on or adjacent to the continental shelf including the Perth Canyon, Great Southern Australian Coastal Upwelling System, and the sub-tropical convergence zone (Ref. 93). The areas around the Perth Canyon and Australian Coastal Upwelling System correspond to 'Foraging Areas' and 'Known Foraging Areas' within the *Conservation Management Plan for the Blue Whale* (Ref. 37). The C*onservation Management Plan for the Blue Whale* (Ref. 37) also identifies 'Possible Foraging Areas'[10], including two in WA, one off the Ningaloo coast, and another around Scott Reef. These 'Possible Foraging Areas' have been characterised as foraging BIAs.

Thums et al (Ref. 93) determined that pygmy blue whale movement off northwest WA was predominantly relatively fast, directed travel (high move persistence) interspersed with relatively short (median 28 hr) periods of low move persistence (Ref. 93).

The satellite tracking data reviewed in the recent study by Ferreira et. al., indicates 17 out of 38 tracked whales (~45%) displayed foraging movement behaviour in north-west WA (Ref. 94). Suitable foraging habitat was identified as a large semi-continuous area from the southern extent (28°S) to the northeastern edge of the modelled region (11.5°S) (Ref. 94). This area occurred almost exclusively on slope (91%), with a small amount of suitable habitat on deep ocean floor (7%) and on the shelf (2%) (Ref. 94).

[9] Grid cells with overlap between two metrics: largest percentage of whales and high move persistence, were designated as the 'most important areas' for migration (Ref. 93)

[10] "Evidence of feeding is based on limited direct observations or through indirect evidence, such as occurrence of krill in close proximity to whales, or satellite tagged whales showing circling tracks. Blue whales travel through on a seasonal basis, possibly as part of their migratory route" (Ref. 216).

Owen et. al. (Ref. 95) deployed a multi-sensor tag on a single pygmy blue whale, tracked its movement from the Perth Canyon region to Geraldton, and examined its dive behaviour. The whale completed a total of 1,677 dives over the duration the tag was attached (7.6 days). A total of 21 feeding dives were identified, with a mean maximum depth of 129 ± 183 m (range 13–505 m). Feeding behaviour appears to be largely a function of prey availability (krill) and their associated oceanographic drivers (i.e. surface currents, light attenuation, upwellings and seabed features) (Ref. 78; Ref. 96).

Data collected from both passive acoustic monitoring and satellite telemetry data, was analysed and determined the 'most important areas' for foraging along the WA coast included the Perth Canyon and vicinity, the shelf edge off Geraldton, and discontinuous use of the shelf edge from Ningaloo Reef to Rowley Shoals (Ref. 93). Although foraging areas are described as static, they are likely to be dynamic given their dependence on presence of prey (Ref. 93; Ref. 97). Studies (Ref. 78; Ref. 96; Ref. 98) have identified that variability in chlorophyll-a and oceanographic conditions (e.g. sea surface temperature, surface height anomaly) had a moderate to strong influence on probability of occurrence of whales suggesting suitable habitats and migratory occurrence may vary.

Data from a tagged pygmy blue whale off Exmouth (Ref. 99) suggests that pygmy blue whales within the waters off the North West Cape demonstrate preferential surface foraging in response to the vertical distribution of krill within these waters, primarily within the upper 100 m of the water column. Thums et al. (Ref. 93) states that ten of the 24 pygmy blue whales that were encountered during the 2020 field trip were observed to be surface feeding (implied by the visible baleen and pleats on the surface).

Pygmy blue whale likely to occur within the waters surrounding Christmas Island (Ref. 2), the occurrence and distribution of this species is widespread in Australian waters (Ref. 801), but is not well-documented in this region.

Biologically, surface feeding is an optimal behavioural response for pygmy blue whales, given the significantly reduced energetic costs associated with this strategy over lunge feeding at depth, which requires a significant oxygen and energetic demand (Ref. 95). Studies in several locations where pygmy blue whales are known to aggregate (New Zealand [Ref. 100]; California [Ref. 101], SA [Ref. 74]; Canada [Ref. 102]; Chile [Ref. 98]) have demonstrated evidence of surface or sub-surface (<100 m) foraging, determined through visual observations of lunge feeding and/or analysis of tagged data. In these instances, surface foraging was driven by the aggregation of krill at the surface (or sub-surface). Torres et al. (Ref. 100) noted that surface foraging adheres to the principles of the 'optimal foraging theory', which states that to maximise fitness, an animal adopts a foraging strategy that provides the most benefit (i.e. energy) for the lowest cost, thereby maximising the net energy gained.

Foraging and migration BIAs for the pygmy blue whale have been identified in the PA (Table 4-8, Figure 4-2).

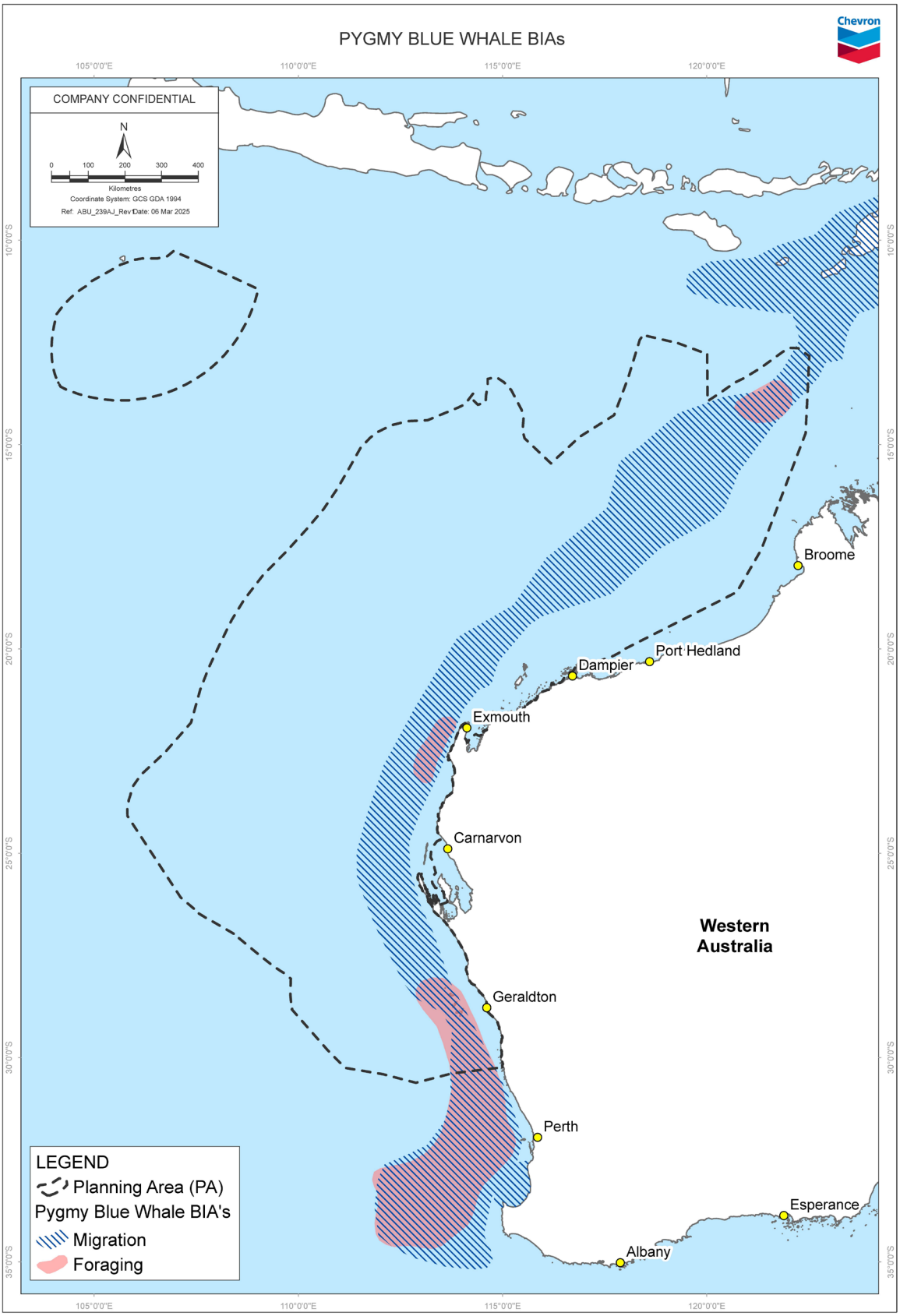

Figure 4-2: Biologically important areas for pygmy blue whale

4.3.1.7 Pygmy right whale

Pygmy right whales (*Caperea marginata*) are the smallest and least conspicuous of all baleen whales (Ref. 103), making them one of the least studied marine mammal species (Ref. 104). Unlike other balaenopterids, they do not undertake large-scale migrations, although juveniles may move further south into waters beyond 41°S (Ref. 103). Globally, they have a circumpolar distribution, favouring water temperatures of 5°C to 20°C (Ref. 105) and staying north of the Antarctic Convergence (Ref. 106).

In Australian waters, their range extends between 32°S and 47°S (Ref. 104). Their northern distribution on the west and east coasts is likely limited by the warm, south-flowing Leeuwin and East Australian currents (Ref. 103). Coastal upwelling zones are critical to their distribution (Ref. 103), while offshore areas like the Subtropical Convergence may serve as key habitats for sub-adults and adults (Ref. 103; Ref. 107). Juveniles weaned in Australian waters are thought to migrate south of 41°S to areas with greater prey availability (Ref. 103). Pygmy right whales are not known to occur within the Ningaloo, Pilbara, Kimberley or Christmas Island sections of the PA but they may occur within the west coast.

Dedden et al. (Ref. 108) suggest that pygmy right whales remain year-round in mid-latitude waters, feeding primarily in upwelling regions between southern Australia's coastal zones and the Subtropical Convergence, with no evidence of foraging in Antarctic waters. Sightings and strandings have been observed throughout the year; however, they are more frequent during austral spring and summer (September to February) than in autumn and winter (March to August) (Ref. 109), indicating possible seasonal movements (Ref. 110).

Key locations for pygmy right whales include Bass Strait, southeastern Tasmania, Kangaroo Island, southern Eyre Peninsula, and possibly southwestern WA (Ref. 44). These nutrient-rich areas provide an abundant supply of prey, including copepods, euphausiids, and small plankton (Ref. 44; Ref. 103; Ref. 111). Stomach content analyses have further supported this dietary preference, revealing evidence of these prey items. These analyses, which have also identified non-food items such as feathers and plastic bags, suggest that pygmy right whales employ surface-feeding strategies, such as skimming (Ref. 111).

No BIAs have been identified for pygmy right whales in Australian waters.

4.3.1.8 Sei whale

Sei whales (*Balaenoptera borealis*) are a cosmopolitan species, ranging from polar to tropical waters (Ref. 112, Ref. 113) and primarily inhabiting deep oceanic habitats. Their distribution, abundance and latitudinal migrations are largely determined by seasonal feeding and breeding cycles (Ref. 114). Generally, sei whales exhibit north-south migratory movements between polar, temperate, and tropical zones (Ref. 70). However, specific movement patterns and distributions within Australian waters remain largely undocumented (Ref. 112).

In Australian waters, sei whales are infrequently documented (Ref. 44), with sightings reported across all states and territories (including Indian Ocean Territories) except Victoria (Ref. 44, Ref. 115, Ref. 116, Ref. 117, Ref. 118). Sightings along the continental shelf in the Bonney Upwelling, SA, 20–60 km offshore (Ref. 119), suggest opportunistic feeding occurs between November and May (Ref. 112, Ref. 120). These whales typically feed on planktonic crustaceans, particularly copepods and amphipods (Ref. 112).

Sei whales are usually seen in small pods of three to five individuals, with group compositions sometimes influenced by age, sex, and reproductive status (Ref. 112). The diversity of habitat for sei whales may be influenced by varying physical conditions and prey availability (Ref. 112). Mating and calving occur mainly in winter, though specific breeding grounds in low latitudes have not been identified (Ref. 118, Ref. 114). Currently, there are no known mating or calving areas (Ref. 115), nor BIAs, identified for sei whales in Australian waters.

4.3.1.9 Southern right whale

The southern right whale (*Eubalaena australis*) occurs seasonally in coastal waters of Australia, with a circumpolar distribution between latitudes 20°S and 65°S (Ref. 121). Two populations, the western and eastern, are present in Australian waters and occur seasonally in State waters (Ref. 41). While there is evidence of population growth in the western group, southern right whale numbers remain below historical estimates (Ref. 41). The western population primarily occupies coastal waters between Exmouth/Ningaloo Reef off WA (Ref. 44) and Ceduna in SA (Ref. 122, Ref. 123). Southern right whales are not known to occur within the Kimberley or Christmas Island sections of the PA.

From May to October, southern right whales inhabit calving and nursing grounds, with peak calving occurring in late July and August (Ref. 41). Female-calf pairs generally occupy these ground for 2 to 3 months from June to September, while non-calf-bearing whales display more variability in their seasonal presence (Ref. 124, Ref. 125). Distribution is concentrated in shallow waters <10 meters deep, usually within 1 km of the coastline (Ref. 125, Ref. 126).

Female southern right whales display strong site fidelity to specific areas for breeding and feeding, often preferring shallow, sloping sandy bays along the southern Australian coast (Ref. 41). Despite this site fidelity, a small percentage of breeding females occasionally shift their calving locations (Ref. 127). Female-calf pairs have an average calving interval of three years (Ref. 41).

As capital breeders, southern right whale reproductive cycles are closely tied to their migratory behaviour (Ref. 41). Migration occurs between feeding and breeding grounds. Feeding whales are observed near the Subtropical Front (41–44°S) in January and December, where they consume copepods, while whales caught at higher latitudes (south of 50°S) primarily consume krill (Ref. 128, Ref. 129, Ref. 130). Coastal foraging in Australian waters has not been observed, and foraging ecology remains poorly understood (Ref. 41).

A migratory and reproductive BIA was identified for the southern right whale in the PA (Table 4-8,Figure 4-3). The migratory BIA in WA spans 3 nm from Exmouth to Augusta and extends to the Exclusive Economic Zone bordering SA. The reproductive BIA covers Exmouth Gulf and stretches from Mandurah to the South Australian border. Critical habitats for the species' survival have been identified within all reproductive BIAs across the species range (Ref. 41).

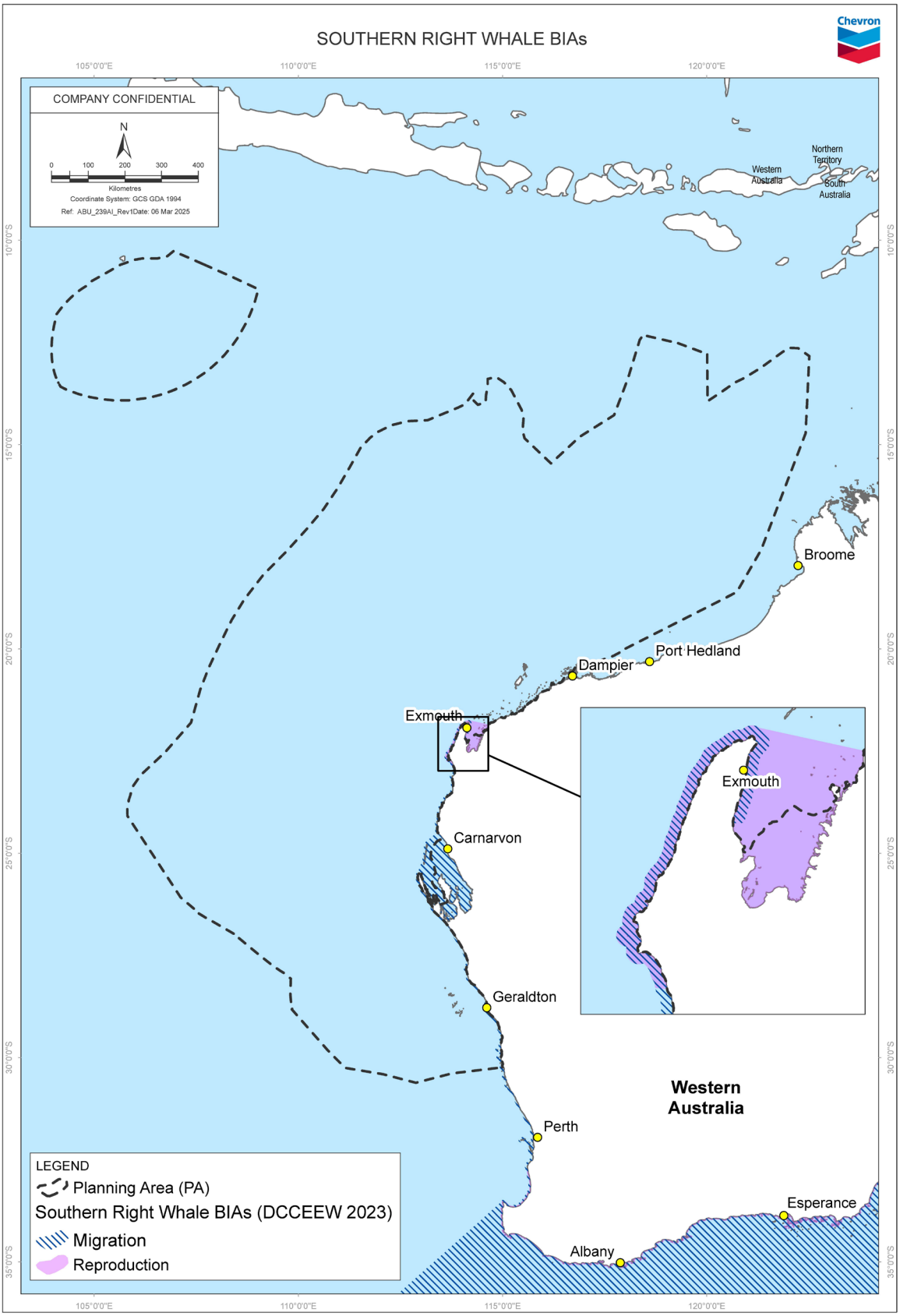

Figure 4-3: Biologically important areas for southern right whale

4.3.1.10 Sperm whale

Sperm whales (*Physeter macrocephalus*) have been recorded in all Australian states (Ref. 44). Gregarious by nature, sperm whales live in groups of up to 50 individuals, although males are sometimes solitary at higher latitudes (above 40°N) (Ref. 131). Typically, they inhabit deep waters (>600 m) and are uncommon in shallow waters (<300 m) (Ref. 131). In WA sperm whales appear to be less concentrated close to the shelf edge and more widely dispersed offshore (Ref. 44). The species may occur within all sections of the PA including waters surrounding Christmas Island however there is uncertainty in distribution specifics.

Female and young male sperm whales tend to remain in warmer waters, while adult males migrate between warmer and colder waters, such as those near Antarctica (Ref. 44). In Australian waters, they concentrate along a narrow area on the shelf edge off Albany, moving westward over the year (Ref. 44). Along the WA coast, where the continental shelf is less steep, sperm whales appear more widely dispersed offshore (Ref. 44).

Sperm whales are seasonal breeders, with a prolonged mating season extending from late winter to early summer (Ref. 132). In the Southern Hemisphere, conceptions occur from July to March, peaking in September and December (Ref. 133).

These whales feed regularly year-round, primarily on medium- to large-sized squids. Their diet also includes cephalopods and demersal fishes (Ref. 134, Ref. 135, Ref. 136, Ref. 137). Sperm whales are known to coordinate foraging dives that often reach depths of over 500 m, spreading out underwater while hunting (Ref. 132, Ref. 138).

Currently, there are no population estimates for sperm whales in Australian waters (Ref. 131). During seismic surveys conducted from December 2016 to April 2017 off North West Cape (Ref. 139), marine mammal observers recorded 23 sightings of sperm whales, with pod sizes ranging from one to six animals. These whales were observed in deep waters over the Montebello Saddle (up to 90 km from North West Cape) and in waters above canyons connecting the Cuvier Abyssal Plain and the Cape Range Peninsula KEF (Ref. 139).

No BIAs were identified within the PA. Foraging BIAs for sperm whales have been identified in southern WA (e.g. between Cape Leeuwin and Esperance) and across SA.

4.3.1.11 Australia humpback dolphin

Australian humpback dolphins (*Sousa sahulensis*) are listed as Vulnerable under the EPBC Act. They are found in tropical/subtropical waters (Ref. 140)in Australia, and their range extends from Shark Bay in WA, northward and eastward to southern Queensland (Ref. 141). The North West Cape and Exmouth Gulf coastal waters report the highest density of Australian humpback dolphins within this range (Ref. 142). Observations of humpback dolphins up to 60 km offshore recorded near Barrow Island and the western Lowendal Islands in WA (Ref. 143).

Australian humpback dolphins typically occur close to the coast (within 20 km from land) and in relatively sheltered offshore waters near shallow bays, inshore reefs, and coastal archipelagos or islands (Ref. 141). They are known to have a wide distribution along the coast of Shark Bay WA (Ref. 784) and in the western Pilbara region, Australian humpback dolphins frequent intertidal areas, with coral

reef and shallow waters identified as highly suitable habitats (Ref. 144). The species is not known to occur within the Christmas Island section of the PA.

Observations suggest year-round dolphin presence in the Montebello Islands, indicating some site fidelity to these areas (Ref. 146). Approximately 25% of the species range is in WA (Ref. 784).

Australian humpback dolphins feed across a wide range of inshore-estuarine coastal habitats in waters up to 40 m deep (Ref. 147). Their feeding behaviour varies, with dolphins sometimes dispersing over large areas or forming tight groups targeting localised prey. They are occasionally seen chasing fish into shallows and beaching themselves to catch their prey (Ref. 148). Reports also suggest they feed near fish farms and on baited drumlines (Ref. 141).

Australian humpback dolphins do not appear to undergo large-scale seasonal migrations, though seasonal fluctuations in abundance have been observed (Ref. 141). School sizes vary significantly based on behaviour, with larger groups observed while socialising compared to when foraging or traveling (Ref. 140).

No BIAs were identified within the PA. Breeding, calving foraging and resting BIAs for Australian humpback dolphins have been identified in northern WA (from Broome to the NT border) and around Darwin, NT. The draft Conservation Advice for Australian humpback dolphin (Ref. 147) defines shallow (≤15 m depth) inshore coastal waters and estuarine habitats within sub-tropical and tropical zones of Australia, up to 20 km from a coastline or landmass, as habitat critical to the survival of the species. Areas with high densities of teleost fish, cephalopods, and bivalves are considered important potential foraging habitats (Ref. 147).

4.3.1.12 Australian snubfin dolphin

Australian snubfin dolphins (*Orcaella heinsohni*) are listed as Vulnerable under the EPBC Act and occur in northern Australian waters, ranging from Broome in WA to the Brisbane River in Queensland (Ref. 149). This population is believed to be continuous with that of Papua New Guinea, though separate from populations in Asia (Ref. 150).

The snubfin dolphin has been recorded along the Kimberley coast in WA, including key areas such as Beagle and Pender Bays on the Dampier Peninsula and the tidal creeks between Kuri Bay and Cape Londonderry (Ref. 155). Group sizes vary from single individuals to 15 animals, typically forming small groups of 2–6 (Ref. 156) with an average school size of around five dolphins (Ref. 157).

The species has been recorded in the Exmouth Gulf, Pilbara and along the northern coastline of Australia. Sightings south of these regions are rare and are considered to be extra limited (Ref. 783). The species is not known to occur within the Christmas Island section of the PA.

Within Australia, snubfin dolphins are primarily found in shallow coastal and estuarine waters, often near freshwater sources and at depths of <20 m (Ref. 149, Ref. 151, Ref. 152, Ref. 153). Surveys conducted by D'Cruz et al. (Ref. 154) from 2007 to 2019 in the Yawuru Nagulagun (Broome coast) region suggest this area supports one of the largest known populations of Australian snubfin dolphins. Results showed that 56% of the dolphins displayed some residency, while 44% appeared to lack site fidelity—though this may be due to data restrictions or limited sampling intensity (Ref. 154).

These dolphins spend most of their time foraging and travelling, with less time devoted to socialising (Ref. 150). The prevalence of foraging in shallow coastal

and estuarine waters (<20 m) suggests these areas are crucial feeding habitats (Ref. 152), where they prey primarily on fish, squid, cuttlefish, octopus, and shrimp (Ref. 158).

No BIAs were identified within the PA. Breeding, calving foraging and resting BIAs for Australian snubfin dolphins have been identified in northern WA (from Broome to the NT border) and around Darwin, NT.

4.3.1.13 Killer whale

Killer whales (*Orcinus orca*) are recorded in all Australian states, with notable concentrations around Tasmania (Ref. 159) and additional sightings in SA and Victoria (Ref. 160). Populations may be highly fragmented in Australian waters, though overall population numbers remain unknown (Ref. 159). While killer whales are typically associated with cold, deeper waters, they are most frequently sighted along Australia's continental slope and shelf, particularly near seal colonies (Ref. 159). During summer, they are regularly observed along the ice edge in Australian territorial waters (Ref. 45).

WA has a number of document sightings of killer whales from Exmouth Gulf to Shark Bay WA during astral winter and spring during humpback migration (Ref. 786). Killer whales may occur in the waters of the entire PA, however sightings remain unverified within waters surrounding Christmas Island (Ref. 786).

No specific key localities are known for killer whales within continental Australian waters, but Macquarie Island (in the Australian subantarctic territory) is considered a key location (Ref. 161). Additionally, the Bremer Canyon Sub-Basin, south of WA, hosts one of the largest congregation of killer whales in the southern hemisphere (Ref. 162).

Killer whales are known to make seasonal movements, likely following migratory routes of their prey, although little is documented about these movements within Australian waters (Ref. 159). While foraging, they are capable of traveling 125–200 km per day (Ref. 163). Group sizes vary, with some gatherings reaching several hundred individuals, though typical groups contain <30 animals (Ref. 159).

Killer whales mate year-round, though the calving season spans several months. Currently, no specific calving areas have been identified within Australian waters (Ref. 159). As top-level carnivores, killer whales have a varied diet. While their specific diet in Australia remains uncertain, they have been reported preying on dolphins, young whales, dugongs, and Australian sea lions (Ref. 44). Additionally, Pitman et al. (Ref. 164) noted that killer whales target calves of humpback whales off Ningaloo Reef during the southern migration season (June to November).

No BIAs have been identified for killer whales in Australian waters.

4.3.1.14 Spotted bottlenose dolphin (Arafura/Timor Sea populations)

In Australia, the spotted bottlenose dolphin (*Tursiops aduncus*) ranges from northern NSW near Port Macquarie, through Queensland and the NT, and extends south along the WA coast to Perth (Ref. 44). However, the number and sizes of the Arafura/Timor Sea populations are unknown (Ref. 165).

Haughey et. al (Ref. 166) identified that the coastal waters of the North West Cape host a relatively large population of spotted bottlenose dolphins, with sightings primarily during winter (June–August). In spring, sightings were more frequent outside the Ningaloo Marine Park, though summer data was not included

in this study (Ref. 166). This population includes 141 individuals with moderate site fidelity and 229 with low site fidelity (Ref. 166).

The spotted bottlenose dolphin has been known to occur within the Kimberley Marine Park to feed, birth and raise their young (Ref. 787). The species is not known to occur within the Christmas Island section of the PA.

The spotted bottlenose dolphin typically inhabits warmer, inshore waters in Australia, often at depths <10 m depth and potentially up to 10 km offshore (Ref. 44). Jefferson et al. (cited in Ref. 165) described this species as primarily found in coastal and inshore areas, with higher population densities near the shore. Haughey et al. (Ref. 166) also found that the probability of dolphin sightings was highest within 1–2 km of the coast, extending up to 7 km. The extent of migrations or seasonal movements by the spotted bottlenose dolphin in the Timor and Arafura Seas remains unknown (Ref. 165), though Bannister et al. (Ref. 44) suggest the spotted bottlenose dolphin species may be migratory in temperate waters.

Bottlenose dolphins are described as catholic feeders, consuming a diverse diet of demersal, benthic, and reef-associated teleosts, cephalopods, elasmobranchs, and crustaceans (Ref. 44). Breeding, calving and foraging BIAs for spotted bottlenose dolphins in WA have been identified around Broome and Kimbolton. However, no BIAs have been identified in the PA.

4.3.1.15 Australian sea lion

The Australian sea lion (*Neophoca cinerea*) is the only pinniped species endemic to Australia (Ref. 167). Female sea lions typically remain within 60 km of their natal site (Ref. 168), while males may disperse up to 200 km (Ref. 169). Migration patterns for adult and juvenile males have been observed on the west coast of WA, between breeding colonies near Jurien Bay and non-breeding sites on islands near Perth (Ref. 170). Australian sea lion sightings have been confirmed across the years in the Abrolhos Islands and Shark Bay WA, however they may occur as far north as Ningaloo (Ref. 172). The species is not known to occur within the Pilbara. Kimberley or Christmas Island sections of the PA.

Australian sea lions inhabit a variety of environments (Ref. 171), including breeding sites (rookeries) and haul-out sites used during the non-breeding season. Haul-out sites are essential for predator avoidance, thermal regulation, and social activities (Ref. 172). Onshore habitats include exposed islands, reefs, rocky terrain, sandy beaches, vegetated foredunes, and swales. Caves and deep cliff overhangs also provide critical haul-out and breeding habitats (Ref. 173; Ref. 174).

A notable feature of breeding colony sites is the presence of shallow, protected pools where pups congregate. On the west coast of WA, breeding occurs on low-lying limestone islands well-protected by perimeter reefs (Ref. 171). Shelter, such as rock crevices or vegetation, is vital for adult females to conceal their pups (Ref. 175). Breeding colonies are confined to SA and WA waters, ranging from Kangaroo Island in SA to the Houtman Abrolhos Islands in WA (Ref. 171). However, the species also forages in adjacent Commonwealth waters (Ref. 43).

Foraging activities are typically restricted to the continental shelf, with juveniles, adult females, and adult males diving to depths of 90 m, 130 m, and 150 m, respectively (Ref. 176). As benthic foragers, Australian sea lions target a wide variety of demersal prey (Ref. 42; Ref. 43; Ref. 175), including fish, cephalopods, sharks, rays, crustaceans, penguins, eels, and gastropods (Ref. 177; Ref. 178;

Ref. 179; Ref. 180). They forage continuously while at sea, both during the day and at night (Ref. 181). Foraging behaviour varies geographically, with sea lions in WA spending more time foraging than those in SA, likely due to the less productive conditions of the Leeuwin Current (Ref. 182).

Foraging, breeding, and haul-out sites BIAs were identified for the Australian sea lion in the PA (Table 4-8, Figure 4-5). Australian sea lion pups have been recorded at 76 sites between WA and SA, with 58 of these identified as breeding colonies. These colonies are considered critical habitat for the survival of the species, as they fulfill essential life cycle requirements, such as reproduction (Ref. 43).

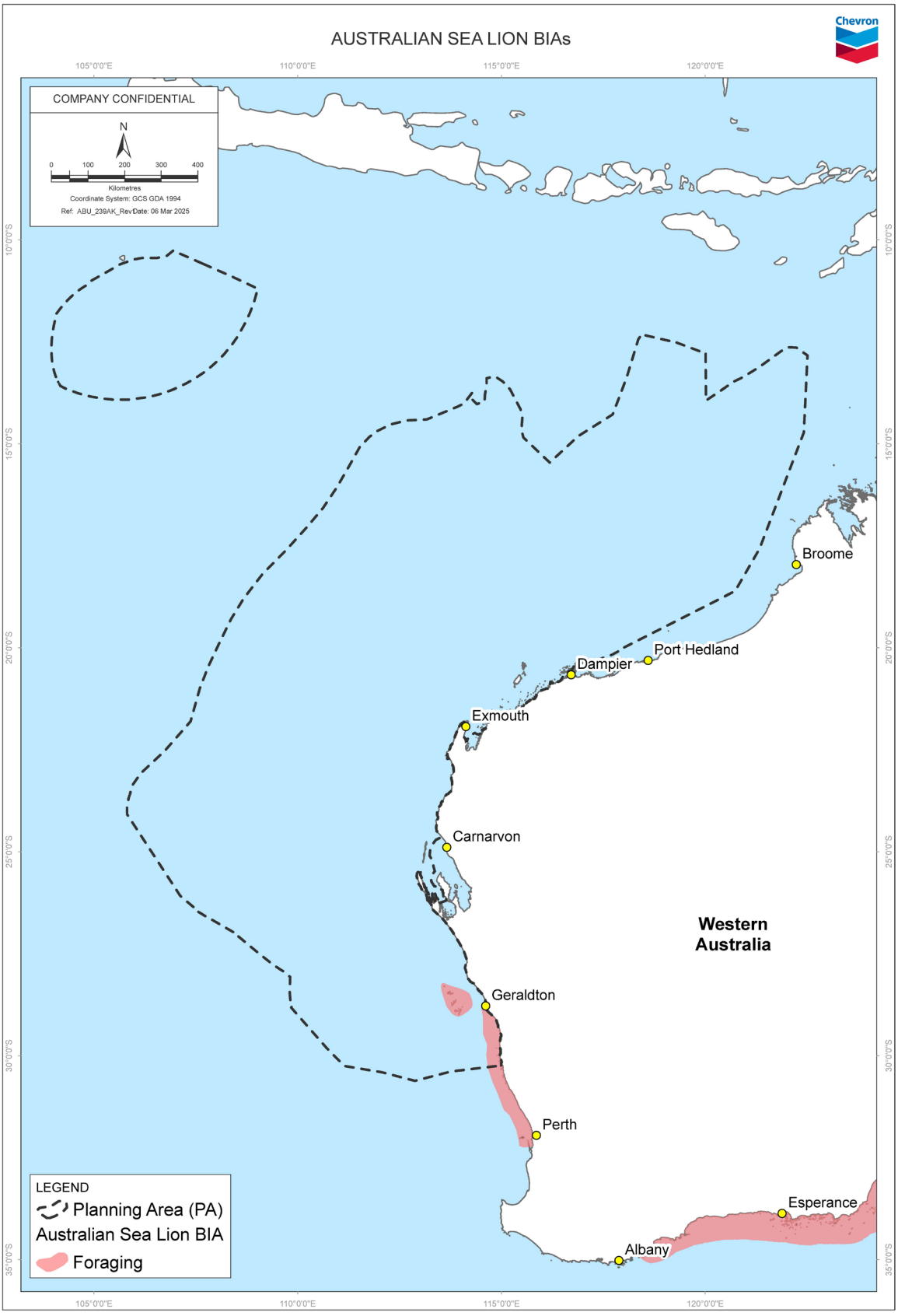

Figure 4-4: Biologically important areas for Australian sea lion

4.3.1.16 Dugong

Dugong (*Dugong dugon*) occur in the tropical and subtropical waters of the Indo-West Pacific (Ref. 183) and inhabit seagrass meadows in coastal waters, estuarine creeks, and streams (Ref. 155). In Australia, dugongs are found in the shallow coastal waters of northern Australia. Specific areas supporting dugongs in WA include Shark Bay (which has the largest population), Ningaloo and Exmouth Gulf, the Pilbara coast (from Exmouth Gulf to De Grey River; Ref. 184), and Eighty Mile Beach and the Kimberley Coast Region, including Roebuck Bay (Ref. 185).

Population estimates are unavailable (Ref. 186); however, aerial surveys since the mid-1980s suggest that dugong populations are now stable at a regional scale in WA (Ref. 187). Dugong feeding aggregations are typically found in extensive seagrass meadows, mangrove channels, and sheltered areas behind large inshore islands (Ref. 188). They also feed in offshore seagrass areas on wide, shallow, and protected sections of the continental shelf (Ref. 186), with feeding occurring at depths of up to 33 m (Ref. 189).

Dugong migration is variable, ranging from <15 km (micro-scale), to 100–560 km (macroscale; Ref. 190). Males, females, and females with calves all undertake large-scale movements (Ref. 186). Although dugong migration patterns are not well known in WA, it is believed that water temperature and the presence of seagrass influence their movements (Ref. 191).

Mating herds of dugongs have been observed in Moreton Bay, Shark Bay, and the northern Great Barrier Reef region (Ref. 188; Ref. 192; Ref. 193). A female may have one calf every three to seven years (Ref. 194).

Several BIAs for dugongs in WA have been identified around Exmouth and Broome, some of which are within the PA (Table 4-8, Figure 4-5).

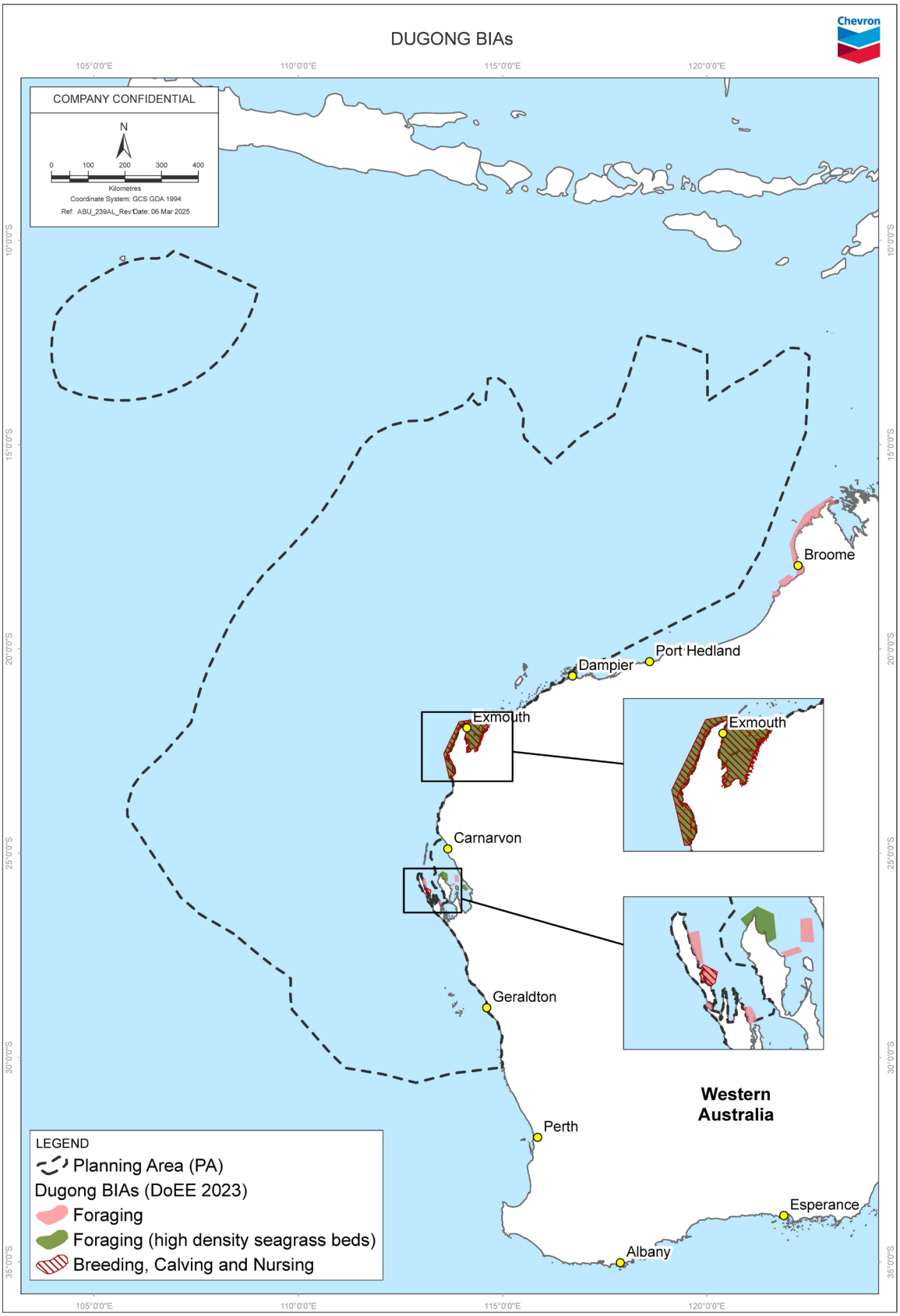

Figure 4-5: Biologically important areas for dugong

4.3.2 Reptiles

Table 4-10 lists the threatened and/or migratory marine reptile species that may be present within the PA. Additional information on these species is provided in the following subsections. The full list of marine species identified from the PMST is provided in appendix a.

Table 4-11 identifies habitats critical to the survival of marine turtles (Ref. 198) within the PA. Table 4-12 outlines the BIAs for marine reptiles and their known seasonal presence within the PA.

A review of the Conservation Advice and Recovery Plans identified key threats associated with threatened and/or migratory marine reptiles that may be present within the PA. Where relevant to petroleum activities these threats and relevant management advice are listed in Table 4-13.

In addition to the threatened and/or migratory marine reptile species identified in the tables below, an additional 20 listed marine reptile species (all sea snakes except the freshwater crocodile [*Crocodylus johnstoni*]) were identified as having the potential to occur within the PA (appendix a).

Studies (Ref. 212; Ref. 222; Ref. 223; Ref. 227; Ref. 228; Ref. 238; Ref. 239) note that sea snakes have shallow benthic feeding patterns and are rarely observed in water >20 m deep, indicating that these species are likely to be present in shallow waters.

Table 4-10: Threatened and/or migratory marine reptiles

Common name	Scientific name	Threatened status	Migratory status	Presence				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Crocodiles								
Salt-water crocodile	*Crocodylus porosus*	—	Migratory	—	SMO	SLO	SLO	—
Sea snakes								
Dusky sea snake	*Aipysurus fuscus*	Endangered	—	—	—	—	SKO	—
Leaf-scaled sea snake	*Aipysurus foliosquama*	Critically Endangered	—	—	SKO	SKO	SKO	—
Short-nosed sea snake	*Aipysurus apraefrontalis*	Critically Endangered	—	—	SLO	SKO	SLO	—
Turtles								
Flatback turtle	*Natator depressus*	Vulnerable	Migratory	FBKO	BKO	BKO	FBKO	SLO
Green turtle	*Chelonia mydas*	Vulnerable	Migratory	FBKO	BKO	BKO	FBKO	SLO
Hawksbill turtle	*Eretmochelys imbricata*	Vulnerable	Migratory	—	BKO	BKO	FBKO	SLO
Leatherback turtle	*Dermochelys coriacea*	Endangered	Migratory	FBKO	FBKO	FBKO	FBLO	SLO
Loggerhead turtle	*Caretta caretta*	Endangered	Migratory	FBKO	BKO	BKO	SKO	SLO
Olive ridley turtle	*Lepidochelys olivacea*	Endangered	Migratory	—	—	—	FBLO	SLO

Legend:
BKO: Breeding known to occur within area
FBLO: Foraging, feeding or related behaviour likely to occur within area
FBKO: Foraging, feeding or related behaviour known to occur within area
SKO: Species or species habitat known to occur within area
SLO: Species or species habitat likely to occur within area
SMO: Species or species habitat may occur within area

Table 4-11: Habitats critical to survival for marine turtles

Common name	Nesting location	Internesting buffer	Seasonal presence	Occurrence description	Section				
					West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Flatback turtle	Barrow Island, Montebello Islands, coastal islands from Cape Preston to Locker Island	60 km internesting buffer	October to March	Known to occur	—	—	✓	—	—
	Cemetery Beach, Port Hedland	60 km internesting buffer	October to March	Known to occur	—	—	✓	—	—
	Dampier Archipelago, including Delambre Island and Hauy Island	60 km internesting buffer	October to March	Known to occur	—	—	✓	—	—
	Eco Beach - coastal beach near Broome	60 km internesting buffer	July	Known to occur	—	—	✓	✓	—
	Eighty-mile beach - coastal beach	60 km internesting buffer	July	Known to occur	—	—	✓	—	—
	Lacepede Islands	60 km internesting buffer	October to March	Known to occur	—	—	—	✓	—
	Mundabullangana Beach	60 km internesting buffer	October to March	Known to occur	—	—	✓	—	—
Green turtle	Adele Island, Lacepede Islands	20 km internesting buffer	November to March	Known to occur	—	—	—	✓	—
	Barrow Island, Montebello Islands, Serrurier Island, and Thevenard Island	20 km internesting buffer	November to March	Known to occur	—	—	✓	—	—
	Dampier Archipelago	20 km internesting buffer	November to March	Known to occur	—	—	✓	—	—
	Exmouth Gulf and Ningaloo Coast	20 km internesting buffer	November to March	Known to occur	—	✓	✓	—	—
	Scott Reef	20 km internesting buffer	November to March	Known to occur	—	—	—	✓	—

Common name	Nesting location	Internesting buffer	Seasonal presence	Occurrence description	Section				
					West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Hawksbill turtle	Cape Preston to mouth of Exmouth Gulf including Montebello Islands and Lowendal Islands	20 km internesting buffer	October to February	Known to occur	—	—	✓	—	—
	Dampier Archipelago, including Delambre Island and Rosemary Island	20 km internesting buffer	October to February	Known to occur	—	—	✓	—	—
Loggerhead turtle	Exmouth Gulf and Ningaloo Coast	20 km internesting buffer	November to May	Known to occur	—	✓	✓	—	—
	Gnaraloo Bay and beaches	20 km internesting buffer	November to May	Known to occur	—	✓	—	—	—
	Shark Bay, all coastal and island beaches out to the northern tip of Dirk Hartog Island	20 km internesting buffer	November to May	Known to occur	—	✓	—	—	—

Table 4-12: BIAs for regionally significant marine reptiles

Common name	Behaviour	Seasonal presence*	Occurrence descriptor	Section				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Flatback turtle	Aggregation	—	Known to occur	—	—	✓	—	—
	Foraging	Aggregation inside of NW Island. Early in summer	Known to occur	—	—	✓	—	—
	Foraging	January	Known to occur	—	—	✓	—	—
	Foraging	—	Known to occur	—	—	✓	✓	—
	Foraging	Observations during July, no evidence of turtle activity October to November for Solitary, Steamboat, Carey, Preston Islands, and Cape Preston	Known to occur	—	—	✓	—	—

Common name	Behaviour	Seasonal presence*	Occurrence descriptor	Section				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
	Foraging	Summer	Known to occur	—	—	✓	—	—
	Foraging	Summer (nesting/internesting) year-round	Known to occur	—	—	✓	—	—
	Foraging	Year-round	Known to occur	—	—	✓	—	—
	Internesting	None identified in dataset	Known to occur	—	—	✓	✓	—
	Internesting	Summer (nesting/internesting) year-round	Known to occur	—	—	✓	—	—
	Internesting buffer	Aggregation inside of NW Island. Early in summer	Known to occur	—	—	✓	—	—
	Internesting buffer	January	Known to occur	—	—	✓	—	—
	Internesting buffer	—	Known to occur	—	—	✓	✓	—
	Internesting buffer	Summer	Known to occur	—	✓	✓	—	—
	Internesting buffer	Summer (nesting/internesting), year-round	Known to occur	—	—	✓	—	—
	Mating	Aggregation inside of NW Island. Early in summer	Known to occur	—	—	✓	—	—
	Mating	—	Known to occur	—	—	✓	—	—
	Mating	Summer (nesting/interesting) year-round	Known to occur	—	—	✓	—	—
	Migrating Corridor	Summer (nesting/interesting) year-round	Known to occur	—	—	✓	—	—
	Nesting	Aggregation inside of NW Island. Early in summer	Known to occur	—	—	✓	—	—
	Nesting	January	Known to occur	—	—	✓	—	—
	Nesting	—	Known to occur	—	—	—	✓	—

Common name	Behaviour	Seasonal presence*	Occurrence descriptor	Section				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
	Nesting	Short summer nesting season, predominantly November to March with peak in January	Known to occur	—	—	✓	—	—
	Nesting	Summer	Known to occur	—	—	✓	—	—
	Nesting	Summer (nesting/interesting) year-round	Known to occur	—	—	✓	—	—
Green turtle	Aggregation	Early summer	Known to occur	—	—	✓	—	—
	Aggregation	—	Known to occur	—	—	✓	—	—
	Basking	Summer	Known to occur	—	—	✓	—	—
	Foraging	Aggregation inside of NW Island. Early in summer	Known to occur	—	—	✓	—	—
	Foraging	January	Known to occur	—	—	✓	—	—
	Foraging	March to May	Likely to occur	—	—	—	✓	—
	Foraging	—	Known to occur	—	—	✓	✓	—
	Foraging	Observations during July, no evidence of turtle activity October to November for Solitary, Steamboat, Carey, Preston Islands, and Cape Preston	Known to occur	—	—	✓	—	—
	Foraging	Summer	Known to occur	—	—	✓	—	—
	Foraging	Summer (nesting/interesting) year-round	Known to occur	—	—	✓		
	Foraging	Summer / possibly year-round	Known to occur	—	—	✓	—	—
	Foraging	Year-round	Known to occur	—	—	✓	—	—
	Foraging	Year-round	Likely to occur	—	—	✓	✓	—
	Internesting	December to February	Known to occur	—	—	—	✓	—
	Internesting	—	Known to occur	—	—	✓	—	—
	Internesting	Peak season December to January	Known to occur	—	—	—	✓	—

Common name	Behaviour	Seasonal presence*	Occurrence descriptor	Section				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
	Internesting	Summer	Known to occur	—	—	✓	—	—
	Internesting	Summer (nesting /internesting) year round	Known to occur	—	—	✓	—	—
	Internesting	Year-round	Likely to occur	—	—	—	✓	—
	Internesting buffer	Aggregation inside of NW Island. Early in summer	Known to occur	—	—	✓	—	—
	Internesting buffer	January	Known to occur	—	—	✓	—	—
	Internesting buffer	—	Known to occur	—	—	—	✓	—
	Internesting buffer	Peak season December to January	Known to occur	—	—	—	✓	—
	Internesting buffer	Summer	Known to occur	—	✓	✓	✓	—
	Internesting buffer	Summer (nesting/internesting) year-round	Known to occur	—	—	✓	—	—
	Mating	Aggregation inside of NW Island. Early in summer	Known to occur	—	—	✓	—	—
	Mating	—	Known to occur	—	—	✓	—	—
	Mating	Summer	Known to occur	—	—	✓	—	—
	Mating	Summer (nesting/internesting) year-round	Known to occur	—	—	✓	—	—
	Migrating Corridor	Summer (nesting/interesting) year-round	Known to occur	—	—	✓	—	—
	Nesting	Aggregation inside of NW Island. Early in summer	Known to occur	—	—	✓	—	—
	Nesting	January	Known to occur	—	—	✓	—	—

Common name	Behaviour	Seasonal presence*	Occurrence descriptor	Section				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
	Nesting	—	Known to occur	—	—	—	✓	—
	Nesting	Peak season December to January	Known to occur	—	—	—	✓	—
	Nesting	Summer	Known to occur	—	—	✓	✓	—
	Nesting	Summer (nesting /internesting) year-round	Known to occur	—	—	✓	—	—
Hawksbill turtle	Foraging	Aggregation inside of NW Island. Early in summer	Known to occur	—	—	✓	—	—
	Foraging	—	Likely to occur	—	—	✓	—	—
	Foraging	Observations during July no evidence of turtle activity October to November for Solitary, Steamboat, Carey, Preston Islands, and Cape Preston	Known to occur	—	—	✓	—	—
	Foraging	Spring and early summer, peak nesting October	Known to occur	—	—	✓	—	—
	Foraging	Summer (nesting /internesting) year round	Known to occur	—	—	✓	—	—
	Foraging	Year-round	Known to occur	—	—	✓	—	—
	Foraging	Year-round	Likely to occur	—	—	✓	—	—
	Internesting	Spring and early summer, peak nesting October	Known to occur	—	—	✓	—	—
	Internesting	Summer (nesting /internesting) year round	Known to occur	—	—	✓	—	—
	Internesting buffer	Aggregation inside of NW Island. Early in summer	Known to occur	—	—	✓	—	—
	Internesting buffer	—	Known to occur	—	✓	✓	—	—
	Internesting buffer	Peak nesting in spring and early summer	Known to occur	—	—	✓	—	—
	Internesting buffer	Peak nesting in spring and early summer	Likely to occur	—	—	✓	—	—

Common name	Behaviour	Seasonal presence*	Occurrence descriptor	Section				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
	Internesting buffer	Peak season December to January	Likely to occur	—	—	—	✓	—
	Internesting buffer	Spring and early summer, peak nesting October	Known to occur	—	—	✓	—	—
	Internesting buffer	Summer (nesting/internesting) year round	Known to occur	—	—	✓	—	—
	Internesting buffer	Year-round	Known to occur	—	—	✓	—	—
	Mating	Aggregation inside of NW Island. Early in summer	Known to occur	—	—	✓	—	—
	Mating	Summer (nesting /internesting) year round	Known to occur	—	—	✓	—	—
	Mating	Spring and early summer, peak nesting October	Known to occur	—	—	✓	—	—
	Mating	Year-round	Known to occur	—	—	✓	—	—
	Migration corridor	Summer (nesting /internesting) year round	Known to occur	—	—	✓	—	—
	Nesting	Aggregation inside of NW Island. Early in summer	Known to occur	—	—	✓	—	—
	Nesting	—	Known to occur	—	✓	✓	—	—
	Nesting	Peak nesting in spring and early summer	Known to occur	—	—	✓	—	—
	Nesting	Peak season December to January	Likely to occur	—	—	—	✓	—
	Nesting	Spring and early summer, peak nesting October	Known to occur	—	—	✓	—	—
	Nesting	Summer (nesting /internesting) year round	Known to occur	—	—	✓	—	—
	Nesting	Year-round	Known to occur	—	—	✓	—	—
	Foraging	—	Known to occur	—	—	✓	✓	—

Common name	Behaviour	Seasonal presence*	Occurrence descriptor	Section				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Loggerhead turtle	Foraging	Year-round	Known to occur	—	—	✓	—	—
	Internesting	December to March	Known to occur	—	✓	—	—	—
	Internesting buffer	December to March	Known to occur	—	✓	—	—	—
	Internesting buffer	—	Known to occur	—	✓	✓	—	—
	Internesting buffer	Peak season monitored	Known to occur	—	✓	—	—	—
	Nesting	December to March	Known to occur	—	✓	—	—	—
	Nesting	—	Known to occur	—	✓	✓	—	—
	Nesting	Peak season monitored	Known to occur	—	✓	—	—	—

**in the seasonal presence column "—" indicates there is no supporting information in the database.*

Table 4-13: Summary of relevant conservation plans—marine reptiles

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
Dusky sea snake	Conservation Advice for dusky sea snake (Ref. 195)	Climate change and severe weather	• none identified
		Fossil fuel exploration and extraction, including: • oil pollution • excessive marine noise • pollution from heavy metals and other toxins • sedimentation and coral smothering	• use scientifically informed planning and regulation to avoid impacts across the known and likely distribution of the dusky sea snake. This includes (but is not limited to) eliminating: – the risk of discharged cooling water, or other heat sources, increasing water temperature for the dusky sea snake and its habitat – the risk of oil spill affecting the dusky sea snake and its habitat – the risk of other pollutants affecting the dusky sea snake and its habitat – all sources of excessive or constant marine noise that may impact the dusky sea snake. • should an oil spill occur that may impact the known or likely distribution of the dusky sea snake: – urgently use herding agents, bioremediation agents and mechanical means to contain and break down the oil – urgently cap or otherwise isolate the source of the oil to prevent further contamination – immediately resource and mobilise multiple expert wildlife care teams to search for, and rehabilitate, ill dusky sea snake.
		Marine vessels associated with constant marine noise	• develop minimal-noise operating guidelines that address constant noise exposure and distribute these to captains of vessels operating in waters where the dusky sea snake is known or likely to occur. Ensure vessels are operating under minimal-noise guidelines in these areas.
Leaf-scaled sea snake	Conservation Advice for leaf-scaled sea snake (Ref. 196)	Degradation of reef habitat	• ensure there is no disturbance in areas where the leaf-scaled sea snake occurs, excluding necessary actions to manage the conservation of the species.
Short-nosed sea snake	Conservation Advice for short-nosed	Degradation of reef habitat	• ensure there is no anthropogenic disturbance in areas where the short-nosed sea snake occurs,

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
	sea snake (Ref. 197)		excluding necessary actions to manage the conservation of the species.
Flatback turtle Green turtle Hawksbill turtle Leatherback turtle Loggerhead turtle Olive ridley turtle	Recovery Plan for Marine Turtles in Australia (Ref. 198)	Climate change and variability	• none identified
		Marine debris	• describe and quantify the impact of ingestion of debris on marine turtles, particularly those life phases using the open ocean • support the implementation of the EPBC Act Threat Abatement Plan for the impacts of marine debris on vertebrate marine life.
		Chemical and terrestrial discharge	• ensure spill risk strategies and response programs adequately include management for marine turtles and their habitats, particularly in reference to 'slow to recover habitats', e.g. nesting habitat, seagrass meadows or coral reefs • quantify the impacts of decreased water quality on stock viability • quantify the accumulation and effects of anthropogenic toxins in marine turtles, their foraging habitats and subsequent stock viability.
		Light pollution	• artificial light within or adjacent to habitat critical to the survival of marine turtles will be managed such that marine turtles are not displaced from these habitats • develop and implement best practice light management guidelines for existing and future developments adjacent to marine turtle nesting beaches • identify the cumulative impact on turtles from multiple sources of onshore and offshore light pollution.
		Habitat modification	• manage infrastructure, coastal development, dredging and trawling to ensure ongoing biologically important behaviours for marine turtle stocks continues • use up-to-date information regarding nesting, internesting and foraging habitat to inform future development proposals and approval decisions.
		Vessel disturbance	• none identified
		Noise interference	• none identified

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
		Diseases and pathogens	• none identified
Leatherback turtle	Approved Conservation Advice for leatherback turtle) (Ref. 199)	Ingestion of marine debris	• none identified
		Boat strike	• none identified
		Degradation of foraging areas	• identify and protect migratory corridors between nesting beaches and common foraging areas to facilitate colonisation
		Changes to breeding sites	• none identified

4.3.2.1 Salt water crocodile

The salt-water crocodile (*Crocodylus porosus*) inhabits Australian coastal waters, estuaries, lakes, inland swamps, and marshes (Ref. 200), reaching up to 150 km inland from the coast (Ref. 201). Its range extends across northern Australia, from Rockhampton in Queensland (Ref. 202; Ref. 203) to King Sound near Broome in WA (Ref. 204; Ref. 205). Despite its common name, the salt-water crocodile can persist in freshwater habitats (Ref. 206).

In WA, the species is found in most major river systems of the Kimberley region and in Parrys Creek, with the largest population located in the northwest (Ref. 207). There are also isolated records in rivers of the Pilbara region, around Derby near Broome, and as far south as Carnarvon on the mid-west coast (Ref. 208). Salt water crocodiles are not known to inhabit waters surrounding Christmas Island or as far south as the West Coast section of the PA.

The distribution and behaviour of salt-water crocodiles are influenced by temperature; they frequently move in and out of water for thermoregulation (Ref. 206). Out of water, they commonly bask, seek shade, and gape their mouths to manage body temperature (Ref. 209).

Preferred nesting habitats include elevated, isolated freshwater swamps that are not affected by tidal movements, as well as floating vegetation rafts (Ref. 200). Nesting occurs during the wet season, from November to May, with a peak between January and February (Ref. 206).

The salt-water crocodile's diet varies by habitat and size. Primary food sources include crustaceans (in higher salinity waters), insects (in freshwater swamps and upper mangroves), and mammals (Ref. 206), though only larger individuals consume mammals. Their prey includes a wide range of species, such as mud crabs, birds, sea turtles, fish, flying foxes, dingoes, domestic animals, livestock, and occasionally, humans (Ref. 210).

No BIAs for salt-water crocodiles have been identified in Australian waters.

4.3.2.2 Dusky sea snake

The dusky sea snake (*Aipysurus fuscus*) is endemic to Australian waters (Commonwealth and WA) in the Timor Sea off northwest WA, within the NWMR (Ref. 195). It has been sparsely recorded across reefs and shoals on the outer margin and mid-shelf of the Australian continental shelf, particularly at the Scott Reef complex and nearby Seringapatam Reef, Heywood Shoal, Ashmore Reef,

and Cartier Island (Ref. 211; Ref. 212). However, since the late 1990s and early 2000s, the dusky sea snake has not been detected at Ashmore Reef, Cartier Island, or Hibernia Reef, coinciding with a notable decline in the sea snake community in these regions (Ref. 211; Ref. 213; Ref. 214). The species is not known to occur within the Pilbara, Ningaloo, West Coast or Christmas Island sections of the PA.

As a reef specialist, the dusky sea snake inhabits complex hard coral reefs and shoals, both emergent and subsurface, typically on seamounts that rise from depth >100 m (Ref. 211; Ref. 212; Ref. 215). It is primarily observed in shallow reef areas (0–20 m) (Ref. 212), though it may occur in deeper areas that have had limited survey effort (Ref. 216). Observations at the Scott Reef complex in 2014 and Heywood Shoal in 2018 noted this species around coral reef-sand edges (Ref. 195; Ref. 217).

The dusky sea snake, an air-breathing marine reptile with toxic venom (Ref. 218), forages along reef-sand edges (Ref. 217) and open sandy substrates at low tide (Ref. 219). Observed behaviours include shifting small coral and shell fragments and probing the sand to locate prey (Ref. 219). Known prey species include long-finned goby, dartfish, three spot wrasse, and knife wrasse (Ref. 220; Ref. 221; Ref. 222).

The movement patterns and reproductive biology remain unknown (Ref. 195). No BIAs have been identified for this species in Australian waters. Habitat critical to the survival of the dusky sea snake includes shallow (<20 m), complex coral reef and shoal ecosystems with substantial coral cover, such as the Scott Reef complex and Seringapatam Reef. Deeper reef areas adjoining critical habitat may also be considered essential if deeper populations are confirmed (Ref. 195).

4.3.2.3 Leaf scaled sea snake

The leaf-scaled sea snake (*Aipysurus foliosquama*) is primarily known from Ashmore and Hibernia Reefs off the north-west coast of WA (Ref. 196), though it has not been detected there since 2001 (Ref. 212; Ref. 223). Anecdotal records suggest this species may also inhabit other WA coastal areas, including Shark Bay, Exmouth Gulf, Barrow Island, and offshore near Port Hedland (Ref. 224; Ref. 225). Model predictions have identified Ashmore Reef, Shark Bay, Exmouth Gulf, Barrow and the Montebello Islands as potentially suitable habitats for the leaf-scaled sea snake (Ref. 212). Supporting these predictions, the leaf-scaled sea snake has been recorded as bycatch by the Shark Bay trawl fishery (Ref. 226). The exact area of occupancy of these WA coastal subpopulations remain unknown (Ref. 223). The leaf scaled sea snake is not known to inhabit waters surrounding Christmas Island or the West Coast sections of the PA.

This sea snake typically inhabits shallow waters (<10 m) in protected reef flats near living coral and coral substrates (Ref. 223; Ref. 227; Ref. 228). However, findings suggest it can also tolerate cooler waters and non-coral habitats, including seagrass beds with sparse or no coral cover (Ref. 212; Ref. 223; Ref. 225). In other regions, access to fresh water has also been an important factor in sea snake distribution and habitat selection (Ref. 229).

As air-breathing reptiles, leaf-scaled sea snakes must surface to breathe but can remain submerged for 30 minutes to two hours between breaths (Ref. 230). They are generally solitary but sometimes gather in groups around specific coral outcrops, especially where gravid (pregnant) females are present (Ref. 228; Ref. 219).

Leaf-scaled sea snakes forage on reef flats by searching for prey in fish burrows (Ref. 219). Their diet includes coral-associated wrasse (*Halichoeres spp.)*, gudgeons (*Eleotridae*), clinids (*Tripterygion spp.*), and eels (*Anguilliformes*) (Ref. 228; Ref. 231; Ref. 221).

No BIAs have been identified for this species in Australian waters.

4.3.2.4 Short-nosed sea snake

The short-nosed sea snake (*Aipysurus apraefrontalis*) endemic to WA, inhabits offshore waters of north-western Australia, including coastal areas between Exmouth and Broome and remote reefs on the NWS (Ref. 225; Ref. 232; Ref. 233). Most specimens have historically been collected from Ashmore and Hibernia Reefs (Ref. 197; Ref. 234), where they disappeared between 1998 and 2002 (Ref. 235; Ref. 236). However, in April 2021, a short-nosed sea snake was observed 67 m below the ocean surface at Ashmore Reef during a deep-sea expedition (Ref. 237).

Model predictions have identified Ashmore Reef, Exmouth Gulf, Murion, and the Montebello Islands, as well as regions near Rowley Shoals, as suitable habitats for the short-nosed sea snake, despite the lack of historical sea snake records in the latter area (Ref. 212). These predictions are supported by recent captures of short-nosed sea snakes in prawn trawl bycatch in the Exmouth Gulf and a specimen found washed ashore near Broome (Ref. 225). The short-nosed sea snake is not known to occur in waters surrounding Christmas Island or the West Coast sections of the PA.

The species typically inhabits reef flats or shallow waters along the outer reef edge, at depths of up to 10 m (Ref. 222; Ref. 238; Ref. 239). During daylight hours, it is often seen resting under small coral overhangs or coral heads in 1–2 m of water (Ref. 239). Guinea and Whiting (Ref. 219) noted that few short-nosed sea snakes venture >50 m from the reef flat (Ref. 233).

Like other sea snakes, short-nosed sea snakes are air-breathing and surface regularly, although they can remain submerged for 30 minutes to two hours (Ref. 233). Their diet consists of fish, such as Eviota spp. (*Gobiidae*; Ref. 240), and eels, which they capture by probing burrows in the sand (Ref. 197).

No BIAs for short-nosed sea snakes have been identified in Australian waters.

4.3.2.5 Flatback turtle

Flatback turtles are found throughout Australia’s marine environment and are most commonly found within the northern coastlines. Australia is the only country where flatback turtles nest and is home to some of the largest rookeries in the Indo-pacific region (Ref. 198). Flatback turtles are primarily carnivorous and feed predominantly on benthic invertebrates. The flatback turtle may occur in all sections of the PA.

The Montebello and Lowendal Islands and Barrow Island support flatback turtle (*Natator depressus*) nesting, occurring from October to March, with a peak in November to January (Ref. 241). The Montebello and Lowendal Islands and Barrow Island are identified as important nesting habitat for the Pilbara stock, as is the associated 60 km internesting buffer (Ref. 198, Ref. 241).

On Barrow Island, nesting activity is concentrated on the central east coast on sandy, low-sloped, low-energy beaches with wide, shallow intertidal zones

(Ref. 242; Ref. 243). Limited nesting activity has also been recorded on the south-west, north, and north-east beaches of Barrow Island (Ref. 244).

Ningaloo is not an identified nesting location for flatback turtles however it is known to be a foraging ground for the species (Ref. 198). Although they may occur within the waters surrounding Christmas Island, the flatback turtle is not known to nest on the Island.

During internesting, turtles remain close to the nesting beach or rookery (Ref. 198) The 60 km internesting buffer defined within the *Recovery Plan for Marine Turtles in Australia* (Ref. 198) is based primarily on the movements of tagged internesting flatback turtles in WA (Ref. 245). The study tracked 56 turtles from four different rookeries, which demonstrated varying internesting movements, with distances ranging from 3–62 km, with some turtles at all four rookeries remaining within 10 km of their nesting beaches. However, tracking data showed these movements were largely longshore movements in nearshore coastal waters or travel between island rookeries and the adjacent mainland, which represent the greater distances (Ref. 245). There is little evidence to suggest that flatback turtles move to deep offshore waters during internesting periods.

A habitat suitability modelling study for internesting flatback turtles in the NWS region of WA (Ref. 246) was conducted to identify areas of suitable flatback turtle internesting habitat and determine overlap with identified industrial hazards. The study used a turtle tracking dataset of 47 nesting female turtles from five important rookeries in the NWS study area, including Barrow Island. The results showed internesting flatback turtles from all rookeries remained within water depths of <44 m, with a mean depth of <10 m (Ref. 246). Results also showed internesting turtles from all rookeries remained within <28 km of the nearest coast, with a mean distance from the coast of <6.1 km. The habitat suitability modelling study defined suitable flatback turtle internesting habitat as water depths of 0–16 m within 5–10 km of the coast. Unsuitable flatback turtle internesting habitat was defined as waters >25 m deep and >27 km from the coast (Ref. 246).

Another recent study involving satellite tracking data for 11 flatback turtles following nesting on the Lacepede Islands (Ref. 247) found that flatback turtles remained at an average distance of 15.75±12.25 km from the nesting beach in water depths of <20 m.

Other previous studies (e.g. Ref. 248; Ref. 249; Ref. 250) have also presented findings that internesting behaviour was only observed in water depths of <40 m. One of these studies (Ref. 250) further indicates that internesting flatback turtles have relatively shallow dives, with 85% of the time during spent in ≤20 m water depth, of which most was spent in 5–10 m (27±2.7%) and 10–15 m (22.3±3.5%) water depths.

Flatback turtle post-hatchlings are believed to remain within the continental shelf waters of Australia during this life stage (Ref. 198). However, there is a significant knowledge gap regarding the juvenile and sub-adult phases of flatback turtles (Ref. 198).

Habitat critical to the survival of flatback turtles, along with BIAs, have been identified within the PA (Table 4-11, Table 4-12, Figure 4-6).

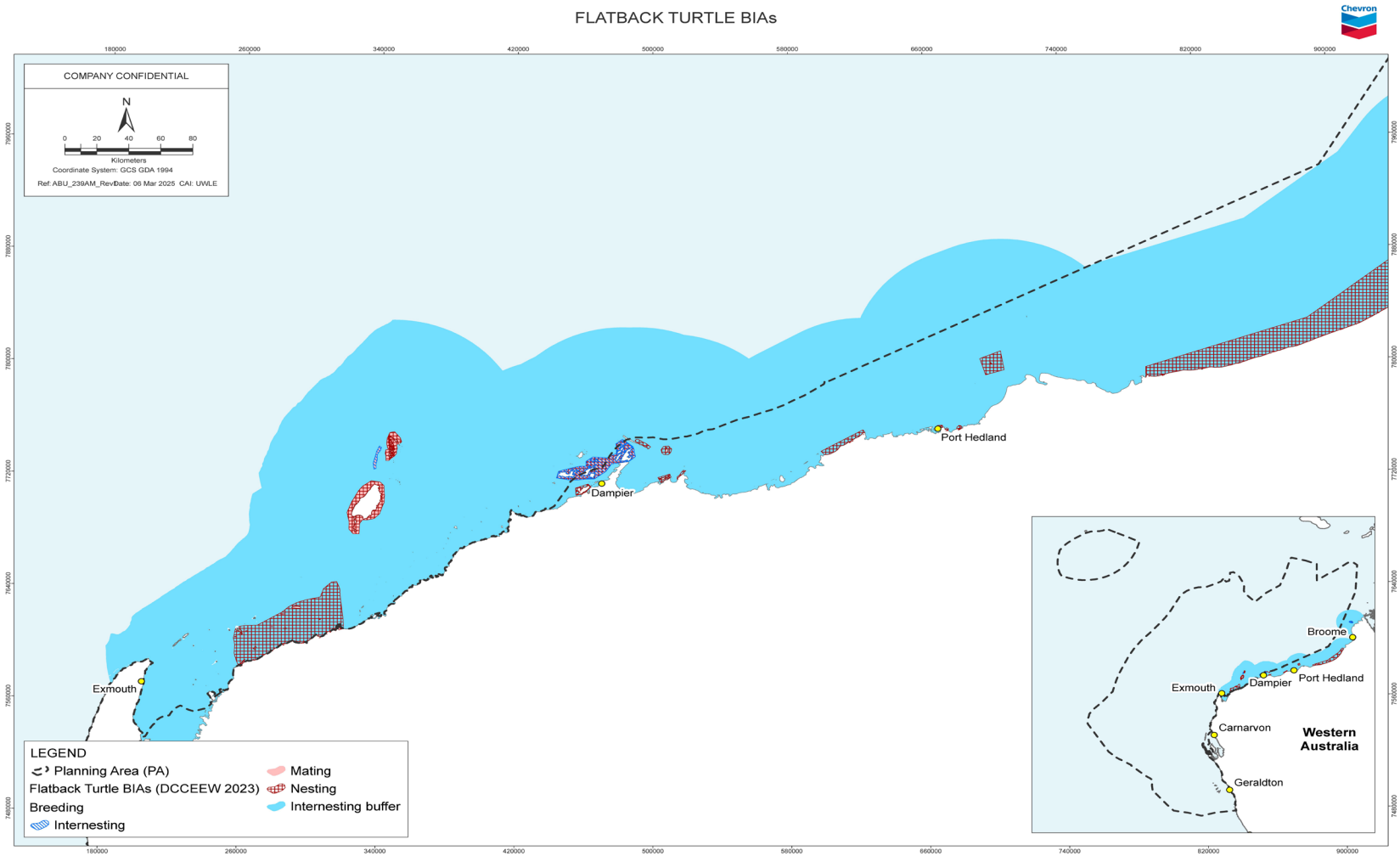

Figure 4-6: Biologically important areas and habitat critical to the survival of the species, for flatback turtles

4.3.2.6 Green turtle

In Australia, green turtles are distributed across nine genetically distinct stocks with some green turtles in Australia that are part of stocks that breed in other countries (Ref. 198). Green turtles are found in Australian waters off the NT, Queensland and Western Australian coastlines with limited numbers in NSW, Victoria and SA (Ref. 198).

The Montebello Islands and Barrow Island supports green turtle (*Chelonia mydas*) nesting, occurring from November to March. The Montebello Islands are identified as nesting habitat critical to the survival of the NSW stock, as is the 20 km internesting buffer around the Montebello Islands (Ref. 198).

The NWS stock is one of the largest green turtle stocks in the world and the largest in the Indian Ocean (Ref. 251). Nesting occurs over a large geographic range with nesting on offshore islands and the mainland. The principle rookeries include:

- Lacepede Islands
- Montebello Islands
- Barrow Island
- North West Cape
- Browse Island (Ref. 242)

Green turtles are primarily herbivorous and forage on algae, seagrass and mangroves, however have been known to feed on pelagic crustaceans and molluscs (Ref. 198).

Green turtle nesting usually occurs on the south, west and north-east coasts of Barrow Island between September and March each year, with a remigration interval of approximately five years (Ref. 252) and peak nesting activity occurring between December and February (Ref. 253; Ref. 242). Mating can also occur in this region between September and December (Ref. 241).

During internesting, turtles remain close to the nesting beach or rookery (Ref. 198). Analysis of satellite tracking data for Barrow Island on green turtles suggests internesting habitat occurs throughout the rocky intertidal and subtidal platforms common on the west coast, around to the north-eastern beaches and waters (Ref. 242; Ref. 253). Satellite tracking of internesting green turtles on Barrow Island were recorded to remain in shallow water within 5 km of Barrow Island (Ref. 242).

Satellite tracking of post-nesting female green turtles has shown that green turtles nesting on Barrow Island and Sandy Island (Scott Reef, WA) feed between 200 km and 1,000 km from their nesting beaches (Ref. 242). Following nesting at Barrow Island, green turtles that were tracked migrating to foraging grounds extending from Legendre Island in the Dampier Archipelago to waters in the southern Kimberley (Ref. 242).

The Ningaloo Coast is a crucial ecological area for green turtle populations, offering vital foraging and nesting grounds. The peak nesting season occurs from December to February, while hatching peaks between February and March (Ref. 198, Ref. 780). A study by Pillans et al. (Ref. 781) using acoustic receivers along the Ningaloo coast, revealed high site fidelity in both juvenile and adult

turtles. This strong attachment to the area may be due to the protection of their habitat, abundant food sources, and reduced human impact (Ref. 781).

Despite the significance of Ningaloo for green turtles, there is limited information on the behaviour of juvenile turtles. Research indicates that some juveniles settle in continental shelf waters, where they inhabit sub-tidal and intertidal coral reefs, rocky outcrops, and seagrass meadows (Ref. 198, Ref. 779). These juvenile turtles are known to migrate to the shallow lagoons of Ningaloo after completing their pelagic life stage (Ref. 780).

Green turtles are known to voyage to and nest on Christmas Island with new hatchlings often seen on the east coast beaches of the island. Christmas Island unlike the mainland is home to year-round nesting of green turtles (Ref. 789). The genetic stock of the green turtles is believed to be part of the greater WA rookeries but are considered ‘unresolved’ in a gap analysis by Limpus et al. (Ref. 800).

Habitat critical to the survival of green turtles, along with BIAs, have been identified within the PA (Table 4-11, Table 4-12, Figure 4-7).

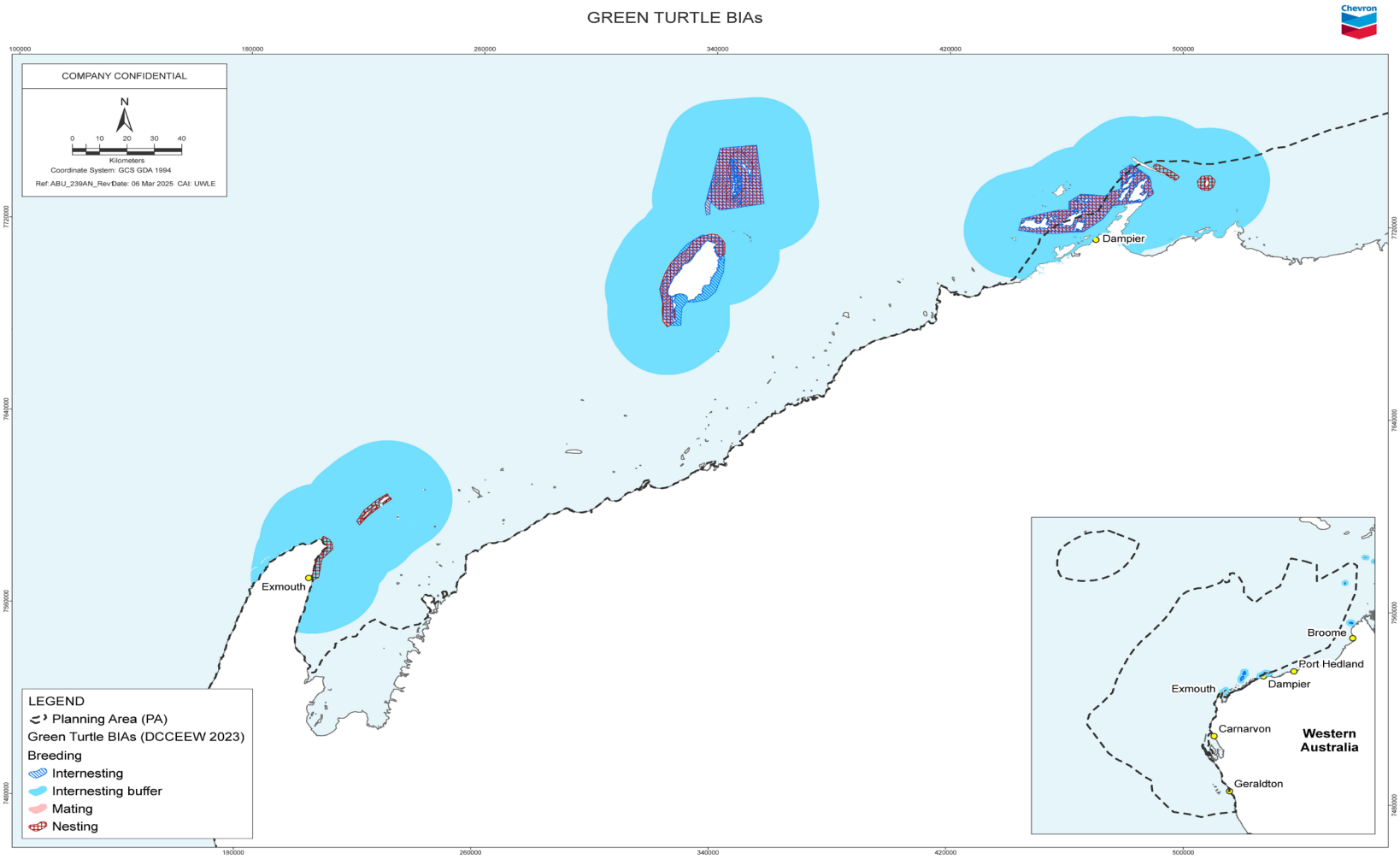

Figure 4-7: Biologically important areas and habitat critical to the survival of the species, for green turtles

4.3.2.7 Hawksbill turtle

In Australia hawksbill turtles are known to occur across the northern region of the continent and may be seen as far south as the east coast of Victoria (Ref. 198) There are three hawksbill turtle stocks in the northern Great barrier Reef and Torres Strait, Arnhem Land and NWS (Ref. 198). Hawksbill turtles are omnivorous, feeding on algae, soft corals, seagrass and with sponges making up a significant portion of their diet (Ref. 198)

The Montebello Islands and Lowendal Islands are identified as nesting habitat critical to the survival of the WA stock, as is the 20 km internesting buffer around the Islands (Ref. 198). Hawksbill turtles (*Eretmochelys imbricata*) are expected to be present within these areas between October and February (Ref. 198).

The WA hawksbill turtle stock is one of the three stocks within Australia (Ref. 198). Most of the nesting for this stock is located in the Pilbara (Ref. 198). The key nesting and inter-nesting areas in Australia include the Dampier Archipelago (including Rosemary Island and Delambre Island), Montebello Islands (including Ah Chong Island, South East Island and Trimouille Island), Lowendal Islands (including Varanus Island, Beacon Island and Bridled Island), Sholl Island (Ref. 254). The estimated size of the reproductive population of WA stock is small (Ref. 241). For example, it has been estimated as an overall reproductive population at Barrow Island of 100, an additional 1,000 in the Lowendal Islands, and 1,300 in the Montebello Islands (Ref. 241).

Hawksbill turtles can be seen in waters surrounding Christmas Island throughout the year (unlike the mainland where it is usually limited to October - November) and are known to forage on the reefs of the island (Ref. 789). Hawksbill turtles are not known to occur within the West Coast section of the PA.

Monitoring of Barrow Island hawksbill turtle nesting has found that nesting activity is more temporally and spatially diffuse than flatback and green turtle nesting activity and occurs predominantly on small, rocky, east coast beaches. Nesting on Barrow Island peaks in October (Ref. 255) and hawksbill turtles typically have an internesting interval of 14.5 days and a remigration interval of approximately three years (Ref. 253; Ref. 254).

During internesting turtles remain close to the nesting beach or rookery (Ref. 198). Satellite tracking of hawksbill turtles found that they remained in shallow coastal waters (<10 m deep) post nesting (Ref. 242).

There are currently significant knowledge gaps in the juvenile stages and migratory corridors of hawksbill turtles.

Although BIAs have been identified, hawksbill turtle mating, internesting, and foraging grounds have not been identified for Barrow Island (Ref. 241). However, data from hawksbill turtles tracked from nearby Varanus Island indicate potential internesting habitat in waters north-east of Barrow Island (Ref. 242).

Habitat critical to the survival of hawksbill turtles, along with BIAs, have been identified within the PA (Table 4-11 Table 4-12,Figure 4-8).

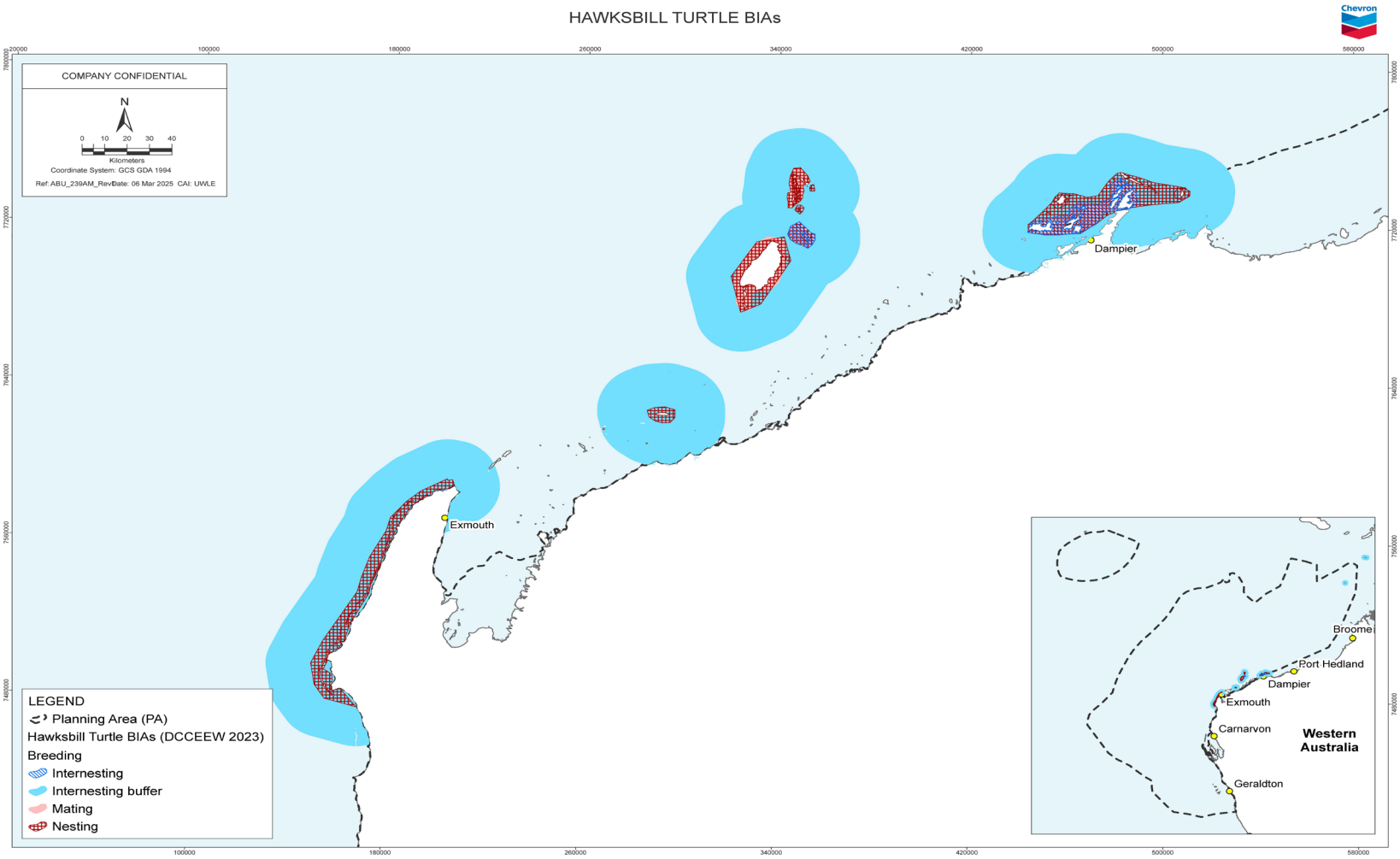

Figure 4-8: Biologically important areas and habitat critical to the survival of the species, for hawksbill turtles

4.3.2.8 Leatherback turtle

Leatherback turtle (*Dermochelys coriacea*) is a pelagic feeder found worldwide in tropical, subtropical, and temperate waters (Ref. 256). In Australia, they have been recorded in coastal waters offshore of all Australian States and NT (Ref. 257; Ref. 258; Ref. 259) inhabiting waters from coastal shallows to depths >5,000 m (Ref. 260).

A study by Hazel et. al (Ref. 260), suggests that leatherback turtles may be present year-round in WA waters, with peak sightings in June and July. Swaminathan et al. (Ref. 261) also indicates that up to 50% of Andaman-nesting leatherbacks may reach Australia's northwestern waters mid-year. Leatherbacks spend most of their lives in the open ocean, traveling vast distances while foraging (Ref. 262). Although generally solitary and pelagic, they may aggregate in areas with abundant food or near nesting beaches (Ref. 199).

Leatherback turtles may occur throughout the PA and display site fidelity to broad nesting zones rather than specific beaches (Ref. 267).

Most leatherback turtles in Australian waters are likely foraging migrants from breeding populations in neighbouring countries (Ref. 260; Ref. 268). They are commonly observed foraging along the east coast and in Bass Strait (Ref. 198; Ref. 269; Ref. 270), and aerial surveys have recorded leatherbacks in NT waters (Ref. 271). Their diet mainly consists of pelagic soft-bodied prey like jellyfish and tunicates (Ref. 198; Ref. 199; Ref. 269).

Despite this, significant gaps remain in knowledge about leatherback turtle biology in Australia beyond nesting beaches (Ref. 199; Ref. 264).

No BIAs or habitat critical to the species were identified within the PA. Internesting and nesting BIAs for leatherback turtles have been identified in the NT and eastern Queensland. The *Recovery Plan for Marine Turtles in Australia* (Ref. 198) established a 20 km internesting buffer around all sandy beaches from Coburg Peninsula to Cape Arnhem in the NT for leatherback turtles, which is classified as habitat critical to the species' survival.

4.3.2.9 Loggerhead turtle

Loggerhead turtles (*Caretta caretta*) are globally distributed in tropical, sub-tropical waters and temperate waters. Loggerheads are carnivorous, feeding primarily on benthic invertebrates in habitat ranging from nearshore to 55 m depth (Ref. 272). Loggerhead turtles forage in all coastal states and the NT (Ref. 198).They are carnivorous and feed predominantly on shellfish, crabs, sea urchins and jellyfish (Ref. 198)

The primary Australian breeding areas for loggerhead turtles are within southern Queensland and WA (Ref. 273). Loggerhead turtles will migrate over distances in excess of 1,000 km and show a strong fidelity to their feeding and breeding areas (Ref. 262).

In WA nesting occurs from Shark Bay (including on the mainland near Steep Point) to the North West Cape with major nesting at Dirk Hartog Island; Gnaraloo Bay; the Muiron Islands; and the beaches of the North West Cape (Ref. 274).

Loggerhead turtles are likely to occur in the waters surrounding Christmas Island, however significant gaps remain about the species in this region. Juvenile loggerhead turtles in the southwest Pacific undertake a remarkable migration from eastern Australian rookeries to South America and back. This migration likely

follows the predominant surface currents, where the young turtles rely on floating debris that accumulates along these currents for protection and food (Ref. 198). However, this pelagic life stage is marked by high mortality rates.

Occasional late summer nesting crawls have also been recorded as far north as Barrow Island, the Lowendal Islands and Dampier Archipelago (Ref. 275). During internesting, turtles remain close to the nesting beach or rookery (Ref. 198). Once breeding and nesting is complete, turtles return to their favoured foraging areas (Ref. 198).

The *Recovery Plan for Marine Turtles in Australia* (Ref. 198) established a 20 km internesting buffer around key nesting and internesting areas for loggerhead turtles, which is classified as habitat critical to the species' survival. Habitat critical to the survival of loggerhead turtles, along with BIAs, have been identified within the PA (Table 4-11, Table 4-12, Figure 4-9).

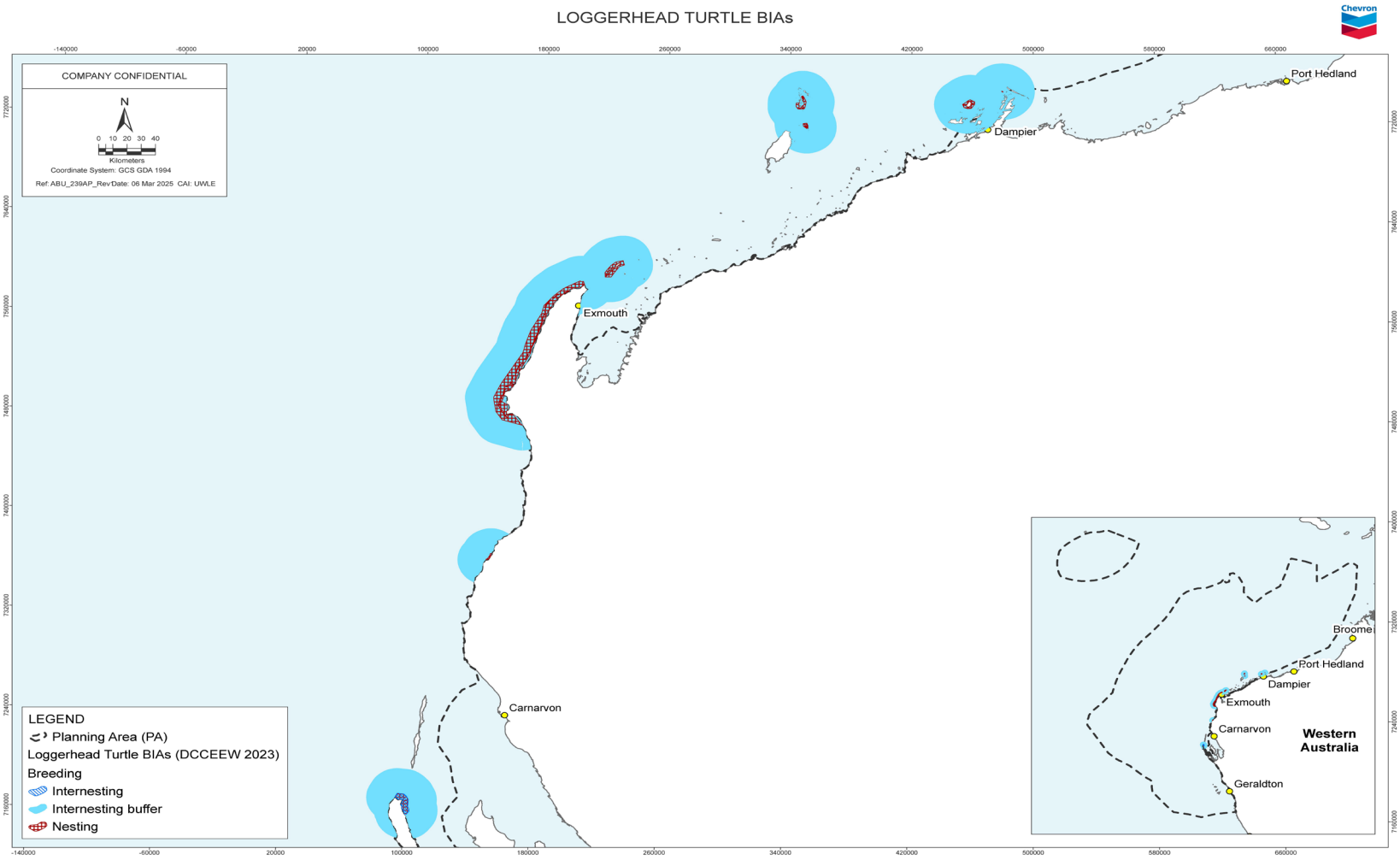

Figure 4-9: Biologically important areas and habitat critical to the survival of the species, for loggerhead turtles

4.3.2.10 Olive ridley turtle

Olive ridley turtles (*Lepidochelys olivacea*) are found in tropical and subtropical waters across all oceans (Ref. 276). In Australia, there are two main stocks: one that nests in the NT and another in QLD (Ref. 277; Ref. 278). Low-density nesting has also been observed on the Kimberley coast, north of Broome and the PA, though genetic relatedness to known stocks remains unknown (Ref. 198). Olive ridley turtles are the smallest marine turtles found in Australia and are a carnivorous species feeding on soft bodied invertebrates and jellyfish in depths between 15 – 200 m (Ref. 198).

There is no record of olive ridley nesting in the PA, however foraging, feeding or related behaviour is likely to occur within the Kimberley section. Habitat for olive ridley turtles is likely to occur in the Christmas Island section. The species is not known to occur in the West Coast, Ningaloo or Pilbara sections (Table 4-10). Significant gaps still exist in our understanding of the species.

Similar to other marine turtle species, female olive ridleys lay eggs on sandy beaches, and hatchlings disperse into offshore currents, undergoing a pelagic phase of unknown duration (Ref. 286). Adults occupy soft-bottomed habitats along the northern Australian continental shelf year-round (Ref. 286). Migratory movements of olive ridley turtles are less studied compared to other marine turtle species but are known to span the coastal waters of over 80 countries. Very few individuals cross between ocean basins (Ref. 282). In Australia, satellite tracking indicates they generally remain on the continental shelf, occasionally extending into waters off Indonesia (Ref. 283; Ref. 284). Studies from northern Australia have recording migration distances of 180 to 1,050 km, remaining within 240 km of land and frequenting waters 45–55 m deep (Ref. 284, Ref. 285). Foraging primarily occurs over soft-bottomed substrates along northern Australia's coastal zone, at depths ranging from a few meters to 200 m (Ref. 284; Ref. 287; Ref. 288). They feed on soft-bodied invertebrates such as sea pens, soft corals, sea cucumbers, and jellyfish (Ref. 198). They are rarely observed in coral reefs or shallow inshore seagrass flats, except in one recorded instance (Ref. 262).

No BIAs or habitat critical to the species were identified within the PA.

4.3.3 Fishes, including sharks and rays

Table 4-14 lists the threatened and/or migratory fishes, sharks and rays that may be present within the PA. Additional information on these species is provided in the following subsections. The full list of marine species identified from the PMST is provided in appendix a.

Table 4-15 outlines the BIAs for fishes, sharks and rays and their known seasonal presence within the PA.

A review of the Conservation Advice and Recovery Plans identified key threats associated with threatened and/or migratory fishes, sharks and rays that may be present within the PA. Where relevant to petroleum activities, these threats and relevant management advice are included in Table 4-16.

In addition to the threatened and/or migratory marine fish species identified in the tables below, an additional 65 listed marine fish species (all syngnathids – seahorses, pipefishes and seadragons) were identified as having the potential to occur within the PA (appendix a). Bray (Ref. 289) notes that syngnathids are mostly benthic on coastal reefs, amongst marine algae and seagrass beds, or on

sandy and rubble substrates and in caves and crevices. Syngnathids are mostly found in water depths above 50 m (Ref. 289).

Almost all syngnathids live in nearshore and inner shelf habitats, usually in shallow coastal waters, among seagrasses, mangroves, coral reefs, macroalgae dominated reefs, and sand or rubble habitats (Ref. 290; Ref. 291; Ref. 292). Although two species have been identified in the NWMR in deeper waters (winged seahorse [*Hippocampus alatus*] and western pipehorse [*Solegnathus sp. 2*]; Ref. 293), these species were not identified by the PMST search (appendix a).

Table 4-14: Threatened and/or migratory fishes, sharks and rays

Common name	Scientific name	Threatened status	Migratory status	Presence				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Sawfish								
Dwarf sawfish	*Pristis clavata*	Vulnerable	Migratory	—	SKO	SKO	SKO	—
Freshwater sawfish[#]	*Pristis pristis*	Vulnerable	Migratory	SMO	SMO	SKO	SLO	—
Green sawfish	*Pristis zijsron*	Vulnerable	Migratory	—	SKO	BKO	SKO	—
Narrow sawfish	*Anoxypristis cuspidata*	—	Migratory	—	SLO	SKO	SLO	—
Sharks								
Grey nurse shark	*Carcharias taurus*	—	Migratory	SLO	CKO	CKO	SMO	—
Grey nurse shark (west coast population)	*Carcharias taurus (west coast population)*	Vulnerable	—	SLO	CKO	CKO	—	—
Little gulper shark	*Centrophorus uyato*	Conservation Dependent	—	SLO	SLO	—	—	—
Longfin mako	*Isurus paucus*	—	Migratory	SLO	SLO	SLO	SLO	SLO
Northern river shark[#]	*Glyphis garricki*	Endangered	—	—	—	—	SMO	—
Oceanic whitetip shark	*Carcharhinus longimanus*	—	Migratory	SLO	SLO	SLO	SMO	SMO
Porbeagle	*Lamna nasus*	—	Migratory	SMO	SMO	—	—	—
Scalloped hammerhead	*Sphyrna lewini*	Conservation Dependent	—	SLO	SKO	SKO	SKO	SLO
Shortfin mako	*Isurus oxyrinchus*	—	Migratory	SLO	SLO	SLO	SLO	SLO
Whale shark	*Rhincodon typus*	Vulnerable	Migratory	SMO	FBKO	FBKO	FBKO	SMO
White shark	*Carcharodon carcharias*	Vulnerable	Migratory	FBKO	SKO	SKO	SMO	SMO
Rays								
Giant manta ray	*Manta birostris*	—	Migratory	SLO	SKO	SKO	SLO	SKO
Reef manta ray	*Mobula alfredi*	—	Migratory	SKO	SKO	SKO	SKO	—

Common name	Scientific name	Threatened status	Migratory status	Presence				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Legend: *BKO: Breeding known to occur within area* *CKO: Congregation or aggregation known to occur within area* *FBKO: Foraging, feeding or related behaviour known to occur within area* *SKO: Species or species habitat known to occur within area* *SLO: Species or species habitat likely to occur within area* *SMO: Species or species habitat may occur within area* *[#] Species mainly located inland (freshwater and estuarine habitats) identified in the Protected Matters Search Report but with the potential to be exposed to CAPL's activities.*								

Table 4-15: BIAs for regionally significant fish, sharks and rays

Common name	Behaviour	Seasonal presence	Occurrence descriptor	Section				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Whale shark^	Foraging	Spring	Known to occur	—	—	✓	✓	✓
	Foraging (high density prey)	April to June, autumn	Known to occur	—	✓	—	—	—
White shark	Foraging	None identified in dataset	Known to occur	✓	—	—	—	—
Southern bluefin tuna*	Breeding (spawning)	Spawning is between September and April, with peaks in October and February	Known to occur	—	—	—	—	✓

^ Includes proposed Christmas Island foraging BIA (Ref. 294).

**Although spawning has also been identified in the Pilbara and Kimberley Sections, this refers to the proposed bluefin tuna breeding BIA in Christmas Island (Ref. 294).*

Table 4-16: Summary of relevant conservation plans—fishes, sharks and rays

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
Dwarf sawfish Freshwater sawfish Green sawfish Northern river shark	Sawfish and river Sharks Multispecies Recovery Plan (Ref. 295)	Habitat degradation and modification	• all future assessments of proposed developments are undertaken in accordance with: – the EPBC Act, and the associated guidelines and policy documents – the sawfish and river shark recovery plan, issues paper and other sources of information. • advice on likely impacts and potential mitigation measures is sought from sawfish and river shark experts for all developments proposed to occur in habitat critical to survival of the species • report/s produced identifying risks to important habitat and recommendations on mitigation actions, including spatial protection.
		Marine debris	• none identified
		Not associated to an specific threat	• BIAs for sawfish and river sharks are adequately taken into account when assessing the impact of proposed activities in the marine environment and adequately protected
Dwarf sawfish	Approved Conservation Advice for dwarf sawfish (Ref. 296)	Habitat degradation due to increasing human development in northern Australia	• none identified
Freshwater sawfish	Approved Conservation Advice for freshwater sawfish (Ref. 297)	Habitat degradation and modification	• implement measures to reduce adverse impacts of habitat degradation and/or modification
		Marine debris	• none identified
Green sawfish	Approved Conservation Advice for green sawfish (Ref. 298)	Habitat loss, disturbance and modification	• none identified
Grey nurse shark	Recovery Plan for the Grey Nurse Shark (Ref. 299)	Pollution and disease	• BIAs for grey nurse sharks are adequately taken into account when assessing the impact of proposed activities in the marine environment and adequately protected.
		Ecosystem effects as a result of habitat modification and climate change	• none identified

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
Little gulper shark	Listing Advice for southern dogfish (Ref. 300)	The main threat was population reduction caused by past fishing	• not applicable
Northern river shark	Conservation Advice for northern river shark (Ref. 301)	Habitat degradation and modification	• implement measures to reduce adverse impacts of habitat degradation and/or modification.
		Marine debris	• none identified
Scalloped hammerhead	Listing Advice for Scalloped Hammerhead (Ref. 302)	The current main threat is fishing	• not applicable
Shortfin mako	Listing Advice for shortfin mako (Ref. 303)	The main threat is fishing	• not applicable
Whale shark	Conservation Advice for the Whale Shark (Ref. 304)	Boat strike	No specific management actions were identified to address the threats; however, the following measure was noted: • minimise offshore developments and transit time of large vessels in areas close to marine features likely to correlate with whale shark aggregations (Ningaloo Reef, Christmas Island and the Coral Sea) and along the northward migration route that follows the northern WA coastline along the 200 m isobath.
		Habitat disruption	
		Disturbance	
		Marine debris	
		Climate change	
White shark	Recovery Plan for the White Shark (Ref. 305)	Ecosystem effects as a result of habitat modification and climate change	Biologically important areas for white sharks, particularly juvenile aggregation sites, pupping grounds and foraging areas are adequately taken into account when assessing the impact of proposed activities in the marine environment and adequately protected.

4.3.3.1 Dwarf sawfish

The dwarf sawfish (*Pristis clavata*) ranges from Cairns, around the Cape York Peninsula in Queensland, to the Pilbara coastline in WA (Ref. 306; Ref. 307). They are known to occur within the Pilbara, Kimberley and Ningaloo sections of the PA where shallow coastal and estuarine waters are prevalent (2–3 m). The dwarf sawfish relies on these areas as nurseries for juveniles (Ref. 308) where as adults seasonally migrate to inshore waters (Ref. 309).

Dwarf fish are not known to occur within the waters surrounding Christmas Island or the West Coast section of the PA.

While specific reproductive data are limited, dwarf sawfish are ovoviviparous, with pupping observed from the northern Australian wet season through early May (Ref. 310). In the Kimberley region, juveniles remain in nursery estuaries until around three years of age (Ref. 311). Adults generally occupy small coastal ranges and demonstrate site fidelity (Ref. 312).

Dwarf sawfish use their rostrum to stun schooling fish by sideswiping through groups, primarily preying on popeye mullet (*Rhinomugil nasutus*) (Ref. 313) as well as molluscs and crustaceans dislodged from the substrate (Ref. 314). Peverell (Ref. 310) noted that dwarf sawfish move into marine waters post-wet season and enter estuarine or freshwater environments during the wet season to breed. Stevens et al. (Ref. 312) observed that at high tide, individuals rest in mangrove forests, typically within 100 m of prior resting sites, and during tidal changes, move into shallow waters for foraging.

No BIAs were identified within the PA. However, foraging, juvenile, nursing and pupping BIAs for the dwarf sawfish have been identified from Port Hedland to Augustus Island, northwest of WA. The *sawfish and river sharks multispecies Recovery Plan* (Ref. 295) highlights that areas where aggregations display biologically important behaviours are considered critical to the survival of the species unless population survey data suggests otherwise.

4.3.3.2 Freshwater (largetooth) sawfish

The freshwater sawfish (*Pristis pristis*) may potentially inhabit all large rivers in northern Australia, ranging from the Fitzroy River in WA to the western side of the Cape York Peninsula in Queensland (Ref. 315). There are few reports of adults at sea, with limited records of individuals over 3 m in total length from the Pilbara coast, and a single record from Cape Naturaliste in southwestern WA (Ref. 316). Globally, this sawfish is known to occur in four distinct regional populations (Ref. 295). The freshwater sawfish is not known to occur within the waters surrounding Christmas Island.

Freshwater sawfish prefer fresh or weakly saline water (Ref. 315) and are commonly found over mud bottoms in river embayments and estuaries (Ref. 315). Juveniles live in freshwater rivers and upper estuarine areas before moving to estuarine and marine areas as adults, to depths of up to 25 m (Ref. 295; Ref. 317; Ref. 318). Larger individuals may also move to deeper water at dawn, returning to shallower waters in the afternoon (Ref. 315). The species has been recorded in rivers as far as 400 km inland (Ref. 316).

Freshwater sawfish are believed to breed in freshwater (Ref. 319). Females may return to their natal rivers to give birth, while males may disperse across regions for breeding. Another possibility is that sawfish gather in breeding aggregations, with females returning to their natal areas to pup (Ref. 320; Ref. 321). In the Fitzroy River, an area identified as an important nursery site, pupping is correlated with high water levels in the late wet season (Ref. 316; Ref. 322). Spawning also occurs in Queensland (Ref. 315).

The freshwater sawfish feeds on fish and benthic invertebrates (Ref. 315), using its saw to stun schooling fish, such as mullet, and to extract molluscs and small crustaceans from the sediment (Ref. 323).

No BIAs were identified within the PA. However, foraging, juvenile, nursing and pupping BIAs for the freshwater sawfish have been identified from Port Hedland to Derby, northwest of WA. The *sawfish and river sharks multispecies Recovery Plan* (Ref. 295) highlights that areas where aggregations display biologically important behaviours are considered critical to the survival of the species unless population survey data suggests otherwise.

4.3.3.3 Green sawfish

The green sawfish (*Pristis zijsron*) is found in inshore coastal environments, including estuaries, river mouths, embayments, and along sandy and muddy beaches, as well as offshore marine habitats (Ref. 318; Ref. 324; Ref. 325). Movement within these preferred habitats is often correlated with tidal changes (Ref. 312). Green sawfish have been recorded in water depths ranging from very shallow areas (<1 m) to offshore trawl grounds >70 m deep (Ref. 318).

In Australian waters, the species is distributed from the Whitsundays in Queensland (Ref. 326) across northern Australian waters to Shark Bay in WA (Ref. 295; Ref. 327). Limited data exists on the relative abundance of this species in WA (Ref. 327). The green sawfish is not known to occur in waters surrounding Christmas Island and the West Coast section of the PA.

Green sawfish are known to occur in offshore waters, with documented pupping areas in coastal waters from north of Port Hedland to Roebuck Bay (Ref. 295). Additional likely pupping areas include regions south of Port Hedland, Exmouth Gulf, and North West Cape (Ref. 295). A recent study (Ref. 322) identified Exmouth Gulf as a globally significant refuge and pupping area for this species. Baseline surveys (Ref. 328) also indicate that the Ashburton estuary near Onslow serves as a habitat and nursery area for juveniles. Pupping is thought to coincide with the wet season (Ref. 310).

Green sawfish feed primarily on shoaling fish, such as mullet, which they stun by sideswiping with their rostrum (Ref. 329). They also sweep molluscs and small crustaceans from the sand and mud using their saw (Ref. 323; Ref. 330) and actively pursue schools of baitfish and prawns (Ref. 331).

No BIAs were identified within the PA. However, foraging, nursing and pupping BIAs for the green sawfish have been identified from Port Hedland to Augustus Island, northwest of WA. The *sawfish and river sharks multispecies Recovery Plan* (Ref. 295) highlights that areas where aggregations display biologically important behaviors are considered critical to the survival of the species unless population survey data suggests otherwise.

4.3.3.4 Narrow sawfish

The narrow sawfish (*Anoxypristis cuspidata*) is distributed patchily across the Indo-West Pacific (Ref. 332; Ref. 333). In Australia, it has a broad range, occurring from Rockhampton, Queensland, to the Pilbara coast, WA (Ref. 334). A study found the Narrow Sawfish to be the most abundant sawfish species sampled in the Gulf of Carpentaria (Ref. 310). The narrow sawfish is not known to occur in waters surrounding Christmas Island and the West Coast section of the PA.

This species is benthopelagic, inhabiting estuarine, inshore, and offshore waters on the continental shelf at depths of up to 128 m, but is typically found in waters <40 m deep (Ref. 335; Ref. 336). Adults primarily occur offshore, while juveniles and pupping females rely on inshore and estuarine habitats (Ref. 310).

According to an assessment of the Great Barrier Reef, the narrow sawfish is known to form aggregations of mature females during October and November (Ref. 337). No BIAs have been identified for this species in Australian waters.

4.3.3.5 Grey nurse shark

The grey nurse shark (*Carcharus taurus*) is primarily found in inshore coastal regions within cool temperate to sub-tropical waters (Ref. 338; Ref. 339). In Australian waters, it primarily occupies continental shelf areas in sub-tropical to cool temperate waters (Ref. 299), and is divided into two genetically distinct populations—one on the east coast and one on the west coast (Ref. 340). The western population is mostly found in southwestern WA coastal waters, with sightings extending as far north as the NWS (Ref. 331; Ref. 341). Population size estimates for this region remain unavailable (Ref. 299).

Evidence suggests that the grey nurse shark is migratory across its WA distribution (Ref. 338). In a 2012 monitoring project, a tagged male shark moved from Augusta to Rottnest by early September and north to Coral Bay by mid-October, marking the first documented case of male migration in WA (Ref. 342). Tagged sharks of the western population have also been observed at depths of 20–160 m, indicating extensive use of the continental shelf (Ref. 343). Their diet consists of a variety of fish, other sharks and rays, squids, crabs, and lobsters (Ref. 338). The grey nurse shark is not known to occur within waters surrounding Christmas Island.

Grey nurse sharks commonly aggregate around inshore rocky reefs or islands, typically near the seabed at depths of 10–40 m, within sandy or gravel-filled gutters or rocky caves (Ref. 339; Ref. 344; Ref. 345; Ref. 346). Key aggregation sites have been identified in Queensland, NSW and Commonwealth Waters off the NSW Coast, which are considered critical for the species' survival (Ref. 299). A study near Exmouth from 2007–2012 identified a small aggregation with strong site fidelity from May to November each year (Ref. 347). Additional aggregation sites are likely between Rottnest and Lancelin, and possibly along the WA coast in caves deeper than 30 m (Ref. 346). Mature sharks show seasonal presence from March to June, peaking in April, while immature sharks are present almost year-round (Ref. 346).

No BIAs for this species have been identified in WA (Ref. 346).

4.3.3.6 Little gulper shark

The little gulper shark (*Centrophorus zeehaani*) inhabits the upper slopes of the southern continental shelf at depths ranging from 180 m to 900 m (Ref. 348). Its range extends along the southern Australian coast from near Warrnambool to south of Ceduna and from the western Great Australian Bight up the west coast to around Mandurah, south of Perth. However, it appears absent along parts of the South Australian coast in the Ceduna Terraces and off southern Tasmania through Bass Strait (Ref. 300). Current data (Ref. 348) indicates the existence of three distinct stocks, with the western stock spanning from the western Great Australian Bight to south WA. The little gulper shark is not known to occur within the Pilbara, Kimberley or Christmas Island sections of the PA.

The little gulper shark’s reproduction is considered to be continuous and non-seasonal (Ref. 339; Ref. 349; Ref. 350). Its diet consists primarily of fish and invertebrates, such as lanternfish and squid (Family Myctophidae), which are key prey items (Ref. 349; Ref. 350).

While the specific migratory patterns of this species remain unknown (Ref. 300), little gulpers are known to undertake diel (day-night) vertical migrations. They move from deeper daytime depths, ~1,000 m, to shallower feeding depths at night, sometimes reaching depths as shallow as 200 m (Ref. 348).

No BIAs have been identified for this species in Australian waters.

4.3.3.7 Longfin mako

The Longfin Mako (*Isurus paucus*) is found in tropical and warm temperate waters but is rarely reported in Australian waters (Ref. 351), with no available information on population trends in the region (Ref. 352). In Australia, its range extends from Geraldton, WA, across the NT and Queensland, down to Port Stevens, NSW (Ref. 339). It is also likely to occur is waters surrounding Christmas Island.

Based on its diet, the Longfin Mako is likely to inhabit deep waters (Ref. 353) and has been recorded at depths up to 1,752 m (Ref. 335).

No BIAs for longfin mako have been identified in Australian waters.

4.3.3.8 Northern river shark

Northern river sharks (*Glyphis garricki*) also known as New Guinea river sharks or northern speartooth sharks, are found in rivers, estuaries, and marine environments in WA and the NT (Ref. 295; Ref. 301). In WA, they have been recorded in both the west and east Kimberley regions (Ref. 318; Ref. 354) and offshore near the Wessel Islands (Ref. 354). Northern river sharks are not known to occur in the Pilbara, Ningaloo, Christmas Island and West Coast sections of the PA.

These sharks use a range of habitats, including rivers, tidal sections of large estuarine systems, macrotidal embayments, and both inshore and offshore marine areas (Ref. 355; Ref. 356). While adults have only been observed in marine environments, neonates, juveniles, and subadults are found across freshwater, estuarine, and marine habitats (Ref. 355).

The presence of individuals well offshore suggests that northern river sharks move between river systems, but the extent and distances of these movements remain unknown (Ref. 301). In northern Australia, observations include a single female with nine pups and free-swimming young in October, indicating that birthing likely occurs during this month (Ref. 355).

As apex predators, northern river sharks primarily feed on various fish and crustaceans (Ref. 318). No BIAs for northern river sharks have been identified in Australian waters.

4.3.3.9 Oceanic whitetip shark

Oceanic whitetip sharks (*Carcharhinus longimanus*) are a widespread pelagic species found in tropical and temperate waters, from inshore regions to open ocean (Ref. 357; Ref. 358). In Australian waters, their range extends from Cape Leeuwin, WA, through the NT and Queensland, to Sydney, NSW, with a single specimen recorded in SA (Ref. 339). As a known pelagic species, the oceanic whitetip shark may occur in waters surrounding Christmas Island.

They typically inhabit the upper 200 m of the water column but have been observed diving to depths of around 1,000 m, likely in relation to foraging behaviour (Ref. 359; Ref. 360). Oceanic whitetip sharks are top predators and opportunistic feeders, primarily consuming bony fish and cephalopods like squid, as well as large pelagic fish, seabirds, other sharks and rays, and marine mammals (Ref. 361).

No BIAs for oceanic whitetip sharks have been identified in Australian waters.

4.3.3.10 Porbeagle (mackerel shark)

The porbeagle (*Lamna nasus*) has a wide range, inhabiting temperate, subarctic, and subantarctic waters of the North Atlantic and Southern Hemisphere (Ref. 362). In Australia, it occurs from southern Queensland to southwestern Australia (Ref. 339). Porbeagles are primarily found in oceanic waters off the continental shelf but may occasionally enter coastal areas (Ref. 362), with recorded depths ranging from the surface to 370 m (Ref. 335; Ref. 339). The porbeagle is not known to occur in the Pilbara, Kimberley or Christmas Island sections of the PA.

This species appears flexible in its foraging habits (Ref. 363) and preys on various species, including teleost fish, elasmobranchs, and cephalopods (Ref. 339; Ref. 364). Porbeagles are known for their seasonal migrations, although the specifics of these movements are not well-understood (Ref. 365). Migrations may be driven by the search for feeding grounds or mates, with Southern Hemisphere populations thought to give birth off New Zealand and Australia in winter (Ref. 366).

No BIAs for porbeagle have been identified in Australian waters.

4.3.3.11 Scalloped hammerhead

Scalloped hammerhead sharks (*Sphyrna lewini*) are found in tropical and temperate seas worldwide, inhabiting both coastal and offshore waters (Ref. 367). In WA, scalloped hammerheads are commonly seen in the Montebello Islands Marine Park and Rowley Shoals Marine Park and are rarely sighted south of the Houtman Abrolhos Islands (Ref. 367). Bartes & Braccini (Ref. 368) also documented sightings of the species east of Geographe Bay, southwestern WA. The scalloped hammerhead although uncommon (Ref. 790) in the region is likely to occur in the waters surrounding Christmas Island.

Hammerheads are sociable and, in some areas have been observed in schools of up to 200 (Ref. 367). Adult scalloped hammerheads typically inhabit deep waters adjacent to continental shelves, ranging from the surface to depths of at least 275 m, while juveniles are more commonly found near shore (Ref. 369). It is thought that adult females occupy deeper waters and move into shallower areas to mate and give birth (Ref. 369), with mating generally hypothesised to occur in deeper waters (Ref. 370).

Hammerheads in other oceans are known to migrate to shallow nursery areas for birthing (Ref. 302). Similarly, observed demographic structuring in Australian populations suggests that some adult females may migrate to waters in Indonesia or Papua New Guinea and return to northern Australia for birthing, indicating that northern Australia may provide important nursery areas for the Indo-Pacific scalloped hammerhead stock (Ref. 302).

No BIAs for scalloped hammerhead have been identified in Australian waters.

4.3.3.12 Shortfin mako

The shortfin mako (*Isurus oxyrinchus*) inhabits tropical and temperate waters (Ref. 353; Ref. 303). In Australian waters, this species is found offshore around most of the continent's coastline, excluding the Arafura Sea, Gulf of Carpentaria, and Torres Strait (Ref. 303). Tagging studies indicate that shortfin makos spend most of their time at depths <50 m, with occasional dives reaching up to 880 m

(Ref. 371; Ref. 372). There is a slight trend for the species to occupy shallower water at night and deeper water during daylight hours (Ref. 373).

The shortfin mako is highly migratory, capable of traveling vast distances, and has been observed migrating from Australian waters to areas well beyond the Australian Exclusive Economic Zone (Ref. 373). It is believed that the Australian population gives birth offshore along the NSW coastline (Ref. 339).

As a highly migratory species, the shortfin mako shark has been recorded throughout the coastal waters of Western Australia, from the southern regions to the Kimberley waters in the north. It has also been previously documented in the waters surrounding Christmas Island and is likely to occur in this region. The diet of the Shortfin Mako primarily consists of fish, cephalopods, and crustaceans, with occasional predation on marine mammals (Ref. 374; Ref. 375; Ref. 376).

No BIAs for shortfin mako have been identified in Australian waters.

4.3.3.13 Whale shark

Whale sharks (*Rhincodon typus*) have a global distribution in tropical and warm temperate waters, including within Australian waters (mainly NT, Queensland and northern WA) (Ref. 304; Ref. 377).The whale shark is a suction filter feeder, with a diet consisting of planktonic and nektonic prey, and feeds at or close to the water's surface by swimming forward with mouth agape, sucking in prey (Ref. 377). While the species is generally encountered close to or at the surface, it will regularly dive and move through the water column.

Feeding, foraging and related behaviour is known to occur in the Ningaloo, Pilbara, Kimberley and Christmas Island section of the PA. Seasonal aggregations are thought to be linked to localised events of food productivity (Ref. 304)

Ningaloo Reef is considered the main known seasonal aggregation area between March and July, where their presence has been linked to coral mass spawning timing (Ref. 304, Ref. 377, Ref. 378). Following the aggregation period around Ningaloo Reef, their movements are largely unknown, although three migration routes from Ningaloo reef have been identified through various surveys (Ref. 380):

- north-west, into the Indian Ocean
- directly north, towards Sumatra and Java
- north-west, passing through the NWS region, travelling along the shelf break and continental slope.

Whale sharks are known to aggregate to the south of the Kimberley region and sometimes pass through the Kimberley marine park as part of their long migrations (Ref. 782). Similarly, whale sharks aggregate at Christmas Island between November and March to feed on the billions of larvae released into the water during the annual red crab spawning (Ref. 304)

Foraging and aggregation BIAs have been identified in northern of Australia. In WA and within the PA (Table 4-15, Figure 4-10), the BIA is associated with foraging behaviours during northward migration from Ningaloo Reef / North West Cape along the 200 m isobath during July to November (Ref. 304).

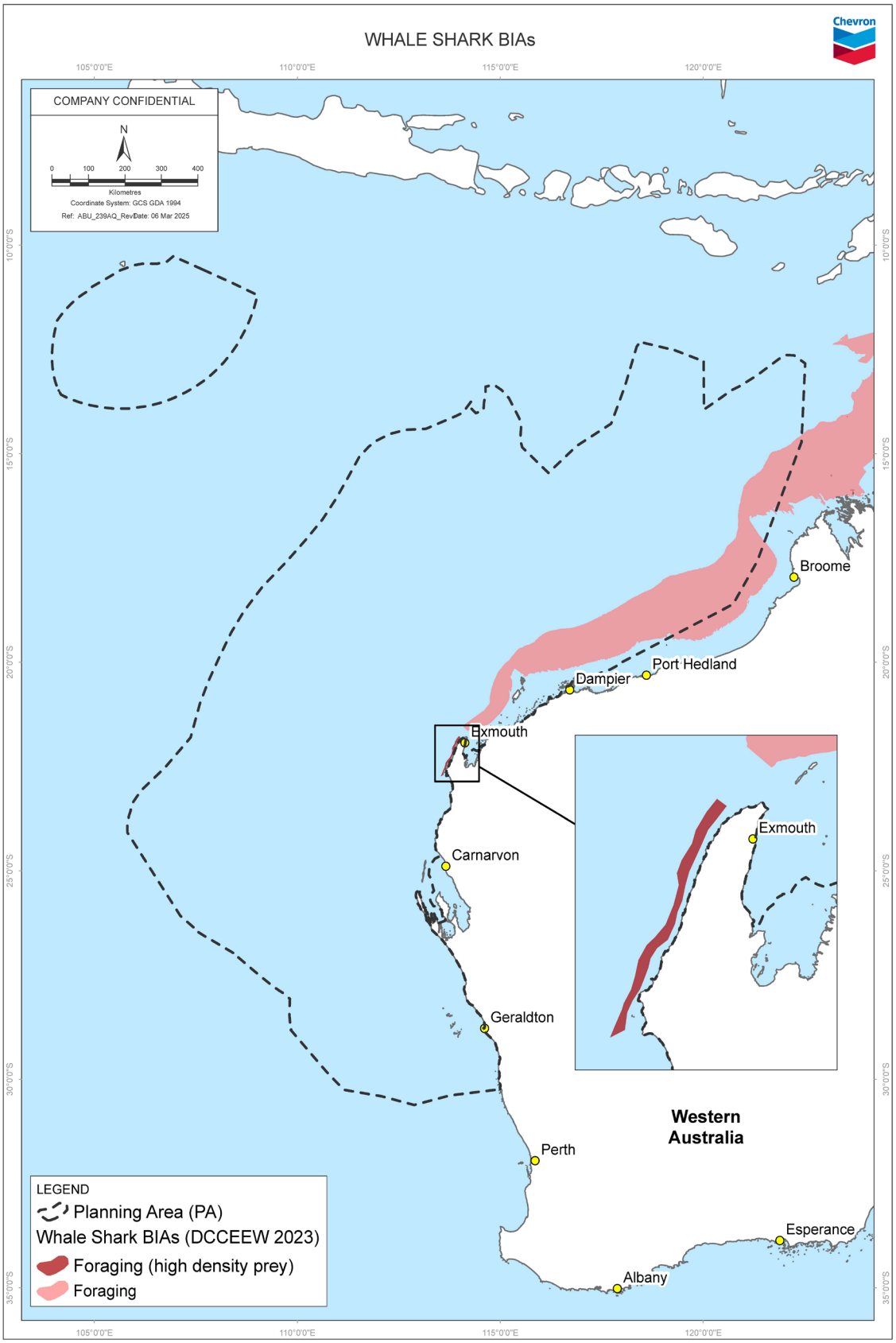

Figure 4-10: Biologically important areas for whale sharks

4.3.3.14 White shark

The White shark (*Carcharodon carcharias*) is widely but sparsely distributed across the world's oceans, including cold temperate waters in both hemispheres (Ref. 381). In Australia, genetic and tracking data reveal two distinct populations: an eastern and a southern-western population (Ref. 305; Ref. 382; Ref. 383). The southern-western population ranges from Bass Strait along the southern coast to north-western WA, with occasional records farther north (Ref. 339; Ref. 384; Ref. 385; Ref. 386).

Tagging data indicate that white sharks are present off most of the south and lower west coasts of WA year-round, with higher occurrences along the lower WA coast in spring and early summer, and fewer sightings during late summer and autumn (Ref. 383).

White shark habitat preferences shift with age: pups and juveniles inhabit nearshore, shallow continental shelves (Ref. 381), while adults and juveniles have been recorded diving to depths of up to 1,000 m (Ref. 385; Ref. 386). Most movements, however, occur in waters over 50 m deep and more than 10 km offshore (Ref. 383).

Notable aggregation sites for white sharks are observed from mid-September to mid-December, followed by migration toward the Bass Strait (Ref. 386). Sightings north of North-West Cape are rare, and no aggregation sites are identified in the NWMR (Ref. 387).

The white shark is known to occur within the Pilbara section of the PA. The white shark is known to occur in coastal, shelf and continental slope waters around the Montebello Islands and studies suggest a correlation between humpback whale migration and white shark presence (Ref. 791). Additionally, white sharks may occur in waters surrounding Christmas Island as records have shown individuals within the region. However, white sharks are not commonly found to inhabit the waters around the Christmas Island.

White sharks are opportunistic predators, feeding on diverse prey such as finfish, other sharks, rays, marine mammals (seals, sea lions, dolphins, whales), squid, crustaceans, and seabirds (Ref. 381). They are also known to follow humpback whale migrations along the WA coast, preying on vulnerable young and sick adults (Ref. 388). Typically, solitary or in pairs, white sharks may aggregate near food sources like pinniped colonies (Ref. 381; Ref. 389).

Although white sharks do not permanently inhabit a single area, they exhibit notable site fidelity (Ref. 381). Aggregation, breeding, and foraging BIAs have been identified for white sharks along the southern Australian coast, from Kalbarri, WA, to Gladstone, Queensland. and the PA (Table 4-15), foraging BIAs are identified in the southwest and southern regions. Identified foraging areas, aggregation areas, along with sites where white sharks consistently return, may represent habitats critical to their survival; however, further research is needed to fully understand and identify such essential habitats (Ref. 305).

4.3.3.15 Giant manta ray

Giant manta rays (*Mobula birostris*) inhabit tropical marine waters worldwide, with occasional sightings in temperate seas. In Australia, their range extends from Montague Island, NSW, to Shark Bay, WA (Ref. 339; Ref. 390; Ref. 391). Photo-identification data show that giant manta rays are most commonly observed in the Ningaloo Reef region, WA, with fewer sightings at Cocos Keeling Island, Christmas Island, the Great Barrier Reef, and the Coral Sea. Despite this range, they are rarely encountered in Australian waters overall (Ref. 390). The Ningaloo coast serves as an important habitat for giant manta rays from March to August (Ref. 392).

Giant manta rays have a notably patchy distribution, with most sightings occurring around specific aggregation sites, particularly near cleaning stations located adjacent to deep waters (Ref. 390). These rays are highly migratory and are known to seasonally visit productive coastal areas with regular upwelling, as well as oceanic island groups, offshore pinnacles, and seamounts (Ref. 393). Their diet consists primarily of plankton and planktonic larvae, which they filter from the water through specialised gill structures (Ref. 390). Giant manta rays are primarily pelagic, inhabiting depths from the surface down to 1,000 m (Ref. 335; Ref. 394).

No BIAs for giant manta ray have been identified in Australian waters.

4.3.3.16 Reef manta ray

The reef manta ray (*Manta alfredi*) is a large pelagic ray found in tropical and subtropical waters across the Indo-Pacific region (Ref. 395). In Australia, it occurs from Coffs Harbour, NSW, to Shark Bay, WA, with occasional sightings as far south as South West Rocks (NSW) and Perth (WA) (Ref. 390; Ref. 396).

Reef manta rays are mainly found in inshore waters, often around coral and rocky reefs from the surface to depths of 432 m (Ref. 335; Ref. 336; Ref. 397). Although capable of traveling distances of at least 1,100 km (Ref. 390), they typically exhibit shorter-range movements and strong site fidelity (Ref. 398; Ref. 399; Ref. 400; Ref. 401). They can be found in the Kimberley section particularly around the Rowley Shoals Marine Park and Montgomery Reef (Ref. 792), and in the Pilbara.

Tagging studies at Ningaloo Reef (Ref. 390) have identified a primary activity hotspot around Shark Bay World Heritage Area, with additional hotspots extending north to Coral Bay within the Ningaloo World Heritage Area. Distribution data suggest connectivity between the Ningaloo Reef and Shark Bay. Tagged reef manta rays showed a preference for shallow coastal shelf waters (<50 m), where they are observed year-round (Ref. 390). A peak in sightings within Exmouth Gulf may correlate with spawning activity, though further research is required to understand prey composition (Ref. 390).

No BIAs for reef manta ray have been identified in Australian waters.

4.3.4 Seabirds and shorebirds

Table 4-17 lists the threatened and/or migratory seabirds and shorebirds that may be present within the PA. Additional information on these species is provided in the following subsections. The full list of marine species identified from the PMST is provided in appendix a.

Table 4-18 outlines the BIAs for seabirds and shorebirds and their known seasonal presence within the PA.

A review of Conservation Advice and Recovery Plans identified key threats associated with threatened and/or migratory seabirds and shorebirds that may be present within the PA. Where relevant to petroleum activities, these threats and relevant management advice are included in Table 4-19.

In addition to the threatened and/or migratory marine seabirds and shorebird species identified in the tables below, an additional 20 listed marine seabirds and shorebird species were identified as having the potential to occur within the PA (appendix a).

Table 4-17: Threatened and/or migratory seabirds and shorebirds

Common name	*Scientific name*	Threatened status	Migratory status	Presence				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Abbott's booby	*Papasula abbotti*	Endangered	—	SLO	—	SMO	SMO	SKO
Amsterdam albatross	*Diomedea amsterdamensis*	Endangered	Migratory	SLO	SLO	—	—	—
Asian dowitcher*	*Limnodromus semipalmatus*	Vulnerable	Migratory	—	SKO	SKO	SKO	—
Australian fairy tern	*Sternula nereis nereis*	Vulnerable	—	FBKO	BKO	BKO	—	—
Australian lesser noddy	*Anous tenuirostris melanops*	Vulnerable	—	BKO	FBLO	—	FBKO	—
Australian painted snipe	*Rostratula australis*	Endangered	—	SMO	SKO	SLO	SMO	—
Bar-tailed godwit*	*Limosa lapponica*	—	Migratory	SKO	RKO	SKO	SKO	—
Black-browed albatross	*Thalassarche melanophris*	Vulnerable	Migratory	FBLO	SMO	—	—	—
Black-tailed godwit*	*Limosa limosa*	Endangered	Migratory	—	RKO	SKO	SKO	—
Blue petrel	*Halobaena caerulea*	Vulnerable	—	SMO	—	—	—	—
Bridled tern	*Onychoprion anaethetus*	—	Migratory	BKO	BKO	BKO	BKO	—
Broad-billed sandpiper*	*Limicola falcinellus*	—	Migratory	—	SKO	SKO	—	—
Brown booby	*Sula leucogaster*	—	Migratory	—	—	BKO	BKO	BKO
Campbell albatross	*Thalassarche impavida*	Vulnerable	Migratory	SMO	SMO	SMO	—	—
Caspian tern	*Hydroprogne caspia*	—	Migratory	BKO	BKO	BKO	BKO	—
Christmas Island frigatebird	*Fregata andrewsi*	Endangered	Migratory	—	—	—	—	BKO
Christmas Island white-tailed tropicbird	*Phaethon lepturus fulvus*	Endangered	—	SMO	SMO	SMO	FBLO	BKO
Common greenshank*	*Tringa nebularia*	Endangered	Migratory	SKO	SKO	SKO	SKO	—
Common noddy	*Anous stolidus*	—	Migratory	SLO	SLO	SLO	FBKO	SLO
Common redshank*	*Tringa totanus*	—	Migratory	—	—	SKO	SKO	—
Common sandpiper*	*Actitis hypoleucos*	—	Migratory	SKO	SKO	SKO	SKO	SKO

Common name	*Scientific name*	Threatened status	Migratory status	Presence				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Curlew sandpiper*	*Calidris ferruginea*	Critically Endangered	Migratory	SKO	SKO	SKO	SKO	SKO
Eastern curlew*	*Numenius madagascariensis*	Critically Endangered	Migratory	SLO	SKO	SKO	SKO	—
Flesh-footed shearwater	*Ardenna carneipes*	—	Migratory	FBLO	FBLO	SLO	—	—
Fork-tailed swift	*Apus pacificus*	—	Migratory	SLO	SLO	SLO	—	—
Great frigatebird	*Fregata minor*	—	Migratory	—	—	SMO	SKO	BKO
Great knot*	*Calidris tenuirostris*	Vulnerable	Migratory	—	RKO	SKO	SKO	—
Greater crested tern*	*Thalasseus bergii*	—	Migratory	BKO	BKO	BKO	BKO	—
Greater sand plover*	*Charadrius leschenaultii*	Vulnerable	Migratory	SMO	SKO	SKO	SKO	—
Grey plover*	*Pluvialis squatarola*	Vulnerable	Migratory	—	RKO	SKO	SKO	—
Grey-tailed tattler*	*Tringa brevipes*	—	Migratory	SKO	RKO	SKO	SKO	—
Indian yellow-nosed albatross	*Thalassarche carteri*	Vulnerable	Migratory	SLO	SMO	SMO	—	—
Lesser frigatebird	*Fregata ariel*	—	Migratory	SLO	SKO	BKO	BKO	SKO
Lesser sand plover*	*Charadrius mongolus*	Endangered	Migratory	—	SKO	SKO	SKO	—
Little curlew*	*Numenius minutus*	—	Migratory	—	RLO	SKO	—	—
Little tern	*Sternula albifrons*	Vulnerable	Migratory	SMO	BKO	BKO	BKO	—
Long-toed stint*	*Calidris subminuta*	—	Migratory	—	SKO	SKO	—	—
Marsh sandpiper*	*Tringa stagnatilis*	—	Migratory	—	SKO	SKO	—	—
Masked booby	*Sula dactylatra*	—	Migratory	—	—	BKO	BKO	—
Northern giant petrel	*Macronectes halli*	Vulnerable	Migratory	FBLO	SMO	—	—	—
Northern Siberian bar-tailed godwit	*Limosa lapponica menzbieri*	Endangered	—	SKI	SKO	SKO	SKO	—
Oriental plover*	*Charadrius veredus*	—	Migratory	—	SKO	SKO	—	—

Common name	*Scientific name*	Threatened status	Migratory status	Presence				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Osprey*	*Pandion haliaetus*	—	Migratory	BKO	BKO	BKO	SKO	—
Pacific golden plover*	*Pluvialis fulva*	—	Migratory	SKO	SKO	SKO	SKO	—
Pectoral sandpiper*	*Calidris melanotos*	—	Migratory	SMO	SKO	SKO	SMO	SMO
Pin-tailed snipe*	*Gallinago stenura*	—	Migratory	—	RLO	—	—	—
Red knot*	*Calidris canutus*	Vulnerable	Migratory	SKO	SKO	SKO	SKO	SMO
Red-footed booby	*Sula sula*	—	Migratory	—	—	—	BKO	BKO
Red-necked phalarope*	*Phalaropus lobatus*	—	Migratory	—	SKO	SKO	—	—
Red-necked stint*	*Calidris ruficollis*	—	Migratory	SKO	RKO	SKO	SKO	—
Red-tailed tropicbird	*Phaethon rubricauda*	—	Migratory	BKO	SKO	—	BKO	BKO
Red-tailed tropicbird (Indian Ocean)	*Phaethon rubricauda westralis*	Endangered	—	—	—	SLO	—	BKO
Roseate tern	*Sterna dougallii*	—	Migratory	BKO	BKO	BKO	BKO	—
Ruddy turnstone*	*Arenaria interpres*	Vulnerable	Migratory	SKO	RKO	SKO	SKO	—
Sanderling*	*Calidris alba*	—	Migratory	SKO	RKO	SKO	SKO	—
Sharp-tailed sandpiper*	*Calidris acuminata*	Vulnerable	Migratory	SKO	SKO	SKO	SKO	SKO
Shy albatross	*Thalassarche cauta*	Endangered	Migratory	SMO	SMO	—	—	—
Soft-plumaged petrel	*Pterodroma mollis*	Vulnerable	—	FBKO	FBLO	FBLO	—	—
Sooty albatross	*Phoebetria fusca*	Vulnerable	Migratory	SMO	—	—	—	—
Southern giant-petrel	*Macronectes giganteus*	Endangered	Migratory	SMO	SMO	SMO	—	—
Southern royal albatross	*Diomedea epomophora*	Vulnerable	Migratory	SMO	—	—	—	—
Streaked shearwater	*Calonectris leucomelas*	—	Migratory	—	SMO	SKO	SKO	—
Swinhoe’s snipe*	*Gallinago megala*	—	Migratory	—	RLO	—	—	—
Terek sandpiper*	*Xenus cinereus*	Vulnerable	Migratory	—	RKO	SKO	SKO	—

Common name	*Scientific name*	Threatened status	Migratory status	Presence				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Wandering albatross	*Diomedea exulans*	Vulnerable	Migratory	SLO	SMO	—	—	—
Wedge-tailed shearwater	*Ardenna pacifica*	—	Migratory	BKO	BKO	SKO	—	—
Whimbrel*	*Numenius phaeopus*	—	Migratory	—	RKO	—	SKO	—
White-capped albatross	*Thalassarche steadi*	Vulnerable	Migratory	SMO	SMO	—	—	—
White-tailed tropicbird	*Phaethon lepturus*	—	Migratory	SMO	SKO	SKO	BKO	BKO
Wood sandpiper*	*Tringa glareola*	—	Migratory	—	RKO	SKO	—	—

Legend:
BKO: Breeding known to occur within area
FBKO: Foraging, feeding or related behaviour known to occur within area
FBLO: Foraging, feeding or related behaviour likely to occur within area
RKO: Roosting known to occur within area
RLO: Roosting likely to occur within area
SKO: Species or species habitat known to occur within area
SLO: Species or species habitat likely to occur within area
SMO: Species or species habitat may occur within area
** Migratory wetland species*

Table 4-18: BIAs for regionally significant seabirds and shorebirds

Common name	Behaviour	Seasonal presence	Occurrence descriptor	Section				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Australian lesser noddy	Foraging (provisioning young)	Year-round	Known to occur	✓	—	—	—	—

Common name	Behaviour	Seasonal presence	Occurrence descriptor	Section				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Bridled tern	Foraging (in high numbers)	Almost entirely a breeding visitor, arriving in late September or October and leaving between late February and early May.	Known to occur	✓	—	—	—	—
Brown booby	Breeding	Breeding February to October (but mainly in autumn)	Known to occur	—	—	✓	✓	—
Caspian tern	Foraging (provisioning young)	Not identified in dataset	Known to occur	✓	—	—	—	—
Common noddy	Foraging (provisioning young)	Breeding visitor in Abrolhos (mid-August to late April) and further north (May to at least November).	Known to occur	✓	—	—	—	—
Fairy tern	Breeding	Breeding from July to late September, birds from SWMR dispersing northwards in winter	Known to occur	—	✓	✓	—	—
	Foraging (in high numbers)	Year round, but southern birds disperse north in winter	Known to occur	✓	—	—	—	—
Great frigatebird	Breeding	Breeding in May–June and August	Known to occur	—	—	—	✓	—
Lesser crested tern	Breeding	Breeding March to June	Known to occur	—	✓	✓	✓	—
Lesser frigatebird	Breeding	Breeding March to September	Known to occur	—	—	✓	✓	—
Little shearwater	Foraging (in high numbers)	Early January to early December, mainly April to November	Known to occur	✓	✓	—	—	—
Little tern	Resting	Breeding recorded in June, July and October.	Known to occur	—	—	✓	✓	—
Pacific gull	Foraging (in high numbers)	Not identified in dataset	Known to occur	✓	—	—	—	—
Red-footed booby	Breeding	Breeding in May-June	Known to occur	—	—	—	✓	—

Common name	Behaviour	Seasonal presence	Occurrence descriptor	Section				
				West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Roseate tern	Breeding	Breeding from mid-March to July. Also birds from SWMR dispersing north in winter.,	Known to occur	—	✓	✓	✓	—
	Foraging (provisioning young)	Winter	Known to occur	✓	—	—	—	—
Soft-plumaged petrel	Foraging (in high numbers)	Mainly March to late September	Known to occur	✓	—	—	—	—
Sooty tern	Foraging	Late August to early May	Known to occur	✓	✓	—	—	—
Wedge-tailed shearwater	Breeding	Breeding visitor arriving in mid-August and leaving in April in Pilbara and mid-May in Shark Bay.	Known to occur	✓	✓	✓	✓	—
	Foraging (in high numbers)	Mid-August to May	Known to occur	✓	—	—	—	—
White-faced storm petrel	Foraging (in high numbers)	Not identified in dataset	Known to occur	✓	—	—	—	—
White-tailed tropicbird	Breeding	Breeding recorded in May and October	Known to occur	—	—	✓	✓	—

Table 4-19: Summary of relevant conservation plans—seabirds and shorebirds

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
Albatrosses and petrels	National Recovery Plan for Albatrosses and Petrels (Ref. 406)	Marine pollution, including fuel and oil spills, chemical contaminants and marine debris	• undertake, as feasible, monitoring of breeding colonies for marine debris, plastics and marine pollution impacts including, as a priority: – incidence of oiled birds at nest – levels of marine debris egestion and entanglement at nest – effect of plastics and marine pollution – develop baseline measures of levels of heavy metals and persistent organic pollutants. • Risk based response strategies for marine pollution incidents are developed
		Marine infrastructure interactions	• none identified
		Climate variability and change	• none identified
Migratory shorebirds	Wildlife Conservation Plan for Migratory Shorebirds (Ref. 407)	Habitat loss and modification	• investigate the significance of cumulative impacts on migratory shorebird habitat and populations in Australia
		Anthropogenic disturbance	• ensure all areas important to migratory shorebirds in Australia continue to be considered in development assessment processes
		Climate variability and change	• investigate the impacts of climate change on migratory shorebird habitat and populations in Australia
Seabirds	Wildlife Conservation Plan for Seabirds (Ref. 408)	Habitat loss and modification	• manage the effects of anthropogenic disturbance to seabird breeding and roosting areas
		Climate variability and change	• none identified
		Anthropogenic disturbance	• enhance contingency plans to prevent and/or respond to environmental emergencies that have an impact on seabirds and their habitats
		Transport	• none identified
		Pollution	• obtain baseline data and continue to monitor pollutant

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
			concentrations in seabirds and their habitats
Abbott's booby	Conservation Advice for Abbott's Booby (Ref. 409)	Climate change	• none identified
		Marine debris - plastics	• none identified
Asian dowitcher	Conservation Advice for Asian Dowitcher (Ref. 410)	Climate change	• quantify and predict changes to important habitat because of climate change and identify potential shifts in the breeding and non-breeding distribution of the species
		Invasive species	• none identified
		Pollution	• none identified
Australian fairy tern	Conservation Advice for Fairy Tern (Ref. 411)	Increasing salinity in waters adjacent to fairy tern colonies and oil spills	• manage any changes to hydrology that may result in changes to tide levels, increase salinity or pollution
	National Recovery Plan for the Australian Fairy Tern (Ref. 412)	Habitat degradation and loss of breeding habitat	• none identified
		Disturbance	• none identified
		Climate variability and change	• use climate modelling techniques to investigate the potential influence of climate change on breeding and foraging habitats
		Water management and increased salinity	• monitor, and adaptively manage changes to hydrology at breeding and foraging sites
		Pollution	• monitor contaminant levels in Australian Fairy Terns
Australian lesser noddy	Conservation Advice Australian Lesser Noddy (Ref. 413)	Habitat loss, disturbance and modification	• Houtman Abrolhos and its surrounds continue to be managed in such a way that human disturbance is minimised
Australian painted snipe	Conservation Advice Australian Painted Snipe (Ref. 414)	Habitat loss, disturbance and modification	• ensure there is no disturbance in areas where the species is known to breed, excluding necessary actions to manage the conservation of the species • manage any changes to hydrology that may result in changes to water table levels, run-off, salinity, algal blooms, sedimentation or pollution
	National Recovery Plan for the Australian Painted Snipe (Ref. 415)	Deterioration of water quality	No specific management actions were identified to address the threats; however, the following measure was noted:
		Climate variability and change	
		Human disturbance	

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
			• manage threats at known breeding and non-breeding habitats • investigate the impact of potential threats such as human disturbance, fire and predation
Black-tailed godwit	Conservation Advice for Black-tailed Godwit (Ref. 416)	Habitat loss, fragmentation, and degradation	• ensure that future development projects avoid any activities that disproportionately affect the upper tidal flats and/or areas providing major foraging opportunities as identified by species experts, local studies and site managers
		Climate change	• quantify and predict changes to important habitat because of climate change and identify potential shifts in the breeding and non-breeding distribution of the species
		Pollution	• none identified
Blue petrel	Conservation Advice for Blue Petrel (Ref. 417)	Nest destruction or predation	• continue to manage Macquarie Island and its surrounds in such a way that human disturbance is minimised
Christmas Island frigatebird	Conservation Advice for the Christmas Island Frigatebird (Ref. 418)	Disturbance of habitat	• preventing activities in habitat critical to the survival that will remove nesting and roosting habitat • preventing activities in buffer areas identified in Map 1 that may disturb nesting and roosting birds e.g. clearing vegetation that would result in increased wind turbulence or weed invasion in nesting and roosting habitat or burning of vegetation that would result in smoke entering nesting and roosting habitat
		Heavy metal contamination	• none identified
		Marine debris - plastics	• assess levels of ingestion of marine debris by Christmas Island frigatebirds and other breeding seabirds in the Indian Ocean territories and determine its impact on survival or breeding success
	National Recovery Plan for Christmas Island Frigatebird (Ref. 419)	Habitat loss	• ensure protection of habitat critical to survival outside the national park

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
Christmas Island white-tailed tropicbird	Conservation Advice for White-tailed Tropicbird (Christmas Island) (Ref. 420)	The primary threat is introduced predators	• not applicable
Common greenshank	Conservation Advice for Common Greenshank (Ref. 421)	Habitat loss, fragmentation, and degradation	• ensure that future development projects avoid any activities that disproportionately affect the upper tidal flats and/or areas providing major foraging opportunities as identified by species experts, local studies, and site managers
		Anthropogenic disturbance	• none identified
		Climate change	• quantify and predict changes to important habitat because of climate change and identify potential shifts in the breeding and non-breeding distribution of the species
		Pollution	• none identified
Curlew sandpiper	Conservation Advice for Curlew Sandpiper (Ref. 422)	Habitat loss, fragmentation, and degradation	• ensure that future development projects avoid any activities that disproportionately affect the upper tidal flats and/or areas providing major foraging opportunities as identified by species experts, local studies, and site managers
		Anthropogenic disturbance	• none identified
		Climate change	• identify and protect inland wetlands and coastal drought refuges in Australia. • quantify and predict changes to important habitat because of climate change and identify potential shifts in the breeding and non-breeding distribution of the species
		Pollution	• none identified
Eastern curlew	Conservation Advice for far Eastern Curlew (Ref. 423)	Habitat loss, fragmentation, and degradation	• ensure that future development projects avoid any activities that disproportionately affect the upper tidal flats and/or areas providing major foraging opportunities as identified by species experts, local studies, and site managers
		Anthropogenic disturbance	• none identified

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
		Climate change	• quantify and predict changes to important habitat because of climate change and identify potential shifts in the breeding and non-breeding distribution of the species
		Pollution	• none identified
Flesh-footed shearwater	Conservation Advice Ardenna carneipes Flesh-footed Shearwater (Ref. 424)	The main threat is fishing	• not applicable
Great knot	Conservation Advice for Great Knot (Ref. 425)	Habitat loss, fragmentation, and degradation	• ensure that future development projects avoid any activities that disproportionately affect the upper tidal flats and/or areas providing major foraging opportunities as identified by species experts, local studies, and site managers
		Anthropogenic disturbance	• none identified
		Climate change	• none identified
		Pollution	• none identified
Greater sand plover	Conservation Advice for Greater Sand Plover (Ref. 426)	Habitat loss, fragmentation, and degradation	• ensure that future development projects avoid any activities that disproportionately affect the upper tidal flats and/or areas providing major foraging opportunities as identified by species experts, local studies, and site managers
		Anthropogenic disturbance	• none identified
		Climate change	• none identified
		Pollution	• none identified
Grey plover	Conservation Advice for Grey Plover (Ref. 427)	Habitat loss, fragmentation, and degradation	• ensure that future development projects avoid any activities that disproportionately affect the upper tidal flats and/or areas providing major foraging opportunities as identified by species experts, local studies and site managers
		Anthropogenic disturbance	• none identified
		Climate change	• none identified
		Pollution	• none identified

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
Little Tern	Conservation Advice for *Sternula albifrons* (little tern) (Ref. 785)	Habitat loss and habitat degradation	• liaise with state and local governments to facilitate consideration of the species' nesting requirements in future assessment policies and procedures, including development and beach wrack harvesting
		Anthropogenic disturbance	• none identified
		Climate change	• none identified
Lesser sand plover	Conservation Advice for Lesser Sand Plover (Ref. 428)	Habitat loss and habitat degradation	No specific management actions were identified to address the threats; however, the following actions were noted: • protect important habitat in Australia • maintain and improve protection of roosting and feeding sites in Australia • manage disturbance at important sites which are subject to anthropogenic disturbance when lesser sand plovers are present – e.g. discourage or prohibit vehicle access, horse riding and dogs on beaches, implement temporary site closures
		Climate change	
		Pollution/contamination impacts	
		Disturbance	
Northern Siberian bar-tailed godwit	Conservation Advice for Yakutian Bar-tailed Godwit (Ref. 429)	Habitat loss, fragmentation, and degradation	• ensure that future development projects avoid any activities that disproportionately affect the upper tidal flats and/or areas providing major foraging opportunities as identified by species experts, local studies and site managers.
		Anthropogenic disturbance	• none identified
		Climate change	• quantify and predict changes to important habitat because of climate change and identify potential shifts in the breeding and non-breeding distribution of the species
		Pollution	• none identified
Red knot	Conservation Advice for Red Knot (Ref. 430)	Habitat loss, fragmentation, and degradation	• ensure that future development projects avoid any activities that disproportionately affect the upper tidal flats and/or areas providing major foraging opportunities as identified by species experts, local studies, and site managers.

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
		Anthropogenic disturbance	• none identified
		Climate change	• none identified
		Pollution	• none identified
Red-tailed tropicbird (Indian Ocean)	Conservation Advice for Indian Ocean Red-tailed Tropicbird (Ref. 431)	Climate change	• none identified
Ruddy turnstone	Conservation Advice for Ruddy Turnstone (Ref. 432)	Habitat loss, fragmentation, and degradation	• ensure that future development projects avoid any activities that disproportionately affect the upper tidal flats and/or areas providing major foraging opportunities as identified by species experts, local studies and site managers
		Anthropogenic disturbance	• none identified
		Climate change	• none identified
		Pollution	• none identified
Sharp-tailed sandpiper	Conservation Advice for Sharp-tailed Sandpiper (Ref. 433)	Habitat loss, degradation, and fragmentation	• ensure that future development projects avoid any activities that disproportionately affect the upper tidal flats and/or areas providing major foraging opportunities as identified by species experts, local studies and site managers
		Climate change	• none identified
		Pollution	• none identified
Shy Albatross	Conservation Advice for Shy Albatross (Ref. 434)	Climate change	• the likely impacts on albatrosses and giant petrels breeding and foraging within Australian jurisdiction are assessed and reported and knowledge gaps identified (long term monitoring strategies are important for understanding and tracking impacts of climate change)
		Marine pollution	• none identified
		Human disturbance	• none identified
Soft-plumaged petrel	Conservation Advice for Soft-plumaged Petrel (Ref. 435)	The only potential threat is accidental introduction of predators	• not applicable
Terek sandpiper	Conservation Advice for Terek	Habitat loss, degradation, and fragmentation	• ensure that future development projects avoid any activities that disproportionately affect the upper tidal flats and/or areas

Species	Relevant Plan / Advice	Key threats	Relevant management advice/action
	Sandpiper (Ref. 436)		providing major foraging opportunities as identified by species experts, local studies and site managers
		Anthropogenic disturbance	• quantify and predict changes to important habitat because of climate change and identify potential shifts in the breeding and nonbreeding distribution of the species.
		Climate change	• none identified
		Pollution	• none identified

4.3.4.1 Abbott's booby

The Abbott's booby (*Papasula abbotti*) is a large seabird that occurs on Christmas Island in the Indian Ocean, primarily inhabiting its forested areas of the plateau and in upper terrace forests for nesting and roosting (Ref. 409; Ref. 439). Approximately 83% of known nesting habitat on Christmas Island occurs within the National Park (Ref. 409). These birds prefer emergent rainforest trees at elevations 100 m above sea level for their nests, often using the same sites year after year (Ref. 409; Ref. 440). The Abbott's booby spends most of its life at sea and has a range that covers Christmas Island and the NWS off WA up to the southern end of Timor-Leste in the Timor Sea (Ref. 409). The Abbott's booby is not known to occur in the West Coast and Ningaloo sections of the PA.

Abbott's boobies are known for their unique foraging behaviour, diving from heights to catch fish and squid, which constitute the bulk of their diet (Ref. 441). Their physiological adaptations include long, pointed wings that facilitate gliding over the ocean, allowing them to cover large distances while searching for food (Ref. 442).

The *Conservation Advice for Abbott's Booby* (Ref. 409) defines all known nesting trees and all forest vegetation within a 200 m radius of known nesting trees as habitat critical to the survival of the species. No habitat critical to the survival of the species or BIAs have been identified in the PA.

4.3.4.2 Amsterdam albatross

The Amsterdam albatross (*Diomedea amsterdamensis*) is native to Amsterdam Island in the southern Indian Ocean (Ref. 443), ~3,000 km southwest of WA. Satellite tracking has shown that adult birds range from the coast of eastern South Africa to waters south of WA during non-breeding years (Ref. 444). It is not known to occur in the Pilbara, Kimberley or Christmas Island sections of the PA.

The Amsterdam albatross primarily feeds on squid and fish found in subantarctic waters (Ref. 445), some of which extend toward parts of Australia. This species shares its habitat with other seabird species commonly found in Australian waters, such as the wandering albatross and various species of petrels (Ref. 406). Although breeding occurs on Amsterdam Island (Ref. 406), the species' migratory patterns and feeding habitats connect it to the broader ecological networks that involve Australian waters (Ref. 445).

No BIAs have been identified for this species in Australia.

4.3.4.3 Asian dowitcher

The Asian dowitcher (*Limnodromus semipalmatus*) is a large migratory shorebird found in tidal mudflats, estuaries, and coastal lagoons in WA during migration and non-breeding seasons (Ref. 446; Ref. 447). The species is a regular visitor to coastal areas between Broome and Port Hedland (Ref. 448; Ref. 449; Ref. 450) and the Port McArthur tidal wetlands in the Gulf of Carpentaria (Ref. 451). The Asian dowitcher is not known to occur within the West Coast or Christmas Island sections of the PA.

The Asian dowitcher breeds in Siberia, Mongolia and north-east China, forming small colonies of 6-20 pairs. Clutch sizes typically consist of two eggs, occasionally three (Ref. 410). In Australia, Asian dowitchers are observed from August to April, with no recorded internal movements (Ref. 452). While predominantly found in northern Australia, occasional sightings occur in the NT, with rare records from southwest WA and the east coast (Ref. 452).

Asian dowitchers primarily feed on small fish, insect larvae, and oligochaetes during the breeding season and polychaetes, molluscs, and insect larvae while migrating or overwintering (Ref. 450; Ref. 453). Foraging, often synchronised with tidal cycles, occurs during low tides on exposed mudflats (Ref. 454). During the non-breeding season, they roost in sheltered coastal environments such as mudflats, lagoons, creeks, and saltworks (Ref. 410).

The *Conservation Advice for Asian dowitcher* (Ref. 410) defines habitats critical to the survival of the species as those essential for foraging, breeding, roosting, dispersal, genetic diversity, and recovery. However, no habitat critical to the survival of the species or BIAs have been identified in the PA.

4.3.4.4 Australian lesser noddy

The Australian lesser noddy (*Anous tenuirostris melanops*) is a small seabird primarly found along the coast of WA (Ref. 459). The species typically inhabits tropical and subtropical regions of the Indian Ocean (Ref. 413). In WA, the species is known to breed exclusively in the Houtman Abrolhos, nesting in mangroves (Ref. 413). The species is largely sedentary, with birds remaining near their breeding islands throughout the year (Ref. 452). The Australian lesser noddy it not known to occur at Christmas Island.

The lesser noddy feeds predominantly on small fish and invertebrates, which it catches through plunge diving or surface foraging (Ref. 460). Australian lesser noddy diet is influenced by the availability of prey in coastal waters, and while it typically stays near its breeding colonies, individuals may forage extensively offshore (Ref. 452).

A foraging BIA has been identified (Figure 4-11, Table 4-18) around a group of islands off the mainland coast, including Pelsaert Island, Abrolhos Island, and North Island. This BIA overlaps with the PA, specifically the West Coast section.

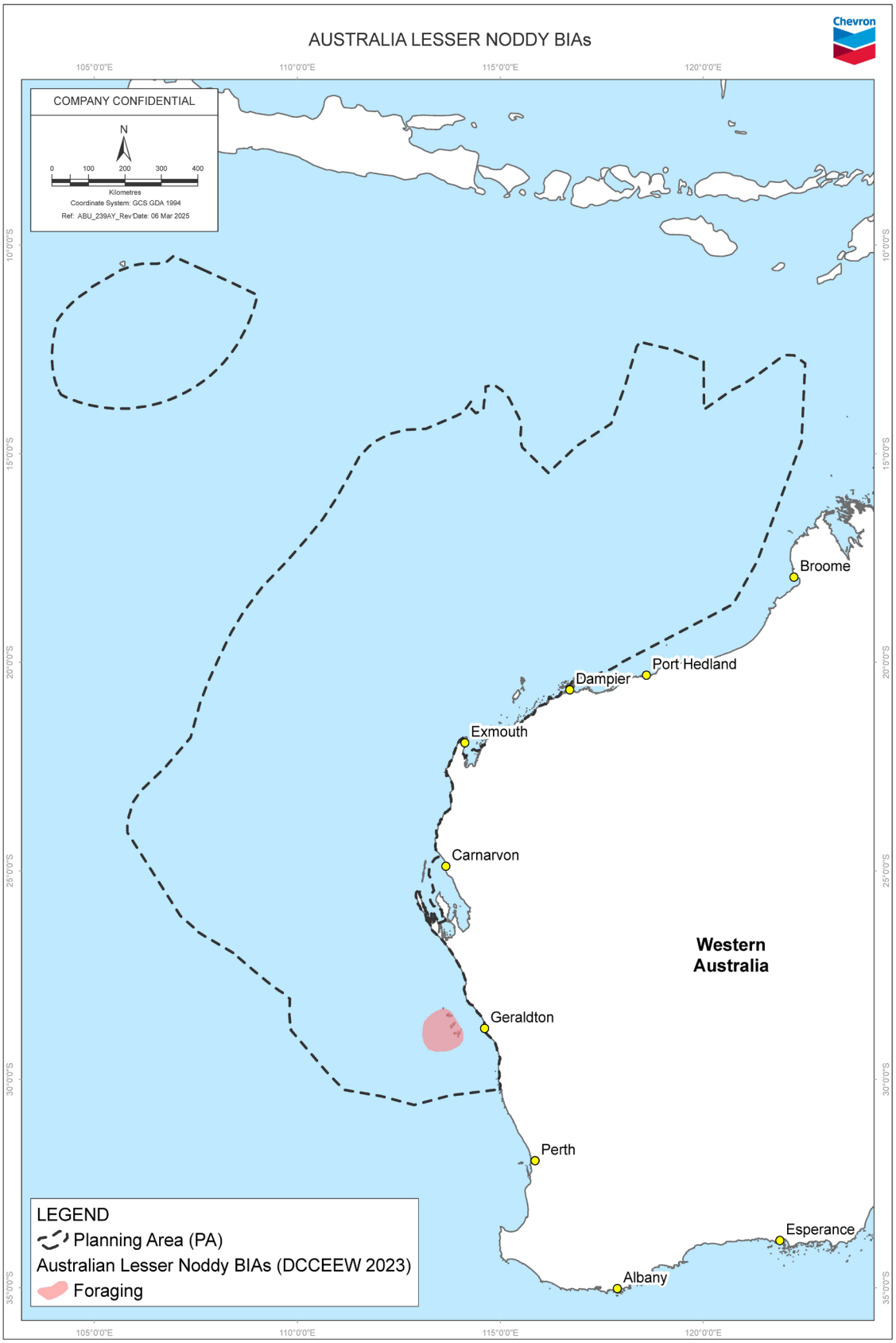

Figure 4-11: Biologically important areas for Australian lesser noddy

4.3.4.5 Australian painted snipe

The Australian painted snipe (*Rostratula australis*) is endemic to Australia and has been recorded in wetlands across all states and territories (Ref. 415; Ref. 461; Ref. 462). The species is most commonly found in eastern Australia, particularly in scattered locations throughout Queensland, NSW, Victoria, and southeastern SA. Less frequent records exist from western SA, the NT, and WA (Ref. 461; Ref. 462; Ref. 463). The species primarily inhabits shallow freshwater wetlands with dense emergent vegetation, such as grasses, reeds, and sedges, which provide concealment (Ref. 414; Ref. 415; Ref. 464). The Australian painted snipe is not known to occur at Christmas Island but is known across the remaining sections of the PA.

Movement patterns are not well understood, but the species is thought to be dispersive or migratory (Ref. 465) but might be best described as nomadic, moving unpredictably in response to rainfall and wetland availability (Ref. 415). It often appears in areas recently inundated by flooding (Ref. 414).

The Australian painted snipe is primarily crepuscular, feeding during dawn and dusk. It forages in shallow water and soft mud, probing for insects, crustaceans, and seeds (Ref. 414; Ref. 463). While generally solitary, the birds may gather in small groups during foraging or breeding (Ref. 466).

Nests are typically located among tall tussocks on small, muddy islands or mounds surrounded by shallow freshwater, or on swamp shores and channel banks (Ref. 415). Breeding sites are often ephemeral wetlands with complex shorelines, featuring a mix of shallow water, exposed mud, and dense low cover (Ref. 463). Nesting occurs from December to May in northern Australia and from October to December in the south (Ref. 467)

No BIAs have been identified for this species in Australia.

4.3.4.6 Bar-tailed godwit

The bar-tailed godwit (*Limosa lapponica*) has been recorded in the coastal areas of all Australian states (Ref. 468). Two subspecies of the Bar-tailed Godwit are recognised, *L. l. menzbieri* that breeds in northern central Russia, and *L. l. baueri* that breeds in eastern Russia and Alaska (Ref. 446). The distribution of *L. l. baueri* in the non-breeding period is New Zealand and eastern Australia, while *L. l. menzbieri* occurs predominantly in the north of WA and south-eastern Asia (Ref. 446). The bar-tailed godwit is not known to occur at Christmas Island but is known across the remaining sections of the PA.

The bar-tailed godwits are primarily found in coastal habitats such as estuaries, intertidal mudflats, and sandy beaches, where they usually roosts (Ref. 468). They have been observed roosting at high tide on a claypan 2 km inland of Roebuck Bay, WA (Ref. 469). The birds do not seem to move between south-east and north-west Australia, with high fidelity to non-breeding sites apparent in both areas (Ref. 468).

The bar-tailed godwit is a long-distance migrant, typically visiting Australia from September to April. Godwits from north-west Australia typically depart early to mid-April and may fly non-stop to China (Ref. 470).

This species feeds by probing its long, slightly upturned bill into mud and sand, extracting marine invertebrates, including worms, bivalves, and crustaceans (Ref. 468). This feeding strategy is highly effective on exposed tidal flats, and

feeding is often synchronised with tidal cycles (Ref. 468). Bar-tailed godwits are social birds, foraging and migrating in large flocks.

No BIAs have been identified for this species in Australia.

4.3.4.7 Black-browed albatross

The black-browed albatross (*Thalassarche melanophris*) is a seabird commonly found in subantarctic and Antarctic waters during the breeding season, with some individuals ranging as far south as 70ºS or north into temperate waters (Ref. 473). The species predominantly breeds on subantarctic islands, such as Heard Island and Macquarie Island (Ref. 473), both part of Australia's remote territories. Breeding occurs between September and December, after which fledglings and adults leave the breeding colonies (Ref. 474). This black-browed albatross is not known to occur within the Pilbara, Kimberley or Christmas Island sections of the PA.

This species primarily forages on crustaceans, fish, squid, carrion, and fishery discards (Ref. 475). Known for its highly migratory behaviour, the black-browed albatross spends much of the year over open oceans, far from land, returning to breeding colonies for reproduction (Ref. 474; Ref. 475). The species undertakes long-distance foraging flights, using strong winds and thermals to glide efficiently over vast stretches of water.

During the breeding season, the albatross nests in colonies on cliffs or steep slopes (Ref. 474; Ref. 475). The nests, constructed as mounds of soil and vegetation, are reused annually (Ref. 474; Ref. 441).

From May to November, this species migrates to waters off the continental shelf (Ref. 474). Foraging BIAs for the black-browed albatross extend off the coast of SA, running eastward along the Australian coastline, encompassing Tasmania, and continuing north toward Queensland. The BIAs do not intersect with the PA.

4.3.4.8 Black-tailed godwit

The black-tailed godwit (*Limosa limosa*) is a migratory wader species with a large, discontinuous breeding range extending from Iceland to the Russian far east (Ref. 416). During the austral summer non-breeding season, black-tailed godwits are found across all Australian states and territories, with the highest densities occurring in coastal regions (Ref. 416). The black-tailed godwit is not known to occur within the Christmas Island section but is known across the remaining sections of the PA

Highly migratory, black-tailed godwits travel vast distances between breeding and wintering grounds. They nest solitarily during the breeding season in grasslands or wetlands but are typically observed in small to moderate-sized flocks in Australia (Ref. 416). These birds are known for their long-distance flight capabilities, migrating thousands of kilometres to reach their southern wintering grounds (Ref. 476).

The species' feeding habitats include mudflats, soft wet sand in intertidal zones, saltmarshes, and beaches along coastlines, bays, and estuaries (Ref. 453). While they forage across the tidal range, they often spend significant time feeding on upper tidal flats (Ref. 477). As opportunistic feeders, black-tailed godwits play a vital ecological role, primarily consuming invertebrates such as worms, molluscs, and small crustaceans by probing mud with their long, slender bills (Ref. 416).

The *Conservation Advice for black-tailed godwit* (Ref. 416) defines habitats critical to the survival of the species as those essential for foraging, breeding, roosting, dispersal, genetic diversity, and recovery. However, no habitat critical to the survival of the species or BIAs have been identified in the PA.

4.3.4.9 Blue petrel

The blue petrel (*Halobaena caerulea*) is a small seabird with a global distribution in the Southern Ocean (Ref. 478). These birds breed on remote islands, including Macquarie Island, and is typically observed in Australian waters during the non-breeding season (Ref. 417). Adults are generally sedentary, while younger birds are more dispersive (Ref. 479). The blue petrel may occur in the west coast section, but is not known to occur in any other sections of the PA.

Blue petrels primarily feed on small crustaceans, fish, and squid, foraging near the ocean surface in cold, nutrient-rich waters, which provide productive feeding grounds (Ref. 479; Ref. 480).

Like most small petrels, they are nocturnal at their breeding sites and nest in burrows within large colonies. Blue petrels are monogamous, with both parents sharing incubation of the single egg and feeding the chick regurgitated food until fledging (Ref. 481).

No BIAs have been identified for this species in Australia.

4.3.4.10 Bridled tern

The bridled tern (*Onychoprion anaethetus*) is a medium-sized seabird found in tropical and subtropical regions (Ref. 408). This species is widespread in Australia, breeding on offshore islands in western, northern, and north-eastern regions. Its range extends from Cape Leeuwin in the south-west, around northern Australia, to north-eastern and mid-eastern Queensland, including the Great Barrier Reef and Coral Sea as far south as Lady Elliott Island (Ref. 482). During the breeding season, they show high site fidelity to natal colonies (Ref. 482).

In WA, bridled terns breed on islands along the coast from Cape Leeuwin to the Pilbara and Kimberley regions. They nest in sheltered areas such as rock crevices, under vegetation, or beneath debris to protect against predators and harsh environmental conditions (Ref. 482; Ref. 484). The bridled tern is not known to occur at Christmas Island.

In WA, a nearly all bridled terns return to breeding colonies between late September and mid-October, departing from early to mid-April. In some years, they leave as late as mid-May (Ref. 482). During the breeding season, they remain close to their nesting islands, foraging in nearby waters and breed in small to large colonies (hundreds to thousands of birds) (Ref. 483).

Bridled terns moving along the WA coast to search for food in oceanic waters, where they hunt for small fish, squid, and crustaceans (Ref. 484). Foraging often involves hovering and diving from a height to capture prey just below the water's surface (Ref. 482).

Breeding and foraging BIAs have been identified (Figure 4-12, Table 4-18) in Australia. In WA, foraging BIAs extend off the coast from Kalbarri to Esperance, intersecting with the southern section of the PA, specifically the West Coast section.

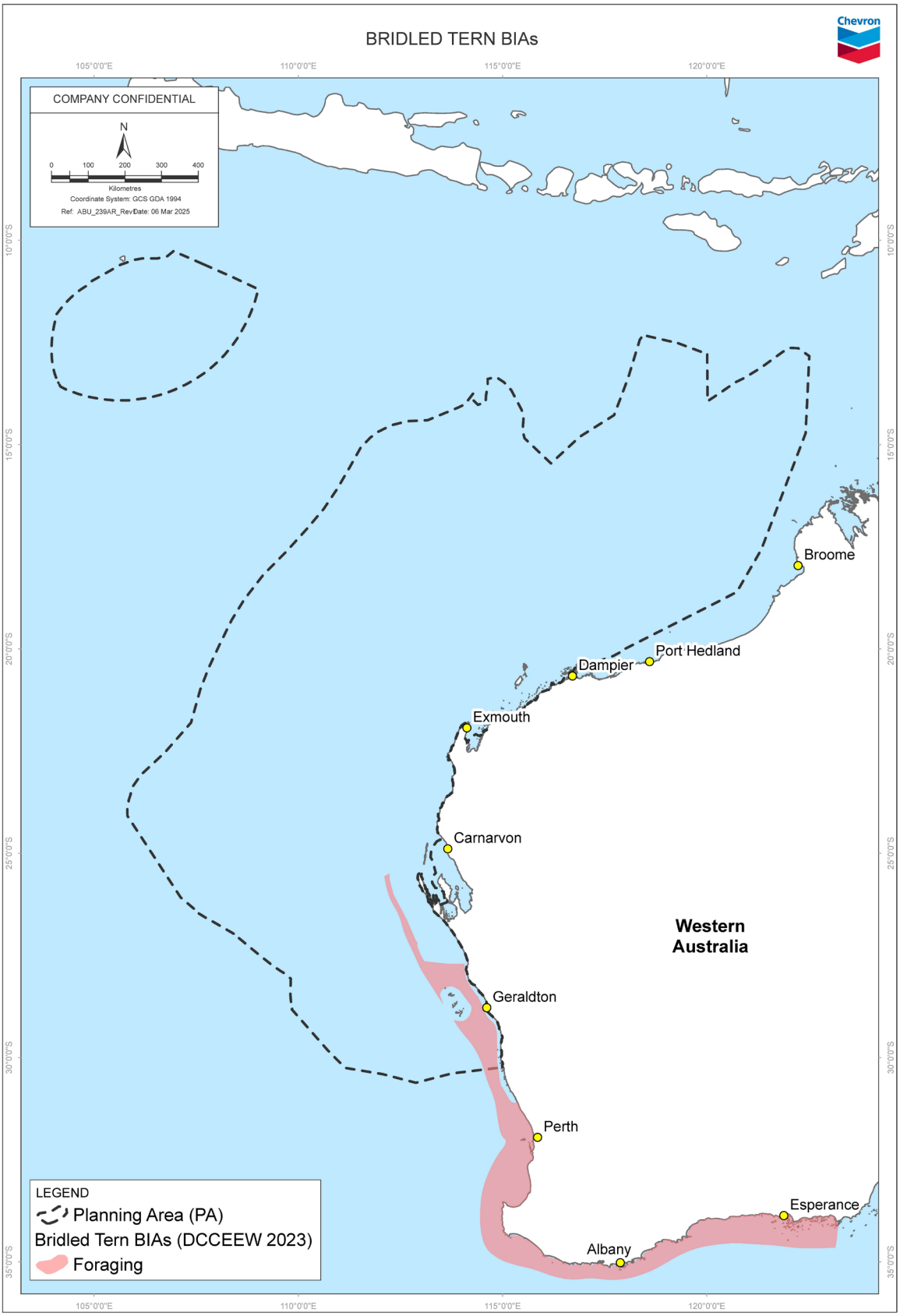

Figure 4-12: Biologically important areas for Bridled tern

4.3.4.11 Broad-billed sandpiper

The broad-billed sandpiper (*Limicola falcinellus*) is a migratory wader species that visits Australia occasionally, primarily during the austral summer. It breeds in the northern hemisphere and migrates south during the non-breeding season (Ref. 485). In WA, the species is found along the coasts of the Ningaloo, Pilbara and Kimberley regions, mainly from Onslow to Broome, with additional sightings near the mouth of the Lawley River and inland at Lake Daley (Ref. 485). The broad billed sandpiper does not occur within Christmas Island or the West Coast sections of the PA.

This sandpiper forages on a variety of invertebrates, including marine nereid worms, small bivalves, snails, crustaceans (e.g. amphipods), and both adult and larval insects (Ref. 486). The broad-billed sandpiper prefers sheltered coastal habitats, such as estuarine mudflats, but it can also be found in saltmarshes, shallow freshwater lagoons, saltworks, and sewage farms. Areas with extensive soft intertidal mudflats, often accompanied by nearby shell or sandbanks, are ideal. Occasionally, the species is observed on reefs or rocky platforms (Ref. 485).

In Australia, the broad-billed sandpiper is typically seen in small flocks during migration or in suitable feeding habitats. In north-western Australia, very few adults arrive during August and early September (Ref. 485). By late October, both adults and first-year birds are present. Peak numbers occur in March and April, with most birds departing around mid-April (Ref. 485).

No BIAs have been identified for this species in Australia.

4.3.4.12 Brown booby

The brown booby (*Sula leucogaster*) is a seabird commonly found across all tropical oceans (Ref. 487). In Australia, the brown booby is found from Bedout Island in WA, along the coasts of the NT to the Bunker Group of islands in Queensland, with occasional sights further south in NSW and Victoria (Ref. 441). Brown boobies inhabit coastal islands, rocky outcrops, and cliff faces, where they nest in colonies, but they are also frequently seen in open ocean areas, spending much of their time flying or diving for prey (Ref. 441; Ref. 488). The Christmas Island brown booby population is one of the largest in the world with 7,000 breeding pairs (Ref. 793). They are ground nesters and occupy their nests year-round and breeding may occur at any time (Ref. 793). The brown booby is not known to occur within the West Coast and Ningaloo sections of the PA.

This marine species primarily feeds in inshore waters. Its diet consists mainly of flying fish and squid, with additional prey such as halfbeak, mullet, and anchovy (Ref. 408). Brown boobies hunt by diving from great heights into the water, often at remarkable speeds (Ref. 489).

They are social birds, often gathering in large groups, especially during the breeding season (Ref. 489). While breeding is seasonal in some regions, in others, it occurs opportunistically or continuously. Nests are built on the ground, typically in vegetation on rocky islands or coral atolls. Colonies tend to be smaller than those of other *Sula* species (Ref. 479.)

Breeding and foraging BIAs for this species have been identified (Figure 4-13, Table 4-18) around Australia's northern coastline, ranging from northern WA to Queensland. Breeding BIAs overlap with the PA, particularly in the Pilbara and Kimberley sections.

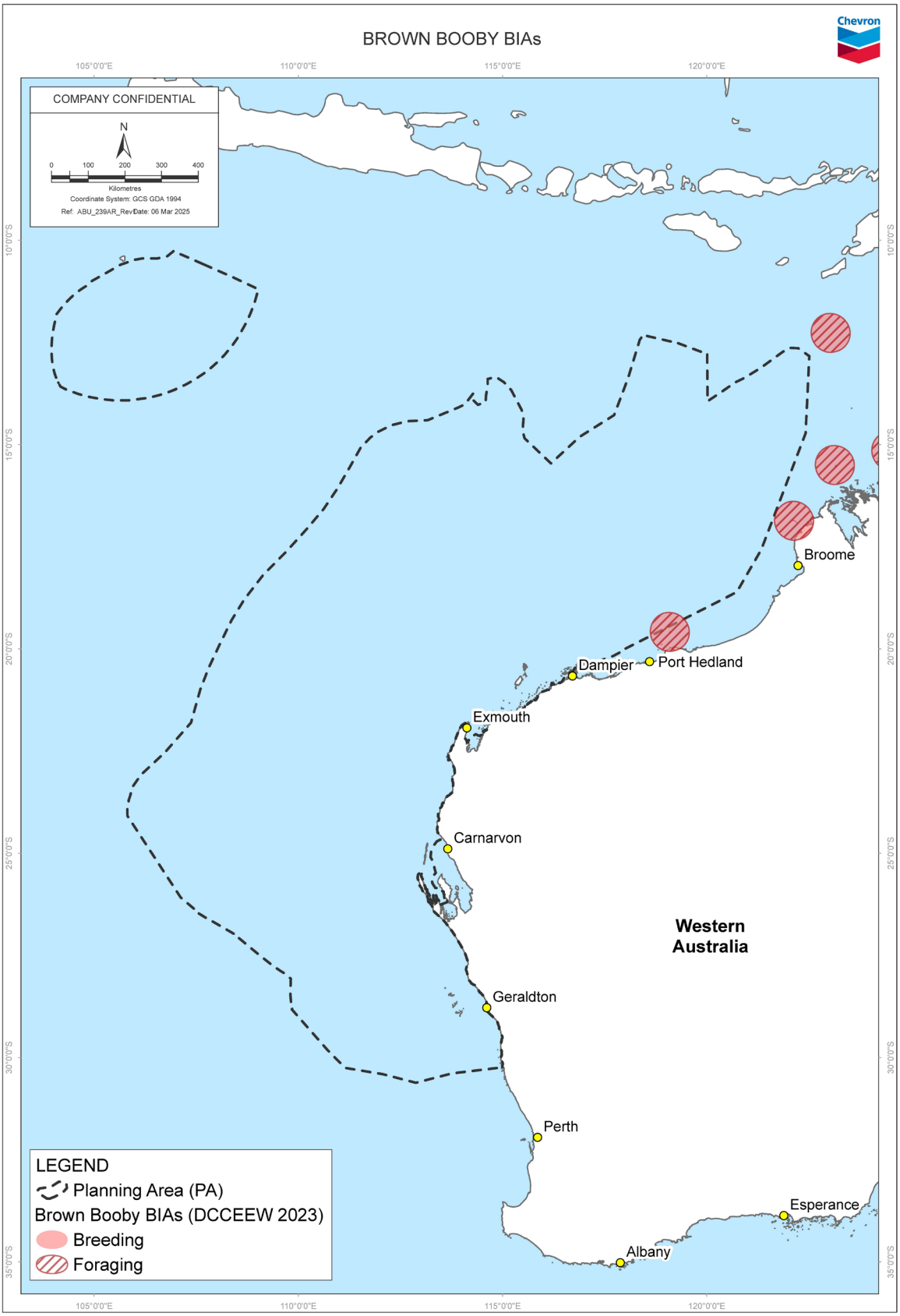

Figure 4-13: Biologically important areas for brown booby

4.3.4.13 Campbell albatross

The Campbell albatross (*Thalassarche impavida*) is a medium sized albatross, identified by its black brow, bright yellow-orange bill, and broad black leading edge on the underwing (Ref. 490). Although it breeds on Campbell Island, south of New Zealand, where it exhibits strong site fidelity, Australia lies within its foraging range (Ref. 406).

In Australian waters, Campbell albatrosses are commonly found over the oceanic continental slopes off Tasmania, Victoria, and NSW (Ref. 490). This migratory species moves from its breeding colonies to the continental shelf waters of Australia and New Zealand (Ref. 490). Adults and fledglings leave the breeding grounds on Campbell Island by mid-April, with breeding birds returning between late August and early September. Non-breeding immature and adult birds disperse throughout the South Pacific and across southern Australian waters (Ref. 441).

Campbell albatrosses are primarily pelagic, spending most of their lives in open oceanic waters. However, they are known to forage within Australia's high latitudes including the West Coast, Ningaloo and Pilbara sections of the PA (Ref. 406). The Campbell albatross is not known to occur in the Kimberley or Christmas Island sections of the PA.

Their diet consists mainly of krill and fish, with occasional consumption of cephalopods, salps, and jellyfish (Ref. 490). They are enthusiastic scavengers, often following fishing boats (Ref. 441; Ref. 491) and foraging alongside other seabirds, such as albatrosses and petrels (family Diomedeidae) (Ref. 490).

Foraging BIAs for this species have been identified in the South-east Marine Region, including Macquaire Island. These BIAs are outside of the PA.

4.3.4.14 Caspian tern

The Caspian tern (*Hydroprogne caspia*), the largest tern species in Australia, is a widespread and powerful seabird known for its distinctive large size, thick red-orange bill, and striking black cap (Ref. 492). It is found globally and commonly inhabits both coastal and inland waters throughout Australia (Ref. 452).

In WA, the Caspian tern occupies diverse habitats, ranging from the Great Australian Bight to the Dampier Peninsula. Sparse records exist east of King Sound and in inland regions. Breeding occurs from the Recherche Archipelago to Dirk Hartog Island and Faure Island in Shark Bay, as well as in the Pilbara region from Point Cloates to North Turtle Island. Rare breeding events have also been recorded in the Kimberley (Ref. 452). The Caspian tern is not known to occur within the Christmas Island section of the PA.

This species is an opportunistic forager, thriving in both freshwater and marine environments due to its adaptability to varying salinity levels. Its diet consists primarily of fish, which it captures by hovering over water and performing high, plunging dives to snatch prey near the surface (Ref. 452).

The Caspian tern is a year-round resident at many breeding sites in Australia, with some locations supporting year-round or protracted breeding activity. At non-breeding sites, seasonal patterns suggest migratory passage (Ref. 492).

During the breeding season, Caspian terns form small colonies and are gregarious, though they prefer solitary foraging, unlike other tern species (Ref. 492; Ref. 452). Nests are shallow scrapes situated on sandy or gravel

islands, with females typically laying one to three eggs per clutch (Ref. 452; Ref. 453).

Foraging BIAs for this species have been identified (Figure 4-14, Table 4-18) in WA within the SWMR, spanning from Kalbarri to Esperance, and around Port Lincoln, SA. These BIAs overlap with the southern section of the PA, the West Coast section.

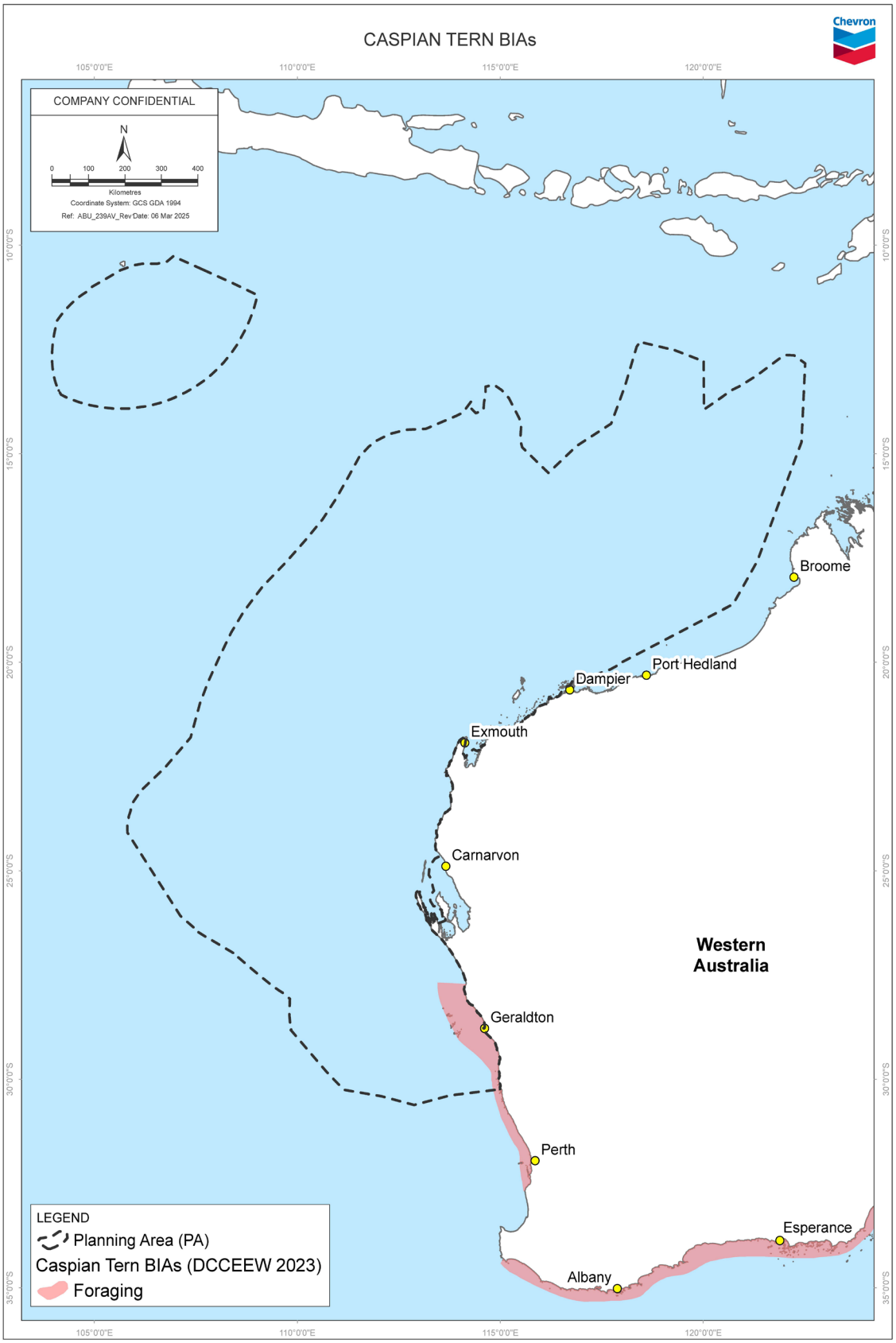

Figure 4-14: Biologically important areas for Caspian tern

4.3.4.15 Christmas Island frigatebird

The Christmas Island frigatebird (*Fregata andrewsi*), is a seabird endemic to Christmas Island, where it exclusively breeds (Ref. 493). Although breeding is restricted to Christmas Island, from January to September, the species forages and roosts widely across Southeast Asia and the Indian Ocean (Ref. 441). The Christmas Island frigatebird is not known to occur in the West Coast, Ningaloo, Pilbara or Kimberley section of the PA.

During early chick-rearing, females primarily forage in the waters surrounding Christmas Island. As chicks grow, both sexes undertake longer and more distant foraging trips, including to the coastal waters off Java (Ref. 494). The Christmas Island frigatebird is an adept aerial predator, feeding by scooping marine organisms or offal from the water's surface and exhibiting kleptoparasitic behavior by harassing other seabirds to force them to regurgitate their meals. Their primary diet includes flying fish and squid (Ref. 495). Occasionally, they forage on land, consuming carrion, offal from beaches, and even stealing eggs and nestlings (Ref. 419).

Breeding occurs in forested colonies on Christmas Island's terraces. Smaller nesting clusters have also been observed in the Settlement and at Smith Point on the foot slopes of inland cliffs (Ref. 418). Females lay a single egg between mid-February and early June. Both parents share incubation duties, which last ~50 days (Ref. 418).

The *Conservation Advice for the Christmas Island Frigatebird* (Ref. 418) identifies *a*ll nesting and roosting areas, in known colonies and smaller groups of nests away from the colonies, are critical to the survival of the species. While the PA overlaps Christmas Island, no habitat critical to the species' survival is expected to occur within the PA. Furthermore, no BIAs have been identified for this species in Australia.

4.3.4.16 Christmas Island white-tailed tropicbird

The Christmas Island white-tailed tropicbird (*Phaethon lepturus fulvus*) is a seabird endemic to Christmas Island, Australia, which is its only known breeding location (Ref. 420). This subspecies is widely distributed across the island, roosting and foraging over the Indian Ocean (Ref. 420; Ref. 496). While it primarily occurs north of 18°S, it has been recorded up to 1,500 km from Christmas Island, including near the continental shelf off WA at 21°S (Ref. 497; Ref. 498). The Christmas Island white-tailed tropicbird is not known to occur in the West Coast, Ningaloo, Pilbara or Kimberley sections of the PA.

The species nests in deep, shaded hollows or crevices and utilises a variety of sites, including rainforest tree hollows, rock crevices, cliffs, and quarries (Ref. 420; Ref. 498). Potential nesting sites are abundant, and breeding occurs across most parts of Christmas Island. In both interspecific and intraspecific competition, multiple pairs often use the same nest cavities (Ref. 497). Outside the breeding season, this tropicbird roams the open ocean, foraging over vast distances (Ref. 496).

The Christmas Island white-tailed tropicbird is primarily piscivorous, feeding on flying fish and squid. It captures prey with precision through high-diving strikes, aided by its strong, pointed beak and powerful diving muscles (Ref. 420). Aerial displays and tail streamers are prominent during courtship, serving as communication and mating signals. Chicks are fed a regurgitated mix of fish and squid until fledging (Ref. 496).

The *Conservation Advice for the Christmas Island white-tailed tropicbird* (Ref. 420) identifies all areas on Christmas Island, including surrounding inshore waters, as habitat of primary importance for the species. No BIAs have been identified for this subspecies in Australia.

4.3.4.17 Common greenshank

The common greenshank (*Tringa nebularia*) is a widely distributed shorebird found across Europe, Africa, Asia, Melanesia, and Australasia (Ref. 499). Its breeding range extends from the northern British Isles and Scandinavia to eastern Russia (Ref. 441). Although it does not breed in Australia, this species occupies various wetland habitats and has the broadest distribution of any shorebird in the country (Ref. 452). In WA, it occurs along much of the coast, from Cape Arid in the south to Carnarvon in the northwest, and is also recorded in the southwest and northeast Kimberley, with isolated sightings in the Bonaparte Archipelago (Ref. 452). The common greenshank is not known to occur in the Christmas Island section of the PA.

During migration, common greenshanks typically arrive in Australia in August, passing mainly through WA and the Torres Strait. They begin moving southward in WA from November onwards, with numbers increasing at coastal and inland sites during August and September (Ref. 421; Ref. 500). During the austral summer, individuals are found as far south as south-east Tasmania (Ref. 452). Northward migration occurs from March, peaking in April, when numbers decline across Australia (Ref. 421). Most individuals exhibit limited movement within Australia during the non-breeding season, though some dispersive movements may occur (Ref. 452).

Common greenshanks are carnivorous, foraging in shallow waters where they probe the mud or sand with their bills to capture invertebrates, small fish, and crustaceans (Ref. 421). They favour habitats with soft substrates, which allow easier access to prey.

The *Conservation Advice for common greenshank* (Ref. 421) defines habitats critical to the survival of the species as those essential for foraging, roosting, dispersal, maintaining genetic diversity, and long-term species recovery. However, no critical habitat for the species has been identified within the PA. No BIAs have been identified for this species in Australia.

4.3.4.18 Common noddy

The common noddy (*Anous stolidus*) is widespread in tropical and subtropical seas and land masses (Ref. 501). In Australia the common noddy occurs mainly off the Queensland coasts and in WA, it is typically found off the northwest and central coast (Ref. 501). The common noddy is known to occur in all sections of the PA.

During the breeding season, common noddies inhabit islands, rocky islets, and stacks with cliffs, as well as coral or sand shoals and cays. They nest in a variety of habitats, including bushes, saltbush, or other low vegetation, and on the ground among pigface, grass, bare rock, or coral rubble. Nests are also built in tall trees, coconut palms, dead timber, and tree stumps (Ref. 501). When not nesting, individuals remain near their breeding sites, foraging in surrounding waters. Breeding seasonality varies greatly by location, with some populations breeding annually, others breeding twice a year (spring to early summer and autumn), and some breeding year-round (Ref. 501).

This highly pelagic species migrates extensively during breeding. Birds from the Houtman Abrolhos Islands, their primary breeding ground in the Eastern Indian Ocean, migrate up to 950 km north into the NWMR (Ref. 502). Smaller breeding populations occur on offshore islands throughout the NWMR (Ref. 503).

Common noddies are social birds, often seen flying in flocks with graceful and agile flight patterns (Ref. 452). They primarily forage for fish, squid, and crustaceans by diving or skimming the water's surface. They are also frequently observed feeding on fish scraps near fishing boats (Ref. 452).

Breeding and foraging BIAs have been identified (Figure 4-15, Table 4-18) for this species along the east and west coasts of Australia. In WA, only foraging BIAs have been identified, specifically around Lancelin Island (off Perth) and the Houtman Abrolhos Islands (off Geraldton), which overlaps with the southern extend of the PA.

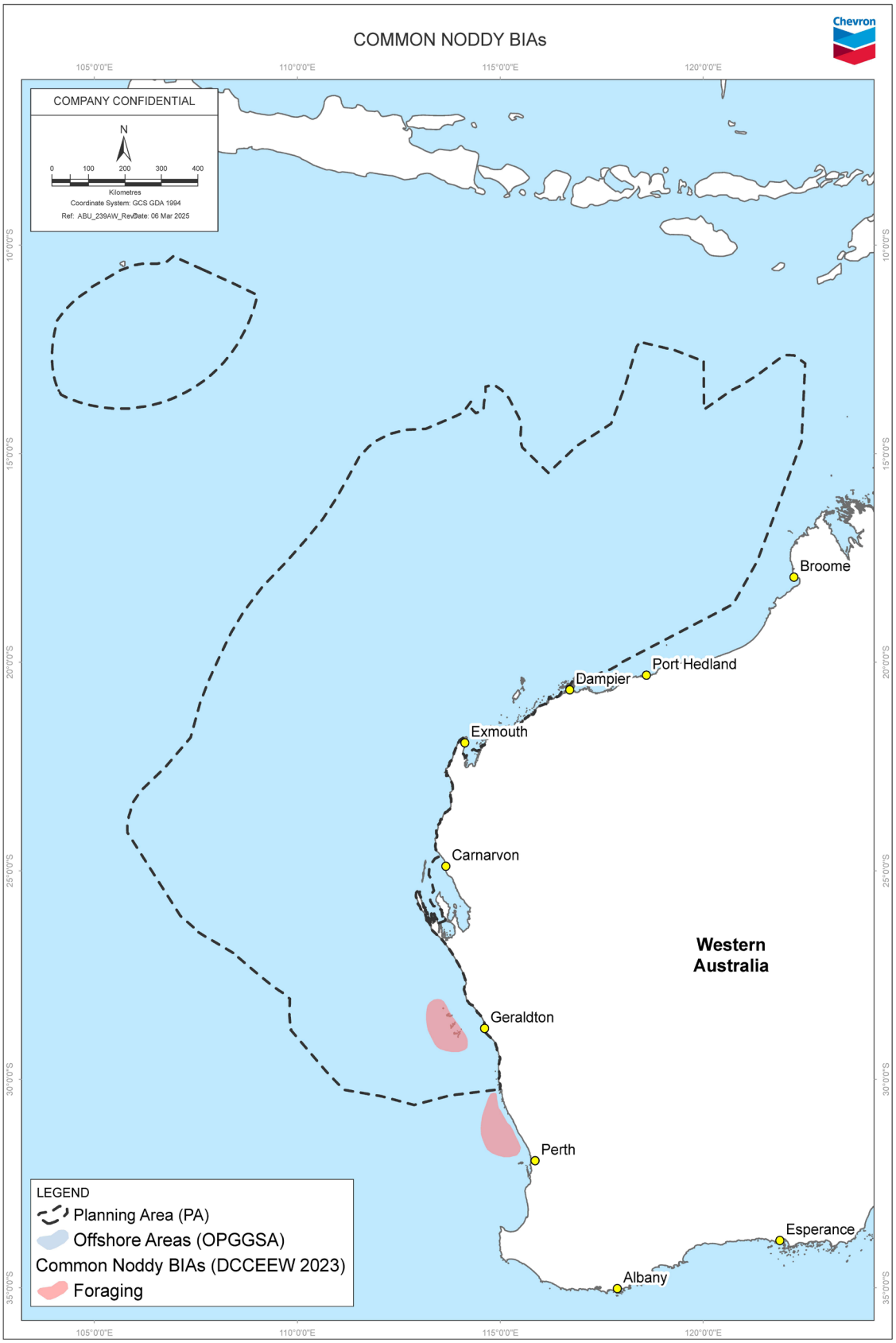

Figure 4-15: Biologically important areas for common noddy

4.3.4.19 Common redshank

The common redshank (*Tringa totanus*) migrates to Australia from northern Europe and Asia, where it occupies coastal mudflats, tidal wetlands, salt marshes, and estuarine areas during the non-breeding season (Ref. 504). In WA, the species is a vagrant in the southwest, with records from Peel Inlet, Coodanup, the Gascoyne region, Coral Bay, and Carnarvon (Ref. 452). It is regular and widespread in the northwest, from the Dampier Saltfields to Roebuck Bay and Broome, with an additional record from Ashmore Reef (Ref. 504). The common redshank may occur in the Ningaloo section but is not known to occur in the West Coast or Christmas Island section of the PA.

The common redshank feeds in shallow water, wet bare mud or sand, algal deposits, and areas near rocks or samphire (Ref. 452). This species is carnivorous, consuming worms, molluscs, crustaceans, spiders, and insects, as well as fish and tadpoles. It is active during both day and night, locating prey visually by day and through touch at night (Ref. 452). Roosting occurs on small elevated areas, such as estuarine sandbars and muddy islets surrounded by water (Ref. 452).

Common redshanks are usually seen in small groups or alone, particularly in Australian coastal areas. They are highly vocal, often emitting sharp calls when agitated or threatened (Ref. 452).

No BIAs have been identified for this species in Australia.

4.3.4.20 Common sandpiper

The common sandpiper (*Actitis hypoleucos*) is a small shorebird with a wide distribution, including the British Isles, western and central continental Europe (Ref. 505). In Australia, it is found along all coastlines and in many inland areas, though typically in small numbers (Ref. 505). The common sandpiper is known to occur throughout the PA.

This species primarily breeds in parts of Europe and Asia, with occasional breeding in Africa (Ref. 452). The population migrating to Australia breeds in the Russian far east (Ref. 505).

The species inhabits a variety of coastal and inland wetlands with varying salinity levels. It is most often seen around muddy margins or rocky shores and rarely on expansive mudflats (Ref. 505). Foraging occurs in shallow water or on soft mud at the edges of wetlands, often near obstacles such as rocks or mangrove roots. Birds may also venture into grassy areas adjacent to wetlands (Ref. 452).

Roost sites are typically on rocks or in roots or branches of vegetation, especially mangroves. The species is known to perch on posts, jetties, moored boats and other artificial structures, and to sometimes rest on mud or 'loaf' on rocks (Ref. 505).

The common sandpiper primarily feeds on invertebrates, including insects, molluscs, and small crustaceans, using quick, flicking movements to probe the mud or sand. Its adaptability allows it to occupy both inland and coastal habitats, particularly during migration (Ref. 505; Ref. 506).

No BIAs have been identified for this species in Australia.

4.3.4.21 Curlew sandpiper

The curlew sandpiper (*Calidris ferruginea*) is widely distributed along the Australian coast and in some inland areas. In WA, they are commonly observed in coastal and sub-coastal plains from Cape Arid to the southwest Kimberley (Ref. 507). This species does not breed in Australia. The curlew sandpiper is known to occur throughout the PA.

Curlew sandpipers breed in the high Arctic regions of Siberia and migrate south to spend the non-breeding season in Australia and other parts of the Southern Hemisphere. WA serves as an important stopover during their long migratory journey, with significant populations utilizing the region's productive coastal wetlands (Ref. 508).

These birds migrate in flocks, often flying at night to minimize predation risk and take advantage of favourable wind conditions (Ref. 422). They forage on mudflats and shallow waters and typically roost on bare, dry shingle, shell, or sandy beaches, as well as on sandspits and islets in coastal lagoons or wetlands. Occasionally, they forage on wet mats of algae or waterweed, or among banks of beach-cast seagrass or seaweed. At high tide, curlew sandpipers are often found foraging in low, sparse vegetation such as saltmarshes or within flooded paddocks and inundated saltflats (Ref. 452).

Their diet consists primarily of small invertebrates, including molluscs, crustaceans, and polychaete worms, which they extract from mud and sand using their long, slender bills (Ref. 509).

The *Conservation Advice for curlew sandpiper* (Ref. 422) defines habitats critical to the survival of the species as those essential for foraging, roosting, dispersal, maintaining genetic diversity, and long-term species recovery. However, no critical habitat for the species has been identified within the PA, and no BIAs have been identified for this species in Australia.

4.3.4.22 Eastern curlew

The Eastern curlew (*Numenius madagascariensis*) is the largest species of curlew and is endemic to the East Asian–Australasian Flyway. It breeds in Siberia, far eastern Russia (Ref. 423; Ref. 510) and northeastern China (Ref. 510). During the austral summer non-breeding season, most of the global population migrates to Australia (Ref. 446; Ref. 511). In Australia, the species has a predominantly coastal distribution and is rarely observed inland. In WA, its range extends continuously from Barrow Island and the Dampier Archipelago through the Kimberley region and into the NT (Ref. 423). The Eastern curlew is not known to occur within the Christmas Island section of the PA.

Eastern Curlews begin arriving in northwest and eastern Australia as early as July (Ref. 500). The peak arrival in north-west Australia occurs in mid-August (Ref. 512), with onward dispersal to the rest of Australia by October (Ref. 500). Most birds depart Australia between late February and April (Ref. 452).

During the non-breeding season, Eastern Curlews rely on a network of suitable habitats, including freshwater lake shores and various wetlands. For example, at Roebuck Bay, WA, they have been observed flying from tidal flats to roosting sites 5 km inland on a claypan (Ref. 423). Their preferred foraging habitats are sheltered intertidal sandflats or mudflats, which are open and largely devoid of vegetation or seagrass. They also forage near mangroves, on saltflats, saltmarshes, rockpools, coral rubble, and occasionally along ocean beaches near the tideline (Ref. 423).

The Eastern Curlew primarily feeds on crustaceans, including crabs, shrimps, and prawns, but occasionally consumes small molluscs and insects (Ref. 452). Its long legs are well-suited for wading in shallow waters, while its elongated, down-curved bill allows it to probe deep into mud for prey (Ref. 509).

The *Conservation Advice for eastern curlew* (Ref. 423) defines habitats critical to the survival of the species as those essential for foraging, breeding, roosting, dispersal, maintaining genetic diversity, and long-term species recovery. However, no critical habitat for the species has been identified within the PA, and no BIAs have been identified for this species in Australia.

4.3.4.23 Flesh-footed shearwater

The flesh-footed shearwater (*Ardenna carneipes*) is widely distributed across the southern Indian and southwestern Pacific Oceans. This species primarily breeds on subantarctic islands and migrates to the warmer waters of the Southern Hemisphere (Ref. 513). The flesh-footed shearwater is a locally common visitor to waters of the continental shelf and continental slope off southern Australia, including south-western WA (Ref. 513). The flesh-footed shearwater is not known to occur within the Kimberly or Christmas Island sections of the PA.

Breeding usually occurs from late September to early January in southwestern WA, with eggs laid in burrows (Ref. 513). The species nests on offshore islands and cliffs, favouring sandy or gravelly substrates for burrow excavation. Major breeding sites include islands such as the Houtman Abrolhos (off Geraldton) and the Recherche Archipelago (off Esperance) (Ref. 514).

The flesh-footed shearwater primarily feeds on fish, squid, and crustaceans, which it captures by foraging on the water’s surface or diving (Ref. 424).

Aggregation, breeding, and foraging BIAs have been identified for this species along the east and southwest coasts of Australia. In WA, an aggregation BIA is located around the Perth Canyon, and a foraging BIA extends from Cape Naturaliste to Nuytsland Nature Reserve in southern WA. No BIAs have been identified in the PA.

4.3.4.24 Fairy tern

The fairy tern (*Sternula nereis*) is a small seabird found along Australia's southern and eastern coasts, primarily inhabiting sandy beaches, estuaries, and offshore islands. It nests in colonies on bare sand or shingle, often near tidal zones and freshwater sources, where it forages for small fish and invertebrates (Ref. 441).

Fairy terns dive from the air to capture prey, often hovering over the water before plunging. They are opportunistic feeders, targeting schools of small fish or foraging in areas with abundant planktonic organisms (Ref. 441).

The species is adapted for aerial foraging, with lightweight wings for quick, agile flights (Ref. 452). These birds are also well-suited to breeding in hot, exposed environments, with plumage offering some protection against the harsh sun. However, they are vulnerable to heat stress during extreme weather events, particularly in summer (Ref. 452).

Outside the breeding season, fairy terns are more solitary and migrate to other coastal areas in search of better foraging conditions (Ref. 441).

4.3.4.24.1 Australian fairy tern

The fairy tern (species name) has a large geographic range between Australia, New Zealand and New Caledonia, with three subspecies identified based on phenotypic, genotypic and geographic differences (Ref. 412). The Australian fairy tern occurs in coastal southern Australia, from the Montebello Islands in the Pilbara, WA, to Botany Bay, NSW, including Tasmania (Ref. 412). The Great Australian Bight forms a distribution gap between western and eastern populations (Ref. 452). The Australian fairy tern is not known to occur within the Kimberly or Christmas Island sections of the PA.

Australian fairy tern has been found in embayments of a variety of habitats including offshore, estuarine, or lacustrine (lake) islands, wetlands and mainland coastline (Ref. 411). They nest above the high-water mark, typically in sandy areas with sparse vegetation, often in clear view of the water. Nests are shallow scrapes in the sand lined with small shells and vegetation (Ref. 411).

In WA, two subpopulations have been identified (Ref. 412):

- a sedentary subpopulation based along the Pilbara and upper Gascoyne coasts from Exmouth Gulf to the Dampier Archipelago, including Barrow, Montebello, and Lowendal Archipelagos; these Australian Fairy Terns nest from late July to late-September
- a migratory subpopulation that disperses south along the coast from Shark Bay to breed between the Houtman Abrolhos Islands to the Recherche Archipelago between September and May, with active breeding flocks appearing at various locations between October and February.

Australian fairy terns are present on Barrow Island year-round, predominantly on the southeast and southwest coasts, with peak counts recorded between November and April (Ref. 455). Nesting has been observed on offshore islands between Barrow and the Montebello Islands (Ref. 456), including intermittently nesting on North and/or South Double Island (Ref. 455).

These terns are diurnal plunge-diving feeders that prey exclusively on small (<60 mm) surface-schooling baitfish, such as sprats, hardyheads, and larvae of some demersal fish species (Ref. 452). Their foraging occurs in nearshore waters adjacent to nesting colonies and around island archipelagos (Ref. 452).

In WA, colony formation and egg-laying are closely tied to food availability, with colonies typically forming near areas of high prey abundance (Ref. 457). While colonies may remain in the same general area for several seasons, they occasionally shift locations (Ref. 458).

Behaviours used to define BIAs for seabirds in Commonwealth marine areas include breeding with a foraging buffer, and roosting (Ref. 408). BIAs for seabird species are buffers around islands that the species is known to nest on as they may forage in the waters surrounding the islands during nesting seasons.

Breeding and foraging BIAs have been identified (Figure 4-16, Table 4-18) along the south and southwest coasts of Australia. In WA, breeding BIAs are located in the NWMR, and foraging BIAs are found in the SWMR. These BIAs overlap the PA.

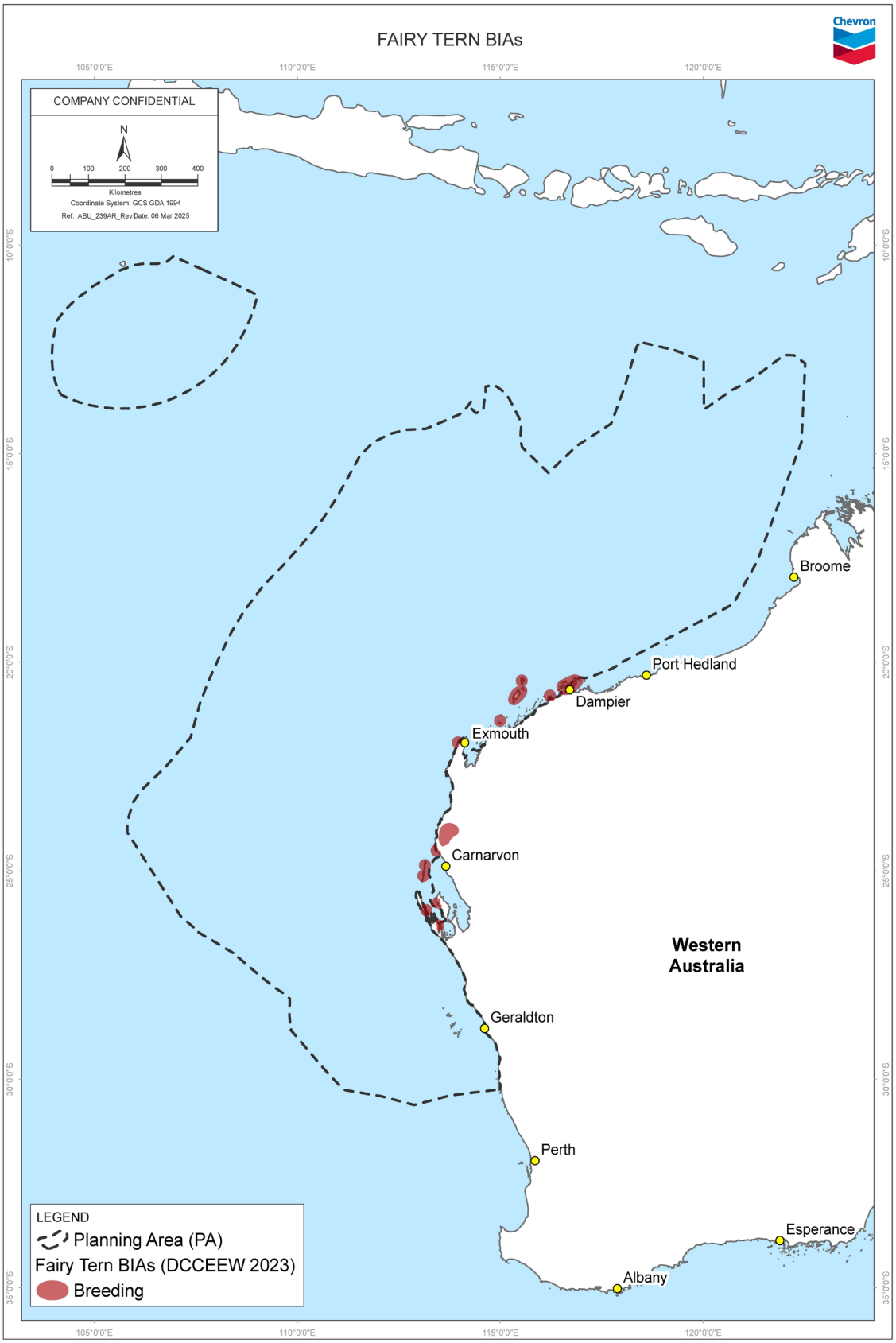

Figure 4-16: Biologically important areas for Australian fairy tern

4.3.4.25 Fork-tailed swift

The fork-tailed swift (*Apus pacificus*) is a migratory bird and a non-breeding visitor to all states and territories of Australia. In WA, it is widespread in coastal and subcoastal areas between Augusta and Carnarvon, including nearshore and offshore islands (Ref. 515). They are also found along the coast from the south-west Pilbara to the north and east Kimberley regions near Wyndham. Inland sightings are sparse, with records from areas such as the Wheatbelt, Lake Annean, and Wittenoom, as well as parts of the Gascoyne, Pilbara, and Kimberley regions (Ref. 515). Low numbers of the fork-tailed swift have been recorded at Christmas Island according to the 1999 Handbook of Australian, New Zealand and Antarctic Birds (Ref. 441). These recordings may not fully reflect the species current distribution, and there may be gaps in knowledge regarding the species population.

Fork-tailed swifts forage at heights ranging from 1 to 300 m above the ground, typically in flocks of 10 to 1,000 birds, feeding primarily on flying insects (Ref. 515; Ref. 516). They migrate seasonally, arriving in Australia around October, with rare early arrivals in September. Birds are commonly sighted in WA arriving from Indonesia between October and November (Ref. 515). In Broome, peak numbers occur in February, while in the Kimberley, Pilbara, and Eucla regions, they are present from September to late April. Most birds leave south-east WA by mid-April and depart from north and north-west WA by the end of April (Ref. 515).

During the breeding season, fork-tailed swifts nest in small colonies, often on cliff ledges or under building eaves, constructing nests from saliva and plant material (Ref. 441).

No BIAs have been identified for this species in Australia.

4.3.4.26 Great frigatebird

The great frigatebird (*Fregata minor*) is primarily found in tropical and subtropical regions. In WA, it inhabits coastal areas, islands, lagoons, and coral reefs, including the Rowley Shoals and Montebello Islands (Ref. 516). The great frigatebird is known to occur on Christmas Island; however, it is not known to be present within the Ningaloo or West Coast section of the PA. This species prefers open ocean and coastal waters for foraging, feeding mainly on fish, squid, and chicks (Ref. 408; Ref. 517), which it catches by soaring and diving. It also exhibits kleptoparasitism, stealing food from other seabirds (Ref. 517).

Major breeding populations are located in tropical waters of the Pacific and Indian Oceans. The great frigatebird breeds on small, remote tropical and subtropical islands, often in mangroves, bushes, or occasionally on bare ground (Ref. 479). Within the NWMR, it breeds in small numbers on Ashmore Reef. Although pelagic, breeding birds typically forage within 100–200 km of their colony during the early stages of the breeding season (Ref. 519).

Highly social, great frigatebirds are often seen in large flocks and are renowned for their exceptional flying abilities (Ref. 518).

Breeding and foraging BIAs have been identified (Figure 4-17, Table 4-18) for this species in northern Australia. In WA, breeding areas have been identified around Kimberley and Ashmore Reef, overlapping the northern part of the PA, particularly the Kimberley section.

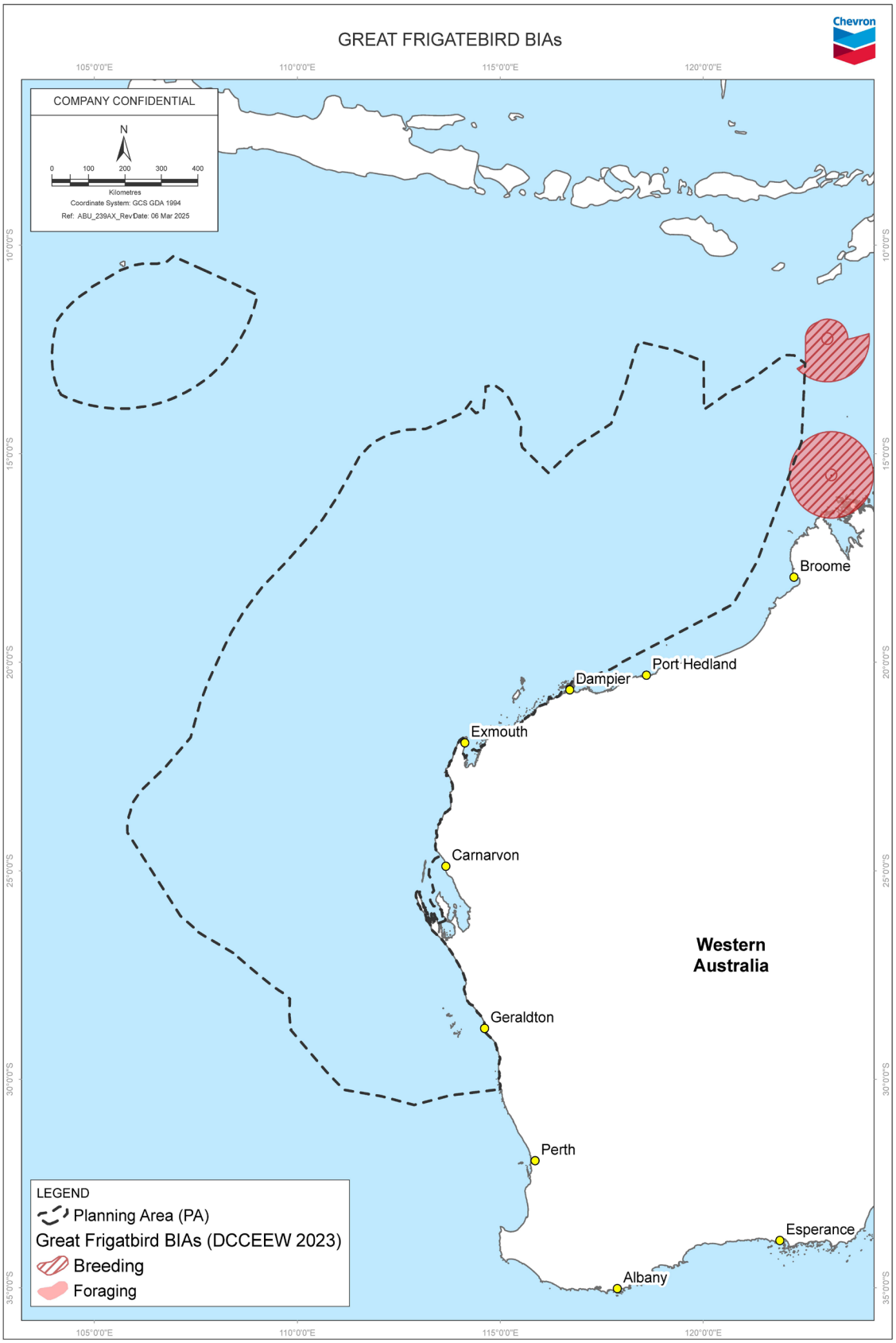

Figure 4-17: Biologically important areas for great frigatebird

4.3.4.27 Great knot

The Great Knot (*Calidris tenuirostris*) is a medium-sized migratory shorebird confined to the East Asian–Australasian Flyway, visiting Australia during its non-breeding season (Ref. 519). The largest populations in Australia are found in northern regions, including the Pilbara and Kimberley coasts of WA (Ref. 425). The great knot is not known to occur within the West Coast or Christmas Island section of the PA.

The great knot typically arrives in late August to early September, with juveniles and many males arriving later, around October-November (Ref. 520). Most individuals remain near their arrival sites throughout the non-breeding season, with a few making single-flight movements to southern Australia (Ref. 425). They leave Australia via the northern coast in March-April (Ref. 500).

During migration, the species can fly non-stop for distances up to 5,000 km, relying on stored fat for energy (Ref. 519) and flocks can number in the thousands, aiding in locating food and providing safety in numbers (Ref. 500).

The great knot forages by probing mud or sand with its long, slender bill, extracting invertebrates. It predominantly inhabits coastal mudflats, tidal flats, salt marshes, and estuarine environments, which provide nutrient-rich sediments and abundant prey such as molluscs, crustaceans, and worms (Ref. 425; Ref. 500). The species often roosts and feeds in large flocks during low tide (Ref. 452).

Great knots breed in the montane tundra of the subarctic at elevations of 300-1,600 m, with egg-laying occurring from late May to late June (Ref. 425; Ref. 453).

The *Conservation Advice for great knot* (Ref. 425) defines habitats critical to the survival of the species as those essential for foraging, breeding, roosting, dispersal, maintaining genetic diversity, and long-term species recovery. However, no critical habitat for the species has been identified within the PA, and no BIAs have been identified for this species in Australia.

4.3.4.28 Greater crested tern

The greater crested tern (*Thalassarche bergii*) is a large seabird found across coastal regions of the Southern Hemisphere, including WA (Ref. 521). It is commonly observed year-round in estuaries and along the coast, where it dives into the water to catch fish (Ref. 522). In WA, the species has been recorded along the west and northern coast at the Abrolhos and Montebello Islands (Ref. 516). The species is not known to occur within the Christmas Island section of the PA.

The diet of the greater crested tern primarily consists of small fish, crustaceans, and occasionally molluscs, which it catches with remarkable agility and speed by diving from the air (Ref. 441; Ref. 522). his highly social species often forms large colonies and typically forages within 3 km of its breeding colony (Ref. 453). After hatching, the chicks are precocial, leaving the nest soon after birth but relying on their parents for food for several weeks.

No BIAs have been identified for this species in Australia.

4.3.4.29 Greater sand plover

The greater sand plover (*Charadrius leschenaultii*) is a medium-sized shorebird that breeds in western China, Mongolia, and southern Russia (Ref. 519). During the non-breeding season, this species visits Ashmore Reef in internationally

significant numbers between December and February (Ref. 446). Its distribution extends from North West Cape to Roebuck Bay, WA, with occasional records along the southern WA coast (Ref. 426). The greater sand plover is not known to occur within the Christmas Island section of the PA.

The greater sand plover is one of the earliest migratory waders to return to north-western Australia, typically arriving in late July, with some individuals departing in October and November (Ref. 523; Ref. 524).

Feeding usually occurs in sheltered coastal areas, including sandy, shelly, or muddy habitats, as well as intertidal mudflats, sandbanks, saltmarshes, estuaries, coral reefs, rocky islands, tidal lagoons, and coastal dunes (Ref. 450). The species primarily feeds on invertebrates such as molluscs, crustaceans, and insects, which it forages by probing the sand or mud, particularly during low tide when feeding grounds are exposed (Ref. 441).

The *Conservation Advice for greater sand plover* (Ref. 426) defines habitats critical to the survival of the species as those essential for foraging, breeding, roosting, dispersal, maintaining genetic diversity, and long-term species recovery. However, no critical habitat for the species has been identified within the PA, and no BIAs have been identified for this species in Australia.

4.3.4.30 Grey plover

The Grey Plover (*Pluvialis squatarola*) is a migratory shorebird found in coastal regions of Australia during the non-breeding season. Approximately 38% of the species' Australian population occurs in WA (Ref. 450), with Ashmore Reef supporting >1% of the flyway population (Ref. 446; Ref. 525). They typically visit Ashmore Reef during the non-breeding period between December and February (Ref. 446). The species can also be found between Albany and the northern Kimberley (Ref. 427). The grey plover is not known to occur within the Christmas Island section of the PA.

Migrating grey plovers arrive in northern Australia between August and October (Ref. 526) and usually depart between February and April (Ref. 500; Ref. 526). Some individuals in south-western Australia leave in April, moving northwards along the east coast (Ref. 500; Ref. 527). Unusually, nearly all grey plovers in Australia are females (Ref. 528; Ref. 529). This species can travel thousands of kilometres, often in non-stop flights, relying on stored fat as their primary energy source (Ref. 452).

Grey plovers prey on a variety of invertebrates, including molluscs, worms, and crustaceans (Ref. 529). They occasionally consume insects such as grasshoppers and beetles or earthworms when inland (Ref. 453; Ref. 530). Foraging is characterized by stop-start running, pecking, and probing, mostly in mud or soft, wet sand on intertidal flats, saltmarshes, sandflats, and beaches of oceanic coastlines, bays, and estuaries (Ref. 453; Ref. 530).

Roosting occurs in sandy areas such as unvegetated sandbanks, sand-spits along sheltered beaches, or other protected environments like estuaries and lagoons. Grey plovers are also observed in small numbers on mangrove mudflats (Ref. 427).

The *Conservation Advice for grey plover* (Ref. 427) defines habitats critical to the survival of the species as those essential for foraging, breeding, roosting, dispersal, maintaining genetic diversity, and long-term species recovery. However, no critical habitat for the species has been identified within the PA, and no BIAs have been identified for this species in Australia.

4.3.4.31 Grey-tailed tattler

The grey-tailed tattler (*Tringa brevipes*) is a migratory wader that spends its non-breeding season in Australia, primarily along the northern coasts (Ref. 452). In WA, it has been recorded along the south coast near the Eyre Bird Observatory, Point Malcolm, Rossiter Bay, Shark Lake Nature Reserve, and surrounding swampland. It is also found in the southwest between Augusta and Cervantes, and is widespread from the Houtman Abrolhos to the Kimberley division. Inland sightings include Lake Argyle, as well as islands off the coast (Ref. 452). The grey-tailed tattler is not known to occur within the Christmas Island section of the PA.

The species typically arrives in Australia in August, though some individuals appear as early as July, while others remain on breeding grounds until September or October (Ref. 533). Adults first reach northern Australia from late August to early September, with first-year birds arriving approximately four weeks later. Most grey-tailed tattlers leave Australia by early to mid-April to return to their breeding grounds (Ref. 533).

Grey-tailed tattlers inhabit sheltered coastal areas with reefs, rock platforms, and intertidal mudflats. They are also found in rocky, coral, or stony intertidal zones, as well as islets exposed at low tide (Ref. 533). The species forages in shallow water, often on hard intertidal substrates like rock pools, reefs, and coral rubble, as well as on exposed mudflats, sandflats, and areas near mangroves or seagrass. It is typically seen in small groups but can form larger aggregations at productive feeding sites, particularly during migration (Ref. 452).

The diet of the grey-tailed tattler consists primarily of polychaetes, molluscs, crustaceans, insects, and occasionally fish (Ref. 533). For roosting, it prefers mangrove branches, dense shrubs, snags, or driftwood. In areas without mangroves, it roosts on rocks, which are sometimes partially submerged (Ref. 533).

While generally non-territorial in Australia, the grey-tailed tattler may exhibit aggressive behaviour toward other shorebirds during feeding or roosting when resources are limited (Ref. 452).

No BIAs have been identified for this species in Australia.

4.3.4.32 Indian yellow-nosed albatross

The Indian yellow-nosed albatross (*Thalassarche carteri*) is a small albatross species that visits Australian waters during its non-breeding season. Tracking studies and at-sea records indicate that the Indian yellow-nosed albatross disperses from its breeding colonies primarily within the higher latitudes of the Indian Ocean, ranging from southern Africa to south-west Australia. In WA, it is commonly observed in offshore waters (Ref. 534). The species is not known to occur as far north as the Kimberley or Christmas Island sections of the PA.

The species is most abundant in waters off southern WA and SA between March and May. Immature birds typically return south between September and October, moving northward along the coast and favouring inshore waters during this time (Ref. 441; Ref. 535).

Indian yellow-nosed albatrosses inhabit open ocean environments, favouring waters with surface temperatures of 10°C to 23°C, and are most abundant in the warmer parts of the subtropical zone. They concentrate over productive waters of continental shelves, particularly at coastal upwellings and current boundaries

during both breeding and non-breeding seasons (Ref. 536; Ref. 537; Ref. 538). Its diet primarily consists of cephalopods and fish, and it is known to scavenge from fishing vessels when opportunities arise (Ref. 534).

Foraging BIAs for this species are located in southwestern Australia (around Augusta) and the South-east Marine Region, including Macquarie Island. These BIAs are outside the PA.

4.3.4.33 Lesser crested tern

The lesser crested tern (*Thalasseus bengalensis* formerly known as *Sterna bengalensis*), inhabits tropical and subtropical sandy and coral coasts and estuaries. It breeds on low-lying offshore islands, coral flats, sandbanks, and flat sandy beaches, and forages in the surf and over offshore waters (Ref. 452).

Since 1996, this species has nested regularly at the Lowendal Islands, where up to 200 pairs nest among larger colonies of crested terns (Ref. 519). Additional nesting sites within state waters adjacent to the NWMR include Sterna Island in the Kimberley, Bedout Island in the Pilbara, and potentially the Montebello Islands (Ref. 519). Breeding records also exist for Ashmore Reef, various Kimberley islands (including Low Rocks and Adele Island), and islands extending south to Shark Bay (Ref. 519; Ref. 439). The species is not known to occur within the Christmas Island section of the PA.

During the breeding season, lesser crested terns prefer to nest in colonies on bare sand or shingle, where they are protected from terrestrial predators. Outside the breeding season, they roost on coastal rocks and sandbars (Ref. 500).

The species feeds by plunging or dipping from the air to catch prey in shallow waters, primarily targeting pelagic fish and shrimps (Ref. 408; Ref. 453). Lesser crested terns are highly social, particularly during the breeding season, when they form colonies that often include other seabird species (Ref. 452).

Breeding BIAs for this species have been identified (Figure 4-18, Table 4-18) In the north-west coast of WA extending along the coast to the NT. These BIAs overlap the PA.

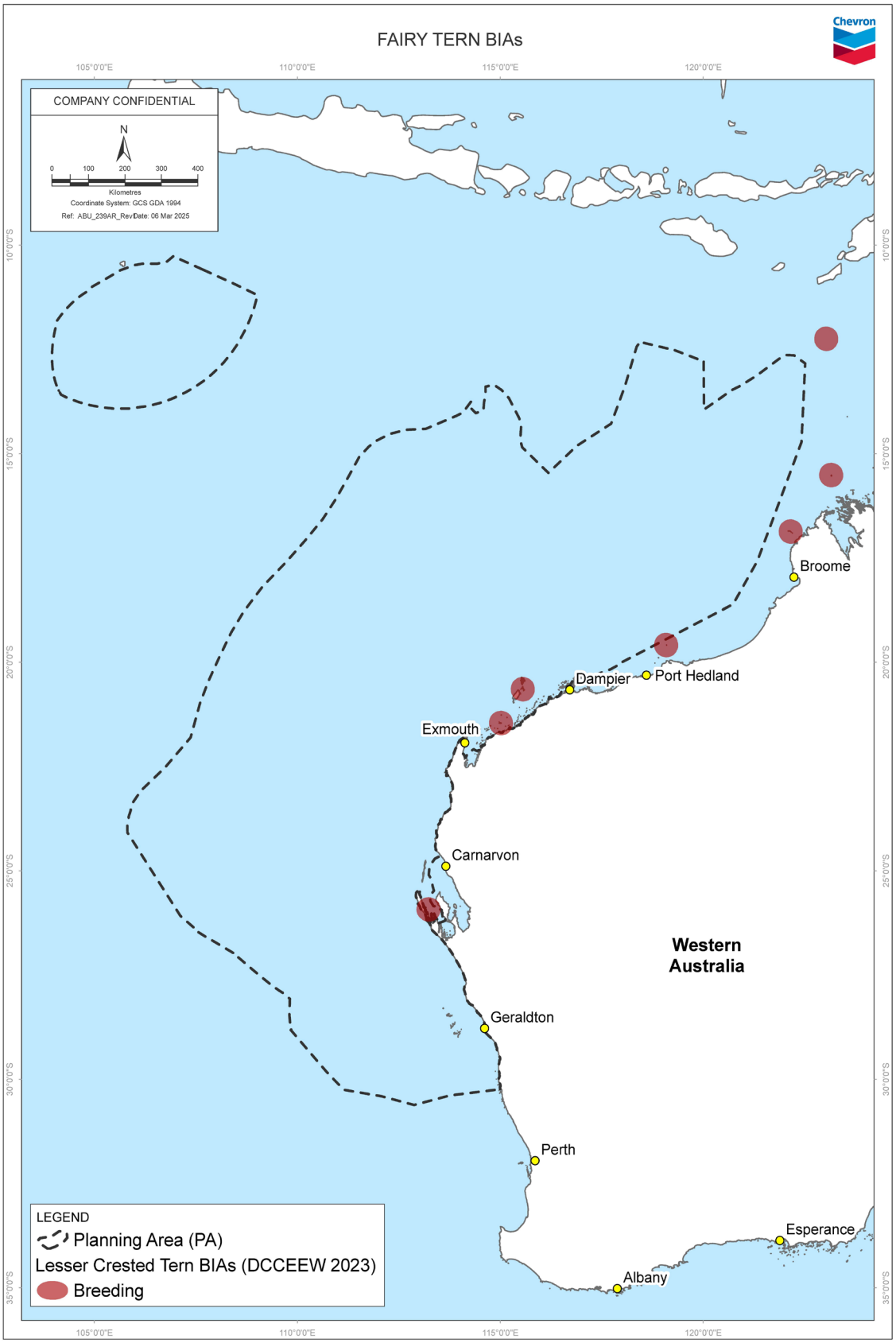

Figure 4-18: Biologically important areas for lesser crested tern

4.3.4.34 Lesser frigatebird

The lesser frigatebird (*Fregata ariel)* is the most widely distributed of the frigatebirds, inhabiting tropical waters across the Indian, western, and central Pacific Oceans (Ref. 408). In Australia, it is commonly observed in tropical or warmer coastal waters, particularly in WA, the NT, Queensland and northern NSW (Ref. 519).

Breeding colonies of lesser frigatebirds are known on Adele, Bedout, and West Lacapede Islands (Ref. 441), as well as Ashmore Reef and Cartier Island (Ref. 539). Historically, the species also bred on Swan Island in the Kimberley, although this colony no longer exists (Ref. 539). The lesser frigatebird is known to occur within Christmas Island, however due to identification difficulties between the three known species on the Island (Christmas Island frigatebird, greater and lesser frigatebird) the population and distribution status of the species remains unreliable in the region (Ref. 794).

Tracking studies have revealed that non-breeding individuals roosting at Ashmore Reef and Adele Island exhibit extensive distributions, ranging from Australian coastal waters to the South China, Java, and Sulu Seas, and the Gulf of Thailand (Ref. 540). During the wet season, Australian waters serve as optimal habitat for non-breeding individuals (Ref. 540).

The lesser frigatebird breeds on remote tropical and subtropical islands, often in mangroves, bushes, or even on bare ground. Outside the breeding season, the species is largely sedentary, with immature and non-breeding birds dispersing across tropical seas, particularly in the Indian and Pacific Oceans (Ref. 479).

Foraging occurs by snatching prey from surface waters or capturing prey as it breaks the surface. The species also practices kleptoparasitism, harassing other seabirds until they regurgitate their food. Their diet primarily includes flying fish and squid, but also extends to seabird eggs and chicks, carrion, and fish scraps (del Hoyo et al. 1992).

Breeding and foraging BIAs have been identified (Figure 4-19, Table 4-18) for this species in northern Australia. In WA, breeding BIAs have been defined along the Kimberley and Pilbara coasts (from Port Hedland to the NT border) and at Ashmore Reef. These breeding BIAs overlap with the Kimberly and Pilbara sections of the PA.

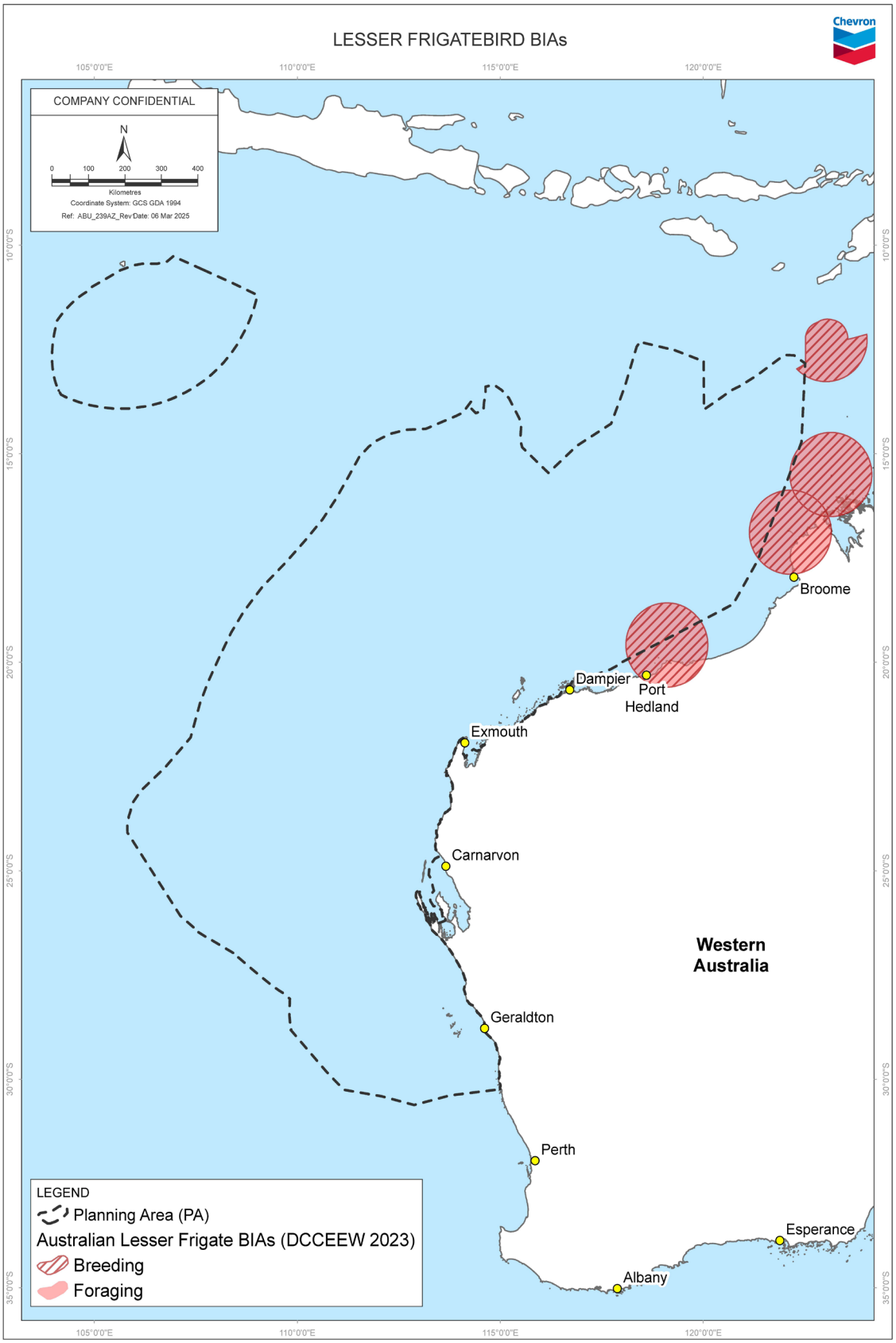

Figure 4-19: Biologically important areas for Lesser frigatebird

4.3.4.35 Lesser sand plover

The lesser sand plover (*Charadrius mongolus*) is a migratory shorebird that spends the non-breeding season in Australia during the Austral summer (September to April or May). Maximum numbers are typically observed at most sites by December, remaining fairly constant until late February (Ref. 428). In Australia, the species is widespread in coastal regions and recorded in all states, primarily occurring in northern and eastern areas such as Eighty Mile Beach and Roebuck Bay(Ref. 428). Off WA, it has also been observed on Lord Howe Island, Norfolk Island, and Christmas Island (Ref. 441).

During the non-breeding season, the lesser sand plover is almost exclusively coastal, favouring sandy beaches, mudflats in bays and estuaries, sandflats, and coastal dunes (Ref. 453). It occasionally frequents mangrove mudflats in Australia (Ref. 541). The species is highly mobile, moving between foraging and roosting sites in response to tidal changes and food availability (Ref. 500).

The lesser sand plover often feeds alongside other shorebird species, especially the greater sand plover, though the two typically roost separately (Ref. 441). It is primarily diurnal but may forage on moonlit nights (Ref. 453; Ref. 541). During the breeding season, its diet consists mainly of beetles, weevils, fly larvae, stalk worms, and crabs (Ref. 453). In the non-breeding season, the diet expands to include insects, crustaceans (especially crabs and amphipods), molluscs (especially bivalves), and polychaete worms (Ref. 441).

No BIAs have been identified for this species in Australia.

4.3.4.36 Little curlew

The little curlew (*Numenius minutus*) is a small migratory wader that spends its non-breeding season in northern Australia, from Port Hedland in WA to the Queensland coast (Ref. 542). It has also been recorded on Lord Howe Island, Cocos-Keeling Island, and Christmas Island (Ref. 452). The species is typically present in Australia between September and April, with few records during the winter months (Ref. 462). In the Broome and Darwin regions, numbers gradually increase until late October before decreasing during November and December as individuals disperse southward or inland (Ref. 542).

The little curlew primarily inhabits short, dry grasslands and sedgelands, including dry floodplains and blacksoil plains with scattered shallow freshwater pools or seasonally inundated areas. It also uses open woodlands with grassy or burnt understories, dry saltmarshes, coastal swamps, and estuaries. Other habitats include mudflats, sandflats on sheltered coasts, mown lawns, gardens, recreational areas, ovals, racecourses, and road or airstrip verges (Ref. 452).

Foraging typically occurs in relatively short grass (~20 cm tall), as the birds avoid dense, tall grasses (Ref. 452). The little curlew primarily feeds on insects but also consumes seeds and berries (Ref. 452). During the non-breeding season, it is highly gregarious, often forming dense flocks of several hundred to thousands on coastal and inland grasslands or blacksoil plains near freshwater swamps, pools, or flooded ground (Ref. 542).

No BIAs have been identified for this species in Australia.

4.3.4.37 Little shearwater

The little shearwater (*Puffinus assimilis*) is a small seabird that inhabits subantarctic, subtropical, and occasionally tropical waters (Ref. 408). In Australia,

it occurs in coastal waters of southeastern and southwestern regions, particularly during its breeding season, which extends from June to December (Ref. 408). The little shearwater is not known to occur in the Pilbara, Kimberley or Christmas Island sections of the PA.

These birds primarily nest in burrows on offshore islands and coastal cliffs, including areas such as Bass Strait and islands off the coasts of NSW, SA, and WA (Ref. 452). During the non-breeding season, little shearwaters are pelagic, ranging widely across the southern Indian and Pacific Oceans, feeding in offshore waters (Ref. 543).

The species breeds colonially, typically under forest cover or in tussocks. At sea, little shearwaters are usually solitary or found in small groups. They forage by plunge-diving or surface-seizing, feeding on cephalopods, crustaceans, and small fish (Ref. 408; Ref. 452).

During the breeding season, little shearwaters are primarily nocturnal, coming ashore at night to avoid diurnal predators such as gulls and large seabirds (Ref. 543). They are highly social during this period, nesting in dense colonies and often returning to the same burrows each year.

Foraging and breeding BIAs have been identified (Figure 4-20, Table 4-18) in the SWMR of WA, as well as around Lord Howe Island and Norfolk Island off Australia's east coast. The foraging BIAs overlap with the West Coast and Ningaloo sections of the PA.

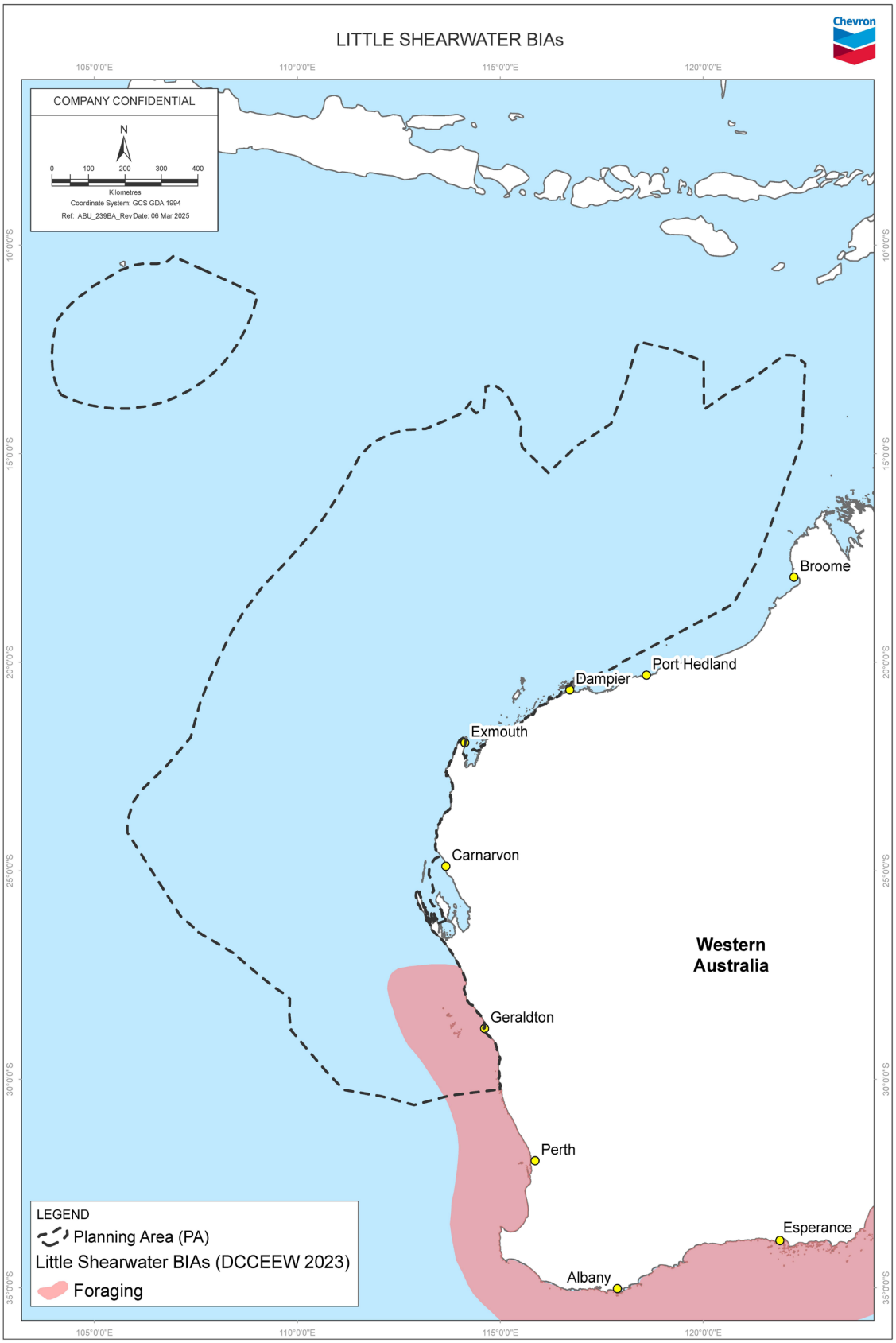

Figure 4-20: Biologically important areas for little shearwater

4.3.4.38 Little tern

The little tern (*Sternula albifrons*) is listed as Vulnerable under the EPBC Act and is the smallest tern in the Australian region (Ref. 408). This species breeds across much of Europe, parts of Africa and Asia, and regions of Australasia (Ref. 408).

The western Pacific subspecies (*Sternula albifrons sinensis*) is one of three subspecies of *Sternula albifrons*. In Australia, there are three subpopulations of *S. a. sinensis*, two of which occur in the NWMR (Ref. 519):

- a northern Australian breeding subpopulation that nests around Broome and extends into the North Marine Region, spanning the Gulf of Carpentaria to the east coast of Cape York Peninsula
- an east Asian breeding subpopulation, some of which migrate to the northern Australian coast, ranging from Shark Bay to southeastern Queensland during the austral summer.

The little tern is not known to occur within the Christmas Island section of the PA.

The northern Australian breeding subpopulation nests along shorelines and sand spits, similar to the fairy tern (*Sternula nereis,* refer to Section 4.3.4.24). Many nearshore islands with undisturbed sheltered beaches in the Kimberley likely support breeding pairs during September and October (Ref. 539).

Little terns typically forage close to breeding colonies in shallow waters of estuaries, coastal lagoons, and lakes (Ref. 452). Their diet consists primarily of small fish (<10 cm), supplemented by crustaceans, insects, worms, and molluscs (Ref. 452).

During the breeding season, little terns are colonial nesters, forming small-sized colonies on sandy beaches or saltmarshes. Their nests are simple ground depressions, sometimes lined with shells or small stones (Ref. 453).

Breeding and resting BIAs for this species have been identified (Figure 4-21, Table 4-18) in WA, along the Kimberley, Pilbara, and Gascoyne coasts and islands, including Ashmore Reef. The breeding BIAs overlap the Kimberley section and a small portion of the Pilbara section of the PA.

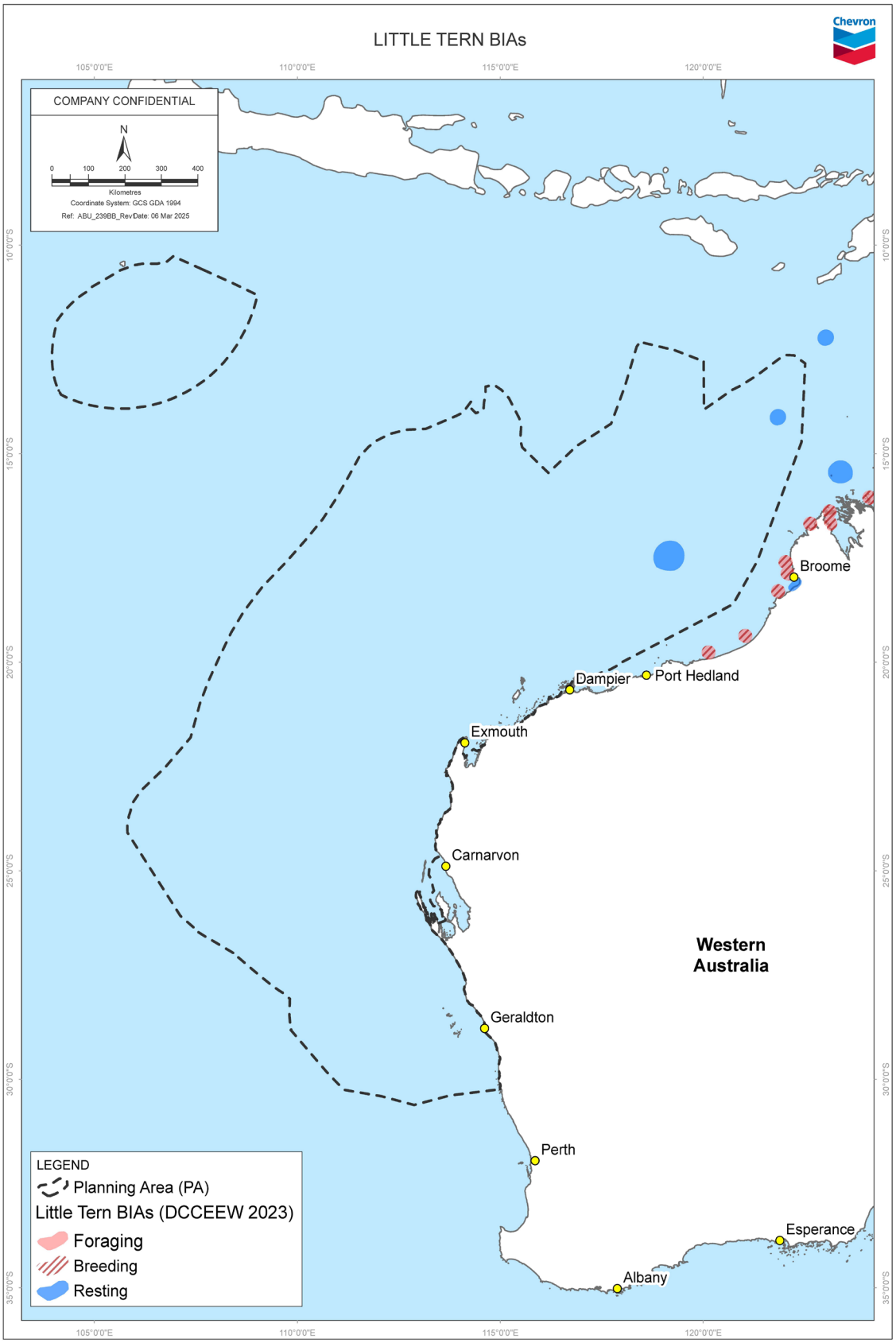

Figure 4-21: Biologically important areas for little tern

4.3.4.39 Long-toed stint

The long-toed stint (*Calidris subminuta*) is a small sandpiper that breeds in Siberia and migrates to Australia primarily during the southern hemisphere summer (Ref. 544). Notable locations include the Gascoyne Region (e.g. Lake Wooleen, Meeberrie Station, and McNeill Claypan) and widespread areas in the Pilbara and Kimberley regions, from Karratha to Wyndham-Kununurra (Ref. 544). The long-toed stint is not known to occur within the West Coast and Christmas Island section of the PA.

The species arrives on the north coast, occupying freshwater wetlands in the west Kimberley and Pilbara regions. During summer, it disperses mainly between the Pilbara and South Australian coast, with a few individuals moving farther east (Ref. 544). Most of the population departs south-west Australia in February–March, returning to the Kimberley from March to May before continuing their migration to breeding grounds in Siberia (Ref. 544).

In Australia, the long-toed stint inhabits a variety of terrestrial wetlands, favouring shallow freshwater or brackish environments. It is often found along muddy shorelines or areas with short grass, weeds, sedges, and aquatic vegetation. The species is also common on the muddy fringes of drying ephemeral lakes and swamps and may frequent permanent wetlands like reservoirs and artificial lakes (Ref. 452). Although uncommon, it has been observed at tidal estuaries, saline lakes, salt ponds, and bore swamps (Ref. 452). These habitats provide abundant food sources, including molluscs, crustaceans, and insects (Ref. 545).

Roosting sites include sparse vegetation at wetland edges, damp mud near shallow water, or small depressions in the mud. They are mostly active during the day, particularly at low tide. In the evenings, they rest in groups, often on islands or mudflats (Ref. 500).

No BIAs have been identified for this species in Australia.

4.3.4.40 Marsh sandpiper

The marsh sandpiper (*Tringa stagnatilis*) occurs throughout southern Africa, the Nile River valley, and the Red Sea coast, breeding from eastern Europe to eastern Siberia (Ref. 546). In WA, they are mainly found around the coast (Ref. 546). The marsh sandpiper is not known to occur within the West Coast, Kimberley or Christmas Island section of the PA.

Birds arrive in Australia from September, moving southward across the continent between September and December (Ref. 500). During the Australian summer, some dispersive movements have been observed (Ref. 452). The marsh sandpiper begins its migration northward to breeding grounds in March–April (Ref. 546).

This species inhabits permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, and inundated floodplains. It is also commonly found at sewage farms and saltworks (Ref. 546). Less frequently, it is recorded at reservoirs, waterholes, soaks, bore-drain swamps, and flooded inland lakes. In northern Australia, the species shows a preference for intertidal mudflats (Ref. 452).

The marsh sandpiper typically forages in shallow water along the edges of wetlands, probing wet mud or feeding among marshy vegetation. It roosts or loafs on tidal mudflats, low saltmarshes, and around inland swamps (Ref. 452).

A carnivorous species, the marsh sandpiper primarily consumes insects, molluscs, and, internationally, crustaceans. Plant material has been found in stomach contents, though it may be ingested incidentally (Ref. 452). Feeding occurs singly or in groups, and the species has been observed following ducks, egrets, and other waders, taking advantage of prey disturbed by these birds (Ref. 547).

No BIAs have been identified for this species in Australia.

4.3.4.41 Masked booby

The masked booby (*Sula dactylatra*) is a large seabird found in tropical and subtropical waters. While not migratory, individuals may range widely from their breeding islands in search of food (Ref. 548).

In Australia, masked boobies are primarily found from the Dampier Archipelago in WA, along the entire north coast and east coast, extending south to Brisbane (Ref. 549). Individuals have also been recorded in Barrow Island (Ref. 441). The breeding population on Lord Howe Island represents the most southerly breeding colony in the world Ref. 549). The masked booby is not known to occur within the west coast, Ningaloo or Christmas Island section of the PA.

Masked boobies are usually solitary or found in small, loose colonies on breeding islands, where they engage in complex courtship displays. The breeding season is year-round (Ref. 519) but varies by locality, with colonies forming on rocky offshore islands. Nests are typically built on cliff ledges, though other sites are also used (Ref. 479). Typically, the species roost on the ground beside their nests during breeding season or near colonies (Ref. 549). Outside the breeding season, individuals may roost on other islands. After foraging, masked boobies often rest on beaches or sandbanks, occasionally in mixed-species flocks (Ref. 441).

This species is well-adapted to life over the ocean. At sea, masked boobies are generally found over pelagic waters, preferring deeper areas compared to other booby species. Their diet consists primarily of large shoaling fish, especially flying fish, but also includes large squid (Ref. 408).

Breeding and foraging BIAs have been identified for this species along the east coast of Australia, and are outside the PA.

4.3.4.42 Northern giant petrel

The northern giant petrel (*Macronectes halli*) is a large seabird that breeds in the sub-Antarctic and visits areas off the Australian mainland primarily during the winter months (May–October) (Ref. 550). In WA, immature and some adult birds are commonly observed in offshore and inshore waters around Fremantle during this period (Ref. 551). The species may occur within the Ningaloo and West Coast sections of the PA but is not known to occur within the Pilbara, Kimberley or Christmas Island sections.

Northern giant petrels are diurnal feeders at sea and are known to scavenge on land both during the day and at night (Ref. 553). Females exhibit more pelagic habits and feed extensively on marine resources during breeding periods, while males tend to scavenge more nearshore or on land (Ref. 554).

The breeding population at Macquarie Island is likely critical for the long-term persistence of northern giant petrels within Australian jurisdiction (Ref. 406).

Foraging BIAs for this species have been identified along the east coast of Australia.

No BIAs have been identified for this species in the PA.

4.3.4.43 Northern Siberian bar-tailed godwit

The northern Siberian bar-tailed godwit (*Limosa lapponica menzbieri*), also known as the Yakutian bar-tailed godwit, is a long-distance migratory wader that breeds in northern Siberia and migrates to north-western Australia for the non-breeding season (Ref. 450). In WA, the species is widespread along the coast, from Eyre to Derby (Ref. 452). The northern Siberian bar-tailed godwit is not known to occur within the Christmas Island section of the PA.

Bar-tailed godwits typically forage near the water's edge or in shallow water within tidal estuaries and harbors (Ref. 452). They are found on exposed sandy or muddy substrates on intertidal flats, banks, and beaches (Ref. 429). Their diet mainly consists of invertebrates such as worms, molluscs, crustaceans, and occasionally plant material, which they probe from the mud using their long, straight bill (Ref. 452). They roost in supratidal areas during higher tides, often in very large aggregations Ref. 556)

Known for their extraordinary migration, bar-tailed godwits travel over 11,000 km non-stop between Siberia and Australia (Ref. 555). During this journey, they rely on large fat reserves to sustain them. Outside the breeding season, they are highly social, frequently seen in large flocks in areas with abundant food (Ref. 452). Though they typically feed during the day, they may also forage by moonlight (Ref. 452).

The *Conservation Advice for Yakutian bar-tailed Godwit* (Ref. 429) defines habitats critical to the survival of the species as those essential for foraging, breeding, roosting, dispersal, maintaining genetic diversity, and long-term species recovery. However, no critical habitat for the species has been identified within the PA, and no BIAs have been identified for this species in Australia.

4.3.4.44 Oriental plover

The oriental plover (*Charadrius veredus*) is a medium-sized migratory shorebird that breeds in Central Asia and migrates to Australia (Ref. 559). In Australia, most records are along the north-western coast between Exmouth Gulf and Derby, with a few scattered sightings elsewhere. Two major staging areas are near Broome, where the majority of birds pass through during their arrival and departure (Ref. 559). Oriental plovers typically arrive in north-western Australia from early to mid-September, with numbers peaking in October and November (Ref. 470; Ref. 500; Ref. 560; Ref. 561). They usually leave between February and April, with most departing by the end of March (Ref. 470; Ref. 560). The oriental plover is not known to occur within the West Coast or Christmas Island sections of the PA.

Initially, this species is found in coastal habitats, such as estuarine mudflats, sandbanks, sandy or rocky beaches, nearby reefs, and near-coastal grasslands (Ref. 562; Ref. 563; Ref. 564). Later, they disperse inland to flat, open, semi-arid, or arid grasslands with short, sparse grass interspersed including dry paddocks, playing fields, lawns, cattle camps, and recently burned areas (Ref. 565; Ref. 566). Such environments provide a reliable source of invertebrates, including insects, small crustaceans, and other prey.

The Oriental Plover is well-adapted to ground foraging, often seen on mudflats and saltflats. It uses its sharp bill and keen eyesight to pick food from the surface (Ref. 441).

No BIAs have been identified for this species in Australia.

4.3.4.45 Osprey

The osprey (*Pandion haliaetus,* also known as *Pandion cristatus*) is a coastal raptor commonly found in northern Australia. Ospreys inhabit littoral and coastal regions, as well as terrestrial wetlands, across tropical and temperate Australia, including offshore islands (Ref. 408). Tin WA, locations include the North-Western and South-Western coasts, particularly areas such as Shark Bay, Exmouth, and the Swan River. Inland, they are also found near large freshwater lakes and wetlands with abundant fish population (Ref. 570). In the Kimberley ospreys are common along the coast and in wetlands and are considered a key part of the Kimberley's birdlife (Ref. 795).

They tend to stay year-round if food resources remain consistent (Ref. 462). They require extensive areas of open fresh, brackish or saline water for foraging (Ref. 470). Their preferred habitats include inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs, and large lakes or waterholes (Ref. 470).

In Australia, ospreys breed between April and February (Ref. 408). Breeding seasons vary with latitude, commencing progressively later in southern regions compared to northern areas (Ref. 470).

Ospreys are generally solitary, except during the breeding season. Outside the nesting period, they are typically seen alone but may gather in small groups in areas with abundant food, such as fish-rich rivers or lakes (Ref. 452. Ref. 462).

No BIAs have been identified for this species in Australia.

4.3.4.46 Pacific golden plover

Pacific golden plovers (*Pluvialis fulva*) are medium-sized shorebirds that breed in the Arctic regions of Siberia and Alaska before migrating to Australia for the southern hemisphere summer (Ref. 519). In the NWMR, they are present at Ashmore Reef during the southern spring and summer, between September and March (Ref. 446) and Eighty Mile Beach (Ref. 796). The species is widespread with fragmented distribution in Australia (Ref. 796). The Pacific golden plover is not known to occur within the Christmas Island section of the PA.

In Australia, the Pacific golden plover is commonly found in habitats such as mudflats, estuaries, and tidal flat margins (Ref. 519). They roost near their foraging areas, which include sandy beaches, spits, rocky points, islets, and exposed reefs. Occasionally, they may also roost among or beneath vegetation, such as mangroves, low saltmarsh, or beach-cast seaweed (Ref. 470; Ref. 571).

These highly social birds typically form small to medium-sized flocks, especially during the non-breeding season. They forage both during the day and at night, using gleaning and probing techniques to feed on invertebrates. Their diet is sourced from moist mud or sand on mudflats, saltmarshes, wave-wash zones, tide wrack on beaches, and even pastureland (Ref. 470).

No BIAs have been identified for this species in Australia.

4.3.4.47 Pacific gull

The Pacific gull (*Larus pacificus*) is a large seabird native to Australia (Ref. 408). The subspecies *georgii* is found along the coasts of south-western WA and western SA, with its range recently expanding northwards along the WA coast (Ref. 572). This subspecies of pacific gull is not known to occur within the Kimberley or Christmas Island sections of the PA. The species is shown to potentially occur in the southernmost region of the Pilbara section.

This species prefers coastal environments, including rocky shorelines, sandy beaches, and estuaries, which provide abundant food sources (Ref. 452). Its diet is diverse, comprising fish, squid, intertidal molluscs, echinoderms, crabs, fish offal, carrion, and refuse (Ref. 408).

Pacific gulls breed between September and January, either solitarily or in small, open colonies. Most nest sites are protected due to their inaccessibility, and the species has adapted well to urbanised environments, taking advantage of new food sources (Ref. 453; Ref. 573; Ref. 574).

Foraging BIAs have been identified (Figure 4-22, Figure 4-22) along Australia's southern coastline, stretching from Adelaide, SA, to Kalbarri, WA. These BIAs overlap with the southern section of the PA, specifically the West Coast section.

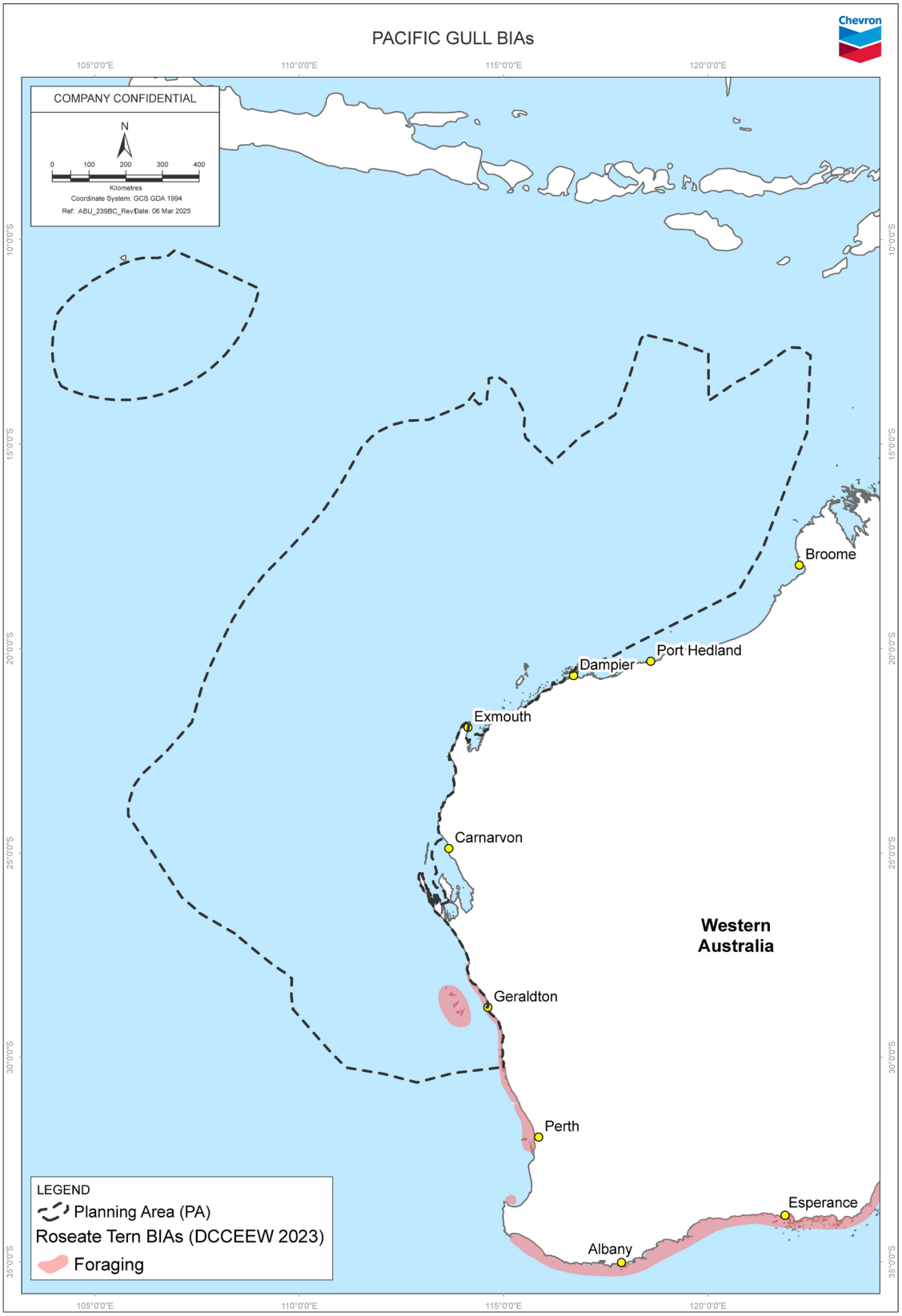

Figure 4-22: Biologically important areas for Pacific gull

4.3.4.48 Pectoral sandpiper

The pectoral sandpiper (*Calidris melanotos*) is a small to medium-sized shorebird that breeds in northern Russia and North America, migrating to non-breeding areas in Australia (Ref. 575). In WA, the species is rarely recorded, with observations at locations such as the Nullarbor Plain, Reid, Stokes Inlet, Grassmere Lake, Warden Lake, Dalyup and Yellilup Swamp, Swan River, Benger Swamp, Guraga Lake, Wittecarra, Harding River, coastal Gascoyne, the Pilbara, and the Kimberley (Ref. 452). The pectoral sandpiper may occur within the Christmas Island section of the PA however there are significant gaps in the current understanding of the species' distribution.

Migration is primarily driven by the availability of food resources and changes in day length, with birds typically leaving their breeding grounds in late summer and returning in spring (Ref. 576).

During the breeding season, the pectoral sandpiper builds its nest on the ground, often in shallow depressions lined with grasses, moss, and plant material (Ref. 576). In Australasia, it favours shallow freshwater to saline wetlands, typically in coastal or near-coastal areas, though it is occasionally found farther inland. Preferred habitats include wetlands with open, fringing mudflats and low emergent vegetation, such as grass or samphire (Ref. 575).

The species forages in shallow water or soft mud at wetland edges, feeding on a diverse diet that includes algae, seeds, crustaceans, arachnids, and insects (Ref. 452).

No BIAs have been identified for this species in Australia.

4.3.4.49 Pin-tailed snipe

The pin-tailed snipe (*Gallinago stenura*) is a migratory wader species that breeds in Russia and northeast Asia, migrating to Australia during the non-breeding season (Ref. 577). In WA, the species has been recorded in the Pilbara and Kimberley sections, including areas such as Port Hedland, Myaree Pool, Maitland River, and near Karratha. Its distribution in the Pilbara is believed to range from Pardoo (Banningarra Spring) to the lower Maitland River and Shay Gap (Ref. 577), it has also been reported in the south-west of WA (Ref. 452). Additionally, the pin-tailed snipe has been reported on the Cocos (Keeling) Islands and Christmas Island (Ref. 452).

The species typically arrives in Australia, particularly in the Pilbara, from late September to the end of March, with occasional sightings in southwestern WA in late March. There are no winter records of the species in Australia (Ref. 452).

In Australia, the Pin-tailed Snipe inhabits freshwater wetlands, including shallow lakes, ponds, mudflats, and marshes. These environments often feature dense vegetation such as reeds and grasses, which provide feeding grounds and sheltered roosting sites (Ref. 452).

No BIAs have been identified for this species in Australia.

4.3.4.50 Red knot

The red knot (*Calidris canutus*) is a medium-sized migratory shorebird with a worldwide distribution. It breeds in various Arctic regions and migrates to non-breeding areas, including the Australian coast (Ref. 578). In WA, it is occasionally observed in the south, particularly around Peron Peninsula and Carnarvon, and is

widespread along the coast from Ningaloo and Barrow Island to the south-west Kimberley Division. Large numbers are consistently recorded at 80 Mile Beach and Roebuck Bay, which are significant strongholds for the species (Ref. 578). The red knot may to occur within the Christmas Island section of the PA, however, there are significant gaps in the current understanding of the species' distribution.

Most red knots arrive on the north-west coast and the Gulf of Carpentaria from late August (Ref. 432). They reach south-west and southern Australia from September onward (Ref. 452) and depart north-west Australia between late March and late April, often migrating directly to China (Ref. 578).

In Australia, red knots inhabit intertidal mudflats, sandflats, and sandy beaches along sheltered coasts, estuaries, bays, inlets, lagoons, and harbours (Ref. 432). They are active both diurnally and nocturnally, with feeding activity regulated by tidal movements. Individuals often feed along the receding tide and are highly gregarious, frequently forming large flocks and mixing with other small shorebirds while feeding and roosting (Ref. 452).

The red knot's diet in non-breeding areas consists primarily of intertidal invertebrates, including bivalve and gastropod molluscs, crustaceans, annelid worms, and insects. Occasionally, they may consume fish and seeds (Ref. 453; Ref. 579).

The *Conservation Advice for red knot* (Ref. 432) defines habitats critical to the survival of the species as those essential for foraging, breeding, roosting, dispersal, maintaining genetic diversity, and long-term species recovery. However, no critical habitat for the species has been identified within the PA, and no BIAs have been identified for this species in Australia.

4.3.4.51 Red-footed booby

The red-footed booby (*Sula sula*) is a seabird found in tropical and subtropical regions, including northern Australia (Ref. 408; Ref. 580). Within the NWMR, it breeds on Ashmore and Cartier Islands (Ref. 539). However, there are no records of this species from the WA mainland coasts (Ref. 441). The red footed booby is known to breed on Christmas Island.

While the species is known to migrate, the specifics of its migratory patterns in Australian populations remain unclear. Most adults appear to leave colonies after breeding, but some individuals return more frequently than others (Ref. 581). The red-footed booby has a year-round breeding season, typically laying a single egg per clutch (Ref. 408).

The species is highly dependent on areas of high marine productivity, often associated with underwater slopes adjacent to breeding islands, which provide rich feeding grounds (Ref. 441). Red-footed boobies feed on fish and squid, capturing their prey by diving from considerable heights, a characteristic behaviour of the booby family (Ref. 580). Birds are known to follow boats, sometimes for hundreds of kilometres, as part of their feeding behaviour (Ref. 408; Ref. 441).

Breeding and foraging BIAs (Figure 4-23, Table 4-18) for the red-footed booby have been identified off the northern coast of WA. The breeding BIAs are identified around Ashmore Reef and Adele Island, both located within the northern section of the PA, specifically in the Kimberley region.

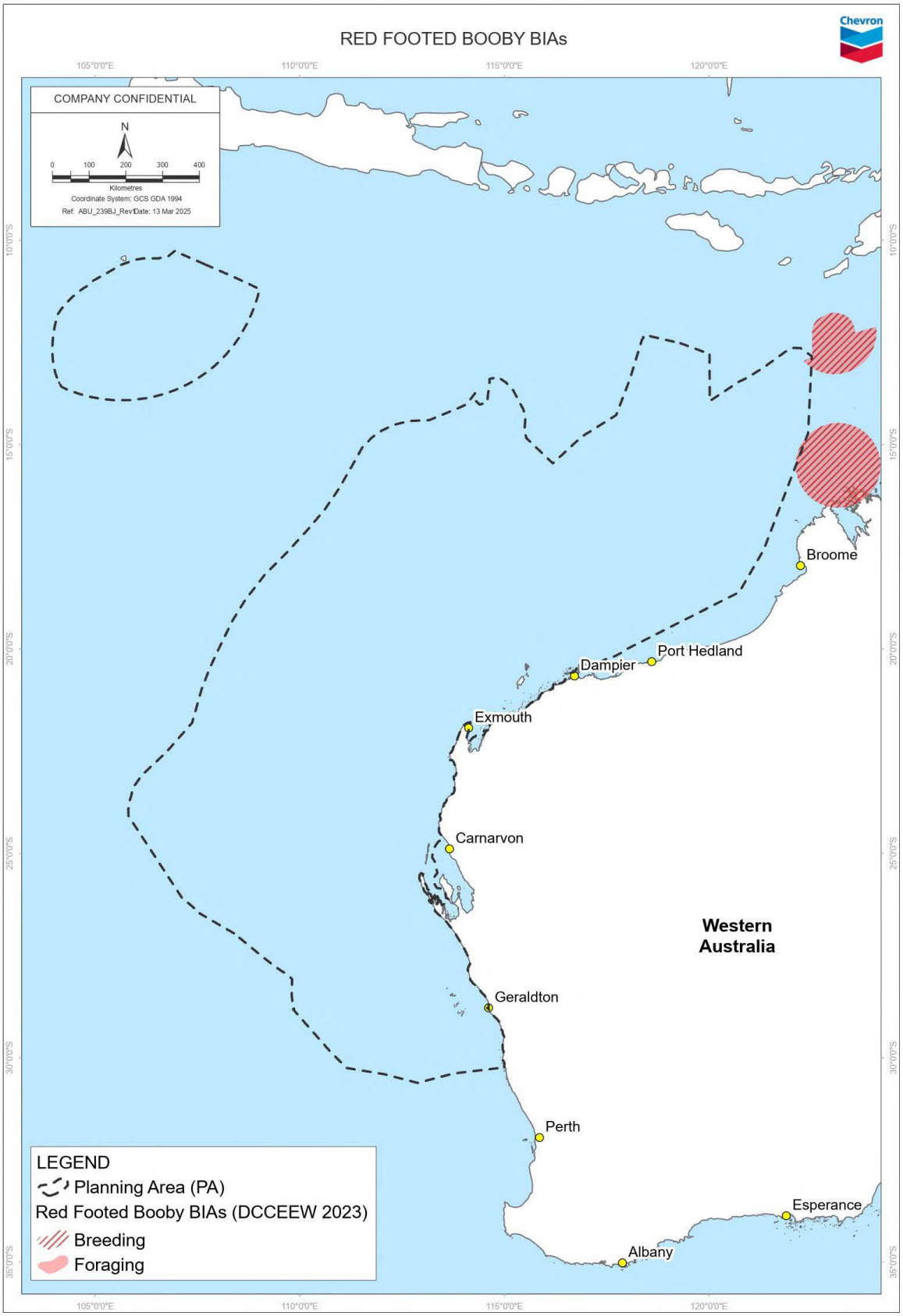

Figure 4-23: Biologically important areas for red-footed booby

4.3.4.52 Red-necked phalarope

The red-necked phalarope (*Phalaropus lobatus*) is a migratory shorebird that breeds in the Arctic and subarctic regions of North America, Europe, and Russia (Ref. 582). In WA, this species is regularly observed at the Port Hedland Saltworks and Rottnest Island (Ref. 582). Red-necked phalaropes are commonly sighted in Australia from mid-October to early April (Ref. 452). The species is not known to occur within the Christmas Island section of the PA.

During the non-breeding period, the red-necked phalarope primarily occurs at sea. In Australia, it is recorded at inland and coastal lakes or swamps, including highly saline waters and artificial wetlands such as saltfields (Ref. 452). It feeds on abundant invertebrates, including brine flies and aquatic larvae, in these habitats (Ref. 583).

Although primarily solitary outside the breeding season, red-necked phalaropes are often seen in flocks in Australia, particularly during migration, when large groups gather at suitable feeding sites (Ref. 583).

No BIAs have been identified for this species in Australia.

4.3.4.53 Red-necked stint

The red-necked stint (*Calidris ruficollis*) is a small migratory shorebird, with over 80% of its global population visiting Australia during the non-breeding period (Ref. 519). The northwest of Australia plays a critical role during their southward migration, with birds flying from the northwest to the southeast of the continent (Ref. 519). In the NWMR, nationally significant numbers are recorded at Ashmore Reef during the southern spring and summer, between September and March (Ref. 446). Red-necked stints typically arrive in Australia from August, sometimes as early as July, with most arriving by early September. They depart between late February and April, though a few may remain until May (Ref. 452). The red-necked stint is not known to occur within the Christmas Island section of the PA.

During migration, the species relies on shallow, nutrient-rich waters with abundant food sources. Important migration sites for the red-necked stint are located entirely within Australia (Ref. 584).

This species commonly inhabits coastal and inland wetlands, including intertidal mudflats, estuaries, saline lakes, and flooded plains (Ref. 441). Red-necked stints often travel and feed in dense flocks, consuming invertebrates such as crustaceans, molluscs, and insects (Ref. 583; Ref. 584). They also glean food from vegetation in saltmarshes and water surfaces (Ref. 452).

No BIAs have been identified for this species in Australia.

4.3.4.54 Red-tailed tropicbird

The red-tailed tropicbird (*Phaethon rubricauda*) is a medium-sized seabird found in the Indo-Pacific Ocean (Ref. 408). This species typically inhabits offshore islands, such as those in the Coral Sea, including the Great Barrier Reef, and parts of the northern coastline (Ref. 441). Of the four recognized subspecies, two occur in Australian territory. The subspecies *Phaethon rubricauda westralis*, commonly known as the Indian Ocean red-tailed tropicbird, is found in WA (Ref. 433).

The *Conservation Advice for Indian Ocean red-tailed tropicbird* (Ref. 433) identifies all known and potential breeding habitats as habitats critical to the

survival of the subspecies. This includes Christmas Island, the Cocos (Keeling) Islands, Bedwell Island, Rowley Shoals, and the islands of Ashmore Reef, as well as Rottnest Island.

At sea, the red-tailed tropicbird is solitary, flying above the waves with steady, mechanical wing-beats interspersed with horizontal glides (Ref. 519). It breeds in tropical and subtropical zones on volcanic islands, coastal cliffs, slopes, cays, and atolls. Nests are located in rugged terrain, under dense tree canopies, or on coral atolls (Ref. 441; Ref. 519; Ref. 586). Birds generally return to the same breeding sites for successive attempts, unless the sites have been overgrown (Ref. 587) or destroyed (Ref. 588).

The red-tailed tropicbird captures most of its food by deep plunging into the water. Its diet primarily consists of fish and cephalopods, and it often feeds opportunistically near schools of fish or marine predators (Ref. 518). While the movements of adults and juveniles away from breeding sites are not well understood, they appear to disperse widely (Ref. 519).

. No BIAs for this species overlap the PA.

. No critical habitats for this subspecies have been identified within the PA. No BIAs have been identified for this subspecies (Indian Ocean red-tailed tropicbird) in Australia.

4.3.4.55 Roseate tern

The roseate tern (*Sterna* d*ougalli*i) is a seabird known for its striking plumage and migratory behaviour. The roseate tern occurs in coastal and marine areas in subtropical and tropical seas. In WA the roseate tern is known to occur north of Mandurah to Eighty Mile Beach in the Pilbara. The species is also known to be scattered around the West Coast and Kimberley coastlines (Ref. 452).

The species inhabits rocky and sandy beaches, coral reefs, sand cays and offshore islands (Ref. 452). The roseate tern is a migratory species, though the movement patterns are not well known. Birds are known to usually move away from breeding colonies following breeding, but their non-breeding range is not well defined (Ref. 452).

Behaviours used to define biologically important areas for seabirds in Commonwealth marine areas include breeding with a foraging buffer, and roosting (Ref. 408). Bird species may forage in the waters surrounding the islands during nesting seasons.

Breeding in WA occurs in two distinct periods (Ref. 441):

- at some sites (including Montebello Islands), breeding occurs during both late spring-summer and late autumn-winter
- at other sites (typically further south, including around Cervantes), breeding occurs only during autumn-winter.
- the Pilbara region from March to July and October (Ref. 589).

Different islands can be chosen for the breeding colony from year to year. As roseate terns do not forage widely from their breeding colonies, suitable nesting islands may be chosen because of nearby aggregations of their pelagic fish prey (Ref. 590).

Breeding, foraging and resting BIAs have been identified (Figure 4-24, Table 4-18) for this species in WA and the NT. In the NWMR, breeding populations of roseate

terns have been recorded at Ashmore Reef, Napier Broome Bay, the Bonaparte Archipelago, Lacepede Island, Bedout Island, the Dampier Archipelago, Lowendal Island, Frazer Island, Koks Island, Mary Anne Island, and Meade Island (Ref. 519). Foraging and breeding BIAs overlap with the PA.

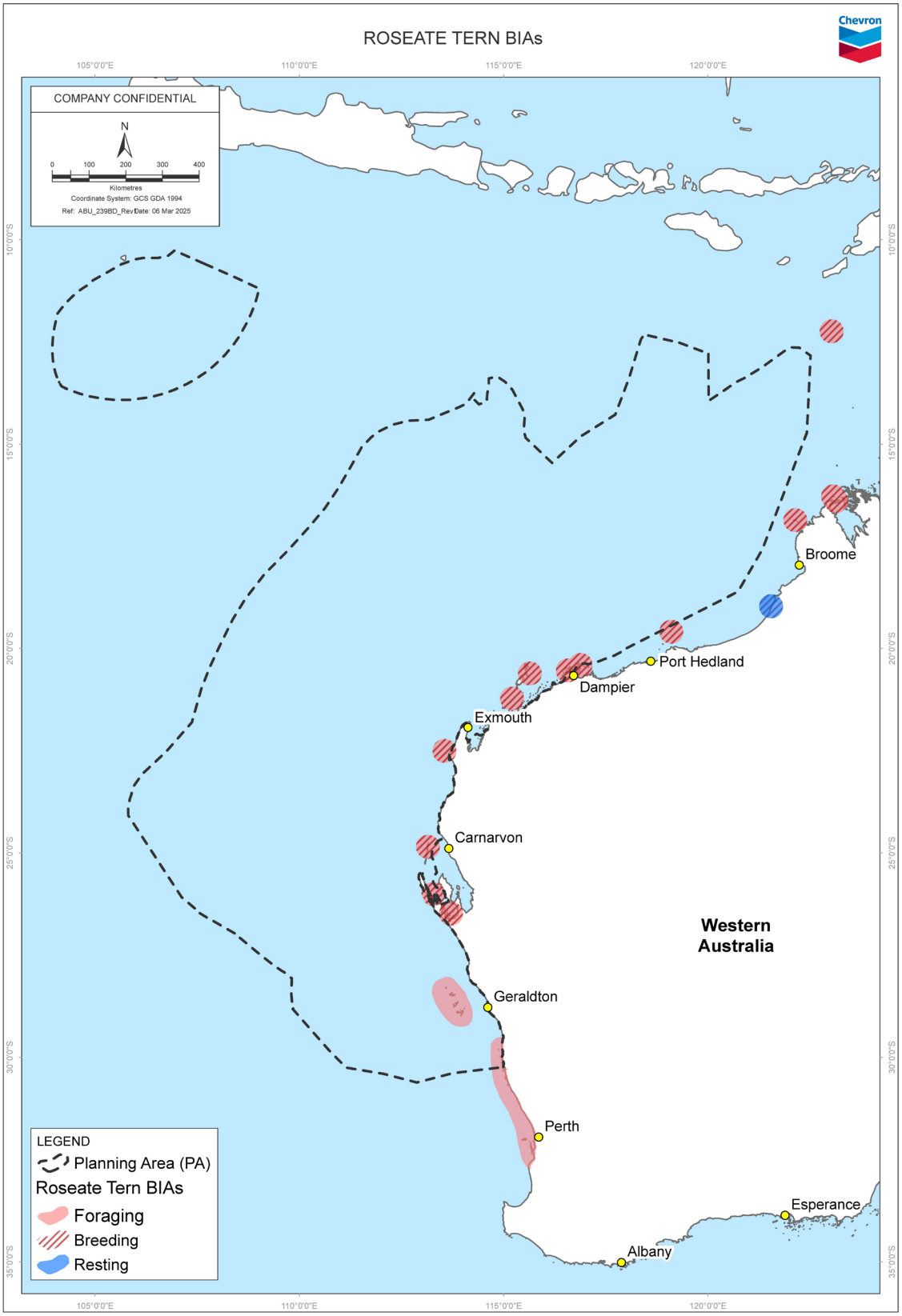

Figure 4-24: Biologically important areas for roseate tern

4.3.4.56 Ruddy turnstone

The ruddy turnstone (*Arenaria interpres*) is a migratory shorebird that breeds in the high Arctic tundra in Siberia and Alaska (Ref. 454) and visits Australia during its southward migration. Ruddy turnstones arrive in northwestern Australia, although this region appears to be less extensively used during their southward migration compared to their northward journey (Ref. 519). They are present in internationally significant numbers in the NWMR at Ashmore Reef between August and May (Ref. 446). In WA, the species is also found at Eighty Mile Beach, Roebuck Bay, Barrow Island, and the Lacepede Islands (Ref. 446). The species habitat may occur across all sections of the PA (Ref. 432).

Ruddy turnstones arrive in northern and southern WA from August onwards, with movements into and through Australia continuing until at least October. They depart southern sites from mid-March. The absence of inland records during March and April suggests that some birds may fly directly over northern Australia during migration (Ref. 452).

In Australia, the ruddy turnstone prefers coastal environments, including rocky shores, sandy beaches, mudflats, and estuaries, although there are occasional records of inland populations (Ref. 452). It is known for its distinctive foraging behaviour, using its robust bill to flip over stones, shells, and debris to uncover hidden prey such as small crabs, insects, and molluscs (Ref. 441).

The ruddy turnstone is social, particularly outside the breeding season, often forming large flocks during migration or at abundant food sources (Ref. 583). In Australia, these flocks are frequently observed foraging together on tidal flats or rocky shorelines (Ref. 452). During the breeding season, however, the species is solitary, nesting on the open tundra in the Arctic.

Ruddy turnstones typically roost on beaches above the tideline, among rocks, shells, beach-cast seaweed, or other debris. They have also been observed roosting on rocky islets with grassy tussocks and on mudflats and sandflats (Ref. 452).

No BIAs have been identified for this species in Australia.

4.3.4.57 Sanderling

The sanderling (*Calidris alba*) is a small migratory shorebird that travels from its Arctic breeding grounds to the coastal regions of Australia during the non-breeding season (Ref. 441). On their southward migration, sanderlings arrive in Australia through the northwest visiting Christmas Island; however, this area is less extensively used compared to their northward migration (Ref. 446). In WA, they are more frequently recorded along the south and southwest coasts, extending northward to southern Shark Bay. Records become more sporadic further north, in the Gascoyne and Pilbara regions, and the Kimberley Division (Ref. 591). Internationally significant numbers have also been observed at Ashmore Reef between December and February (Ref. 446).

Sanderlings typically arrive in Australia during September, with most occurrences in northwestern regions, and depart between March and May (Ref. 452).

This species prefers coastal habitats such as sandy beaches exposed to open sea swells, as well as exposed sandbars, spits, and shingle banks. They forage primarily in the wave-wash zone and among rotting seaweed (Ref. 591). These environments provide ideal feeding grounds, where sanderlings consume small invertebrates, including crustaceans, molluscs, and other marine organisms

(Ref. 441). They occasionally feed on medusae, fish, and larger molluscs and crustaceans as carrion (Ref. 591).

Sanderlings are known for their distinctive behaviour of running swiftly along the shoreline, pausing briefly to peck at the sand for food before darting forward again. This behaviour enables them to efficiently exploit exposed prey, particularly during low tide when invertebrates are more accessible (Ref. 583).

No BIAs have been identified for this species in Australia.

4.3.4.58 Sharp-tailed sandpiper

The sharp-tailed sandpiper (*Calidris acuminata*) is a small migratory shorebird that breeds in northern Siberia and visits all Australian states during the non-breeding season (Ref. 433). Approximately 91% of the East Asian – Australasian population occurs in Australia and New Zealand (Ref. 446). In WA, scattered records exist along the northwest and west coasts, including Henty River and Port Davey (Ref. 433). Inland, the species is widespread, ranging from Cape Arid to Carnarvon, across the coastal and sub-coastal plains of the Pilbara region, and throughout the Kimberley Division (Ref. 452). The sharp tailed sandpiper may occur within the Christmas Island section of the PA.

Small numbers of sharp-tailed sandpipers arrive in north-west Australia by mid-August, with larger numbers arriving in early September. They depart the non-breeding grounds in Australia by April, being one of the earliest shorebirds to leave (Ref. 452).

The species is predominantly found in southeastern Australia but is widespread in both inland and coastal locations. Sharp-tailed sandpipers occur in both freshwater and saline habitats, including wetlands and intertidal mudflats (Ref. 452; Ref. 592).

During the non-breeding season in Australia, sharp-tailed sandpipers forage along the edges of wetlands and intertidal mudflats, typically on bare wet mud, sand, or in shallow water (Ref. 452). Roosting occurs on rocky and sandy beaches, as well as in freshwater and inland saltwater habitats (Ref. 452). Highly gregarious, the species often forms large flocks, particularly during migration and feeding. Sharp-tailed sandpipers exhibit varied foraging techniques, such as rapid running and probing in the mud, which enable efficient prey capture (Ref. 593). Their diet consists of seeds, worms, molluscs, crustaceans, and insects (Ref. 452).

The *Conservation Advice for sharp-tailed sandpiper* (Ref. 433) defines habitats critical to the survival of the species as those essential for foraging, breeding, roosting, dispersal, maintaining genetic diversity, and long-term species recovery. However, no critical habitat for the species has been identified within the PA, and no BIAs have been identified for this species in Australia.

4.3.4.59 Shy albatross

The shy albatross (*Thalassarche cauta*) is a large seabird endemic to Australia, breeding exclusively on three Tasmanian islands: Albatross Island, Mewstone, and Pedra Branca (Ref. 406). Unlike many other albatross species, shy albatrosses are less oceanic, typically found over the continental shelf and frequently venturing close to shore along the coasts of Tasmania and southern Australia (Ref. 594; Ref. 595; Ref. 596). In WA, the shy albatross may occur within the West Coast and Ningaloo sections of the PA but are not known to occur within the Pilbara, Kimberley or Christmas Island sections.

Shy albatrosses are annual breeders when successful, with birds present at the colonies year-round. Females lay a single egg predominantly in September (Ref. 406). During the breeding season, adults forage near their colonies, usually within 300 km in continental shelf waters (Ref. 595)

These birds typically forage singly or in flocks of ~20 individuals (Ref. 535). They also aggregate behind fishing vessels, where they outcompete smaller Procellariiformes and most species except the great albatrosses (Ref. 597). Shy albatrosses capture prey from surface schools using flight feeding, surface feeding, and surface diving, with most diving activity occurring during daylight hours. Their diet primarily consists of fish and cephalopods, with smaller amounts of tunicates and crustaceans (Ref. 535; Ref. 595; Ref. 598).

The *National Recovery Plan for albatrosses and petrels* (Ref. 406) identifies the Tasmanian islands of Albatross Island, the Mewstone and Pedra Branca as critical habitat for they shy albatross under the EPBC Act. Breeding and foraging BIAs have also been identified along the southeastern coast of Australia. However, the critical habitat and BIAs do not overlap the PA.

4.3.4.60 Soft-plumaged petrel

The soft-plumaged petrel (*Pterodroma mollis*) is a medium-sized seabird found over temperate and subantarctic waters in the South Atlantic, Southern Indian, and Western South Pacific Oceans (Ref. 599). The species is a regular and relatively common visitor to southern Australian seas (Ref. 599). In WA, beach cast individuals have been found in the southwest between June and September, though sightings have been recorded throughout most months (Ref. 441). The soft plumaged petrel is not known to occur within the Kimberley or Christmas Island sections of the PA.

Primarily a pelagic species, the soft-plumaged petrel is typically found far from land. In Australia, it breeds at two sites: Maatsuyker Island off Tasmania and Macquarie Island, nesting in burrows or rock crevices (Ref. 599). Its movements during the non-breeding season remain poorly documented (Ref. 599). The bird is often observed in small groups, flying swiftly near the water's surface (Ref. 435).

The diet of the soft-plumaged petrel mainly consists of cephalopods, along with fish and crustaceans. It frequently forages by following fishing boats or scavenging in areas with upwelling currents that bring prey to the surface. The species feeds on the wing by dipping to the water’s surface to capture prey and occasionally dives from the surface (Ref. 600).

Breeding and foraging BIAs have been identified (Figure 4-25, Table 4-18) for the soft-plumaged petrel in southwestern WA, from Geraldton to Albany, as well as south of Tasmania. Foraging BIAs overlap the southern section of the PA, particularly within the West Coast section.

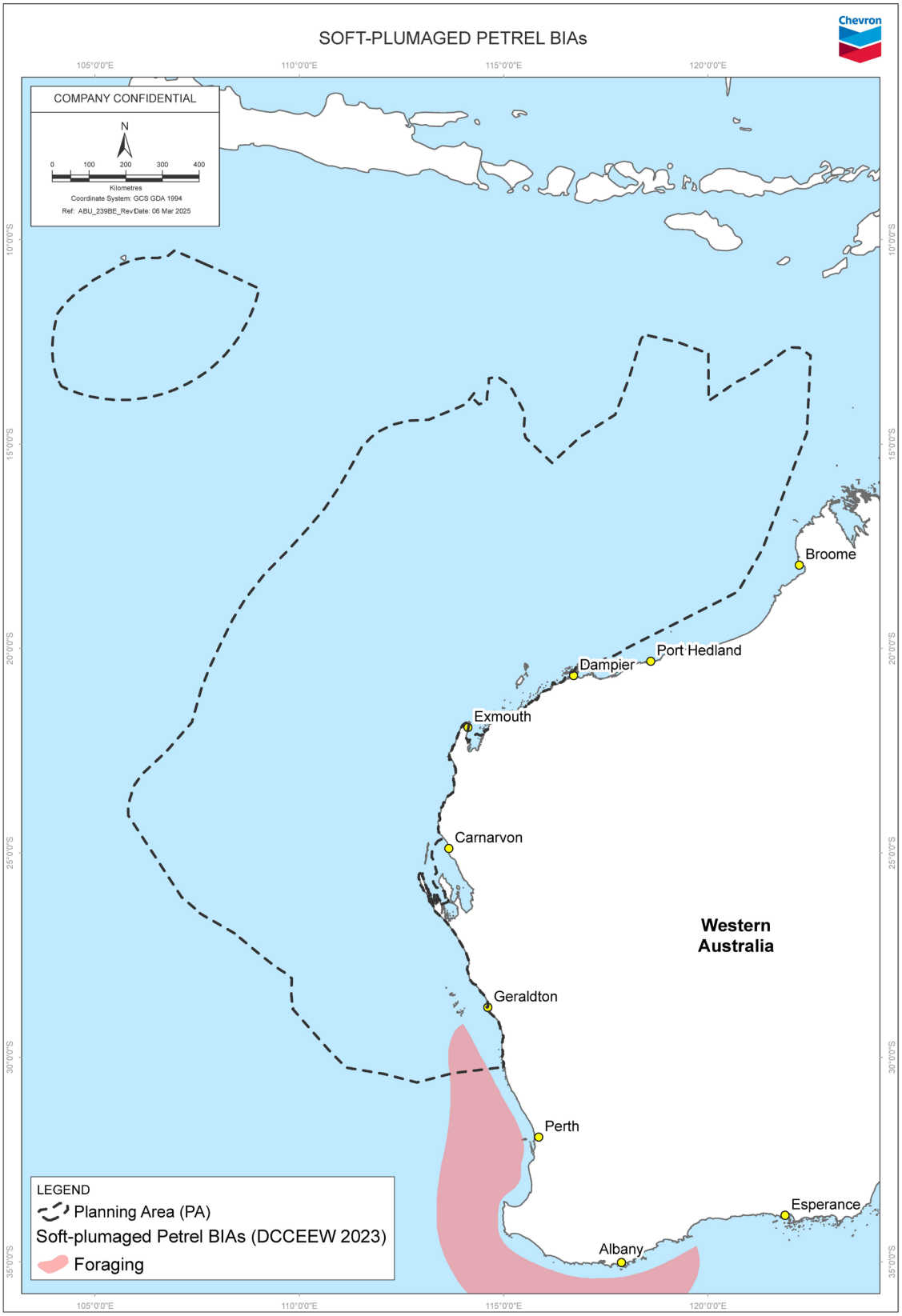

Figure 4-25: Biologically important areas for soft plumage petrel

4.3.4.61 Sooty albatross

The sooty albatross (*Phoebetria fusca*) is a seabird primarily inhabiting the Indian Ocean and surrounding waters, with breeding grounds located in territories belonging to France, South Africa, and the United Kingdom (Ref. 406). While Australia is within the foraging range of the sooty albatross, it is considered a rare visitor to Australian waters (Ref. 406). The sooty albatross is not known to occur within the Pilbara, Kimberley, Ningaloo or Christmas Island sections of the PA.

This marine and pelagic species is most commonly found south of 35°S during the summer, frequenting subtropical and subantarctic waters, particularly near the Subtropical Convergence (Ref. 602; Ref. 603). Its range extends south of the Antarctic Convergence in the southwestern Indian Ocean, though it is rarely observed beyond this region (Ref. 603). In late autumn and winter, the species predominantly occupies the Subtropical Zone (Ref. 602; Ref. 604). Immature birds remain within the Subtropical Zone year-round.

The sooty albatross is solitary and monogamous (Ref. 601). It occurs widely over pelagic waters during both breeding and non-breeding seasons, foraging across dispersed food sources (Ref. 603). Its diet primarily consists of cephalopods, fish, crustaceans, siphonophores, and occasionally penguin carrion, which it captures while flying over the sea (Ref. 441).

No BIAs have been identified for this species in Australia.

4.3.4.62 Sooty tern

The sooty tern (*Onychoprion fuscatus*) is a medium-sized tropical seabird commonly found in tropical and subtropical regions. It is absent from areas influenced by cold ocean currents and generally avoids islands inhabited by terrestrial predators (Ref. 453). Large populations are present in WA (Ref. 606), Queensland (Ref. 607), and the Coral Sea Marine Park. A 2019 survey of the Ashmore Reef Marine Park (Ref. 608) identified sooty terns as the most abundant bird species at Ashmore. The species has been recorded on Christmas Island, where it is considered a vagrant species (Ref. 797).

The species breeds on flat, open, oceanic or barrier islands composed of sand, coral, or rock, which may be sparsely or heavily vegetated. These islands are typically situated in productive tropical and subtropical offshore waters rich in plankton, fish, and squid (Ref. 453; Ref. 605). Their diet predominantly consists of fish and squid, though it occasionally consumes crustaceans, insects, and offal (Ref. 453; Ref. 605). During breeding, it relies heavily on prey driven to the surface by predatory fish, such as tuna (Ref. 452).

Sooty terns are highly adapted to life at sea, exhibiting impressive foraging behaviour. They often hunt in groups, using their speed and agility to capture prey effectively (Ref. 441).

Breeding and foraging BIAs have been identified (Figure 4-26, Table 4-18) for this species in offshore waters along WA, from Augusta to Carnarvon, and around islands off the east coast, from Norfolk Island to offshore Cairns. Breeding BIAs overlap the PA, particularly in the Western Coast section.

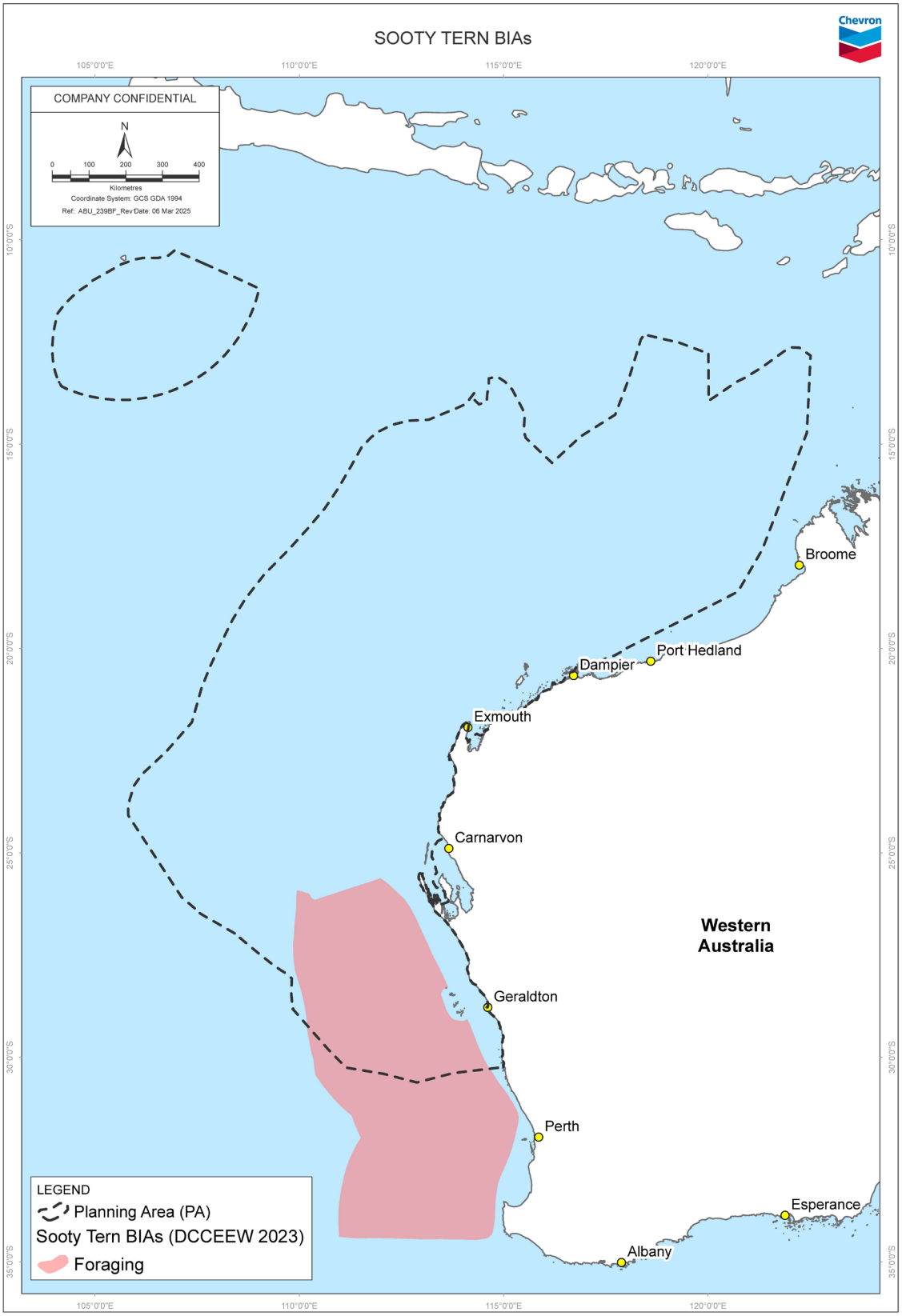

Figure 4-26: Biologically important areas for sooty tern

4.3.4.63 Southern giant-petrel

The southern giant-petrel (*Macronectes giganteus*) is the largest petrel, with a widespread distribution across the Southern Ocean. In Australia, it breeds exclusively in the Australian Antarctic Territory, Heard Island, McDonald Islands, and Macquarie Island (Ref. 406). While the majority of the population breeds annually, a significant proportion (20–40%) does not breed in a given year (Ref. 406). The southern giant petrel may occur in the Kimberley, Pilbara, Ningaloo and West Coast sections of the PA but is not known to occur within Christmas Island.

The species is an opportunistic scavenger. During the breeding season, southern giant petrels primarily prey on cephalopods and fish at sea. On land, they prey on penguin chicks and scavenge seal and penguin carrion (Ref. 553; Ref. 609). Their hunting methods at sea include surface seizing, surface filtering, surface diving, and surface plunging (Ref. 609).

All breeding populations of the southern giant petrel within Australia's jurisdiction are likely to be important for the long-term persistence of the species within Australia (Ref. 406). Foraging BIAs have been identified for this species in the shelf region of NSW coast. These BIAs do not overlap the PA.

4.3.4.64 Southern royal albatross

The southern royal albatross (*Diomedea epomophora*) is a large seabird predominantly found in the subantarctic regions of the Southern Ocean, with primary breeding colonies in New Zealand. Australia lies within the foraging range of this species (Ref. 406). The species is not known to occur within the Ningaloo, Pilbara, Kimberley or Christmas Island sections of the PA but may occur in the West Coast section.

The southern royal albatross inhabits cold, nutrient-rich waters of the Southern Ocean. It breeds on remote, windswept islands, nesting on flat, grassy plateaus or ridges that are free from predators (Ref. 610). During non-breeding periods, the species ranges widely across the Southern Ocean, including southern subantarctic Australia and the Australian Antarctic Territory (Ref. 406).

Its large wings are adapted for dynamic soaring, an energy-efficient method of flight that allows it to cover vast distances while foraging for squid, fish, and krill (Ref. 441). The southern royal albatross is an efficient forager, capable of traveling thousands of kilometres during its long migrations in search of food (Ref. 610).

No BIAs have been identified for this species in Australia.

4.3.4.65 Streaked shearwater

The streaked shearwater (*Calonectris leucomelas*) is a large shearwater native to the western Pacific. It breeds on coastal and offshore islands in Japan, Russia, China, and the Korean Peninsula (Ref. 408). The species undergoes trans-equatorial migration, traveling south during the northern winter to the coasts of Australia. It is commonly observed between October and March, with occasional records from August to May (Ref. 441). The streaked shearwater is not known to occur within the West Coast or Christmas Island section of the PA.

Streaked shearwaters are typically found over continental shelves and around islands, where they feed on abundant marine resources such as small fish, squid,

and other marine organisms. Their primary foraging method is surface-seizing, capturing prey from the water's surface while in flight (Ref. 408; Ref. 441).

During the breeding season, these birds nest on remote islands (Ref. 611). They exhibit strong site fidelity, returning to the same colonies each year. Highly social, streaked shearwaters are often observed in large flocks, particularly while foraging or migrating (Ref. 612).

No BIAs have been identified for this species in Australia.

4.3.4.66 Swinhoe's snipe

The Swinhoe's snipe (*Gallinago megala*) is a migratory wader species that occasionally migrates through or winters in Australia. Primarily breeding in Siberia, this snipe migrates to northern coastal regions of Australia during the non-breeding season (Ref. 613). In WA, it has been recorded in the Pilbara, Kimberley region, Mount Goldsworthy, Mount Blaize, and areas around the Mitchell Plateau (Ref. 441). The species is observed in northern WA, particularly the Kimberley region, from October to April, and may also occur in the Pilbara from October to March (Ref. 613). The Swinhoe's snipe is not considered a regular resident of Christmas Island; however, it has been reported on the island. It is not commonly observed, and challenges exist in distinguishing it from other snipe species (Ref. 798).

During the non-breeding season, Swinhoe's snipe typically inhabits coastal wetlands, mudflats, and estuarine environments (Ref. 613). It prefers habitats with soft, muddy substrates rich in invertebrate prey such as insects, worms, and small crustaceans (Ref. 441).

The species is known for its long migratory flights, typically undertaken at night, covering vast distances across the Asian continent to reach Australian wetlands. Swinhoe's snipe is generally solitary or found in small groups, exhibiting swift, direct flight patterns. Unlike many other wader species, it is less frequently observed in large flocks and is known for its elusive behaviour when feeding (Ref. 441).

No BIAs have been identified for this species in Australia.

4.3.4.67 Terek sandpiper

The terek sandpiper (*Xenus cinereus*) is a medium-sized migratory shorebird primarily found along the northwest and east coasts of Australia during the non-breeding season (Ref. 446). It breeds from eastern Europe to eastern Russia, with less than half of the flyway population migrating as far south as Australia (Ref. 519). In WA, the species is widespread in the Pilbara and Kimberley regions, from Dampier to Wyndham, with occasional records around Shark Bay (Ref. 614). Nationally significant numbers of terek sandpipers have been observed at Ashmore Reef (Ref. 446; Ref. 525). The species is also a regular visitor to Christmas Island (Ref. 470).

Terek sandpipers primarily forage on soft, wet intertidal mudflats or in sheltered estuaries, embayments, harbors, and lagoons. They are also recorded on islets, mudbanks, sandbanks, spits, and near mangroves. While typically foraging in open areas, they may occasionally wade into shallow water (Ref. 470). Their diet includes crabs (Ref. 519), crustaceans, insects, seeds, molluscs, and arachnids (Ref. 441).

The species exhibits swift movements and abrupt changes of direction and is usually seen singly or in small flocks. It can also form communal roosts, sometimes numbering in the hundreds, often among other waders. When roosting, terek sandpipers commonly perch on mangroves, partially submerged posts, or breakwaters, frequently alongside grey-tailed tattlers (Ref. 470).

The *Conservation Advice for terek sandpiper* (Ref. 436) defines habitats critical to the survival of the species as those essential for foraging, breeding, roosting, dispersal, maintaining genetic diversity, and long-term species recovery. However, no critical habitat for the species has been identified within the PA, and no BIAs have been identified for this species in Australia.

4.3.4.68 Wandering albatross

The wandering albatross (*Diomedea exulans*) is a large seabird primarily found in the Southern Ocean, with its distribution extending into Australian waters. While it breeds in subantarctic and Antarctic regions, including Macquarie Island, it is commonly observed in the southern and southeastern oceans of Australia (Ref. 406; Ref. 441). The wandering albatross is not known to occur within the Pilbara, Kimberley or Christmas Island sections of the PA.

Wandering albatrosses mostly feed during daylight (Ref. 609; Ref. 615). They often gather in large groups at abundant food sources, such as behind fishing vessels, where they are aggressive scavengers, outcompeting other seabirds for discards and baited hooks (Ref. 597; Ref. 603). Their feeding methods include surface seizing, surface diving up to one meter, and occasional shallow plunging (Ref. 609; Ref. 616). Their diet consists mainly of fish and cephalopods, with smaller amounts of crustaceans, jellyfish, and scavenged prey such as penguins (Ref. 617; Ref. 618; Ref. 619).

Foraging areas vary due to sexual and age-related segregation. During non-breeding years, individuals often maintain a preferred home range 1,500–8,500 km from breeding islands, with females tending to forage in warmer waters than males (Ref. 620). The species demonstrates efficient energy acquisition relative to effort, with the lowest flight costs recorded among seabirds.

Macquarie Island is listed as critical habitat for the Wandering Albatross under the EPBC Act (Ref. 406). Foraging BIAs have been identified in the shelf region off the NSW coast, encompassing the EEZ from the Victorian border to Adelaide, SA. These critical habitats and BIAs do not overlap the PA.

4.3.4.69 Wedge-tailed shearwater

Wedge-tailed shearwaters (*Ardenna pacifica*) are a pelagic, migratory visitor to WA; estimates indicate more than one million shearwaters migrate to the Pilbara islands each year (Ref. 589); out of an estimated global population of five million (Ref. 519). Wedge-tailed shearwaters typically begin arriving at their WA colonies around August each year and will excavate burrows on vegetated islands for nesting; peak egg laying typically occurs during November; and they will typically leave nests in early-April to early-May and travel north to the Indian Ocean (Ref. 441; Ref. 621). Migration from the colony is very synchronous, but the return is less so (Ref. 621). Once adults cease returning to feed their young, the young (fledgling) wedge-tailed shearwaters fledge and depart nests (Ref. 622; Ref. 423).

Known breeding locations in the NWMR include Forestier Island (Sable Island), Bedout Island, Dampier Archipelago, Passage Island, Lowendal Island, islands off Barrow Island (Mushroom, Double and Boodie islands), islands in the Onslow

area (including Airlie, Bessieres, Serrurier, North and South Muiron and Locker islands), islands in Freycinet Estuary, and south Shark Bay (Slope, Friday, Lefebre, Charlie, Freycinet, Double and Baudin islands) (Ref. 519). The species is known to occur on Christmas Island however gaps in knowledge limit the available information on the distribution and population in this region.

Baseline monitoring (pre-construction of the Gorgon Gas Development) recorded ~20–50 wedge-tailed shearwater nesting burrows on North Double Island and ~300 on South Double Island (Ref. 455; Ref. 624). CAPL (Ref. 253; Ref. 455) provided an estimate of 500 burrows over a 2 ha portion of the north-eastern corner of South Double Island, supporting 5,000–10,000 pairs of wedge-tailed shearwaters.

This species forages relatively close to breeding islands and its diet consists of squid, fish, and crustaceans (Ref. 519). However, more recent studies have indicated bimodal foraging. A study on foraging behaviour of the wedge-tailed shearwaters during the 2018 nesting season on the Muiron Islands showed a bimodal foraging strategy that incorporated both short (<4 days) and long (>7 day) trips (Ref. 621). The foraging trips of the wedge-tailed shearwaters from the Muiron Islands were recorded over a large area, extending from the Cape Range Canyon to the Indonesian Archipelago; and a consistent pattern of foraging near seamounts was observed (Ref. 621). It is noted that this same area is part of the foraging extent used by the wedge-tailed shearwaters from both Pelsaert and Houtman Abrolhos islands) (Ref. 621; Ref. 425). The use of a bimodal foraging strategy suggests that prey availability close to the colony (i.e. areas that would be utilised on short trips) are inadequate for the large numbers of breeding shearwaters (Ref. 621).

Breeding and foraging BIAs have been identified (Figure 4-27, Table 4-18) for this species in the NWS, which overlap with the PA.

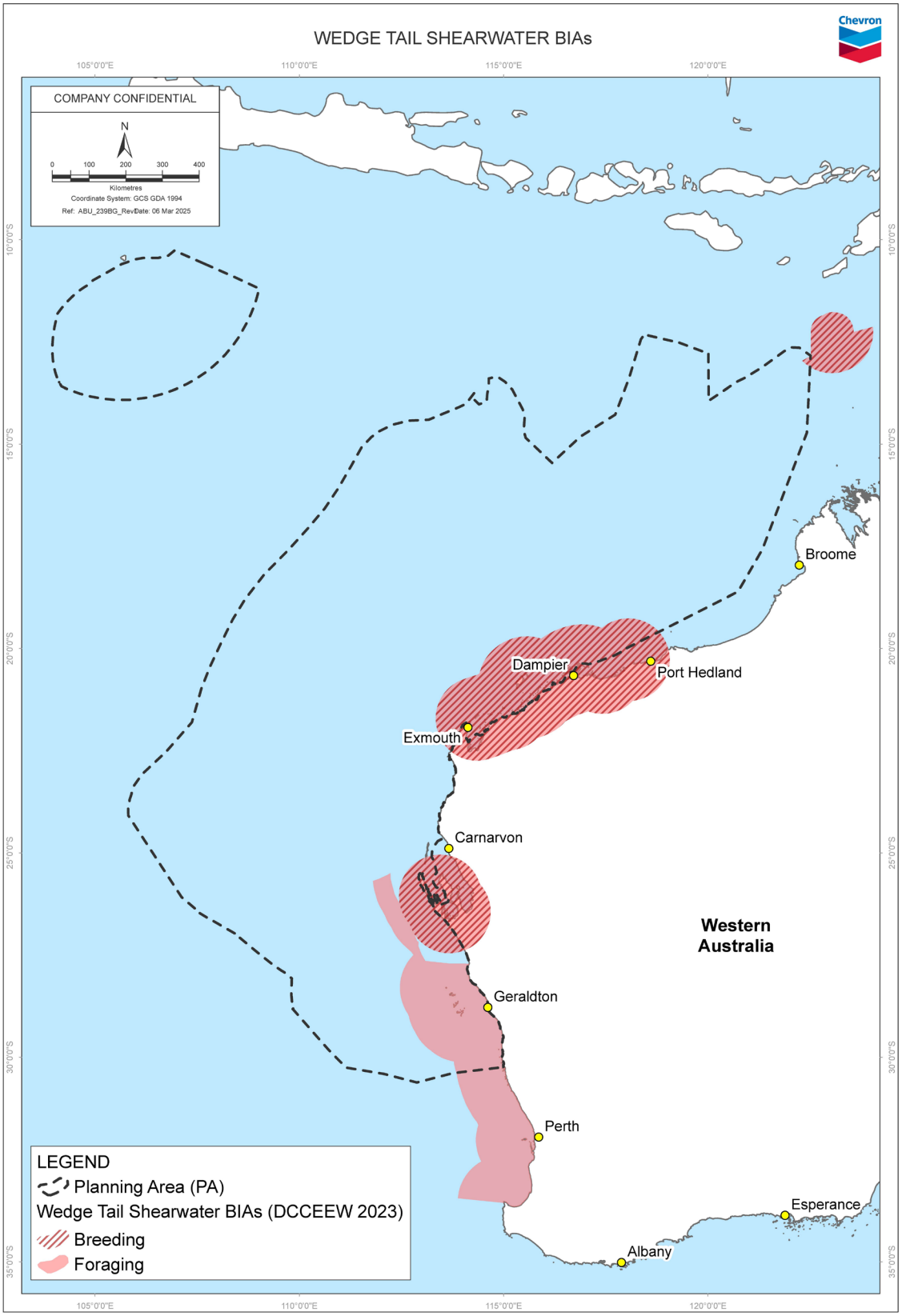

Figure 4-27: Biologically important areas for wedge-tailed shearwater

4.3.4.70 Whimbrel

The whimbrel (*Numenius phaeopus*) is a migratory wader that travels from its Arctic breeding grounds to Australia during the non-breeding season (Ref. 519). It is commonly found along Australia's northern coasts. In WA, it is widespread from Carnarvon to the northeast Kimberley Division. The species is occasionally observed along the south coast and in the southwest, including Shark Bay (Ref. 626). The whimbrel is known to occur on Christmas Island.

In WA, Whimbrels migrate south through Roebuck Bay from August to September (Ref. 500). They begin their northward migration in February, with most leaving Roebuck Bay between mid- and late April (Ref. 626). Whimbrels are present in nationally significant numbers at Ashmore Reef during the southern spring and summer, between September and March (Ref. 446).

Whimbrels primarily inhabit intertidal mudflats along sheltered coasts, but they are also found in harbours, lagoons, estuaries, and river deltas, often in areas with mangroves or open, unvegetated mudflats (Ref. 626). These habitats provide abundant food sources, including molluscs, worms, and crustaceans (Ref. 441). The species forages on intertidal mudflats, muddy estuary banks, and coastal lagoons and often roosts in mangroves or other elevated structures during high tide (Ref. 626).

Whimbrels are social birds, typically observed in small groups or loose flocks during the non-breeding season, particularly in areas with plentiful food (Ref. 441).

No BIAs have been identified for this species in Australia.

4.3.4.71 White-capped albatross

The white-capped albatross (*Thalassarche steadi)* is a medium-sized seabird endemic to New Zealand, with a foraging range that extends into Australian waters (Ref. 406). It is observed in Australian southern oceans, particularly around Tasmania and the southern coasts of Victoria and NSW, during the non-breeding season (Ref. 441). The species is not known to occur within the Kimberley majority of the Pilbara or Christmas Island sections of the PA.

This species inhabits pelagic zones, far from the coastline, where it forages in the open ocean (Ref. 441). Its diet primarily consists of squid, fish, and krill, which it captures while gliding over the ocean or diving from the air (Ref. 441; Ref. 627).

The white-capped albatross is solitary and monogamous, typically forming long-term pair bonds with a single mate (Ref. 441). During the non-breeding season, it is migratory, traveling vast distances across the Southern Ocean in search of food. It is usually observed alone or in small groups while foraging but may gather in areas with abundant food resources (Ref. 441).

Foraging BIAs have been identified for the species along the NSW shelf. These BIAs do not overlap the PA.

4.3.4.72 White-faced storm petrel

The white-faced storm petrel (*Pelagodroma marina*) is a medium-sized petrel commonly found over inshore and oceanic waters around southern Australia (Ref. 408). This species has an extensive range, breeding on remote islands in the North and South Atlantic Ocean, as well as along the coasts of southern Australia and New Zealand (Ref. 408).The white-faced storm petrel may occur in

the Pilbara, Kimberley, Ningaloo, West Coast and Christmas Island however is a strictly pelagic species outside of breeding season (Ref. 799).

During the breeding season (September to March), the species nests in burrows on remote, rocky islands in subantarctic and temperate regions, such as Macquarie Island and other islands off southern Australia, where it is sheltered from predators (Ref. 408; Ref. 628). Females typically lay a single egg per breeding season (Ref. 408; Ref. 628).

The white-faced storm petrel feeds primarily on planktonic crustaceans, krill, small fish, and zooplankton (Ref. 408). It forages while in flight, using a pattering and dipping technique to snatch prey from the water (Ref. 408; Ref. 629), and occasionally follows cetaceans to access disturbed prey. The species rarely follows ship (Ref. 408).

The white-faced storm petrel is migratory, moving from temperate breeding areas to tropical and subtropical waters during the non-breeding season (Ref. 408).

Breeding and foraging BIAs have been identified (Figure 4-28, Table 4-18) in southern Australia. Foraging BIAs overlap the south section of the PA, particularly the West Coast section.

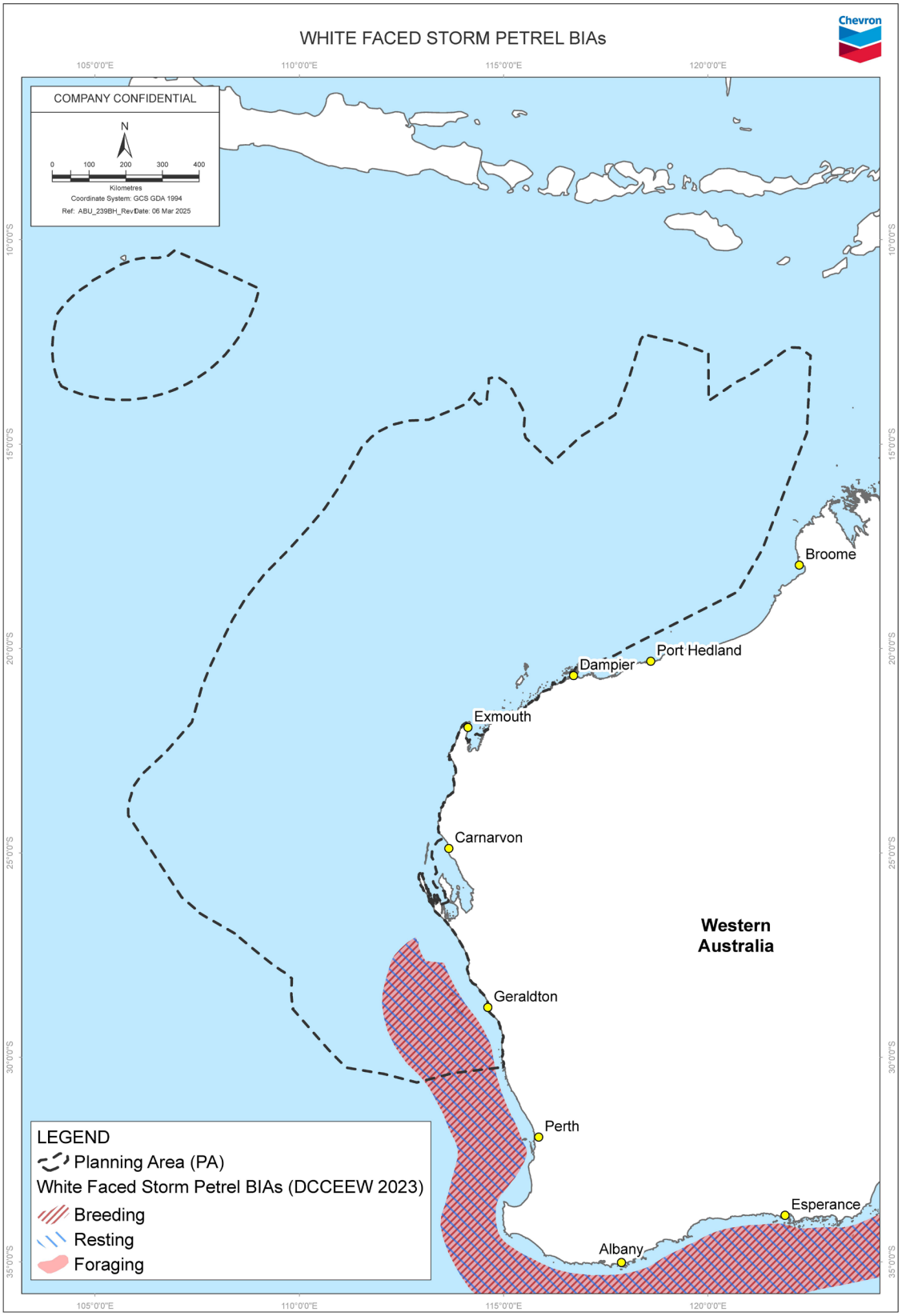

Figure 4-28: Biologically important areas for white-faced storm petrel

4.3.4.73 White-tailed tropicbird

The white-tailed tropicbird (*Phaethon lepturus*) is a pantropical seabird widely distributed across tropical and subtropical regions. It is primarily found off the northern coast of WA, with occasional sightings in the Coral Sea and along the east coast (Ref. 408; Ref. 630). The subspecies *P. l. lepturus* is present in the NWMR but is limited in both numbers and distribution (Ref. 519). The species is not known to occur in the West Coast section of the PA.

Tropicbirds are predominantly pelagic, rarely coming to shore except to breed (Ref. 519). Their nests are located on islands and atolls, utilising a variety of habitats, including closed-canopy rainforests, bare sandy ground, and rugged rocky terrain (Ref. 408).

White-tailed tropicbirds are solitary foragers, primarily feeding on flying fish and cephalopods (Ref. 441). They forage at the ocean's surface, occasionally diving shallowly, and rest on the water between foraging bouts (Ref. 631). Their foraging range is extensive, with some individuals travelling up to 1,600 km from their breeding colonies, such as those on Christmas Island (Ref. 630).

Breeding BIAs have been identified (Figure 4-29, Table 4-18) in waters off the northwest coast of WA, particularly near Port Hedland and Derby, within the Pilbara and Kimberley sections of the PA.

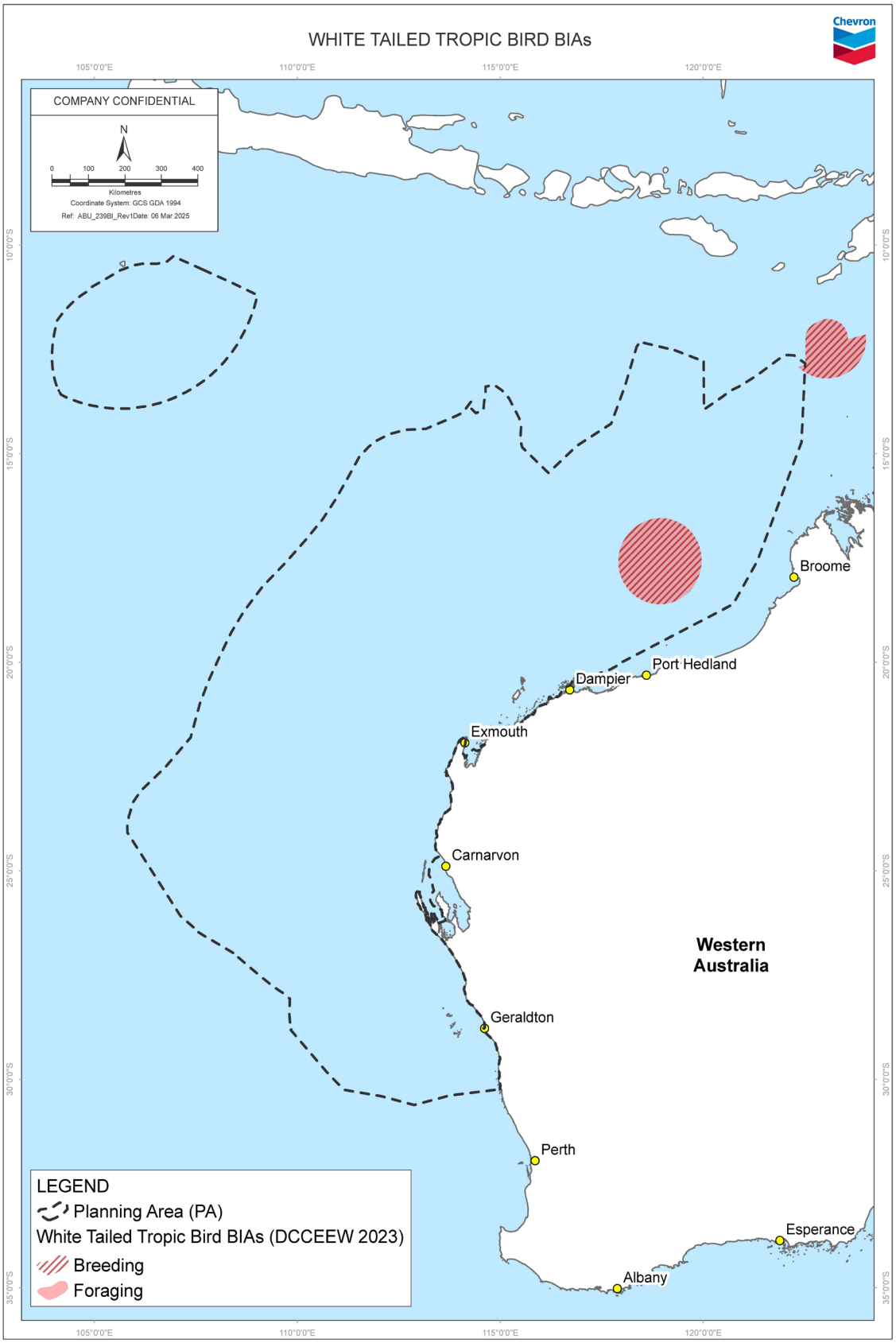

Figure 4-29: Biologically important areas for white-tailed tropicbird

4.3.4.74 Wood sandpiper

The wood sandpiper (*Tringa glareola*) is a migratory shorebird that breeds across Eurasia and visits Australia, typically between August and departures in March or April (Ref. 452). In WA the species is widespread and scattered across the state within all sections of the PA and has been recorded on Christmas Island (Ref. 452).

This species inhabits well-vegetated, shallow freshwater wetlands such as swamps, billabongs, lakes, pools, and waterholes. These wetlands are often characterised by emergent aquatic plants or grasses and fringed with taller vegetation, such as dense stands of rushes or reeds, shrubs, or live and dead trees (Ref. 639). In WA, the wood sandpiper is often concentrated at specific sites within wetlands, frequently occurring within a few meters of one another (Ref. 452).

The wood sandpiper forages along the moist or dry mud margins of wetlands, including shores, areas with open scattered aquatic vegetation, and shallow clear water (Ref. 452). Its diet in Australia primarily consists of insects and molluscs, reflecting its carnivorous feeding habits (Ref. 452).

Typically observed singly, in pairs, or in small flocks, the wood sandpiper occasionally gathers in flocks of hundreds. It freely associates with other wader species and often feeds in scattered groups (Ref. 639). In Australia, it is most commonly seen in small to medium-sized groups in suitable feeding areas (Ref. 640).

No BIAs have been identified for this species in Australia.

4.3.5 Summary of marine fauna seasonal sensitivities

Table 4-20 presents periods of the year coinciding with key biologically important behaviours for EPBC Act listed threatened and/or migratory species that may potentially be in the Pilbara Section, where CAPL's activities are primarily concentrated.

Table 4-20: Seasonal presence of marine fauna with biologically important behaviours within the Pilbara section of the PA

Activity / Species	January	February	March	April	May	June	July	August	September	October	November	December
Marine mammals												
Dugong breeding, foraging and nursing[1]												
Humpback whale migration[2]												
Humpback whale resting[3]												
Pygmy blue whale northern migration[4]												
Pygmy blue whale southern migration[4]												
Southern right whale migration[5]												

Activity / Species	January	February	March	April	May	June	July	August	September	October	November	December
Southern right whale reproduction[6]							■	■				
Reptiles												
Flatback turtle nesting and internesting[7]	■										■	■
Green turtle nesting and internesting[8]	■	■										■
Hawksbill turtle nesting and internesting[9]										■		
Loggerhead turtle internesting[10]												
Fishes, including sharks and rays												
Whale shark migration and foraging[11]												
Southern bluefin tuna spawning[12]		■	■						■	■		
Seabirds and shorebirds												
Australian fairy tern breeding[13]												
Brown booby breeding[14]			■	■	■							
Lesser crested tern breeding[15]												
Lesser frigatebird breeding[16]												
Little tern nesting[17]												
Roseate tern breeding[18]												
Wedge-tailed shearwater migration[19]				■	■							
Wedge-tailed shearwater breeding[20]											■	
White-tailed tropicbird breeding[21]												

	Species may be present and display biologically important behaviour in the region
■	*Predicted peak period*

1. Dugong breeding, foraging and nursing occurs along the Ningaloo coast year-round (Ref. 33).

2. Humpback whale migration along WA coast typically occurs between May and November (Ref. 80; Ref. 81). Predicted peak migration periods for the Montebello Islands region are late-July (northern) and early-September (southern) (Ref. 79).

3. Humpback whale females and calves are known to stop and rest in Exmouth Gulf and Shark Bay. Peak densities of lactating females were observed in late September to early October around Exmouth Gulf (Ref. 79).

4. Pygmy blue whales migrate north along the WA coast between February and August (Ref. 88; Ref. 92), with predicted highest densities in the Montebello Island region during May and June (Ref. 93). Pygmy blue whales migrate south between November and January (Ref. 88; Ref. 92), with predicted highest densities in the Montebello Island region during November and December (Ref. 93).

5.Souther right whale migration in WA, spans 3 nm from Exmouth to Augusta with migration occurring from April to October (Ref. 33).

Activity / Species	January	February	March	April	May	June	July	August	September	October	November	December
6. From May to October, Southern right whales inhabit calving and nursing grounds, with peak calving occurring in late July and August (Ref. 41). 7.Seasonal presence within nesting and internesting habitat critical to the survival of flatback turtles in the Pilbara (including Barrow and Montebello islands) is predicted to occur between October and March (Ref. 198), with peak nesting activity on Barrow Island predicted between November and January (Ref. 241). 8. Seasonal presence within nesting and internesting habitat critical to the survival of green turtles in the NWS (including Barrow and Montebello islands) is predicted to occur between November and March (Ref. 198), with peak nesting activity on Barrow Island predicted between December and February (Ref. 241). 9. Seasonal presence within nesting and internesting habitat critical to the survival of hawksbill turtles in WA (including Montebello and Lowendal islands) is predicted to occur between October and February Ref. 198), with peak nesting activity on Barrow Island predicted in October (Ref. 241). 10. Seasonal presence within internesting habitat critical to the survival of loggerhead turtles in WA (including Muiron Islands) is predicted to occur between November and May (Ref. 198). 11.Whale shark migration occurs mainly between July to November along the 200 m isobath (Ref. 304). A foraging BIA for Whale Sharks is associated with the area around this isobath. 12. Two peaks spawning periods have been observed in southern bluefin tuna spawning ground: September–October and February–March (Ref. 696; Ref. 697). 13. The Pilbara and upper Gascoyne sedentary population of Australian Fairy Terns nests from late-July to late-September (Ref. 412). 14. Brown booby breeding around Bedout Island occurs from February to October, with a peak in March to May (Ref. 33). 15. Lesser crested terns breed in the Pilbara region from March to June (Ref. 33). 16. Breeding colonies of lesser frigatebirds are known on Adele, Bedout, and West Lacapede Islands (Ref. 441), as well as Ashmore Reef and Cartier Island (Ref. 539). Breeding occurs from March to September (Ref. 33). 17. The breeding subpopulation of little terns nest along nearshore islands in the Kimberley likely supporting breeding pairs during September and October (Ref. 539). 18. Roseate terns breed in the Pilbara region from March to July and October (Ref. 589). 19. Wedge-tailed shearwaters typically begin arriving at their WA colonies around August; and then leave nests in early-April to early May (Ref. 441; Ref. 621). Once adults cease returning to feed their young, the young (fledging) wedge-tailed shearwaters fledge and depart nests (Ref. 622; Ref. 423). 20. Wedge-tailed shearwaters breed in the Pilbara region from November to April (Ref. 306); peak egg laying typically occurs during November (Ref. 441; Ref. 621). 21. White-tailed tropicbirds breed on Ashmore Reef and Rowley Shoals from May to October (Ref. 33).												

4.4 Marine environmental quality

The term ‘environmental quality’ refers to the level of contaminants, or changes to the physical or chemical properties relative to a natural state (Ref. 643).

4.4.1 Meteorology

Northwest WA is characterised by an arid, subtropical climate. During summer (September to March), average temperatures range from 23°C to 32°C, while winter (May to July) mean temperatures range from 19°C to 25°C (Ref. 644). April and August are transitional months, with weather conditions varying between summer and winter regimes (Ref. 645). The region experiences relatively low rainfall overall, though heavy downpours can occur during tropical cyclones and

depressions. Average temperatures in the north SWMR are lower than those in northwest WA (Ref. 644).

Wind patterns in northwest WA are influenced by the monsoonal climate, characterised by the summer monsoon (December to April) and winter monsoon (June to October) (Ref. 646). In winter, the higher latitudinal position of the anticyclonic belt results in strong offshore trade winds over the Pilbara. During summer, as the belt shifts to its southernmost latitude, monsoonal wind systems move into the area, combining with regular prevailing south-southwesterly winds and sea breezes to influence the weather (Ref. 647).

The cyclone season in northwest WA typically occurs between November and April, predominantly affecting the region between Broome and Exmouth (Ref. 648). On average, two cyclones per year cross the Pilbara coast, bringing intense winds that can reach up to 300 km/h (Ref. 647).

Christmas Island, part of Australia's IOT, has a tropical climate with temperatures ranging from 21°C to 32°C. Humidity is around 80–90% and south-east trade winds provide pleasant weather for most of the year. However, during the wet season between November and April, it is common for some storm activity to occur producing a swell in seas around the Island. The average rainfall is ~2,000 mm per annum (Ref. 649).

4.4.2 Oceanography

Waters in north-west WA, including Christmas Island, are tropical year-round, with sea surface temperature in open shelf waters reaching ~26°C in summer, and dropping to ~22°C in winter. Nearshore temperatures of north-west WA fluctuate through a higher temperature range from ~17°C in winter to ~31°C in summer (Ref. 650). Tropical surface waters are also present in the northern section of the SWMR, aligning with the temperature and salinity characteristics of the Leeuwin Current (Ref. 651).

The major surface currents influencing WA flow towards the poles and include the Indonesian Throughflow, the Leeuwin Current, the South Equatorial Current, and the Eastern Gyral Current. The Ningaloo Current, the Holloway Current, the Shark Bay Outflow, and the Capes Current are seasonal surface currents in the region. Below these surface currents are several subsurface currents, the most important of which are the Leeuwin Undercurrent and the West Australian Current. These subsurface currents flow towards the equator in the opposite direction to surface currents (Ref. 3). Water circulation in WA is strongly influenced by the southward-flowing Indonesian Throughflow, whose strength varies seasonally with the northwest monsoon (Ref. 3).

The NWMR is notable for large internal waves, with amplitudes up to 75 m, which facilitate the mixing of surface waters with nutrient-rich deeper waters. This mixing is critical for biological productivity in the region. Key sites of internal wave activity include the Exmouth Plateau and the slope adjacent to the NWS (Ref. 3). In the SWMR, wave energy is also high, particularly on the continental shelf throughout the region (Ref. 5).

North-west WA experiences some of the largest tides along a coastline adjacent to an open ocean in the world. Tidal amplitudes increase from south to north, corresponding to the widening continental shelf (Ref. 3). Nearshore waters exhibit larger and stronger tidal movements than offshore waters. Tides in the region are broadly categorised as semidiurnal (i.e. two high tides and two low tides per day) with a spring/neap cycle (Ref. 3). In the SWMR, tidal flows are generally small (2–

5 cm/s) over the adjacent shelves, but stronger tidal currents (~50 cm/s) occur in the gulfs (Ref. 651).

4.4.3 Water quality

The NWS is characterised by a relatively clear water column; however, these waters sometimes have naturally higher levels of turbidity as a result of local current, tidal or wave-induced resuspension of fine sediments and seasonal fluvial inputs (Ref. 652; Ref. 653). In the waters off the east coast of Barrow Island, turbidity and concentrations of suspended sediments were generally low (<5 mg/L) and indicative of clear water environments (Ref. 653).

The nearshore waters on the east coast of Barrow Island are generally oligotrophic, with temporal fluctuations in nutrients (Ref. 653; Ref. 654). Nutrient concentrations were generally below the Australian and New Zealand Governments (ANZG) default trigger values (nutrient enrichment) for tropical Australia, with occasional fluctuations of ammonia, nitrite+nitrate, and orthophosphate well above guideline values (Ref. 653; Ref. 654). Pre-construction water quality sampling off the east coast of Barrow Island showed that concentrations of metals were typically consistently below the ANZG guideline trigger values for 99% species protection (Ref. 653).

Close to the Australian mainland, in the waters surrounding the Dampier Archipelago, Wenziker et al. (Ref. 655) estimated natural background concentrations for various potential contaminants. These contaminants included heavy metals (e.g. cadmium, chromium, copper, lead, mercury, and zinc) and organic chemicals (e.g. polycyclic aromatic hydrocarbons, total petroleum hydrocarbons). The survey identified low background concentrations of both metals and organic chemicals, with localised elevations of some contaminants (metals) near the coastal industrial centres and ports (e.g. Dampier).

With the exception of select constituents, such as relatively high natural levels of cadmium, the concentrations of metals were low by world standards. Wenziker et al. (Ref. 655) recommended that guideline water quality trigger values from the ANZG for Fresh and Marine Water Quality (Ref. 656) are suitable for use in the NWS.

Salinity in the waters of north-west WA varies spatially and temporally, ranging from 34.4 to 36.3 g/L in offshore areas around the NWS (Ref. 655). Salinity for the SWMR and Christmas Island also fall within these ranges (Ref.29; Ref. 659).

The SWMR has clear waters and low turbidity, the region’s waters are typically oligotrophic which fluctuate in nutrient concentrations due to seasonal changes and natural processes or local runoff (Ref. 7; Ref. 657). Overall, the water quality supports a healthy marine ecosystem, though local variations can occur near infrastructure, ports and anthropogenic activities (Ref. 7). Similar characteristics are expected from Christmas Island (Ref. 657; Ref. 658).

4.4.4 Sediments quality

Sediment quality sampling during 2014 and 2015 off the east coast of Barrow Island showed that except for nickel in one reference site sample, total metal concentrations of all sediment samples were below respective laboratory Limit of Reporting (LoR) and/or Interim Sediment Quality Guideline (ISQG)-Low trigger values (Ref. 653). Sediment tributyltin concentrations were all below the laboratory LoR and the ISQG-Low trigger value, except for one sample in each of the 2014 and 2015 surveys (Ref. 653). Total petroleum hydrocarbons and Total

polycylic aromatic hydrocarbon (PAH) concentrations were all below the LoR in 2014 and at very low concentrations in 2015 samples (with a much lower LoR). Once normalised for (very low) organic carbon content, six samples from 2015 were above ISQG-Low concentrations for benzo(a)pyrene, but well below the ISQG-High concentrations (Ref. 653).

Closer to the Australian mainland, from Exmouth to the Dampier Archipelago, the Department of Environment and Conservation (Ref. 660) estimated background concentrations for various potential contaminants. Background sediment quality was found to be high, with concentrations of most metals and metalloids at similar levels or lower than those observed in other studies conducted in northern Australia. However, total arsenic concentrations were relatively high (median of 36 mg/kg for one site off Onslow) and exceeded the recommended sediment quality guideline at some essentially unimpacted locations sampled across the region. These elevations are considered natural and likely related to the region's geology.

The report (Ref. 660) did not detect organic chemicals in any of the samples. However, compliance with the recommended sediment quality guidelines could not be determined for eight of the analysed chemicals (acenaphthene, anthracene, dibenzo(ah)anthracene, fluorene, lindane, chlordane, dieldrin and endrin) due to laboratory LoR limitations.

In the SWMR, metal and hydrocarbon concentrations are typically low to moderate levels with some localised hotspots near urban, industrial and agricultural areas (Ref. 12). The remoteness of Christmas Island and its limited industrial activity contribute to the low concentration of metals and hydrocarbons in its waters (Ref. 658).

4.4.5 Air quality

Vessel traffic and existing offshore infrastructure are the main sources of pollutants in the PA. Closer to the coast, localised and temporary reductions in air quality may occur in areas with high vessel traffic or as a result of dust storms and bushfires.

As part of the Ambient Air Quality Monitoring Program on Barrow Island, there were no recorded exceedances for nitrogen dioxide (NO_2), ozone), sulfur dioxide (SO_2), carbon monoxide, hydrogen sulfide (H_2S), or aromatic hydrocarbons (benzene, toluene, ethylbenzene and xylene) against the relevant National Environmental Protection Measure (NEPM) standards (Ref. 661). There have been elevations of PM_{10} levels around facilities on Barrow Island, however these are likely associated with vehicle traffic and regional weather events (Ref. 661).

In the northern sector of the SWMR there has been elevations of PM_{10} air quality index between 30-35 µg/m^3. This is typically in the moderate range and not hazardous for the general public (Ref. 662). Christmas Island has an average annual air quality index of 20 µg/m^3 indicating less polluted air (Ref. 663).

4.5 People and communities

People and communities, and specifically their social, economic, and cultural features, are included in the definition of environment within the OPGGS(E)R. People and communities have been identified and described to the extent that they are directly affected, or are affected by, the existing physical and biological environments.

The NWMR and SWMR support a range of economic, social, and cultural activities. At present, industries within these regions include petroleum exploration and production, commercial and recreational fishing, tourism, ports and shipping (Ref. 3; Ref. 5). These uses of the NWMR and SWMR make an important economic and social contribution to settlements along the coast (Ref. 3). Industry activities present with the PA are identified in Section 5.6.

As outlined in Section 1.1, this document describes the 'offshore area' where CAPL's activities may interact with the environment, typically extending up to the high-water mark.

Given that CAPL's activities are primarily concentrated in the Pilbara region, additional details are provided below for that area. If further descriptions are required in a project-specific EP, CAPL will assess their significance and include detailed information in the EP as necessary.

4.5.1 Land use

The Montebello Islands are designated as a State Conservation Park (International Union for Conservation of Nature II (IUCN II)) (Section 6.3), and are surrounded by the State Montebello Islands Marine and Conservation Parks (Section 6.2) and the Commonwealth Montebello Marine Park (IUCN VI) (Section 6.1). The Conservation Park is gazetted to the HWM. Given the natural values of the islands and surrounding waters, recreational activities may occur. Shore-based fishing, beach walks, picnics and wildlife viewing are types of activities that may occur (Ref. 664). Camping is permitted on some of the islands (with some restrictions during turtle nesting season) (Ref. 664).

Barrow, Double, Middle, and Boodie islands are designated as State Nature Reserves (IUCN IA) (Section 6.3), and are surrounded by the Barrow Island Marine Park (IUCN IA) and Barrow Island Marine Management Area (IUCN VI) (Section 6.2). The Nature Reserves are gazetted to the low water mark (LWM). Access to Barrow, Double, Middle, and Boodie Islands is not encouraged due to numerous natural and man-made hazards, including the operation of an oilfield and the Gorgon Gas Project (Ref. 664). Camping is not permitted on any of these islands (Ref. 664).

The Pilbara Inshore Islands are a group of over 170 islands, islets, rocks and cays that lie between the bottom of Exmouth Gulf and the Regnard Islands near Cape Preston (Ref. 664). Some of the islands are classified as Nature Reserves (IUCN IA) (Section 6.3). The islands are gazetted to both the LWM and HWM. The Pilbara Inshore Islands Nature Reserves are known as important breeding and resting places for migratory and resident shorebirds, seabirds and marine turtles (Ref. 664). Shore-based fishing, beach walks and wildlife viewing are types of activities that may occur in the Pilbara Inshore Islands Nature Reserves (Ref. 664). Camping is only permitted on certain islands and may require a permit (Ref. 664).

The Bundegi Coastal Park is a 5(1)(h) Reserve (IUCN II) (Section 6.3), protected under WA jurisdiction, and forms part of the Ningaloo Coast World Heritage Area (Section. 7.1). The terrestrial protected area is gazetted to the HWM. Given the natural values of the parks and surrounding waters, recreational activities may occur. Walk trails, wildlife viewing, camping, beachcombing, swimming, snorkelling, beach fishing are types of activities that may occur (Ref. 665).

The Dampier Archipelago comprises 42 islands and islets off the coasts of Dampier and Point Samson (Ref. 664; Ref. 666). 25 of these islands are nature

reserves protected under WA jurisdiction (Ref. 664). The islands are known as nesting sites for marine turtles, breeding grounds for land, sea, and shorebirds, and a popular destination for marine fauna viewing (Ref. 666). Alongside the Burrup Peninsula, the islands host one of the densest and most diverse collections of rock art globally, as well as other Aboriginal heritage features such as shell middens, stone arrangements, and artefact scatters (Ref. 664). Camping is permitted on selected islands for up to five consecutive nights, up to 100 m inland from the HWM in areas zoned for recreation.

Recreational activities along the Pilbara coastline include fishing, diving, snorkelling, and boating (Ref. 666; Ref. 667). The beaches near Onslow and surrounding areas are also known for sunset beach walks (Ref. 667).

Native Title determinations extend into the PA (Section 7.3.2). The determination areas contain places of special significance, such as spiritual and ceremonial sites and natural resources (Ref. 668).

4.5.2 Heritage

Heritage includes places, values, traditions, events and experiences that capture where we have come from, where we are now and gives context to where we are headed as a community (Ref. 669).

Where known heritage sites and/or artefacts are formally protected under specific heritage legislation, these are described within Section 7. The following sections summarise other known heritage values identified within the PA, with a focus on the NWMR, where the majority of the PA lies.

4.5.2.1 First nations cultural activities

The land adjacent to the NWMR has been inhabited by First Nations people for at least 50,000 years, and they continue to use the NWMR and adjacent coastal resources, and have an ongoing connection to these areas (Ref. 3).

Evidence from offshore waters near Murujunga (Burrup Peninsula) and on Barrow Island are indicative of the historical and ongoing connection of First Nations people to the NWMR.

Australia's first confirmed First Nations underwater archaeological sites were identified in 2020 in waters offshore from Murujuga (Burrup Peninsula) during the Deep History of Sea Country Project (Ref. 670). These findings confirmed an understanding that First Nations people would have lived on lands that are now submerged in water from rising seas after the last glacial maximum (LGM)[11]. At the LGM sea level was ~125 m below present (Ref. 672); this coincides with the ancient coastline at 125 m depth KEF (refer to Section 4.6.1 for a description of this KEF).

Recent studies at Murujuga have demonstrated that archaeological material remains on the seabed, predating inundation by rising seas (Ref. 670; Ref. 673). Previous geomorphological work (which was based on the analysis of available 3D seismic data) on the mid to outer shelf regions proximal to Barrow Island, demonstrated the presence of a highly complex and geomorphically mature coastal landscape preserved at depths of 70–75 m below sea level, including coastal barrier dunes, lagoonal systems, tidal flats, and estuarine channels. (Ref. 672). Such feature preservation has significant geoheritage value (Ref. 672).

[11] The period of the LGM in Australia is described as 24 to 18 ka (Ref. 671).

Archaeological deposits from Boodie Cave on Barrow Island, reveal some of the oldest evidence for First Nations occupation of Australia, as well as illustrating the early use of marine resources (Ref. 674). First occupation on Barrow Island has been dated as occurring between 51.1 and 46.2 ka, overlapping with earliest dates for occupation of Australia (Ref. 674). There is evidence of marine resources (e.g. shellfish, fish) being incorporated into dietary assemblages by 42.5 ka on Barrow Island; which continued through all periods of occupation, despite fluctuating sea levels and associated extensions of the coastal plain (Ref. 674). The caves on Barrow Island (including Boodie Cave), and others on nearby Montebello Islands, were abandoned by 6.8 ka when rising sea levels reached their present levels, and the islands had become increasingly distant from the mainland coast (Ref. 674). Despite the isolation of Barrow Island from the mainland for most of the Holocene, Thalanyji knowledge holders refer to historic use of the island from both colonial-era fishing activities and indentured labour in the pearling grounds (Ref. 675).

First Nations people have a culture that relates to a connectedness of land and sea in a holistic way (Ref. 676). The term ‘Country’ refers to more than just a geographical area, and includes values, places, resources, stories, and cultural obligations associated with that geographical area (Ref. 677). For First Nations peoples the term ‘Country’ includes both land and sea and the coastal areas that are connected with the traditional Country of a group or clan. Both Country and Sea Country, contain evidence of the ancient events by which all geographic features, animals, plants and people were created (Ref. 676). For example, Thalanyji knowledge holders reference Sea Country “between the islands of the shelf”, and “see the artifacts as an important manifestation of their ancestral use of, and connection to, the now-drowned coastal plain” (Ref. 675).

Cultural heritage is not only comprised of tangible values; it also includes intangible values. Tangible values are those with a physical nature (such as artefacts and engravings); while intangible values are those that do not have a physical component (such as songlines and dances). Songlines are a feature of First Nations culture, linking people, places, and practices (Ref. 678). Certain songlines are referred to as ‘Dreaming pathways’ because of the tracks forged by Creator Spirits during the Dreaming; these Dreaming songlines have specific ancestral stories attached to them (Ref. 679). Nunn and Reid (Ref. 680) discuss how First Nations oral traditions have documented sea level rise over the last 7,000 years. Kearney et al. (Ref. 681) also discusses how seabed mapping near Murujuga (Burrup Peninsula) identified two submerged waterholes that were identified by local senior elders as belonging to the Kangaroo songline. A song line from the mainland to Barrow Island has been referenced during studies involving Thalanyji knowledge holders (Ref. 675) and also identified by representatives of Mardathoonera Cultural Heritage Pty Ltd (MCH) during consultation (Table 4-21).

The cultural, customary, and spiritual significance of species and the ecological communities they form are diverse and varied for First Nations people and their stewardship of Country (Ref. 41). For example, some First Nations people have a strong connection to whales, which has significance as totemic ancestors to some groups (Ref. 41). The arrival of whales along Australia's coast marked the arrival of the "elders of the sea", which follows a songline that traces the journeys of ancestral spirits as they created the land, animals, and lore (Ref. 41).

First Nations people in northwest WA continue to rely on coastal and marine environments and resources of the region for their cultural identity, health and

wellbeing, and their domestic and commercial economies (Ref. 677). Their commitment to their sea country is demonstrated through their native title claims and their many initiatives to regain their role as managers of the cultural and natural values of northwest WA (Ref. 677).

First Nations peoples of northwest WA engage in a diverse range of marine resource use activities, including hunting, egg collecting, fishing and gathering shellfish. Activities also continue on lands and waters where they have a ceremonial and spiritual connections (Ref. 677).

Consultation with First Nations groups and individuals has identified that Sea Country is of importance to their people (Table 4-21). These values include coastal areas, offshore islands, marine fauna, and traditional stories (e.g. it is believed that the Dreamtime serpent which created the rivers and inland springs is now in its resting place off the Pilbara coast; and as such, if the sea is protected, then the serpent is also being protected). It is acknowledged that First Nations people who are the custodians of this knowledge have the rights to decide how it is shared and used.

Underwater cultural heritage (UCH), including First Nations UCH, as protected under the UCH Act is discussed in Section 7.2.

Table 4-21: Cultural values or features identified through consultation

Source	Cultural value or feature
Baiyungu Aboriginal Corporation (BAC)	• the Baiyungu coastal area, Sea Country, and adjacent islands are highly valuable to the Baiyungu people • no specific areas have been identified through consultation however BAC has noted the cultural importance of Sea Country and the need to ensure it is protected.
Buurabalayji Thalanyji Aboriginal Corporation (BTAC)	• the Thalanyji people have a deep connection to Sea Country north of Onslow, extending out into the islands off the coast of the Pilbara including: – Montebello Islands – Barrow Island – Mackerel Islands – Direction Island – Airlie Island – Weld Island – North and South Islands – Ashburton Island – Twin Islands – any island or atoll proximate to the above islands – a general radius of 150 km from Onslow.
Kariyarra Aboriginal Corporation (KAC)	• KAC has noted that flatback turtles are culturally significant • KAC has also identified the importance of protecting marine fauna.
Malgana Aboriginal Corporation	• Malgana Aboriginal Corporation identified Shark Bay seagrass as culturally significant.
Mardathoonera Cultural Heritage Pty Ltd (MCH)	• identified a connection with Barrow Island and surrounding waters; specific values described include: – the creation story starts on Barrow Island – Barrow Island is a place that connects saltwater and freshwater together

Source	Cultural value or feature
	– Barrow Island is connected to Murujuga; both are considered by MCH as women's places – Biggada Creek is significant and connected to the Fortescue River; and that the rock formations in the creek are protectors – women's sites and ancestor spirits are present on Barrow Island • identified that Barrow Island was a hill in ancient times and is a sister hill to two hills on the mainland, and old people would walk across before the sea levels rose and the island drifted; because of this, there will be artefacts and stories underwater • identified cultural importance of traditional stories, songlines ocean, and marine fauna – the sea is the source of energy for all life, it holds the codes that are encrypted in each person's body, the songlines, and is the lifeforce for the world – the places where the saltwater from the sea and the freshwater from the land connect are where the biggest energy lines are, and that connection is a force of creation relevant to a Dreaming story – songlines extend out from the land, through the sea, and around the globe – songlines connect places, people, and animals to each other, creating migratory patterns for animals and telling animals of the right time to birth and eat – freshwater that flows underneath the seabed carries the songlines – there is a large energy line that exists off the coast of Murujuga and runs through the area that CAPL operates in – there are songlines that go through Barrow Island and offshore and connect Barrow Island to the mainland; this includes a whale songline – Mardathoonera people are connected to songlines—if the songlines are disrupted, their widdart (heart) is disconnected, like the whales, their feet get lost and they don't know where to go anymore. • Country owns people and we are all connected by energy – different frequencies connect all beings on earth and everything on earth is connected – if you protect country, it will protect you – women hold the energy connected to water.
Murujuga Aboriginal Corporation (MAC)	• no specific areas have been identified through consultation however MAC has noted the cultural importance of Sea Country and the need to ensure it is protected.
Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC)	• no specific areas have been identified through consultation however NTGAC has noted the cultural importance of Sea Country and the need to ensure it is protected • in addition CAPL understands the Ningaloo Coast is culturally significant to the groups NTGAC represents.
Ngarluma Aboriginal Corporation (NAC)	• NAC has noted that offshore islands are culturally significant.
Ngarluma Yindjibarndi Foundation Ltd (NYFL)	• the people from the land speak for and care about the marine animals, even if they are far out to sea • identified that marine fauna, specifically whales, dugongs, and turtles are species of importance

Source	Cultural value or feature
	• the nature of many traditional narratives have origins and connection to the seascape, and that impacts to the seascape can have cultural repercussions • presence and importance of intangible values, such as Barrimirndi (the serpent), which is an important part of dreaming for Ngarluma and Yindyibarndi people • identified the interconnectedness of the cultural landscape, whereby Traditional Owners from the western Pilbara are held to account by other Nyambali (cultural bosses) when proponents impact land and sea • cultural responsibilities transcend Native Title and other boundaries.
Robe River Kuruma Aboriginal Corporation (RRKAC)	• the area within their Kuruma Mardathoonera native title claim, Jajiwurra (Robe River) and the waters extending seaward from the river mouth • ecological integrity of Jajiwurra.
Wirrawandi Aboriginal Corporation (WAC)	• the coastal area, Sea Country, and adjacent islands are highly valuable to the Yaburara and Mardathoonera people • identified a connection to Barrow Island.
Yinggarda Aboriginal Corporation (YAC)	• Bernier Island, Dorre Island and associated Sea Country have been identified as significant to the Yinggarda people.
Yamatji Marlpa Aboriginal Corporation (YMAC)	• no specific areas have been identified through consultation; however, YMAC has noted the cultural importance of Sea Country and the need to ensure it is protected.

4.5.2.2 European heritage

Early European exploration of the NWMR and adjacent coast occurred in the 1600s; however, it was concluded at the time that resources and conditions were not appropriate for settlement (Ref. 677). British colonisation did not begin in the Pilbara until 1860s, with pastoralism the first major industry, followed by small ports and service centres (Ref. 677). The pearling industry began in the late-1800s, and remains a significant contributor to the economy of northwest WA (Ref. 677).

Similarly, small fishing fleets were common from the 1860s onwards, and the commercial fishing industry also remains a significant economic input for northwest WA, particularly from prawn and demersal finfish fisheries (Ref. 3). Petroleum discovery and development commenced from the 1950s, with both onshore and offshore discoveries (Ref. 3).

The marine and coastal industries that still exist and operate within the PA are further described in Section 5.6.

4.6 Commonwealth marine area

The Commonwealth marine area is a MNES under the EPBC Act, and a relevant value and sensitivity under the OPGGS(E)R. The PA is within Commonwealth waters off WA that are part of the NWMR and SWMR.

The NWMR comprises the Commonwealth waters and seabed from the WA— NT border south to Kalbarri (Ref. 3). The NWMR is characterised by shallow-water tropical marine ecosystems with high species richness. Most of the region's species are tropical and are also found in other parts of the Indian and western Pacific oceans (Ref. 3).The region is a tropical carbonate margin that comprises an extensive area of shelf, slope, and abyssal plain/deep ocean floor, as well as

complex areas of bathymetry such as plateau, terraces and major canyons (Ref. 9). The region experiences a tropical monsoonal climate towards the northern extent of the region, transitioning to tropical arid and subtropical arid within the central and southern areas of the region (Ref. 3).

The SWMR comprises Commonwealth waters from the eastern end of Kangaroo Island in SA to Shark Bay in WA (Ref. 5). Particular hotspots for biodiversity are the Houtman Abrolhos Islands, the overlap between tropical and temperate fauna along the west coast, the Recherche Archipelago and the soft sediment ecosystems in the Great Australian Bight (Ref. 5). The low-nutrient environment of the SWMR results in clear waters and high levels of light penetration, giving rise to a continental shelf characterised by high diversity of seagrass and algal species and benthic communities (Ref. 5).

Conservation values of the Commonwealth marine area include:

- protected species and/or their habitat (Section 4.3)
- protected places including Australian Marine Parks (Section 6.1) and heritage places (Section 7)
- KEFs (Section 4.6.1).

4.6.1 Key ecological features

KEFs are elements of the Commonwealth marine environment that are considered to be of regional importance for a region's biodiversity or its ecosystem function and integrity. KEFs are not MNES and have no legal status in their own right; however, they are considered as components of the Commonwealth marine area.

KEFs meet one or more of these criteria (Ref. 3; Ref. 5):

- a species, group of species, or a community with a regionally important ecological role (e.g. a predator, or prey that affects a large biomass or number of other marine species)
- a species, group of species, or a community that is nationally or regionally important for biodiversity
- an area or habitat that is nationally or regionally important for:
  - enhanced or high productivity (such as predictable upwellings—an upwelling occurs when cold nutrient-rich waters from the bottom of the ocean rise to the surface)
  - aggregations of marine life (such as feeding, resting, breeding or nursery areas)
  - biodiversity and endemism (species that only occur in a specific area)
- a unique sea floor feature, with known or presumed ecological properties of regional significance.

KEFs have been identified by the Australian Government based on advice from scientists about the ecological processes and characteristics of the area.

The presence of KEFs within the PA, and a description of the KEFs values, are shown in Table 4-22 and Figure 4-30.

Table 4-22: Presence of KEFs

KEF	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Ancient coastline at 125 m depth contour	—	—	✓	✓	—
Parts of the ancient coastline, particularly where it exists as a rocky escarpment, are thought to provide biologically important habitats in areas otherwise dominated by soft sediments. The topographic complexity of these escarpments may also facilitate vertical mixing of the water column, providing relatively nutrient-rich local environments (Ref. 3). The ancient submerged coastline provides areas of hard substrate and therefore may provide sites for higher diversity and enhanced species richness relative to surrounding areas of predominantly soft sediment. Little is known about fauna associated with the hard substrate of the escarpment but it is likely to include sponges, corals, crinoids, molluscs, echinoderms and other benthic invertebrates representative of hard substrate fauna in the North West Shelf bioregion (Ref. 3). **Values:** Unique sea floor feature with ecological properties of regional significance (Ref. 3).					
Ancient coastline at 90-120 m depth	✓	—	—	—	—
A prominent escarpment occurs close to the middle of the continental shelf off the Great Australian Bight at a depth of 90–120 m. Experts suggest that, in places, this ancient coastline may support some demersal fish species travelling across the continental shelf to the upper continental slope—thereby supporting ecological connectivity. Benthic biodiversity and productivity occur where the ancient coastline forms a prominent escarpment, such as in the western Great Australian Bight, where the sea floor is dominated by sponge communities of significant biodiversity and structural complexity (Ref. 5). Large sponges up to one metre across—which is remarkable for any discrete colonial animal—have been recorded from this area; the large individuals at these depths are likely to be many decades old (Ref. 5). **Values:** Relatively high productivity and aggregations of marine life, and high levels of biodiversity and endemism (Ref. 5).					
Canyons linking the Argo Abyssal Plain with the Scott Plateau	—	—	—	✓	—
The canyons linking the Argo Abyssal Plain and Scott Plateau are important features likely to be associated with aggregations of marine life (Ref. 3). The Bowers and Oats canyons are major canyons on the slope between the Argo Abyssal Plain and Scott Plateau. The canyons cut deeply into the south-west margin of the Scott Plateau at a depth of ~2,000–3,000 m, and act as conduits for transport of sediments to depths of more than 5,500 m on the Argo Abyssal Plain (Ref. 683). Benthic communities at these depths are likely to be dependent on particulate matter falling from the pelagic zone to the sea floor. The ocean above the canyons may be an area of moderately enhanced productivity, attracting aggregations of fish and higher-order consumers such as large predatory fish, sharks, toothed whales and dolphins. Whaling records from the 19th century suggest that sperm whales aggregated over Scott Plateau for reasons that remain unclear (Ref. 3). **Values:** High productivity and aggregations of marine life (Ref. 3).					
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	—	✓	✓	—	—
The canyons are associated with upwelling as they channel deep water from the Cuvier Abyssal Plain up onto the slope. This nutrient-rich water interacts with the Leeuwin Current at the canyon heads. Aggregations of whale sharks, manta rays, sea snakes, sharks, large predatory fish and seabirds are known to occur in this area (Ref. 3). The canyons on the slope of the Cuvier Abyssal Plain and Cape Range Peninsula are connected to the Commonwealth waters adjacent to Ningaloo Reef and may also have					

KEF	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
connections to Exmouth Plateau. The narrow shelf width (~10 km) near the canyons facilitates nutrient upwelling. Thus the canyons probably play a part in the enhanced productivity of the Ningaloo Reef system. (Ref. 3). The canyons are also repositories for organic and inorganic particulate matter from the shelf and serve as conduits for its transfer from the surface and shelf to greater depths. The hard substrates of canyons provide habitat for deepwater snapper and other species (Ref. 11). **Values:** Unique seafloor features with ecological properties of regional significance (Ref. 3).					
Commonwealth marine environment surrounding the Houtman Abrolhos Islands	✓	—	—	—	—
The Houtman Abrolhos Islands and surrounding reefs support a unique mix of temperate and tropical species, resulting from the southward transport of species by the Leeuwin Current over thousands of years. The Houtman Abrolhos Islands are the largest seabird breeding station in the eastern Indian Ocean. They support more than one million pairs of breeding seabirds. (Ref. 5). The islands represent the southern limit in WA of many widespread Indo-Pacific tropical fish. The high biodiversity of the islands is attributed to the mix of temperate and tropical species, resulting from the southward transport of species by the Leeuwin Current over thousands of years. Many of the islands' biodiversity features rely on the benthic and pelagic ecosystems in deeper, offshore waters—most notably, seabirds and rock lobster (Ref. 5). **Values:** High levels of biodiversity and endemism (Ref. 5).					
Commonwealth marine environment within and adjacent to the west coast inshore lagoons	✓	—	—	—	—
The chain of inshore lagoons that extends from south of Mandurah to Kalbarri is considered important for benthic productivity and recruitment for a range of marine species. The lagoons are formed by distinct ridges of limestone reef with extensive beds of macroalgae (principally *Ecklonia spp.*) and extend to a depth of 30 m. Although macroalgae and seagrass appear to be the primary source of production, scientists suggest that groundwater enrichment may supplement the supply of nutrients to the inshore lagoon (Ref. 5). These lagoons are important for benthic productivity, including macroalgae and seagrass communities, and breeding and nursery aggregations for many temperate and tropical marine species. They are important areas for the recruitment of commercially and recreationally important fishery species. Extensive schools of migratory fish visit the area annually, including herring, garfish, tailor and Australian salmon. Seagrass meadows occur in more sheltered areas and in the inter-reef lagoons along exposed sections of the coast (Ref. 5). **Values:** High productivity and aggregations of marine life (Ref. 5).					
Commonwealth waters adjacent to Ningaloo Reef	—	✓	✓	—	—
The Commonwealth waters adjacent to Ningaloo reef include Ningaloo Marine Park (Commonwealth waters) and encompass an area of 2,435 km^2. This feature lies adjacent to the Ningaloo Reef state water margin at the 3 nm limit. Ningaloo Reef is globally significant as the only extensive coral reef in the world that fringes the west coast of a continent. Upwellings associated with canyons on the adjacent slope and interactions between the Ningaloo and Leeuwin currents are thought to support the rich aggregations of large marine species present at Ningaloo Reef (Ref. 3). Aggregations of whale sharks, manta rays, humpback whales, sea snakes, sharks, large predatory fish and seabirds are known to occur in this area (Ref. 3).					

KEF	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Detrital input from phytoplankton production in surface waters and from higher-trophic consumers cycles back to the deeper waters of the shelf and slope (Ref. 11). Deepwater biodiversity includes fish, molluscs, sponges, soft corals and gorgonians. Some of these sponge and filter-feeding communities appear to be significantly different to those of the Dampier Archipelago and Abrolhos Islands, indicating that the Commonwealth waters of Ningaloo Marine Park have some particular areas of potentially high and unique sponge biodiversity (Ref. 684). **Values:** High productivity and aggregations of marine life (Ref. 3).					
Continental Slope Demersal Fish Communities	—	✓	✓	✓	—
The diversity of demersal fish assemblages on the continental slope in the Timor Province, the Northwest Transition and the Northwest Province is high compared to elsewhere along the continental slope (Ref. 3). The continental slope between North West Cape and the Montebello Trough has more than 500 fish species, 76 of which are endemic, which makes it the most diverse slope bioregion in Australia (Ref. 685). The demersal fish species occupy two distinct demersal community types associated with the upper slope (water depth of 225–500 m) and the mid slope (750–1,000 m) (Ref. 3). Bacteria and fauna present on the continental slope are the basis of the food web for demersal fish and higher-order consumers in this system (Ref. 3). **Values:** High levels of endemism (Ref. 3).					
Exmouth Plateau	—	—	✓	—	—
The Exmouth Plateau is a regionally and nationally unique deep-sea plateau in tropical waters. The plateau is a very large topographic obstacle that may modify the flow of deep waters, generating internal tides and may contribute to upwelling of deeper water nutrients closer to the surface, thus serving an important ecological role (Ref. 3). The topography of the plateau (with valleys and channels), in addition to potentially constituting a range of benthic environments, may provide conduits for the movement of sediment and other material from the plateau surface through the deeper slope to the abyss (Ref. 3). The Exmouth Plateau is generally an area of low habitat heterogeneity; however, it is likely to be an important area of biodiversity as it provides an extended area offshore for communities adapted to depths of around 1,000 m. Sediments on the plateau suggest that biological communities include scavengers, benthic filter feeders and epifauna. Fauna in the pelagic waters above the plateau are likely to include small pelagic species and nekton (Ref. 11). **Values:** Unique seafloor feature with ecological properties of regional significance (Ref. 3).					
Glomar Shoals	—	—	✓	—	—
The Glomar Shoals are a submerged littoral feature at depths of 33–77 m (Ref. 683). The shoals consist of a high percentage of marine-derived sediments with high carbonate content and gravels of weathered coralline algae and shells (Ref. 686). The area's higher concentrations of coarse material in comparison to surrounding areas are indicative of a high-energy environment subject to strong sea-floor currents (Ref. 683). Cyclones are also frequent in this area of the north-west and stimulate periodic bursts of productivity as a result of increased vertical mixing (Ref. 3). it is known to be an important area for a number of commercial and recreational fish species such as rankin cod, brown-striped snapper, red emperor, crimson snapper, bream and yellow-spotted triggerfish (Ref. 687). These species have recorded high catch rates associated with the Glomar Shoals, indicating that the shoals are likely to be an area of high productivity. **Values:** High productivity and aggregations of marine life (Ref. 3).					
Mermaid Reef and Commonwealth waters surrounding Rowley Shoals	—	—	✓	✓	—

KEF	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
The KEF encompasses Mermaid Reef Marine National Nature Reserve as well as waters from 3 nm out to 6 nm surrounding Clerke and Imperieuse reefs (Ref. 3). The reefs of the Rowley Shoals (including Mermaid Reef) are areas of enhanced productivity and high species richness. Enhanced productivity that contributes to this species richness is thought to be facilitated by the breaking of internal waves in the waters surrounding the reefs, causing mixing and re-suspension of nutrients from water depths of 500–700 m into the photic zone. The steep changes in slope around the reef also attract a range of migratory pelagic species such as dolphins, tuna, billfish and sharks (Ref. 3). The reefs provide a distinctive biophysical environment in the region as there are few offshore reefs in the north-west. The reefs may play a role in supplying coral and fish larvae to reefs further south via the southward flowing Indonesian Throughflow. Both coral communities and fish assemblages differ from similar habitats in eastern Australia (Ref. 688). **Values:** High productivity and aggregations of marine life (Ref. 3).					
Perth Canyon and adjacent shelf break, and other west coast canyons	✓	—	—	—	—
The Perth Canyon is prominent among the west coast canyons because of its size and ecological importance; however, the sheer abundance of canyons spread over a broad latitudinal range makes this feature important as a whole. The west coast canyons are believed to be associated with small, periodic upwellings that locally enhance productivity and attract aggregations of marine life (Ref. 5). The Perth Canyon is the largest known undersea canyon in Australian waters. Deep ocean currents rise to the surface, creating a nutrient-rich cold water habitat attracting feeding aggregations of deep-diving mammals, such as pygmy blue whales and large predatory fish that feed on aggregations of small fish, krill and squid (Ref. 5). **Values:** High biological productivity and aggregations of marine life, and unique seafloor features with ecological properties of regional significance (Ref. 5).					
Seringapatam Reef and Commonwealth waters in the Scott Reef Complex	—	—	—	✓	—
Seringapatam Reef and the Commonwealth waters in the Scott Reef complex are regionally important in supporting the diverse aggregations of marine life, high primary productivity and high species richness associated with the reefs themselves. As two of the few offshore reefs in the north-west, they provide an important biophysical environment in the region (Ref. 3). The coral communities at Scott and Seringapatam reefs play a key role in maintaining the species richness and subsequent aggregations of marine life identified as conservation values for this key ecological feature. Scott Reef is a particularly biologically diverse system and includes >300 species of reef-building corals, ~400 mollusc species, 118 crustacean species, 117 echinoderm species and around 720 fish species (Ref. 689). Scott and Seringapatam reefs and the waters surrounding them attract aggregations of marine life including humpback whales and other cetacean species, whale sharks and sea snakes (Ref. 689; Ref. 690; Ref. 691). **Values:** High productivity and aggregations of marine life (Ref. 3).					
Wallaby Saddle	—	✓	—	—	—
The Wallaby Saddle may be an area of enhanced productivity. Historical whaling records provide evidence of sperm whale aggregations in the area of the Wallaby Saddle, possibly due to the enhanced productivity of the area and aggregations of baitfish (Ref. 3). It is a unique habitat that neither occurs anywhere else nearby (within hundreds of kilometres) nor with as large an area (Ref. 683). The Wallaby Saddle covers 7,880 km^2 of sea floor					

KEF	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
(Ref. 692) in water depths of 4,000–4,700 m (Ref. 683) and is located within the Indian Ocean water mass (Ref. 3). **Values:** High productivity and aggregations of marine life (Ref. 3).					
Western demersal slope and associated fish communities	✓	—	—	—	—
The western demersal slope provides important habitat for demersal fish communities, with a high level of diversity and endemism. A diverse assemblage of demersal fish species below a depth of 400 m is dominated by relatively small benthic species such as grenadiers, dogfish and cucumber fish. Unlike other slope fish communities in Australia, many of these species display unique physical adaptations to feed on the sea floor (such as a mouth position adapted to bottom feeding), and many do not appear to migrate vertically in their daily feeding habits (Ref. 5). **Values:** Species groups that are nationally or regionally important to biodiversity (Ref. 5).					
Western rock lobster	✓	—	—	—	—
This species is the dominant large benthic invertebrate in the region. The lobster plays an important trophic role in many of the inshore ecosystems of the SWMR. Western rock lobsters are an important part of the food web on the inner shelf, particularly as juveniles (Ref. 5). Western rock lobsters are also particularly vulnerable to predation during seasonal moults in November–December and to a lesser extent during April–May (Ref. 5). **Values:** A species that plays a regionally important ecological role (Ref. 5).					

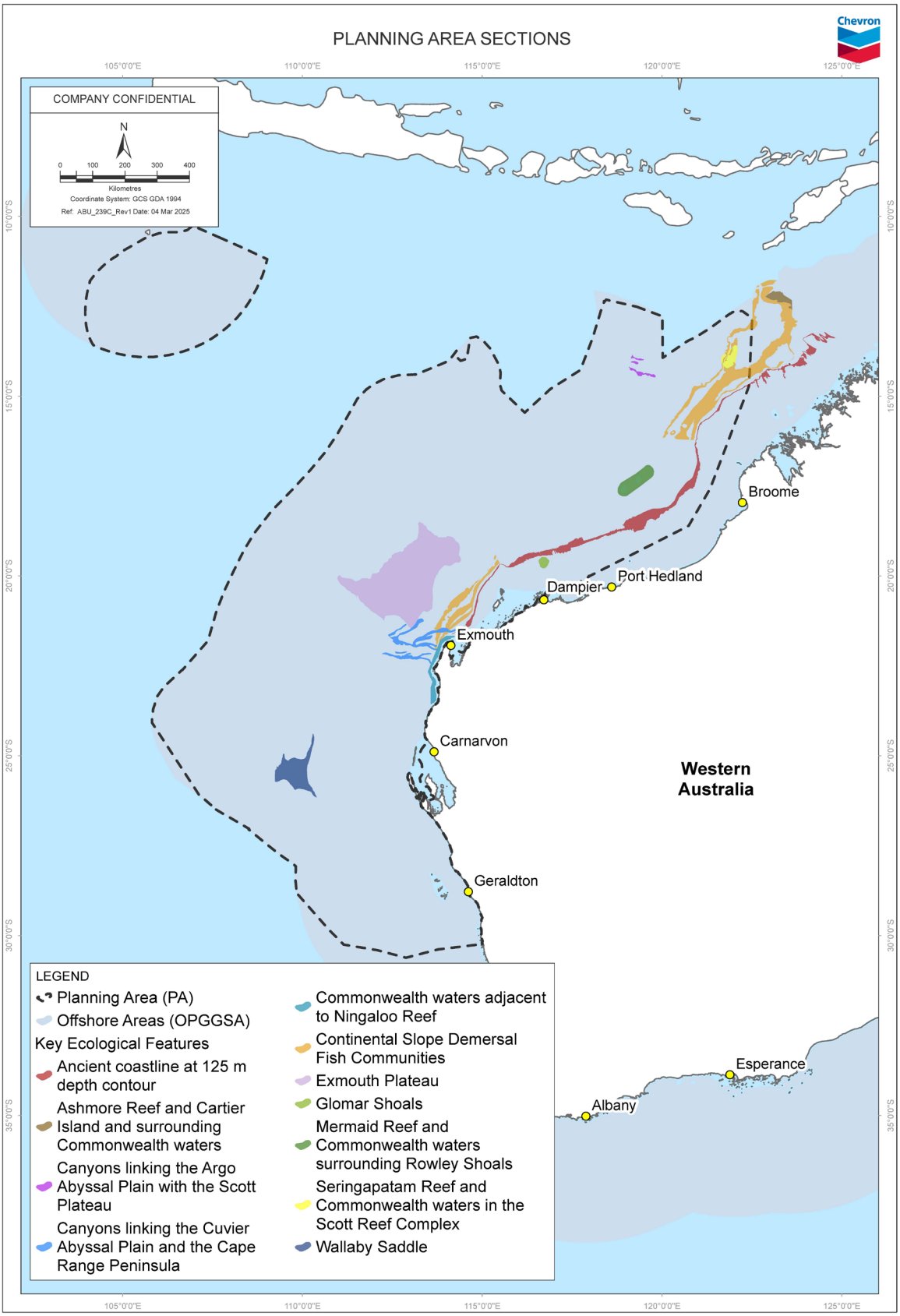

Figure 4-30: KEFs within the vicinity of the PA

4.7 Commonwealth land area

Commonwealth land[12] is a relevant value and sensitivity under the OPGGS(E)R. Based on spatial review and searches of the EPBC Act protected matters database (appendix a) presence of Commonwealth land within the PA was identified, except in the Kimberley section. Specific details are not provided in this document. However, if Commonwealth land is identified within an Operational Area described in a project-specific EP, CAPL will assess its significance and include detailed information in that EP, if necessary.

[12] Commonwealth land includes land owned or leased by the Commonwealth or a Commonwealth agency, land in the Jervis Bay Territory, land in the Christmas Island, Ashmore and Cartier Islands, Coral Sea Islands, Cocos (Keeling) Islands, Australian Antarctic territory and Heard and McDonald Islands external territories, and any other area of land that is included in a Commonwealth reserve.

5 natural and physical resources

Natural and physical resources are described as substances occurring in nature which can be exploited for economic gain, and may include such resources as fishing stocks, petroleum reservoirs, or values of the Commonwealth marine area.

Marine and coastal industries have been developed based on natural and physical resources, and where these industries may overlap with the PA they have been identified and described in the following sections.

5.1 Commercial fisheries

5.1.1 Commonwealth-managed fisheries

The Commonwealth-managed commercial fisheries with fishery management areas that intersect the PA, and that have fishing effort recorded during 2018–2023 (Ref. 693) are listed in Table 5-1. Further descriptions are provided in the following subsections.

The southern bluefin tuna fishery primarily operates within the Great Australian Bight and southeastern Australian waters; however, known spawning grounds overlap with parts of the PA, particularly in the Pilbara, Kimberley, and Christmas Island sections.

5.1.1.1 Southern bluefin tuna fishery

A known spawning ground for southern bluefin tuna occurs in the Indian Ocean between Java and northern WA (Ref. 694; Ref. 695). The indicative spawning ground for the southern bluefin tuna (based on geospatial data provided by Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), and as shown in annual Commonwealth fishery status reports) extends into the PA. Two peaks have been observed in southern bluefin tuna spawning activity: September–October and February–March (Ref. 696; Ref. 697). Spawning typically occurs near the water surface. The fish then regularly dive into deeper waters to thermoregulate as they are cold-water fish and cannot tolerate warm waters for extended periods (Ref. 696). Individual fish probably stay in the spawning area for one month or so (Ref. 696; Ref. 698). The larvae drift passively before becoming entrained in the southwards flowing South Java and Leeuwin Currents and carried down the coast of WA (Ref. 696). One to two-year old juveniles then head east to the Great Australian Bight, or west to the waters off South Africa (Ref. 697).

Table 5-1: Presence of recent (2018–2023) fishing effort recorded within Commonwealth-managed commercial fisheries

Fishery	Section					Description^
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
North-west slope trawl fishery	—	—	✓	✓	—	**Area** Between the 200 m isobath and the outer boundary of the Australian Fishing Zone. **Fishing methods** Bottom (or demersal) trawl methods to target deep-water prawn and scamp. **Key species** The primary species is Australian scampi, with smaller quantities of velvet scampi (*M. velutinus*) and Boschma's scampi (*M. boschmai*). The fishery also interacts with a number of other scampi species often grouped together and reported as mixed scampi (*Metanephrops spp.* and *Nephropsis spp.*). A quantity of prawns is also harvested each season, and squids are becoming an increasingly significant component of the catch. **Fishing efforts** Increased from 196 days, 3,950 trawl-hours and seven fishing permits in 2021–22 season to 218 days, 4,349 trawl hours and seven fishing permits in 2022-23 season. **Fishing mortality** Scampi stock are classified as not overfished and not subject to overfishing.
Western deepwater trawl fishery	✓	✓	✓	—	—	**Area** Waters seaward of a line approximating the 200 m isobath, in habitats ranging from temperate–subtropical in the south to tropical in the north. **Fishing methods** Demersal trawl methods, catching >50 species. **Key species** The primary species are dominated by six commercial finfish species or species groups: orange roughy (*Hoplostethus atlanticus*), oreos (*Oreosomatidae*), boarfish (*Pentacerotidae*), eteline snapper (*Lutjanidae: Etelinae*), apsiline snapper (*Lutjanidae: Apsilinae*) and sea bream (*Lethrinidae*). Between 2000 and 2005, deepwater bugs emerged as the most important target species.

Fishery	Section					Description^
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
						Fishing efforts No catch or effort was recorded in 2022–23. The total catch in the WDTF for 2021–22 was 12 t, with a catch effort of 7 days and 76 trawl-hours. Ruby snapper compromised 40% of the catch in 2021–22 and 31% in 2020–21. **Fishing mortality** Deepwater bugs and ruby snapper stock are classified as not subject to overfishing.
Western tuna and billfish fishery	✓	✓	—	—	—	**Area** Australia's Exclusive Economic Zone and high seas of the Indian Ocean. **Fishing methods** Pelagic longline, with low levels of minor-line fishing methods to target five species. **Key species** Bigeye tuna (*Thunnus obesus*), yellowfin tuna (*T. albacares*) and swordfish (*Xiphias gladius*). Striped marlin (*Kajikia audax*) is a minor component of the catch and albacore (*T. alalunga*), a non-quota species, can approach levels similar to yellowfin tuna catch in some years. In recent years, fishing effort has concentrated off south-west WA, with occasional activity off SA. **Fishing efforts** Increased from 223,713 hooks, 15 minor lines, and 93 boats in 2022 season to 236,020 hooks, 17 minor lines, and 93 boats in 2023 season). A total of four vessels operated in 2023 season. **Fishing mortality** Three of the key target species (bigeye tuna, yellowfin tuna and striped marlin) are classified as subject to overfishing, while swordfish and albacore are classified as not subject to overfishing.

^*Source: Ref. 694.*

5.1.2 State-managed fisheries

The State-managed commercial fisheries with fishery management areas that intersect the PA, and that have fishing effort recorded over a 10-year period (2014–2023) (Ref. 699) are listed in Table 5-2. Further descriptions are provided in the following subsections.

Table 5-2: Presence of fishing effort recorded over the 2014–2023 period within State-managed commercial fisheries

Fishery	Section					Description^
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
Abrolhos Islands and mid-west trawl managed fishery	✓	—	—	—	—	**Area** The fishery operates around the Abrolhos Islands, extending from 27º51'S to 29º03'S. **Fishing methods** Otter trawls. **Key species** The target species is the saucer scallop, *Ylistrum balloti* (formerly *Amusium balloti).* **Fishing efforts** The fishery was environmentally limited and did not open. It is managed using a constant escapement approach outlined in the Harvest Strategy. **Active licences/vessels** Up to five active vessels were recorded between 2017 and 2023 in the PA, with none recorded in 2022 (Ref. 699).
Broome prawn managed fishery	—	—	✓	✓	—	**Area** The fishery operates within the 200 m isobath, spanning waters from near Derby to north of Port Hedland. It is part of the northern prawn managed fishery. **Fishing methods** Low opening, otter prawn trawl system. **Key species** The target species are western king prawns (*Penaeus latisulcatus*), brown tiger prawns (*Penaeus esculentus*), and blue endeavour prawns (*Metapenaeus endeavouri*). **Fishing efforts** No fishing efforts were recorded in 2022. **Active licences/vessels** Up to three active vessels were recorded between 2015 and 2023 in the PA, with none recorded in 2022 (Ref. 699).
Christmas Island line fishery*	—	—	—	—	✓	**Area** The fishery operates within the waters around Christmas Island, extending from the territorial sea baseline to the outer limit of the EEZ.

Fishery	Section					Description^
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
						Fishing methods Handline methods. **Key species** The target species are pelagic fish, mainly wahoo (*Acanthocybium solandri*) and yellowfin tuna (*Thunnus albacares*). In addition, target of deepwater species, primarily deepwater snappers may also occur. **Fishing efforts** In 2014, two out of the three licences were active. There is no information available regarding total catch for the 2022 or 2023 seasons. The fishery is managed primarily through input controls, including limited entry and gear restrictions. It also incorporates output controls, such as catch limits on both demersal and pelagic species. **Active licences/vessels** Up to three active vessels were recorded between 2014 and 2022, with none recorded in 2023 (Ref. 699).
Exmouth Gulf prawn managed fishery	—	—	✓	—	—	**Area** The fishery operates within Exmouth Gulf, with its upper limit defined as east of Muiron Island and west of Serrurier Island. **Fishing methods** Low-opening, otter prawn trawl systems. **Key species** The target species are western king prawns (*Penaeus latisulcatus*), brown tiger prawns (*Penaeus esculentus*), blue endeavour prawns (*Metapenaeus endeavouri*), and banana prawns (*Penaeus merguiensis*). **Fishing efforts** The total catch in 2022 was 898 t. Brown tiger prawns are the primary species retained, with significant landings of western king and blue endeavour prawns also reported. It is managed through input controls, including limited entry, gear controls (maximum headrope units), seasonal and spatial openings and closures, and monthly moon closures. **Active licences/vessels** Six vessels operated during the 2022 season.

Fishery	Section					Description^
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
						Up to seven active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
Gascoyne demersal scalefish managed fishery	✓	✓	—	—	—	**Area** The fishery extends from 114°50'E to 27°00'S (from Exmouth to Denham). **Fishing methods** Mechanised handlines (line fishing). **Key species** The fishery targets include >60 demersal species inhabiting marine waters deeper than 20 m in the Gascoyne Coast Bioregion. The target species are pink snapper (*Chrysophrys auratus*), and goldband snapper (*Pristipomoides multidens).* **Fishing efforts** In 2021/22, the landed commercial pink snapper catch was 42 t, within the revised total allowable commercial catch (51 t). The landed goldband snapper catch was 83 t, also within the allowable catch limit (100–120 t). **Active licences/vessels** 10 vessels operated during the 2021/22 season. Up to seven active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
Mackerel managed fishery	✓	✓	✓	✓	—	**Area** The mackerel managed fishery extends from Augusta to the WA/NT border. There are three managed fishing areas: Area 1: Kimberley (121°E to the WA/NT border); Area 2: Pilbara (114°E to 121°E) and Area 3: Gascoyne / West Coast (34°S to 114° E). **Fishing methods** Surface and midwater troll fishing methods. **Key species** The fishery targets are Spanish mackerel (*Scomberomorus commerson*), Grey mackerel (*S. semifasciatus*) and Samson fish (*Seriola hippos*). **Fishing efforts** The 2022 catch is below the target commercial catch range for Spanish mackerel in the MMF (246–430 t). In the Kimberley area, the 2022 catch of 137 t is within the catch range (110–225 t), while the catches of 56 t in the Pilbara and 16 t in the Gascoyne /

Fishery	Section					Description^
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
						West Coast are below the respective tolerance ranges of 80–126 t and 56–79 t. Activity primarly occurs from May to November. **Active licences/vessels** 13 boats fished in the 2022 season. Up to five active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
Marine aquarium fish managed fishery	✓	✓	✓	✓	—	**Area** The fishery operates in all State waters between the NT border and the SA border. **Fishing methods** SCUBA or surface-supplied air (hookah) from small vessels, usually in teams of two or three people. **Key species** Fish catches were dominated by species such as the Spotted Blenny (*Istiblennius meleagris*), Stripey (*Microcanthus strigatus*), Scribbled Angelfish (*Chaetodontoplus duboulayi*), Vachell's Glassfish (*Ambassis vachellii*), Margined Coralfish (*Chelmon marginalis*), Black-axil Chromis (*Chromis atripectoralis*), blue and yellow Wrasse (*Anampses lennardi*), with nearly 250 other fish taxa also reported. **Fishing efforts** In 2022, the total catch for the fishery was 98,694 fish and invertebrates, 17.83 t of coral, live rock, and living sand, and 39 litres of marine plants and live feed. The fishery is typically more active in waters south of Broome, with higher effort levels around the Capes region, Perth, Geraldton, Exmouth, Dampier, and Broome. Recent effort has also been observed in waters from Broome northwards to the NT border. **Active licences/vessels** 11 out of the 12 licences were active during the 2022 season. Up to six active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
Nickol Bay prawn managed fishery	—	—	✓	—	—	**Area** The fishery operates from Karratha (116º45'E) to north of Port Hedland (120º00'E). **Fishing methods** Low-opening and high-opening otter prawn trawl systems (the latter specifically for targeting banana prawns, *Penaeus merguiensis*). **Key species**

Fishery	Section					Description^
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
						The target species are western king prawns (*Penaeus latisulcatus*), brown tiger prawns (*Penaeus esculentus*), blue endeavour prawns (*Metapenaeus endeavouri*) and banana prawns (*Penaeus merguiensis*). **Fishing efforts** In 2022, total of landings of penaeids were 51 t, dominated by banana prawns (42 t), with minor landings of brown tiger (7 t), blue endeavour (2 t), and western king prawns (<1 t). It is managed using input controls, including limited entry, gear controls (maximum headrope units), and seasonal and area openings and closures. **Active licences/vessels** Up to eight active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
Northern demersal scalefish managed fishery	—	—	✓	✓	—	**Area** The fishery extends from north of Port Hedland (120°00'E) to the WA/NT border and is divided into two managed fishing areas. Area 1: Inshore Area (between the HWM and a line ~30 m isobath) and Area 2: Offshore Area (between a line ~30 m isobath and the EEZ). **Fishing methods** Area 1: line fishing only. Area 2: handline, dropline, and fish traps. Since 2002, it has primarily operated as a trap-based fishery, employing gear time access and spatial zones as the primary management measures. **Key species** The main species landed by this fishery in the Kimberley subregion are goldband snapper and red emperor. **Fishing efforts** The total catch in 2022 was 1,458 t, following the highest recorded catch of 1,544 t in 2021, with the majority of the catch coming from Area 2. The reported 2022 catch for the jobfish group (*Pristipomoides spp.*) was 552 t, with goldband snapper accounting for ~91% of the jobfish catch. **Active licences/vessels** Eight vessels fished in the 2022 fishing season. Up to six active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).

Fishery	Section					Description^
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
Octopus interim managed fishery	✓	—	—	—	—	**Area** The fishery extends from Shark Bay to the WA/SA border and is divided into three managed fishing zones: Zone 1: from 26°30'S to 30°30'S; Zone 2: from 30°30'S to 34°24'S and Zone 3: from 34°24'S to the WA/SA border. **Fishing methods** Baited octopus traps, which combine active trapping (trigger or sliding door traps with trigger mechanisms) and passive trapping (shelter traps) via open-ended traps. Unbaited shelter pots are also used. **Key species** The main species is Western Australian Rock Octopus (*Octopus djinda*). **Fishing efforts** In 2022, the total commercial octopus catch was 744 t live weight, a 53% increase compared to the 2021 catch of 487 t. **Active licences/vessels** 27 commercial vessels fished in the 2022 fishing season. Up to five active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
Onslow prawn managed fishery	—	—	✓	—	—	**Area** The fishery operates from Karratha (116º45'E) to north of Onslow (115º26'E). **Fishing methods** Low-opening otter prawn trawl systems. **Key species** The target species include western king prawns (*Penaeus latisulcatus*), brown tiger prawns (*Penaeus esculentus*), and blue endeavour prawns (*Metapenaeus endeavouri*). **Fishing efforts** Due to data confidentiality, catch reporting and maps of fishing activity are not disclose; however, one boat fished in the 2022 season, as such, the fishery recorded relatively low effort and catch. The fishery is managed using input controls, including limited entry, gear controls (maximum headrope units), and seasonal and area openings and closures. **Active licences/vessels**

Fishery	Section					Description^
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
						Less than three active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
Pilbara crab managed fishery	—	—	✓	—	—	**Area** The fishery extends from north of Port Hedland (120°00'E) to Onslow (115°06.5'E). **Fishing methods** Hourglass traps, primarily within inshore waters around Nickol Bay. **Key species** Blue swimmer crab (*Portunus armatus*). **Fishing efforts** In 2022, the total catch of the blue swimmer crab was 11.2 t, accounting for ~2% of the state's catch. **Active licences/vessels** Less than three active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
Pilbara fish trawl (interim) managed fishery	—	—	✓	—	—	**Area** The fishery extends from north of Port Hedland (120º00'E) to Exmouth and is divided into Zone 1 and Zone 2 (the latter subdivided into six areas). This fishery is restricted to less than ~2% of the NWS. Zone 1 is closed to fish trawling, while Area 3 and the waters inside the 50 m isobath are permanently closed to fish trawling. Additionally, no fish trawling has occurred in Area 6 since 1998. The fishery is managed under a combination of limited entry, effort allocations (time), gear limits, and spatial zones, including extensive trawl closures. It is part of the Pilbara Demersal Scalefish Fishery. **Fishing methods** Demersal trawl. The fishery operates with standard stern trawling gear (single net with extension sweeps). **Key species** The primary target species are bluespotted emperor, red emperor, and rankin cod. **Fishing efforts** In 2022, the total catch was 1,784 t, representing 72% of the total commercial catch of demersal scalefish in the Pilbara.

Fishery	Section					Description^
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
						Active licences/vessels Four commercial vessels participated in the 2022 season. Up to five active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
Pilbara line fishery (condition)	—	—	✓	—	—	**Area** The fishery is part of the Pilbara Demersal Scalefish Fishery. Boat licences are permitted to operate anywhere within 'Pilbara waters', bounded by a line commencing at the intersection of 21°56′S latitude and the HWM on the western side of the North West Cape on the mainland of WA; west along the parallel to the intersection of 21°56′S latitude and the boundary of the AFZ, and north to longitude 120°E. **Fishing methods** Demersal long line methods. **Key species** The target species are bluespotted emperor (*Lethrinus punctulatus*), red emperor (*Lutjanus sebae*) and rankin cod (*Epinephelus multinotatus*), as well as some deeper offshore species such as ruby snapper and eight-bar grouper. **Fishing efforts** In 2022, the total catch was 104 t, representing 4% of the total commercial catch of demersal scalefish in the Pilbara. The fishery operates on an exemption basis which restricts vessels to operating within a nominated 5-month block period each year (typically May- September). **Active licences/vessels** Six commercial vessels participated in the 2022 season. Up to six active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
Pilbara trap managed fishery	—	—	✓	—	—	**Area** The fishery, which is part of the Pilbara Demersal Scalefish Fishery, covers the area from Exmouth northwards and eastwards to the 120°S line of longitude, and offshore as far as the 200 m isobath. **Fishing methods** Trap methods. **Key species**

Fishery	Section					Description^
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
						The main species targeted by the Pilbara Trap Managed Fishery are bluespotted emperor (*Lethrinus punctulatus*), red emperor (*Lutjanus sebae*) and rankin cod (*Epinephelus multinotatus*). **Fishing efforts** In 2022, the total catch was 597 t, representing 24% of the total commercial catch of demersal scalefish in the Pilbara. It is managed through area closures and effort allocations **Active licences/vessels** Three commercial vessels participated in the 2022 season. Up to three active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
Shark Bay beach seine and mesh net managed fishery	—	✓	—	—	—	**Area** The fishery covers Shark Bay's inner gulf. **Fishing methods** Beach seine netting. **Key species** The primary target species are whiting (mostly yellowfin whiting, *Sillago schomburgkii*), sea mullet (*Mugil cephalus*), tailor (*Pomatomus saltatrix*) and western yellowfin bream (*Acanthopagrus morrisoni*). **Fishing efforts** In 2022, the total commercial catch was 131 t, of which 70-90% is mostly yellowfin whiting. **Active licences/vessels** Five commercial vessels participated in the 2022 season, with a total of 510 boat days. Up to seven active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
Shark Bay crab managed fishery	—	✓	—	—	—	**Area** The fishery extends from Shark Bay gulf to south of Coral Bay. **Fishing methods** Trap and trawl methods. **Key species**

Fishery	Section					Description^
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
						The primary target species is the blue swimmer crab (*Portunus armatus*). **Fishing efforts** The 2021/22 catch landings of 401 t was significantly lower than the 600 t total allowable commercial catch. **Active licences/vessels** Up to 22 active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
Shark Bay prawn managed fishery	—	✓	—	—	—	**Area** he fishery extends from the Shark Bay Gulf (26°30′S) to south of Coral Bay (23°34′S). **Fishing methods** Low-opening otter prawn trawl systems within inner Shark Bay. **Key species** The primary target species are western king prawns (*Penaeus latisulcatus*), brown tiger prawns (P*enaeus esculentus*), and lesser quantities of blue endeavour (*Metapenaeus endeavouri*) and coral prawns (*Metapenaeopsis sp.*). **Fishing efforts** In 2022, the total commercial catch was 831 t. A combination of low recruitment for both king and tiger prawns, along with management restrictions to protect spawning stocks, led to the lowest recorded catches. Management restrictions are based on input controls, including limited entry, gear restrictions (e.g. maximum headrope units), and seasonal and spatial openings and closures to ensure fishing effort maintains a sufficient spawning biomass of prawns. **Active licences/vessels** 18 commercial vessels participated in the 2022 season. Up to 18 active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
Shark Bay scallop managed fishery	—	✓	—	—	—	**Area** The fishery extends from the Shark Bay Gulf (26°30′S) to south of Coral Bay (23°34′S). **Fishing methods** Otter trawls methods. **Key species** The target species is Saucer scallops, *Ylistrum balloti* (formerly *Amusium balloti*).

Fishery	Section					Description^
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
						Fishing efforts Total scallop landings in WA in 2022 were 65.3 t meat weight (326 t whole weight). Of this, 35.5 t meat weight (177.3 t whole weight) was harvested from the Shark Bay fishery, which was 99% of the total quota of 36 t. Only 0.9% of the fishery area, as per the management plan, or 2.2% of the inner Shark Bay area (around Denham), was fished in 2022. It is typically WA's most valuable scallop fishery, comprising boats licensed exclusively for scallops and boats that also fish for prawns. The fishery is managed using a constant escapement approach outlined in the Harvest Strategy. **Active licences/vessels** Up to 24 active vessels were recorded between 2015 and 2023 in the PA (Ref. 699).
Specimen shell managed fishery	✓	✓	✓	—	—	**Area** The fishery operates along the entire WA coastline, with activity concentrated in areas near population centres such as Broome, Exmouth, Shark Bay, Geraldton, Perth, Mandurah, the Capes area, Albany, and Esperance. **Fishing methods** The primary ones being hand collection by small groups of divers operating from small boats in shallow coastal waters, wading along coastal beaches below the HWM, or, in some cases, using remotely operated underwater vehicles. The fishery focuses on the collection of individual shells for display, collection, cataloguing, classification, and sale. **Key species** About 200 species of specimen shells are collected annually, with efforts concentrated on mollusc families popular among shell collectors, such as cowries, cones, murexes, and volutes. **Fishing efforts** In 2022, a total of 5,074 specimen shells, representing 200 species, were collected, with an average catch rate of ~13 shells per day. The fishery is managed through input controls, including limited entry, gear restrictions, and permanent closed areas. Operational limitations such as depth, time, and tide are also in place. **Active licences/vessels** There are 30 licences issued for this fishery, with a maximum of four divers allowed in the water per licence at any given time, and collection is permitted by hand only. In

Fishery	Section					Description^
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
						2022, 16 licences were active, and an exemption was granted for the trial use of remotely operated underwater vehicles, limited to one per licence. Up to six active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
West Coast deep sea crustacean managed fishery	✓	✓	✓	—	—	**Area** The fishery extends from Augusta to the WA/NT border, with closed areas below the 150 m isobath. **Fishing methods** Pot fishery that uses baited pots operated in a long-line formation in shelf-edge water (150-1,200 m) of the West Coast and Gascoyne Bioregions. **Key species** The primary target species are crystal (snow) (*Chaceon albus*), champagne (spiny) (*Hypothalassia acerba*), and giant (*Pseudocarcinus gigas*) crabs. **Fishing efforts** In 2022, the total commercial catch consisted of 123.2 t crystal crab, 10 t champagne crab, 0.1 giant crab and <0.1 king crab. **Active licences/vessels** Seven licence holders operated in the fishery, with five vessels active during the 2022 season. Up to four active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
West Coast demersal gillnet and demersal longline (interim) managed fishery	✓	✓	—	—	—	**Area** The fishery operates between Shark Bay (26°S) and Bunbury (33°S). The fishery is part of the Temperate Demersal Gillnet and Demersal Longline Fisheries **Fishing methods** Demersal gillnets and demersal longline (the latter is not widely used). **Key species** The primary target species are gummy (*Mustelus antarcticus*), dusky (*Carcharhinus obscurus*), whiskery (*Furgaleus macki*), and sandbar (*C. plumbeus*) shark. **Fishing efforts** In the 2021-22 season, the total catch of sharks and rays was 924 t, consisting of 411 t of gummy shark, 193 t of dusky shark, 39 t of sandbar shark, and 156 t of whiskery

Fishery	Section					Description^
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
						shark. This catch was consistent with previous years and remained within acceptable catch ranges. **Active licences/vessels** Five commercial vessels fished in the 2022 season. Up to four active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
West Coast demersal scalefish (interim) managed fishery	✓	✓	—	—	—	**Area** The fishery extends from Augusta (115°30'E) to waters around Shark Bay (26°30'S) and is divided into four managed fishing areas: Kalbarri, Metropolitan, Mid-West, and South-West Areas. **Fishing methods** Involves boat-based commercial, charter, and recreational line fishers. **Key species** The fishery targets over 100 species in both inshore (20-250 m deep) and offshore (>250 m) demersal habitats of the West Coast Bioregion. **Fishing efforts** In 2022, the total commercial catch was 240 t, distributed as follows: Kalbarri: 80 t, Mid-West: 93 t, and South-West: 68 t. **Active licences/vessels** A total of 30 commercial vessels participated in the 2022 season. Up to nine active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
West Coast rock lobster managed fishery	✓	✓	—	—	—	**Area** The fishery operates along the west coast of WA, extending from Shark Bay to Cape Leeuwin. **Fishing methods** Baited pots and hand collection. **Key species** The primary target species is the western rock lobster (*Panulirus cygnus*) with additional bycatch including octopus, champagne crabs, and baldchin grouper. **Fishing efforts**

Fishery	Section					Description^
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
						In 2022, the total commercial catch was 6,342 t, with catch rates remaining near record-high levels. The fishery is managed under a Harvest Strategy and Control system. **Active licences/vessels** Up to 42 active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).
West Australian sea cucumber fishery	—	✓	✓	—	—	**Area** Fishing predominantly occurs in the northern half of the state, from Exmouth Gulf to the NT border. **Fishing methods** Primarily employs diving as its method of catch, with a smaller amount harvested through wading. **Key species** The primary target species are sandfish (*Holothuria scabra*), and redfish (*Actinopyga echinites*). **Fishing efforts** In 2022, a total of 56.5 t of sea cucumber was harvested, comprising 45.2 t of sandfish, 10.8 t of deepwater redfish, and 0.5 t of black teatfish. Access to the fishery is managed under an exemption and is subject to input controls, including limited entry, a maximum number of divers, spatial closures, and gear restrictions. **Active licences/vessels** Two commercial vessels fished in 2022. Less than three active vessels were recorded between 2014 and 2023 in the PA (Ref. 699).

**Source: Ref. 699.*

^Source: Ref. 700.

5.1.3 Pearling and aquaculture

Pearling and aquaculture operations in the northwest are typically restricted to inland and shallow coastal waters, primarily within State waters. Table 5-3 listed the presence of these industries within the PA.

In WA, aquaculture is predominantly focused on pearl production from the oyster species *Pinctada maxima*. A significant number of pearl oysters for seeding are sourced from wild stocks and supplemented by hatchery-produced oysters, with major hatcheries operating in Broome and the Dampier Peninsula (Ref. 700). The Pearl Oyster Managed Fishery is the world's only remaining significant wild stock fishery for pearl oysters. It operates as a quota-based dive fishery in shallow coastal waters (Ref. 700). The fishery is currently managed under the *Pearling Act 1990*.

In 2022, the total catch was 756,531 shells, with six vessels participating in the fishery. Most vessels operate between March and August each year (Ref. 700).

Further aquaculture in the NWMR primarily focuses on barramundi farming within the Kimberley region (Ref. 700).

Table 5-3: Presence of pearling and aquaculture sites

Activity	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Aquaculture site					
Application^	✓	✓	✓	—	—
Licensed^	✓	✓	✓	—	—
Pearling					
Pearl farm lease*	—	—	✓	—	—
Pearl holding site*	—	—	✓	—	—

^In the Pilbara Section, applications were identified around the Dampier Archipelago and Exmouth Gulf, while licensed sites were located around the Dampier Archipelago, Onslow, and Exmouth Gulf.

*In the Pilbara Section, farm leases were identified around Exmouth Gulf, the Montebello Islands, the Dampier Archipelago, and Karratha, while holding sites were located around Exmouth Gulf, Onslow, and Port Hedland.

5.2 Recreational fisheries

Recreational fishing is one of the most popular activities in WA with an estimated third of the population fishing recreationally (Ref. 702). The WA Department of Primary Industries and Regional Development (DPIRD) conducts state-wide recreational fishing surveys every two to three years, with the first survey completed in 2011 (Ref. 703). The survey collects information from more than 3,000 recreational fishers who record their catches in logbooks over a 12-month period with DPIRD also conducting interviews throughout the State and monitoring the number of boat launches and retrievals using cameras at various boat ramps.

The 2020–2021 survey report (Ref. 704) revealed that most boat-based recreational fishing effort occurred in nearshore habitats (62%), followed by inshore demersal habitats (25%). Line fishing accounted for the majority of boat-based effort (59%), with pots contributing 35%. Fishing activity peaked during

summer (38%), followed by autumn (24%) and spring (23%). Effort was lowest from June to August 2021. Fishing effort in December 2020 (20%) was higher than previous years, with increased activity in potting and nearshore habitats.

In the North Coast, where the majority of the Pilbara Section is located, fishing efforts align with state-wide trends. Most boat-based recreational fishing effort was concentrated in nearshore habitats (46%), followed by inshore demersal areas (32%). Line fishing was the predominant method (87%). Effort was highest in winter (42%), followed by spring (25%) and autumn (22%) (Ref. 704).

In the Gascoyne Coast, where the other part of the Pilbara Section is located, fishing effort was concentrated in nearshore (54%) and inshore demersal (39%) habitats. Most fishing effort was attributed to line fishing (91%), with the majority of effort occurring in autumn (36%), followed by winter (32%) and spring (24%) (Ref. 704).

Tour operator fishing efforts recorded over a 10-year period (2014–2023) (Ref. 699) identified the following:

- up to 14 active vessels were recorded between 2014 and 2023 in the West Coast Section
- up to four active vessels were recorded between 2014 and 2023 in the Ningaloo Section
- up to nine active vessels were recorded between 2014 and 2023 in the Pilbara Section
- up to five active vessels were recorded between 2014 and 2023 in the Kimberley Section
- no fishing efforts were recorded in the Christmas Island Section.

5.3 Traditional fisheries

Customary fishing applies to persons who have a traditional connection with the area being fished, and is fishing for personal, domestic, ceremonial, educational or non-commercial needs (Ref. 706). A Customary Fishing Policy has been incorporated into the *Fish Resources Management Act 1994* (WA), which allows for customary fishing by applicable persons to occur within a sustainable fisheries management framework. Customary fishing does not apply to other species of marine fauna (e.g. crocodile, turtle, or dugong).

Under amendments made in 2012 to the *Conservation and Land Management Act 1984* (WA) Aboriginal people can undertake customary activities which includes hunting (except in marine sanctuary zones or marine nature reserves) for dugong, turtle, or crocodiles in WA.

As described in Section 4.5.2.1, ongoing use of marine and coastal resources, including customary fishing, is expected to occur in NWMR and adjacent coastal waters. However, it is expected that much of this activity will occur within shallow coastal waters.

A Memorandum of Understanding (MoU) permits traditional Indonesian fishers to operate within Australian waters using only traditional fishing methods. It is managed through a bilateral agreement between the Australian and Indonesian governments. The MoU area is located within the Australian Fishing Zone and the continental shelf, adjacent to Ashmore Reef, Cartier Island, Scott Reef,

Seringapatam Reef, and Browse Island (Ref. 707). Restrictions were later introduced around Ashmore Reef and Cartier Island following their designation as Nature Reserves under the Commonwealth's National Parks and Wildlife *Conservation Act 1975* in 1983 and 2000, respectively.

The northern section of the PA, Kimberley Section, overlaps with the MoU area.

5.4 Commercial shipping

AMSA collects vessel traffic data from a variety of sources, including satellite shipborne automated identification system data, across Australia's Search and Rescue region. This data has been used to develop Figure 5-1, which shows vessel traffic within the vicinity of the PA.

Shipping fairways are designed to direct shipping traffic away from offshore infrastructure. While their use is not mandatory, it is strongly recommended. As a result, commercial vessels transiting the NWS are expected to remain within these fairways. Shipping fairways are primarily identified in the Pilbara Section, with minor overlaps in the Kimberley and Ningaloo Sections (Figure 5-1).

Vessel traffic within the Pilbara Section is most likely to consist of offshore support vessels servicing existing petroleum activities.

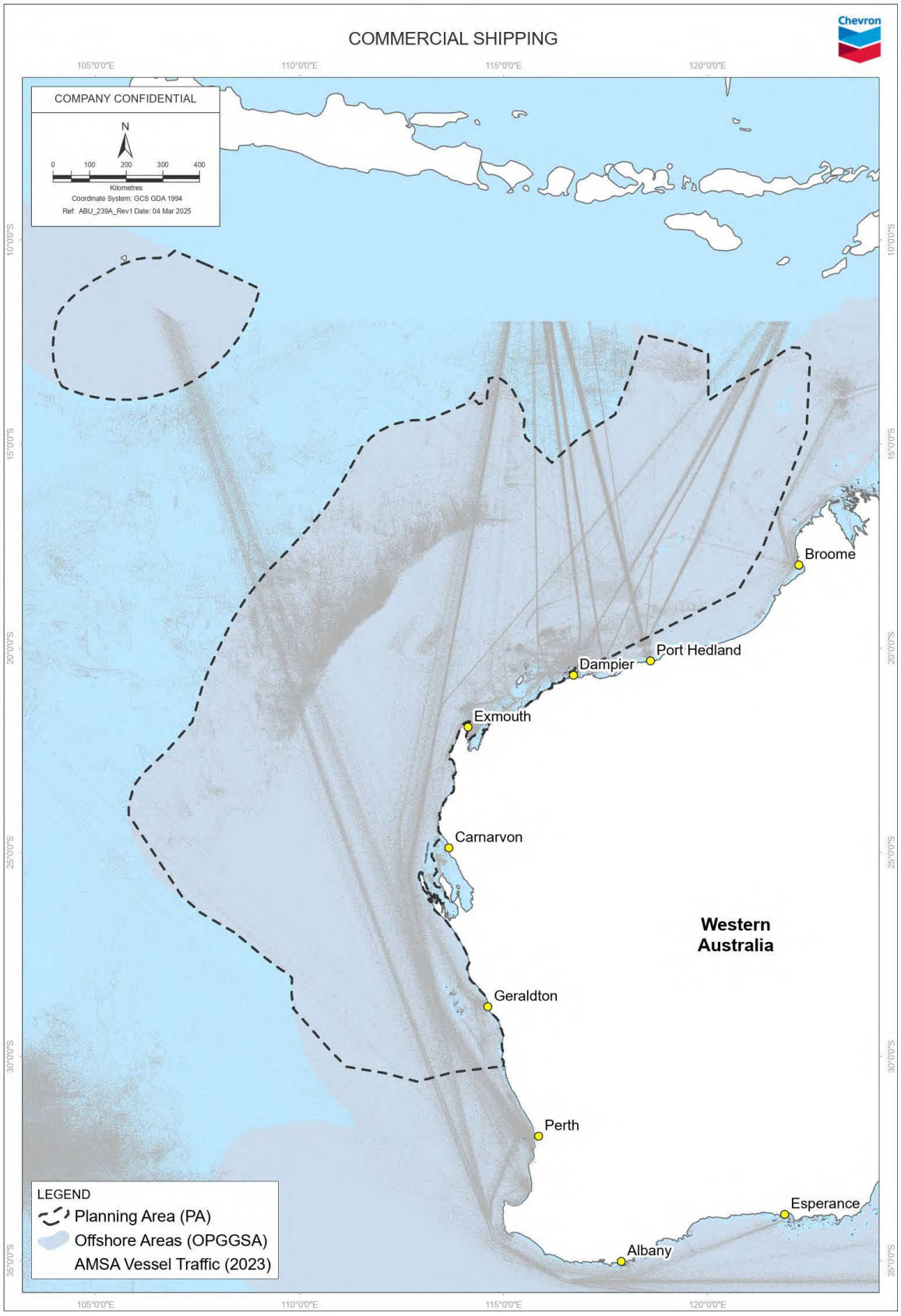

Figure 5-1: Vessel traffic and shipping fairways within the vicinity of the PA

5.5 Tourism and recreation

Tourism is an important industry for WA, directly employing 66,700 people and indirectly employing a further 44,000 (Ref. 707). Charter fishing, diving, snorkelling, wildlife watching, and cruising are some of the commercial tourism activities in and adjacent to the WA coastline (Ref. 3; Ref. 700). With the exception of offshore fishing (Section 5.2), most marine tourism and recreational activities occur in the shallower State waters (Ref. 3).

Within the NWMR, the Gascoyne, Pilbara and Kimberley regions are popular visitor destinations for both Australian and international tourists.

In the Gascoyne Region, marine nature-based tourism is primarily concentrated around the Ningaloo Coast World Heritage Area (Section 7.1). Activities undertaken include recreational fishing, snorkelling and scuba diving, wildlife watching and encounters (including whale sharks, manta rays, humpback whales and turtles) (Ref. 709). Other popular activities include beach access, surfing, and paddling sports.

In the Pilbara Region, recreational activities tends to be concentrated in State waters adjacent to population centres. Charter vessels may also frequent the waters surrounding the Montebello Islands (Ref. 710).

In the Kimberley Region, marine tourism includes charter fishing, diving, snorkeling, and wildlife watching (whales, turtles, and dolphins), along with sightseeing cruises. Luxury cruises are becoming increasingly popular, taking tourists along the coastline and to remote coral atolls for fishing and diving. Primary dive locations include the Rowley Shoals, Scott Reef, Seringapatam Reef, Ashmore Reef, and Cartier Island (Ref. 700).

In the SWMR, beach-going is one of the most popular leisure activities for tourists. Other popular marine-based activities include surfing, fishing, SCUBA diving, snorkelling, windsurfing, whale watching, and marine wildlife experiences (Ref. 700). Charter fishing may occur in both State and Commonwealth waters.

On Christmas Island, recreational activities include SCUBA diving, snorkelling with turtles and dolphins, kite surfing, beach-going, free diving, and fishing (Ref. 705).

5.6 Other marine and coastal industries

Several other marine and coastal industries may be present within the PA (Table 5-4). There were no offshore renewable energy facilities or declared offshore wind areas, or salt mines identified within the PA.

Table 5-4: Presence of industries

Industry	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Defence	✓	✓	✓	✓	—
Onshore facilities	—	—	✓	—	—
Petroleum exploration and production	✓	✓	✓	✓	✓
Ports	✓	—	✓	—	—
Submarine cable	✓	✓	✓	✓	✓

5.6.1 Defence

The Royal Australian Air Force have two bases located in the northwest of WA: Learmonth Base near Exmouth, and Curtin Base near Derby. A designated maritime firing practice and exercise area is associated with these bases (Ref. 711). Military exercise areas are designated over the waters and airspace of northwest WA and may be activated following the required notifications.

Some areas may contain Unexploded Ordnance (UXO) as a result of past military activities. These include offshore sites where ammunition and explosives have been dumped or areas used as live bombing or firing ranges. Defence maintains a record of sites confirmed or reasonably suspected to be affected by UXO (Ref. 712). Known or suspected UXO sites may be present within the PA, particularly near designated firing practice areas.

5.6.2 Onshore facilities

Only one onshore industry with coastal interference, the Karratha Gas Plant, was identified within the PA. Located on the Burrup Peninsula near the Port of Dampier and the City of Karratha, the Karratha Gas Plant is a major producer of liquefied natural gas, natural gas, liquefied petroleum gas, condensate, and crude oil (Ref. 713). Operations at this plant rely on production from offshore fields. Offshore production facilities include the North Rankin Complex, Goodwyn A and Angel platforms, and the Okha floating production, storage, and offloading vessel (Ref. 713).

The onshore gas plant consists of five liquefied natural gas processing plants—referred to as “trains”—a domestic gas plant supplying WA, liquefied petroleum gas production units, and storage and loading facilities for liquefied natural gas, liquefied petroleum gas, and condensate (Ref. 713).

5.6.3 Petroleum exploration and production

Petroleum exploration and production occur along the WA coast within all sections of the PA, except for the Christmas Island Section. Petroleum wells extend throughout the PA, with the majority concentrated in the Pilbara Section. Most petroleum activities take place in the NWMR.

There are seven sedimentary petroleum basins in the NWMR: the Northern and Southern Carnarvon basins, Perth, Browse, Roebuck, Offshore Canning and Bonaparte basins (Ref. 4). Of these, the Northern Carnarvon Basin is one of the most heavily explored and developed petroleum basins in Australia. The Northern Carnarvon, Browse and Bonaparte basins together comprise most of Australia’s natural gas reserves (Ref. 4; Ref. 700). The Carnarvon Basin supports >95% of WA’s oil and gas production, accounts for ~63% of Australia’s total production of crude oil, condensate, and natural gas, and it is the most heavily explored (Ref. 4).

In addition to existing facilities, there are proposed developments in the region, including plans to extract gas and condensate from multiple fields.

5.6.4 Ports

The *Port Authorities Act 1999* (WA) governs Western Australia's port authorities, covering their functions, responsibilities, concept of operations and related matters. The *Shipping and Pilotage Act 1967* (WA) governs shipping and pilotage within ports, boat harbours, and mooring control areas across the state. The

Barrow Island Port (also known as Varanus Island Port) is a declared port under this Act.

Six ports (Ashburton, Dampier, Port Hedland, Bala Balla, Barrow and Varanus) were identified within the Pilbara section, while one port, Geraldton, was identified in the West Coast section.

5.6.5 Submarine cables

Submarine telecommunications cables are underwater infrastructure linking Australia with other countries; the submarine communications cables carry the bulk of Australia's international voice and data traffic. Several known submarine cables intersect with the PA. Under Part 2 of the *Telecommunications Act 1997* (Cth), the Australian Communications and Media Authority can declare protection zones covering the cables to prohibit and/or restrict activities that may damage them. The protection zones are generally the area within 1.85 km (1 nm) either side of the cable and include both the waters and seabed within the area. No protection zone has been declared for the submarine cables identified within the PA.

6 qualities and characteristics of locations, places and areas

The qualities and characteristics of the protected places present within the PA are described in the following sections.

6.1 Australian marine parks

Marine parks help conserve marine habitats and the marine species that live within and rely on these habitats. Marine parks also provide places for people to watch wildlife, dive, and go boating, snorkelling, or fishing (Ref. 714). The PA overlaps several AMP in the Indian Ocean Territories (IOT), North-west and South-west Marine Parks.

The *North-west Marine Parks Network Management Plan* (Ref. 715) and *South-west Marine Parks Network Management Plan* (Ref. 716) defines the following types of values for the Marine Parks in the North-west and South-west Networks:

- natural values—habitats, species and ecological communities, and the processes that support their connectivity, productivity and function
- cultural values—living and cultural heritage recognising Indigenous beliefs, practices and obligations for Country, places of cultural significance and cultural heritage sites
- heritage values—non-Indigenous heritage that has aesthetic, historic, scientific or social significance
- socioeconomic values—the benefits of marine parks for people, businesses and/or the economy.

The types of values identified in the report on the proposal to prepare draft IOT management plans (Ref. 717) applicable for Christmas Island are summarised as:

- natural values—areas of biological importance for threatened species, marine turtles, in particular hawksbill and green sea turtles, resident and migratory seabirds, the ecological linkage of the Christmas Island National Park and the Christmas Island Marine Park for seabirds and the red crab migration, coral reefs and the diverse assemblage of species they support, land crabs on Christmas Island and natural assets that occur outside of the marine parks
- cultural values— the marine environment’s contribution to local community identity, culture, and lifestyle, the continuity of traditional fishing practices in the marine parks, sites of importance within the Christmas Island Marine Park and their contribution to the island's history
- social and economic values— the attraction of scuba divers, snorkelers and other tourists to the marine park’s natural values and the flow on benefits this has to the wider community and local economy, fishing and access to resources local employment opportunities recreational activities that occur within the marine parks, the importance of supporting social and economic values through streamlined processes for appropriate commercial access to the marine parks.

The objectives of the *North-west Marine Parks Network Management Plan* (Ref. 715) and *South-west Marine Parks Network Management Plan* (Ref. 716) are to provide for:

- the protection and conservation of biodiversity and other natural, cultural and heritage values of marine parks in the North-west Network
- ecologically sustainable use and enjoyment of the natural resources within marine parks in the North Network, where this is consistent with objective (a).

No objectives were identified in the report on the proposal to prepare draft IOT management plans (Ref. 717).

Australian Marine Parks (AMPs) occur within Commonwealth waters that start at the outer edge of state and territory waters and extend to the outer boundary of Australia's EEZ, 200 nautical miles (~370 km) from the shore (Ref. 715; Ref. 716). AMPs have been proclaimed under the EPBC Act in 2007 and 2013. The presence of AMPs within the PA, and a summary of values, is described in Table 6-1 (Figure 6-1, Figure 6-2, Figure 6-3, Figure 6-4).

Table 6-1: Presence of AMPs

AMP	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Abrolhos (SWMR)^					
Habitat Protection Zone (IUCN IV)	✓	✓	—	—	—
Multiple Use Zone (IUCN VI)	✓	✓	—	—	—
National Park Zone (IUCN II)	✓	✓	—	—	—
Special Purpose Zone (IUCN VI)	✓	✓	—	—	—

The Abrolhos Marine Park is located adjacent to the WA Houtman Abrolhos Islands, covering a large offshore area extending from the WA state water boundary to the edge of Australia's EEZ. The northernmost part of the shelf component of the Marine Park, north of Kalbarri, is adjacent to the Shark Bay World Heritage Area. The Marine Park covers an area of 88,060 km² and a water depth range between <15 m and 6,000 m.

Natural values

The Marine Park includes examples of ecosystems representative of:

- Central Western Province—characterised by a narrow continental slope incised by many submarine canyons and the most extensive area of continental rise in any of Australia's marine regions. A significant feature within the area are several eddies that form off the Leeuwin Current at predictable locations, including west of the Houtman Abrolhos Islands
- Central Western Shelf Province—a predominantly flat, sandy and low nutrient area, in water depths between 50 and 100 m. Significant seafloor features of this area include a deep hole and associated area of banks and shoals offshore of Kalbarri. The area is a transitional zone between tropical and temperate species
- Central Western Transition—a deep ocean area characterised by large areas of continental slope, a range of significant seafloor features including the Wallaby Saddle, seasonal and sporadic upwelling, and benthic slope communities comprising tropical and temperate species
- South-west Shelf Transition—a narrow continental shelf that is noted for its physical complexity. The Leeuwin Current has a significant influence on the biodiversity of this nearshore area as it pushes subtropical water southward along the area's western edge. The area contains a diversity of tropical and temperate marine life including a large number of endemic fauna species.

The marine park includes seven KEFs characterised by aggregation of marine life, transport nutrients and plankton communities and high species diversity and endemism. The Marine Park supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. Biologically important areas within the Marine Park include foraging and breeding habitat for seabirds, foraging habitat for Australian sea lions and white sharks, and a migratory pathway for humpback and pygmy blue whales. The Marine Park is

AMP	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
adjacent to the northernmost Australian sea lion breeding colony in Australia on the Houtman Abrolhos Islands. **Cultural values** Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Nanda and Naaguja People have responsibilities for sea country in the Marine Park. Traditional owners have strong stories that connect ocean and land. Artefacts from ancestors are abundant on islands in the adjacent state marine park. The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Yamatji region. **Heritage values** No international heritage listings apply to the Marine Park at the commencement of this plan, however, the Marine Park is adjacent to the WA Shark Bay World Heritage Property, listed as an area of outstanding universal value under the World Heritage Convention in 1991, meeting world heritage listing criteria vii, viii, ix, and x. No Commonwealth or national heritage listings apply to the Marine Park at the commencement of this plan; however the Marine Park is adjacent to the WA Shark Bay National Heritage Place. *Historic shipwrecks* The Marine Park contains 11 known shipwrecks listed under the *Historic Shipwrecks Act 1976*. The Zuytdorp (wrecked in 1712) historic shipwreck protected zone lies in state waters adjacent to the northernmost part of the shelf component of the Marine Park, north of Kalbarri. The *HMAS Sydney II* and *HSK Kormoran Shipwreck* Sites (1941) lie at 2,500 m depth about 75 km east of the northern part of the Marine Park. This site is on the National Heritage List and a historic shipwreck protected zone. The Batavia (wrecked on the adjacent Abrolhos Islands in 1629) Shipwreck Site and Survivor Camps Area are on the National Heritage List. **Social and economic values** Tourism, commercial fishing, mining, recreation including fishing, are important activities in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation.					
Argo-Rowley Terrace (NWMR)*					
Multiple Use Zone (IUCN VI)	—	—	✓	✓	—
National Park Zone (IUCN II)	—	—	—	✓	—
Special Purpose Zone (IUCN VI)	—	—	—	✓	—
The Argo–Rowley Terrace Marine Park is located ~270 km north-west of Broome, WA, and extends to the limit of Australia's EEZ. The Marine Park is adjacent to the Mermaid Reef Marine Park and the WA Rowley Shoals Marine Park. The Marine Park covers an area of 146,003 km^2 and water depths between 220 m and 6,000 m. **Natural values** The Marine Park includes examples of ecosystems representative of: • Northwest Transition—an area of shelf break, continental slope, and the majority of the Argo Abyssal Plain. Key topographic features include Mermaid, Clerke and Imperieuse Reefs which collectively are a biodiversity hotspot • Timor Province—an area dominated by warm, nutrient-poor waters. Canyons are an important feature in this area of the Marine Park and are generally associated with high productivity and aggregations of marine life. The marine park includes two KEFs characterised by y seasonal and sporadic upwelling, nutrient rich water and aggregations of marine life and high species richness. The Marine Park supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. Biologically important areas within the Marine Park include resting and breeding habitat for seabirds and a migratory pathway for the pygmy blue whale.					

AMP	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Cultural values Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. At the commencement of this plan there is limited information about the cultural significance of this Marine Park. **Heritage values** No international, Commonwealth or national listings apply to the Marine Park at commencement of this plan. *Historic shipwrecks* The Marine Park contains two known shipwrecks listed under the *Historic Shipwrecks Act 1976*: Alfred (wrecked in 1908) and Pelsart (wrecked in 1908). **Social and economic values** Commercial fishing and mining are important activities in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation.					
Carnarvon Canyon (NWMR)*					
Habitat Protection Zone (IUCN IV)	—	✓	—	—	—
The Carnarvon Canyon Marine Park is located ~300 km north-west of Carnarvon. It covers an area of 6,177 km² and a water depth range of 1,500–6,000 m. **Natural values** The Marine Park includes examples of ecosystems representative of the Central Western Transition—a bioregion characterised by large areas of continental slope, a range of topographic features such as terraces, rises and canyons, seasonal and sporadic upwelling, and benthic slope communities comprising tropical and temperate species. It includes the Carnarvon Canyon, a single-channel canyon covering the entire depth range of the Marine Park. Ecosystems of the Marine Park are influenced by tropical and temperate currents, deep-water environments and proximity to the continental slope and shelf. The soft-bottom environment at the base of the Carnarvon Canyon is likely to support species that are typical of the deep seafloor (e.g. holothurians, polychaetes and sea-pens). The Marine Park supports a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act. There is limited information about species' use of this Marine Park. **Cultural values** Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. **Heritage values** No international, Commonwealth or national heritage listings apply to the Marine Park at commencement of this plan. **Social and economic values** Commercial fishing is an important activity in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation.					
Christmas Island (IOT)#					
Habitat Protection Zone (IUCN IV)	—	—	—	—	✓
National Park Zone (IUCN II)	—	—	—	—	✓
Christmas Island rises sharply from the deep surrounding tropical waters of the Indian Ocean to a height of 361 m. In 2022, the Christmas Island Marine Park was established by the Australian Government under EPBC Act. **Social and economic importance** Christmas Island Marine Park was co-designed with the local community as the marine environment is important for many social, cultural and economic reasons. The park's clear and					

AMP	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
warm topical waters are valued by the community for commercial, recreational and subsistence fishing and other activities like boating, diving and snorkelling. It is also an attraction for many visitors which helps to support and promote the local tourism industry. Additionally, the unique marine environment of Christmas Island means there is potential for increasing scientific study and educational activities in the area.					
Dampier (NWMR)*					
Habitat Protection Zone (IUCN IV)	—	—	✓	—	—
Multiple Use Zone (IUCN VI)	—	—	✓	—	—
National Park Zone (IUCN II)	—	—	✓	—	—
The Dampier Marine Park is located ~10 km north-east of Cape Lambert and 40 km from Dampier extending from the WA state water boundary. The Marine Park covers an area of 1,252 km² and a water depth range between <15 m and 70 m. **Natural values** The Marine Park includes examples of ecosystems representative of the Northwest Shelf Province—a dynamic environment influenced by strong tides, cyclonic storms, long-period swells and internal tides. The bioregion includes diverse benthic and pelagic fish communities, and ancient coastline thought to be an important seafloor feature and migratory pathway for humpback whales. The Marine Park supports a range of species including those listed as threatened, migratory, marine or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding and foraging habitat for seabirds, internesting habitat for marine turtles and a migratory pathway for humpback whales. **Cultural values** Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Ngarluma, Yindjibarndi, Yaburara, and Mardudhunera people have responsibilities for sea country in the Marine Park. The native title holders for these people are represented by the Ngarluma Aboriginal Corporation and Yindjibarndi Aboriginal Corporation. These Prescribed Body Corporates represent traditional owners with native title over coastal area adjacent to the Marine Park are the points of contact for their respective areas of responsibility for sea country in the Marine Park. The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Pilbara and Yamatji regions. **Heritage values** No international, Commonwealth or national listings apply to the Marine Park at commencement of this plan, however the Marine Park is ~10 km north of the Dampier Archipelago (including Burrup Peninsula) national heritage listing, which has significant Indigenous heritage values including rock art sites. **Social and economic values** Port activities, commercial fishing and recreation, including fishing, are important activities in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation.					
Eighty Mile Beach (NWMR)*					
Multiple Use Zone (IUCN VI)	—	—	✓	—	—
The Eighty Mile Beach Marine Park is located ~74 km north-east of Port Hedland, adjacent to the WA Eighty Mile Beach Marine Park. The Marine Park covers an area of 10,785 km² and a water depth ranges between <15 m and 70 m. **Natural values** The Marine Park includes examples of ecosystems representative of the Northwest Shelf Province—a dynamic environment influenced by strong tides, cyclonic storms, long-period					

AMP	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
swells and internal tides. The bioregion includes diverse benthic and pelagic fish communities, and ancient coastline thought to be an important seafloor feature and migratory pathway for humpback whales. The Marine Park supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding, foraging and resting habitat for seabirds, internesting and nesting habitat for marine turtles, foraging, nursing and pupping habitat for sawfish and a migratory pathway for humpback whales. **Cultural values** Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The sea country of the Nyangumarta, Karajarri and Ngarla people extends into Eighty Mile Beach Marine Park. Sea country is culturally significant and important to their identity. They have an unbroken, deep spiritual connection to their sea country, with traditional practices continuing today. Staple foods of living cultural value for the Nyangumarta, Karajarri and Ngarla people include saltwater fish, turtles, dugong, crabs and oysters. Access to sea country by families is important for cultural traditions, livelihoods and future socio-economic development opportunities. The native title holders for the Nyangumarta, Karajarri and Ngarla people are represented by the Karajarri Aboriginal Corporation, Nyangumarta Karajarri Aboriginal Corporation, Nyangumarta Warrarn Aboriginal Corporation, and Wanparta Aboriginal Corporation. These Prescribed Body Corporates represent traditional owners with native title over coastal area adjacent to the Marine Park and are the points of contact for their respective areas of responsibility for sea country in the Marine Park. The Kimberley Land Council and the Yamatji Marlpa Aboriginal Corporation are the Native Title Representative Bodies for Kimberley and Pilbara regions. **Heritage values** No international, Commonwealth or national listings apply to the Marine Park at commencement of this plan. *Historic shipwrecks* The Marine Park contains three known shipwrecks listed under the *Historic Shipwrecks Act 1976*: Lorna Doone (wrecked in 1923), Nellie (wrecked in 1908), and Tifera (wrecked in 1923). **Social and economic values** Tourism, commercial fishing, pearling and recreation are important activities in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation.					
Gascoyne (NWMR)*					
Habitat Protection Zone (IUCN IV)	—	✓	✓	—	—
Multiple Use Zone (IUCN VI)	—	✓	✓	—	—
National Park Zone (IUCN II)	—	✓	✓	—	—
The Gascoyne Marine Park is located ~20 km off the west coast of the Cape Range Peninsula, adjacent to the Ningaloo Reef Marine Park and the WA Ningaloo Marine Park, and extends to the limit of Australia's EEZ. The Marine Park covers an area of 81,766 km² and water depths between 15 m and 6,000 m. **Natural values** The Marine Park includes examples of ecosystems representative of: • Central Western Shelf Transition—continental shelf with water depths up to 100 m, and a significant transition zone between tropical and temperate species					

AMP	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
• Central Western Transition—characterised by large areas of continental slope, a range of topographic features such as terraces, rises and canyons, seasonal and sporadic upwelling, and benthic slope communities comprising tropical and temperate species • Northwest Province—an area of continental slope comprising diverse and endemic fish communities. The marine park includes four KEFs characterised by seasonal and sporadic upwelling, nutrient rich water and aggregations of marine life and high diversity of demersal fish assemblages. The Marine Park supports a range of species including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. BIAs within the Marine Park include breeding habitat for seabirds; internesting habitat for marine turtles; a migratory pathway for Humpback Whales; and foraging habitat and migratory pathway for Pygmy Blue Whales. **Cultural values** Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Gnulli people have responsibilities for sea country in the Marine Park. The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Yamatji region. **Heritage values** *World heritage* The Ningaloo Coast was listed as an area of outstanding universal value under the World Heritage Convention in 2011, meeting world heritage listing criteria vii and x. The Ningaloo Coast World Heritage Property is adjacent to the Marine Park. *Commonwealth heritage* The Ningaloo Marine Area (Commonwealth waters) was established on the Commonwealth Heritage List in 2004, meeting the Commonwealth heritage listing criteria A, B and C. The Ningaloo Marine Area is adjacent to the Marine Park. *National heritage* The Ningaloo Coast was established on the National Heritage List in 2010, meeting the national heritage listing criteria A, B, C, D, and F and is adjacent to the Marine Park. *Historic shipwrecks* The Marine Park contains more than five known shipwrecks listed under the *Historic Shipwrecks Act 1976.* **Social and economic values** Commercial fishing, mining and recreation are important activities in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation.					
Kimberley (NWMR)*					
Habitat Protection Zone (IUCN IV)	—	—	—	✓	—
Multiple Use Zone (IUCN VI)	—	—	—	✓	—
National Park Zone (IUCN II)	—	—	—	✓	—
The Kimberley Marine Park is located ~100 km north of Broome, extending from the WA state water boundary north from the Lacepede Islands to the Holothuria Banks offshore from Cape Bougainville. The Marine Park is adjacent to the WA Lalanggarram/Camden Sound Marine Park and the North Kimberley Marine Park. The Marine Park covers an area of 74,469 km² and water depths from <15 m to 800 m. **Natural values** The Marine Park includes examples of ecosystems representative of: • Northwest Shelf Province—a dynamic environment influenced by strong tides, cyclonic storms, long-period swells and internal tides. The bioregion includes diverse benthic and pelagic fish communities, and an ancient coastline thought to be an important seafloor feature and migratory pathway for humpback whales					

AMP	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island

- Northwest Shelf Transition—straddles the North-west and North Marine Regions and in the Northwest includes shelf break, continental slope, and the majority of the Argo Abyssal Plain and is subject to a high incidence of cyclones. Benthic biological communities in the deeper parts of the bioregion have not been extensively studied, although high levels of species diversity and endemism occur among demersal fish communities on the continental slope
- Timor Province—water depths (of the bioregion) ranging from about 200 m near the shelf break to 5,920 m over the Argo Abyssal Plain. The reefs and islands of the bioregion are regarded as biodiversity hotspots. Endemism in demersal fish communities of the continental slope is high; two distinct communities have been identified on the upper and mid slopes.

The marine park includes three KEFs characterised by strong tides, cyclonic storms, long-period swells and internal tides seasonal and endemic demersal fish. The Marine Park supports a range of species, including protected species listed as threatened, migratory, marine or cetacean under the EPBC Act. BIAs within the Marine Park include breeding and foraging habitat for seabirds, internesting and nesting habitat for marine turtles, breeding, calving and foraging habitat for inshore dolphins, calving, migratory pathway and nursing habitat for humpback whales, migratory pathway for pygmy blue whales, foraging habitat for dugong and foraging habitat for whale sharks.

Cultural values

Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years.

The Wunambal Gaambera, Dambimangari, Mayala, Bardi Jawi and the Nyul Nyul people's sea country extends into the Kimberley Marine Park. The Wunambal Gaambera people's country includes daagu (deep waters), with about 3,400 km^2 of their sea country located in the Marine Park. The Wunambal Gaambera, Dambimangari, Mayala, Bardi Jawi and the Nyul Nyul people have an unbroken connection to their sea country, having deep spiritual connection through Wunggurr (creator snakes) that still live in the sea. Staple foods of living cultural value include saltwater fish, turtles, dugong, crabs and oysters. Access to sea country by families is important for cultural traditions, livelihoods and future socio-economic development opportunities.

The national heritage listing for the West Kimberley recognises the following key cultural heritage values:

- Wanjina Wunggurr Cultural Tradition which incorporates many sea country cultural sites
- log-raft maritime tradition, which involved using tides and currents to access warrurru (reefs) far offshore to fish
- interactions with Makassan traders around sea foods over hundreds of years
- important pearl resources that were used in traditional trade through the wunan and in contemporary commercial agreements.

The Wunambal Gaambera, Dambimangari and Bardi Jawi people consider that these values extend into the Kimberley Marine Park. The Wanjina Wunggurr is law of the Wunambal Gaambera and Dambimangari people and it is recognised that all of the sea country, land, plants and animals were put there by Wanjina Wunggurr. Under Wanjina Wunggurr law, the Wunambal Gaambera and Dambimangari people have a responsibility to manage country, to maintain the health of the country and all living things. The Wunambal Gaambera, Bardi Jawi, Mayala and the Nyul Nyul people have had native title determined over parts of their sea country included in this Park. The native title holders for these people are represented by the Wunambal Gaambera Aboriginal Corporation, Bardi and Jawi Niimidiman Aboriginal Corporation and the Kimberley Land Council. These representative bodies are the points of contact for their respective areas of sea country for the Marine Park.

The Kimberley Land Council is the Native Title Representative Body for Kimberley region.

Heritage values

No international, Commonwealth or national heritage listings apply to the Marine Park at commencement of this plan, however the Marine Park is adjacent to the national heritage place of The West Kimberley.

AMP	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Historic shipwrecks The Marine Park contains >40 known shipwrecks listed under the *Historic Shipwrecks Act 1976*. **Social and economic values** Tourism, commercial fishing, mining, recreation, including fishing, and traditional use are important activities in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation.					
Mermaid Reef (NWMR)*					
National Park Zone (IUCN II)	—	—	—	✓	—
The Mermaid Reef Marine Park is located ~280 km north-west of Broome, adjacent to the Argo–Rowley Terrace Marine Park and ~13 km from the WA Rowley Shoals Marine Park. The Marine Park covers an area of 540 km² and water depths from <15 m to 500 m. **Natural values** The Marine Park includes examples of ecosystems representative of the Northwest Transition—an area of shelf break, continental slope, and the majority of the Argo Abyssal Plain. Together with Clerke Reef and Imperieuse Reef, Mermaid Reef is a biodiversity hotspot and key topographic feature of the Argo Abyssal Plain. A key ecological feature of the Marine Park is the Mermaid Reef and Commonwealth waters surrounding Rowley Shoals—an area of enhanced productivity and high species richness thought to be facilitated by internal wave action generated by internal tides in the lagoon. Ecosystems of the Marine Park are associated with emergent reef flat, deep reef flat, lagoon, and submerged sand habitats. The Marine Park supports a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding habitat for seabirds and a migratory pathway for the pygmy blue whale. **Cultural values** Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. At the commencement of this plan, there is limited information about the cultural significance of this Marine Park. **Heritage values** No international or national listings apply to the Marine Park at commencement of this plan. *Commonwealth heritage* Mermaid Reef–Rowley Shoals was established on the Commonwealth Heritage List in 2004, meeting Commonwealth heritage listing criteria A, B, C and D. *Historic shipwrecks* The Marine Park contains one known shipwreck listed under the *Historic Shipwrecks Act 1976*: Lively (wrecked in 1810). **Social and economic values** Tourism, recreation, and scientific research are important activities in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation.					
Montebello (NWMR)*					
Multiple Use Zone (IUCN VI)	—	—	✓	—	—
The Montebello Marine Park is located offshore of Barrow Island and 80 km west of Dampier extending from the WA state water boundary, and is adjacent to the WA Barrow Island and Montebello Islands Marine Parks. The Marine Park covers an area of 3,413 km² and water depths from <15 m to 150 m. **Natural values** The Marine Park includes examples of ecosystems representative of the Northwest Shelf Province—a dynamic environment influenced by strong tides, cyclonic storms, long-period swells and internal tides. The bioregion includes diverse benthic and pelagic fish communities,					

AMP	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
and ancient coastline thought to be an important seafloor feature and migratory pathway for humpback whales. A key ecological feature of the Marine Park is the ancient coastline at the 125 m depth contour where rocky escarpments are thought to provide biologically important habitat in areas otherwise dominated by soft sediments. The Marine Park supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding habitat for seabirds, internesting, foraging, mating, and nesting habitat for marine turtles, a migratory pathway for humpback whales and foraging habitat for whale sharks. **Cultural values** Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. At the commencement of this plan, there is limited information about the cultural significance of this Marine Park. The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Pilbara region. **Heritage values** No international, Commonwealth or national listings apply to the Marine Park at commencement of this plan, however the Marine Park is adjacent to the Western Australia Barrow Island and the Montebello– Barrow Island Marine Conservation Reserves which have been nominated for national heritage listing. *Historic shipwrecks* The Marine Park contains two known shipwrecks listed under the *Historic Shipwrecks Act 1976*: Trial (wrecked in 1622), the earliest known shipwreck in Australian waters and Tanami (unknown date). **Social and economic values** Tourism, commercial fishing, mining and recreation are important activities in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation.					
Ningaloo (NWMR)*					
National Park Zone (IUCN II)	—	✓	—	—	—
Recreational Use Zone (IUCN IV)	—	✓	✓	—	—
The Ningaloo Marine Park stretches ~300 km along the west coast of the Cape Range Peninsula, and is adjacent to the WA Ningaloo Marine Park and Gascoyne Marine Park. The Marine Park covers an area of 2,435 km² and a water depth range of 30 m to >500 m. **Natural values** The Marine Park includes examples of ecosystems representative of: • Central Western Shelf Transition—continental shelf of water depths up to 100 m, and a significant transition zone between tropical and temperate species • Central Western Transition—characterised by large areas of continental slope, a range of topographic features such as terraces, rises and canyons, seasonal and sporadic upwelling, and benthic slope communities comprising tropical and temperate species • Northwest Province—an area of continental slope comprising diverse and endemic fish communities • Northwest Shelf Province—a dynamic environment, influenced by strong tides, cyclonic storms, long-period swells and internal tides. The bioregion includes diverse benthic and pelagic fish communities, and ancient coastline thought to be an important seafloor feature and migratory pathway for humpback whales. The marine park includes four KEFs characterised by seasonal and sporadic upwelling, nutrient rich water and high diversity of demersal fish assemblages. Ecosystems represented in the Marine Park are influenced by interaction of the Leeuwin Current, Leeuwin Undercurrent and the Ningaloo Current.					

AMP	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
The Marine Park supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding and or foraging habitat for seabirds, internesting habitat for marine turtles, a migratory pathway for humpback whales, foraging habitat and migratory pathway for pygmy blue whales, breeding, calving, foraging and nursing habitat for dugong and foraging habitat for whale sharks. **Cultural values** Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Gnulli people have responsibilities for sea country in the Marine Park. The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Yamatji region. **Heritage values** *World heritage* The Marine Park is within the Ningaloo Coast World Heritage Property, recognised for its outstanding universal heritage values, meeting world heritage listing criteria vii and x. In addition to the Marine Park, the world heritage area includes the WA Ningaloo Marine Park, the Murion Islands, the WA Cape Range National Park and other terrestrial areas. The area is valued for high terrestrial species endemism, marine species diversity and abundance, and the interconnectedness of large-scale marine, coastal and terrestrial environments. The area connects the limestone karst system and fossil reefs of the ancient Cape Range to the nearshore reef system of Ningaloo Reef, to the continental slope and shelf in Commonwealth waters. *National heritage* The Ningaloo Coast overlaps the Marine Park and was established on the National Heritage List in 2010, meeting the national heritage listing criteria A, B, C, D, and F. *Commonwealth heritage* The Ningaloo Marine Area (Commonwealth waters) was established on the Commonwealth Heritage List in 2004, meeting Commonwealth heritage listing criteria A, B and C. The Ningaloo Marine Area overlaps the Marine Park. *Historic shipwrecks* The Marine Park contains more than 15 known shipwrecks listed under the *Historic Shipwrecks Act 1976.* **Social and economic values** Tourism and recreation, including fishing, are important activities in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation.					
Shark Bay (NWMR)*					
Multiple Use Zone (IUCN VI)	—	✓	—	—	—
The Shark Bay Marine Park is located ~60 km offshore of Carnarvon, adjacent to the Shark Bay world heritage property and national heritage place. The Marine Park covers an area of 7,443 km², extending from the WA state water boundary, and a water depth range between 15 m and 220 m. **Natural values** The Marine Park includes examples of ecosystems representative of: • Central Western Shelf—a predominantly flat, sandy and low-nutrient area, in water depths 50–100 m. The bioregion is a transitional zone between tropical and temperate species • Central Western Transition—characterised by large areas of continental slope, a range of topographic features such as terraces, rises and canyons, seasonal and sporadic upwelling, and benthic slope communities comprising tropical and temperate species. Ecosystems represented in the Marine Park are influenced by the Leeuwin, Ningaloo and Capes currents.					

AMP	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
The Marine Park supports a range of species including species listed as threatened, migratory, marine or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding habitat for seabirds, internesting habitat for marine turtles, and a migratory pathway for humpback whales. The Marine Park and adjacent coastal areas are also important for shallow-water snapper. **Cultural values** Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Gnulli and Malgana people have responsibilities for sea country in the Marine Park. The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Yamatji region. **Heritage values** No international, Commonwealth or national heritage listings apply to the Marine Park at commencement of this plan, but the Marine Park is adjacent to the Shark Bay, WA World Heritage Property and Shark Bay, WA National Heritage Place. *Historic shipwrecks* The Marine Park contains ~20 known shipwrecks listed under the *Historic Shipwrecks Act 1976.* **Social and economic values** Tourism, commercial fishing, mining and recreation, including fishing, are important activities in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation.					

** Source: Ref. 715*

^Source: Ref. 716

 # Source: Ref. 718

6.2 State Marine Protected Areas

State marine parks, management areas, and reserves are proclaimed under the *Conservation and Land Management Act 1984* (WA) (CALM Act), are located in State waters and are vested in the WA Conservation and Parks Commission.

The presence of marine parks, management areas within the PA and a summary of values, are shown in Table 6-2.

Fish Habitat Protection Areas (FHPAs) are areas of special protection and management in WA waters. They are established in areas identified as having a particular value for the protection of fish and their habitats, education and/or aquaculture and which is considered to require a higher level of protection than other parts of the marine environment (Ref. 719). They are set under section 115 of the *Fish Resources Management Act 1994* (WA) for the following purposes:

- the conservation and protection of fish, fish breeding areas, fish fossils or the aquatic ecosystem
- the culture and propagation of fish and experimental purposes related to that culture and propagation
- the management of fish and activities relating to the appreciation or observation of fish.

Under the Act, fish can include a range of organisms including finfish, crustaceans, molluscs, corals, seagrass and algae at all stages of their life cycles (Ref. 719). FHPAs may restrict non-fishing related activities, such as the use of

anchors, if they are considered to be inconsistent with the purpose of the FHPA. Protection may also involve the management of human activities such as dredging, draining of wetlands, and fishing or diving near sensitive marine habitats (Ref. 719).

WA has six FHPAs, four of which are located within the PA (Table 6-2, Figure 6-1, Figure 6-2, Figure 6-3, Figure 6-4).

- Abrolhos Islands
- Kalbarri Blue Holes
- Miaboolya Beach
- Point Quobba

Table 6-2: Presence of state marine parks, management areas and reserves

State marine protected areas	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Abrolhos Islands FHPA					
Unassigned (IUCN IV)	✓	—	—	—	—
The Houtman Abrolhos is an archipelago of 210 islands, islets and rocks surrounded by coral reef located off the mid-west coast of WA (Ref. 720). The Abrolhos extend >100 km from north to south and consists of three main island groups: the Wallabi Group (including North Island), the Easter Group, and the Pelsaert (or Southern) Group (Ref. 720). The state waters surrounding the Abrolhos Islands are designated as a gazetted Fish Habitat Protection Area (FHPA), renowned for its exceptional marine biodiversity, cultural heritage, and recreational and fishing values (Ref. 720). The islands are home to several conservation-significant species, including seabirds, migratory shorebirds, and the Australian sea lion. More than 380 species of finfish have been documented in the FHPA, encompassing demersal (bottom-dwelling), pelagic (water-column), and nearshore species (Ref. 721). Turtles are also commonly observed in the surrounding waters, with resident green turtles foraging in and around the reefs (Ref. 722). The FHPA supports the southernmost coral reef system in the Indian Ocean and is among the world's highest-latitude coral reef systems (Ref. 721). Ten seagrass species have been recorded at the Abrolhos ranging from small, delicate species to larger, more robust types that grow in large meadows (Ref. 722). The predominant species of seagrasses occurring in the Abrolhos FHPA include Posidonia australis, *Amphibolis sp*. and *Halophila sp*. A single mangrove species, the grey mangrove (*Avicennia marina*), occurs at the Abrolhos. Extensive stretches of mangroves can be seen on Pelsaert Island, Wooded Island and Morley Island (Ref. 721).					
Barrow Island Marine Park and Marine Management Area					
Unassigned (IUCN IA, VI)	—	—	✓	—	—
Barrow Island and its surrounding waters are known to support marine biota typical of the Indo west Pacific flora and fauna; however, there is a significant degree of endemism in the region (Ref. 710). The Island is known as a breeding area for marine turtles (Ref. 724) and serves as a significant rookery for at least 15 seabird species (Ref. 710). Although macroalgae-dominated limestone reefs and subtidal reef platform/sand mosaics are the main marine habitat types, coral reefs, mangroves, and subtidal sand and soft-bottom habitats are also common (Ref. 710). The subtidal coral reef communities have a high diversity of invertebrates, with at least 150 species of hard corals recorded from fringing and patch coral reef areas (Ref. 710).					
Great Sandy Island Nature Reserve					
Unassigned (IUCN IA)	—	—	✓	—	—

State marine protected areas	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
The Great Sandy Island is part of the Pilbara Islands. The Pilbara Islands are a group of over 170 islands, islets, rocks and cays that lie between the bottom of Exmouth Gulf and the Regnard Islands near Cape Preston (Ref. 725). These remote islands have immense natural, cultural, and heritage value and many of the islands are protected as nature reserves. The islands have high conservation value and provide a refuge for threatened and priority species, relatively free from threats like introduced predators, light or noise pollution, development, bushfires and other disturbances. They also support priority ecological communities, priority flora, and increasingly rare pristine vegetation types (Ref. 725).					
Hamelin Pool Marine Nature Reserve					
Unassigned (IUCN IA)	—	✓	—	—	—
Hamelin Pool, located 100 km south-east of Denham, is one of only two places in the world with living marine stromatolites, also known as 'living fossils.' It is part of the Shark Bay World Heritage Area (Ref. 726). Stromatolites thrive undisturbed in Hamelin Pool, where the sea water is twice as salty as usual, thanks to a natural bar across the bay's entrance (Ref. 726). Recreational activities such as boating, swimming, diving and snorkelling are not permitted over stromatolites, or within 300 m of the shore (Ref. 726)					
Kalbarri Blue Holes FHPA					
Unassigned (IUCN IV)	✓	—	—	—	—
Blue Holes Beach is a FHPA located south of Kalbarri. The Kalbarri Blue Holes FHPA includes part of a near-shore limestone reef system, which stretches intermittently from Red Bluff in the South to the Murchison River Mouth in the North (Ref. 727). A healthy and diverse reef community composed of both temperate and tropical species have been identified in this area. Small colonies of corals occurring within metres of the beach are highly accessible during periods of low swell (Ref. 727). Stormwater from the urban areas of Kalbarri discharges directly into the near-shore marine waters in the vicinity of the FHPA, which has the potential to affect local water quality (Ref. 727). To Aboriginal people, the highly accessible nature of this coastal reef system, which is in near proximity of the river mouth, is likely to have made it a significant site for hunting fish and gathering seafood (Ref. 727).					
Miaboolya BeachFHPA					
Unassigned (IUCN IV)	—	✓	—	—	—
Miaboolya Beach is16 km by road north of Carnarvon, part of the Gascoyne River delta, and home to a rich array of species and habitats (Ref. 728). It includes nearshore waters, mangroves, seasonal creeks and salt marshes up to the HWM from South Bejalong Hill, south to the Gascoyne River mouth (Ref. 728). The area is a habitat for an abundance of native fauna. These include juvenile finfish species and various crab species including mud crabs, blue swimmer and green mud crabs (Ref. 729). All these species are important to the Carnarvon region and are part of the ecological balance that exists within the Miaboolya Beach ecosystem (Ref. 729). The mangals found within Miaboolya Creek are of environmental importance. Resident and migratory populations of birds, marine turtles and dolphins also exist within the area and contribute to its environmental value (Ref. 729).					
Montebello Islands Marine Park and Conservation Park					
General Use Zone (IUCN II)	—	—	✓	—	—
Recreation Zone (IUCN II)	—	—	✓	—	—
Sanctuary Zone (IUCN IA)	—	—	✓	—	—
Special Purpose Zone (Benthic Protection) (IUCN IV)	—	—	✓	—	—

State marine protected areas	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Special Purpose Zone (Pearling) (IUCN VI)	—	—	✓	—	—
Unassigned (IUCN II)	—	—	✓	—	—
The islands are located ~120 km west of the town of Dampier in WA and 8,000 years ago were once part of mainland Australia (Ref. 730). These waters and islands are important for threatened sea turtles as well as dolphins, dugongs and various species of seabird and shorebirds. The Island is known as a breeding area for marine turtles (Ref. 724) and serves as a significant rookery for at least 15 seabird species (Ref. 710). Although macroalgae-dominated limestone reefs and subtidal reef platform/sand mosaics are the main marine habitat types, coral reefs, mangroves, and subtidal sand and soft-bottom habitats are also common (Ref. 710). The subtidal coral reef communities have a high diversity of invertebrates, with at least 150 species of hard corals recorded from fringing and patch coral reef areas (Ref. 710).					
Muiron Islands Marine Management Area					
Conservation Area (IUCN IA)	—	—	✓	—	—
Marine Management Area (Unclassified) (IUCN VI)	—	—	✓	—	—
The Muiron Islands consist of the South Muiron and North Muiron islands which serve as important nesting sites for seabirds and green turtles (Ref. 731). These islands and surrounding waters are also within the Muiron Islands Marine Management Area and the Ningaloo Coast World Heritage property and National Heritage place (Section 7.1). The Muiron Islands Marine Management Area is recognised for its rich marine biodiversity, coral reefs, filter-feeding communities and macroalgal beds (Ref. 732).					
Ningaloo Marine Park					
General Use (IUCN II)	—	✓	✓	—	—
Recreation Area (IUCN II)	—	✓	✓	—	—
Sanctuary Zone (IUCN IA)	—	✓	✓	—	—
Special Purpose Zone (Benthic Protection) (IUCN IV)	—	✓	—	—	—
Special Purpose Zone (Shore Based Activities) (IUCN II)	—	✓	✓	—	—
Unassigned (IUCN II)	—	✓	—	—	—
Ningaloo Marine Park is World Heritage-listed and home to one of the largest fringing reefs in Australia, supporting hundreds of fish and coral species. The Ningaloo Reef stretches over 300 km and forms a discontinuous barrier enclosing a lagoon that varies in width from 200 m to over 7 km (Ref. 732). The reef is home to >300 species of coral and 500 species of fish, as well as iconic marine life such as whale sharks, orcas, humpback whales, dugongs, manta rays, turtles, and dolphins (Ref. 732). In 2004, surveys by the Australian Institute of Marine Science recorded extensive areas of filter-feeding communities in depths ranging from 20 to 200 m (Ref. 732). Shoreline intertidal reefs, a prominent feature along the Ningaloo Marine Park coastline, contribute significantly to the park's biological diversity. These reefs are shaped by tidal and wave action and support a variety of organisms resistant to desiccation (Ref. 732). Larger fish and marine animals feed on the reefs during high tide, while the abundance of invertebrates provides an essential food source for shorebirds. Macroalgal meadows, occupying ~2,200 ha of shallow limestone lagoonal platforms, are also present (Ref. 732). Additionally, three species of mangroves have been identified within the park. The white mangrove (*Avicennia marina*) is the dominant species, while the red mangrove (*Rhizophora stylosa*) and ribbed-orange fruit mangrove (*Bruguiera exaristata*) are less common (Ref. 732).					

State marine protected areas	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Point Quobba FHPA					
Unassigned (IUCN IV)	—	✓	—	—	—
Point Quobba is ~75 km north-west of Carnarvon in WA, and adjoins the popular 'Blowholes' natural tourist attraction. It sits between two distinctive landscapes: the 'Cliff Coast' and the 'Dune Coast' (Ref. 733). Known for its calm, coral-filled lagoon, Point Quobba boasts an abundance of fish, shells, and a white sandy beach. The marine habitat at Point Quobba serves as a transition zone between tropical and temperate climates, supporting a highly diverse range of species (Ref. 733).					
Rocky Island Nature Reserve					
Unassigned (IUCN IA)	—	—	✓	—	—
Rocky Island is part of the Pilbara Islands. The Pilbara Islands are a group of over 170 islands, islets, rocks and cays that lie between the bottom of Exmouth Gulf and the Regnard Islands near Cape Preston (Ref. 725). These remote islands have immense natural, cultural, and heritage value and many of the islands are protected as nature reserves. The islands have high conservation value and provide a refuge for threatened and priority species, relatively free from threats like introduced predators, light or noise pollution, development, bushfires and other disturbances. They also support priority ecological communities, priority flora, and increasingly rare pristine vegetation types (Ref. 725).					
Rowley Shoals Marine Park					
General Use (IUCN II)	—	—	✓	✓	—
Recreation Zone (IUCN II)	—	—	✓	✓	—
Sanctuary Zone (IUCN IA)	—	—	—	✓	—
Unassigned (IUCN IV)	—	—	—	✓	—
Located ~300 km north-north-west of Broome, the Rowley Shoals consist of three oceanic reef systems: Mermaid Reef, Clerke Reef, and Imperieuse Reef, positioned ~30-40 km apart. The Rowley Shoals Marine Park includes Clerke and Imperieuse Reefs, which lie within State waters (Ref. 734). The marine reef fauna of the Rowley Shoals is exceptionally rich and diverse, featuring species typical of the oceanic coral reef communities of the Indo-West Pacific. The faunal assemblages within the Rowley Shoals Marine Park are regionally significant, containing numerous species absent from the more turbid coastal environments of tropical WA (Ref. 734). The Shoals are regionally important due to their location in the headwaters of the Leeuwin Current, suggesting they serve as a vital source of invertebrate and finfish recruits to southern areas. They are also of international significance, acting as a global benchmark for Indo-West Pacific reefs due to their low exposure to human pressures (Ref. 734). The Park also features drop-off areas exceeding 50 m in depth, which support a variety of migratory pelagic species (Ref. 734).					
Scott Reef Nature Reserve					
Unassigned (IUCN IA)	—	—	—	✓	—
Scott Reef rises steeply from the depths near the edge of north-western Australia's continental shelf, isolated from the mainland and other reefs (Ref. 735). The reef consists of two separate reef formations: North Reef and South Reef. The coral communities at Scott reef play a key role in maintaining the species richness and subsequent aggregations of marine life. Scott Reef is a particularly biologically diverse system and includes >300 species of reef-building corals, ~400 mollusc species, 118 crustacean species, 117 echinoderm species and ~720 fish species (Ref. 689). The surrounding waters attract a remarkable diversity of marine life, including aggregations of humpback whales during their northerly migration, as well as Bryde's whales, pygmy blue					

State marine protected areas	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
whales, Antarctic minke whales, dwarf minke whales, minke whales, dwarf sperm whales, and spinner dolphins. Whale sharks and several species of sea snakes have also been recorded in the area (Ref. 689). Sandy Islet on South Scott Reef serves as a nesting site for green and hawksbill turtles during the summer months. These species also use the surrounding waters for internesting and foraging (Ref. 249).					
Sedimentary Deposits Reserve 5(1)(g) Reserve					
Unassigned (IUCN III)	—	✓	—	—	—
Sedimentary Deposits Reserve is a marine protected area located ~64 km east of WA. The reserve's surrounding waters are encompassed by the Shark Bay Marine Park. Further details about its characteristics are provided in the Shark Bay description below.					
Shark Bay Marine Park					
General Use (IUCN II)	—	✓	—	—	—
Recreation Zone (IUCN II)	—	✓	—	—	—
Sanctuary Zone (IUCN IA)	—	✓	—	—	—
Special Purpose Zone (Dugong Protection) (IUCN IV)	—	✓	—	—	—
Special Purpose Zone (Habitat Protection) (IUCN IV)	—	✓	—	—	—
Special Purpose Zone (Seagrass Protection) (IUCN IV)	—	✓	—	—	—
Special Purpose Zone (Wildlife Viewing and Protection) (IUCN IV)	—	✓	—	—	—
Shark Bay Marine Park, part of the Shark Bay World Heritage Area, is renowned for its rich and diverse marine life (Ref. 736). The park supports a unique mix of tropical and temperate fish species, along with an abundance of turtles, dugongs, sea snakes, sharks, and vibrant communities of seagrasses, corals, and sponges (Ref. 737) Humpback whales use the bay as a key staging post during their coastal migration. Green and loggerhead turtles are also found in the area, with Dirk Hartog Island serving as an important nesting site for loggerhead turtles in WA (Ref. 736). Shark Bay is also famous for the Monkey Mia bottlenose dolphins, and its wide sheltered bays provide habitats for a diverse and relatively unexplored array of molluscs, crustaceans, and other invertebrates (Ref. 736). The park encompasses over 4,000 km² of seagrass meadows, which are the foundation of Shark Bay's marine ecosystems. These meadows provide essential shelter and food for a wide range of species, including molluscs, crustaceans, fish, and sea snakes (Ref. 737). The Malgana name for Shark Bay is Gathaaguda. The majority of the Shark Bay Marine Park is Malgana Sea Country, with the north eastern section in Yinggarda Country (Ref. 737).					
Thevenard Island Nature Reserve					
Unassigned (IUCN IA)	—	—	✓	—	—
Thevenard Island is part of the Pilbara Islands. The Pilbara Islands are a group of over 170 islands, islets, rocks and cays that lie between the bottom of Exmouth Gulf and the Regnard Islands near Cape Preston (Ref. 725). These remote islands have immense natural, cultural, and heritage value and many of the islands are protected as nature reserves. The islands have high conservation value and provide a refuge for threatened and priority species, relatively free from threats like introduced predators, light or noise pollution, development, bushfires and other disturbances. They also support priority ecological communities, priority flora, and increasingly rare pristine vegetation types (Ref. 725).					

State marine protected areas	Section				
	West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Marine turtles use the island beaches in summer for nesting and resting, females often rest at the water line before moving back out to sea (Ref. 738).					

6.3 State terrestrial protected areas

Terrestrial protected areas, proclaimed under the CALM Act, are located on State lands and are vested in the WA Conservation and Parks Commission.

While CAPL's activities usually occur offshore and do not directly interface with the coast, the Hydrocarbon EMBAs associated with the EPs may intersect with coastal areas. Table 6-3 identifies the state terrestrial protected areas within the PA[13]. For project-specific EPs, CAPL will assess their significance and include detailed information in the EP, if required.

Table 6-3: Presence of State terrestrial protected areas

Lands protected areas	Zone Type (IUCN category)	Section				
		West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Airlie Island*	Nature Reserve (IUCN IA)	—	—	✓	—	—
Barrow Island*	Nature Reserve (IUCN IA)	—	—	✓	—	—
Bedout Island*	Nature Reserve (IUCN IA)	—	—	✓	—	—
Bernier And Dorre Islands*	Nature Reserve (IUCN IV)	—	✓	—	—	—
Bessieres Island*	Nature Reserve (IUCN IA)	—	—	✓	—	—
Boodie, Double Middle Islands*	Nature Reserve (IUCN IA)	—	—	✓	—	—
Bundegi Coastal Park^	5(1)(h) Reserve (IUCN II)	—	—	✓	—	—
Burnside And Simpson Island*	Nature Reserve (IUCN IA)	—	—	✓	—	—
Cape Range^	National Park (IUCN II)		✓			
Cape Range (South)^	National Park (IUCN II)	—	✓	—	—	—
Christmas Island*	National Park (IUCN II)	—	—	—	—	✓
Dirk Hartog Island*^	National Park (IUCN II)	—	✓	—	—	—

[13] Only state terrestrial protected areas with a coastal and/or marine interface have been identified.

Lands protected areas	Zone Type (IUCN category)	Section				
		West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Faure Island^	Private Nature Reserve (IUCN IV)	—	✓	—	—	—
Francois Peron^	National Park (IUCN II)	—	✓	—	—	—
Freycinet, Double Islands etc#	Nature Reserve (IUCN IA)	—	✓	—	—	—
Giralia	Gazettal in Progress	—	—	✓	—	—
Gnandaroo Island*	Nature Reserve (IUCN IA)	—	—	✓	—	—
Hamelin Station^	Conservation Reserve (IUCN II)	—	✓	—	—	—
Houtman Abrolhos Islands^	National Park (IUCN II)	✓	—	—	—	—
Jarrkunpungu*	Nature Reserve (IUCN IA)	—	—	—	—	—
Jurabi Coastal Park^	5(1)(h) Reserve (IUCN II)	—	✓	✓	—	—
Kalbarri^	National Park (IUCN II)	✓	—	—	—	—
Koks Island*	Nature Reserve (IUCN IA)	—	✓	—	—	—
Lacepede Islands*	Nature Reserve (IUCN IA)	—	—	—	✓	—
Little Rocky Island^	Nature Reserve (IUCN IA)	—	—	✓	—	—
Locker Island^	Nature Reserve (IUCN IA)	—	—	✓	—	—
Lowendal Islands^	Nature Reserve (IUCN IA)	—	—	✓	—	—
Monkey Mia Reserve*	5(1)(h) Reserve (IUCN II)	—	✓	—	—	—
Montebello Islands^	Conservation Park (IUCN II)	—	—	✓	—	—
Muiron Islands^	Nature Reserve (IUCN IA)	—	—	✓	—	—
Murujuga^	National Park (IUCN II)	—	—	✓	—	—
Nanga Station	Gazettal in Progress	—	✓	—	—	—
North Sandy Island*	Nature Reserve (IUCN IA)	—	—	✓	—	—

Lands protected areas	Zone Type (IUCN category)	Section				
		West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
North Turtle Island*	Nature Reserve (IUCN IA)	—	—	✓	—	—
Nyingguulu (Ningaloo) Coastal Reserve^	5(1)(h) Reserve (IUCN II)	—	✓	—	—	—
One Tree Point^	Nature Reserve (IUCN IA)	—	✓	—	—	—
Round Island^	Nature Reserve (IUCN IA)	—	—	✓	—	—
Serrurier Island^	Nature Reserve (IUCN IA)	—	—	✓	—	—
Shell Beach^	Conservation Park (IUCN III)	—	✓	—	—	—
Tamala Pastoral Lease (Part)	Gazettal in Progress	—	✓	—	—	—
Tent Island*	Nature Reserve (IUCN IA)	—	—	✓	—	—
Victor Island*	Nature Reserve (IUCN IA)	—	—	✓	—	—
Unnamed WA36907^	5(1)(h) Reserve (IUCN II)	—	—	✓	—	—
Unnamed WA36910^	5(1)(h) Reserve (IUCN II)	—	—	✓	—	—
Unnamed WA36913^	Nature Reserve (IUCN IA)	—	—	✓	—	—
Unnamed WA36915^	Nature Reserve (IUCN IA)	—	—	✓	—	—
Unnamed WA37500#	5(1)(h) Reserve (IUCN II)	—	✓	—	—	—
Unnamed WA49144#	Conservation Park (IUCN II)	—	✓	—	—	—
Weld Island^	Nature Reserve (IUCN IA)	—	—	✓	—	—
Whalebone Island^	Nature Reserve (IUCN IA)	—	—	✓	—	—
Whitmore, Roberts, Doole Islands And Sandalwood Landing*	Nature Reserve (IUCN IA)	—	—	✓	—	—
Y Island*	Nature Reserve (IUCN IA)	—	—	✓	—	—
Yaringga	Gazettal in Progress	—	✓	—	—	—

Lands protected areas	Zone Type (IUCN category)	Section				
		West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
Zuytdorp^	Nature Reserve (IUCN IA)	—	✓	—	—	—

** Protected area is landward of LWM.*

^ Protected area is landward of HWM.

 # No information available.

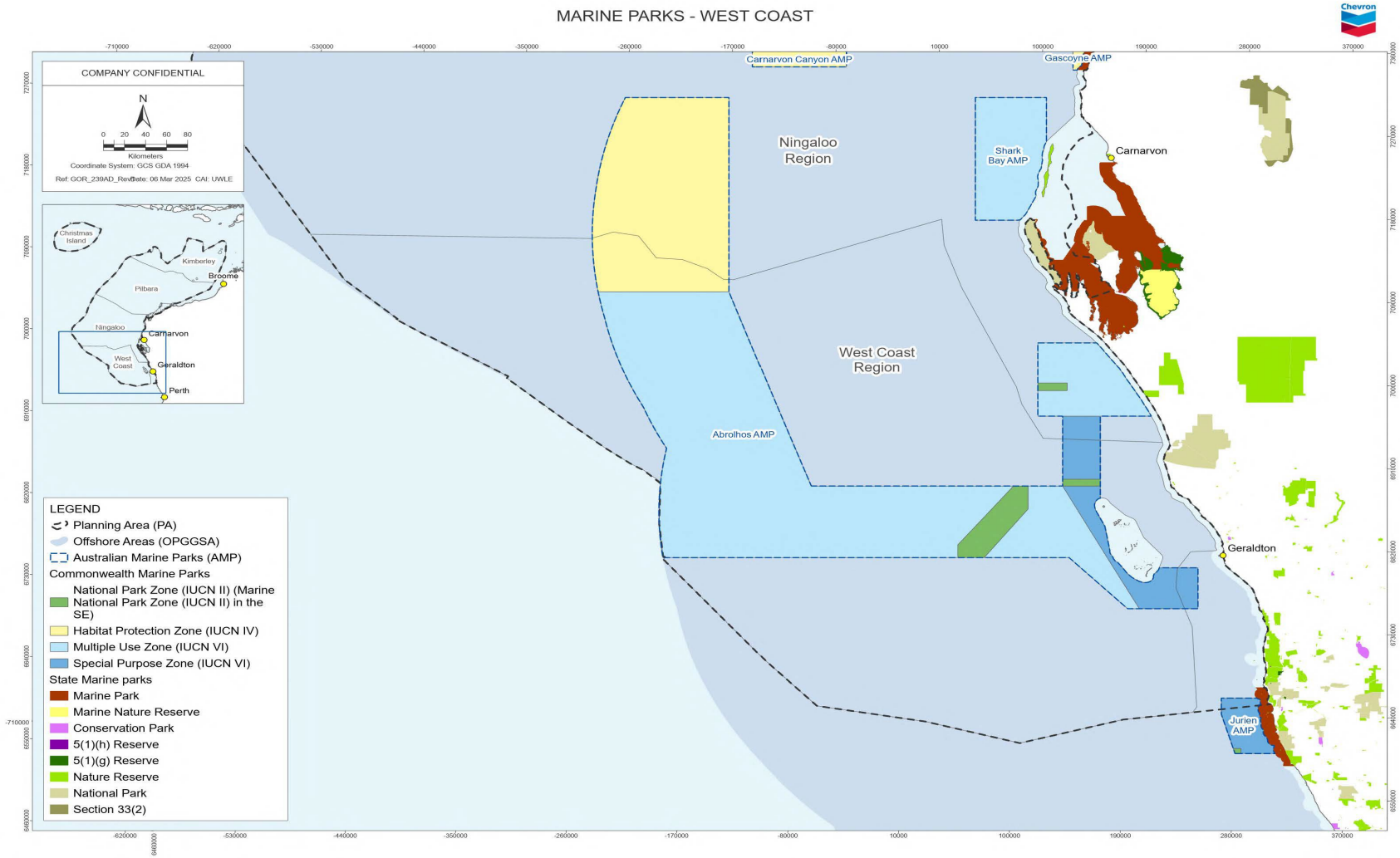

Figure 6-1: Commonwealth and state marine parks relevant to the PA, West Coast

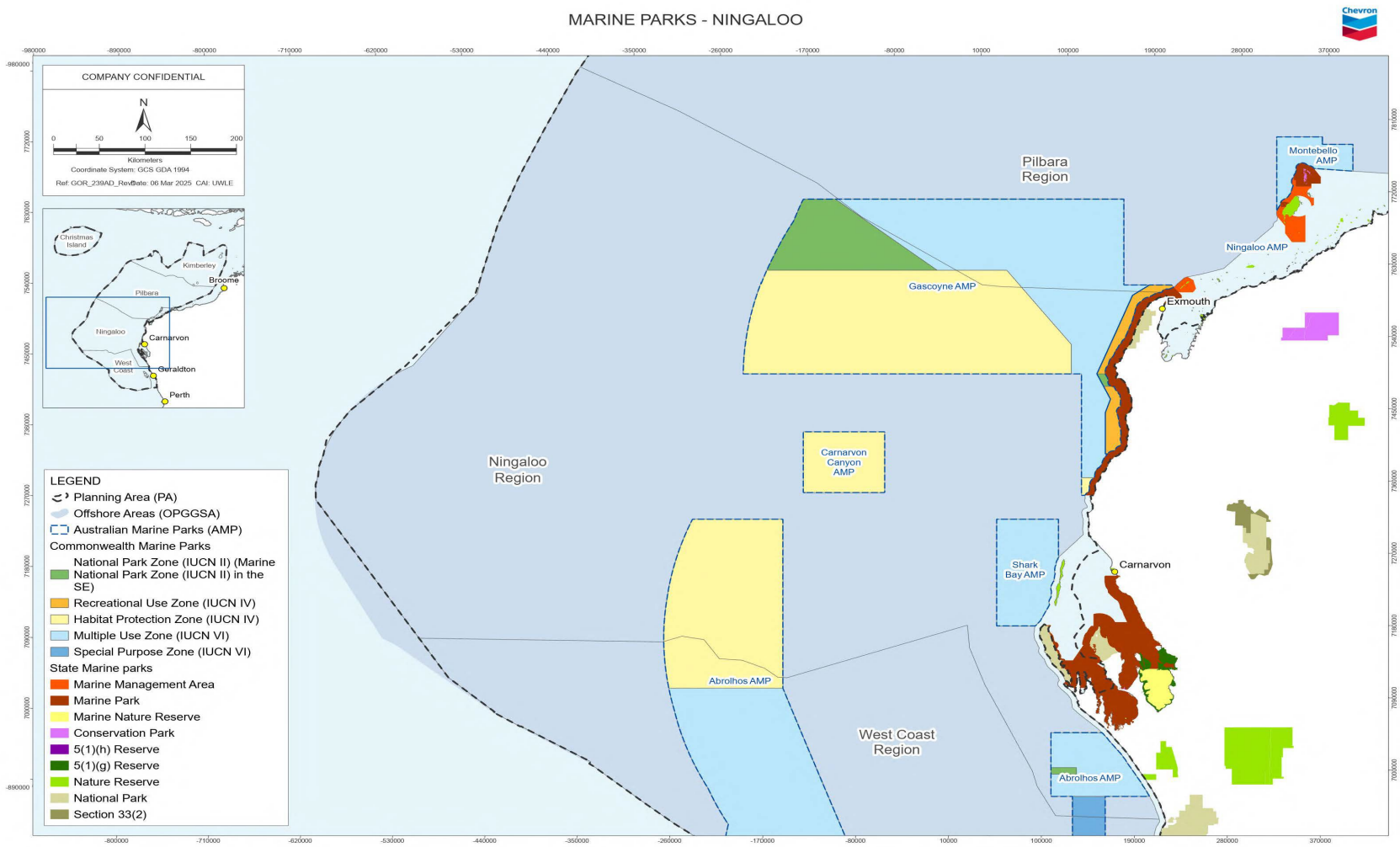

Figure 6-2: Commonwealth and state marine parks relevant to the PA, Ningaloo region

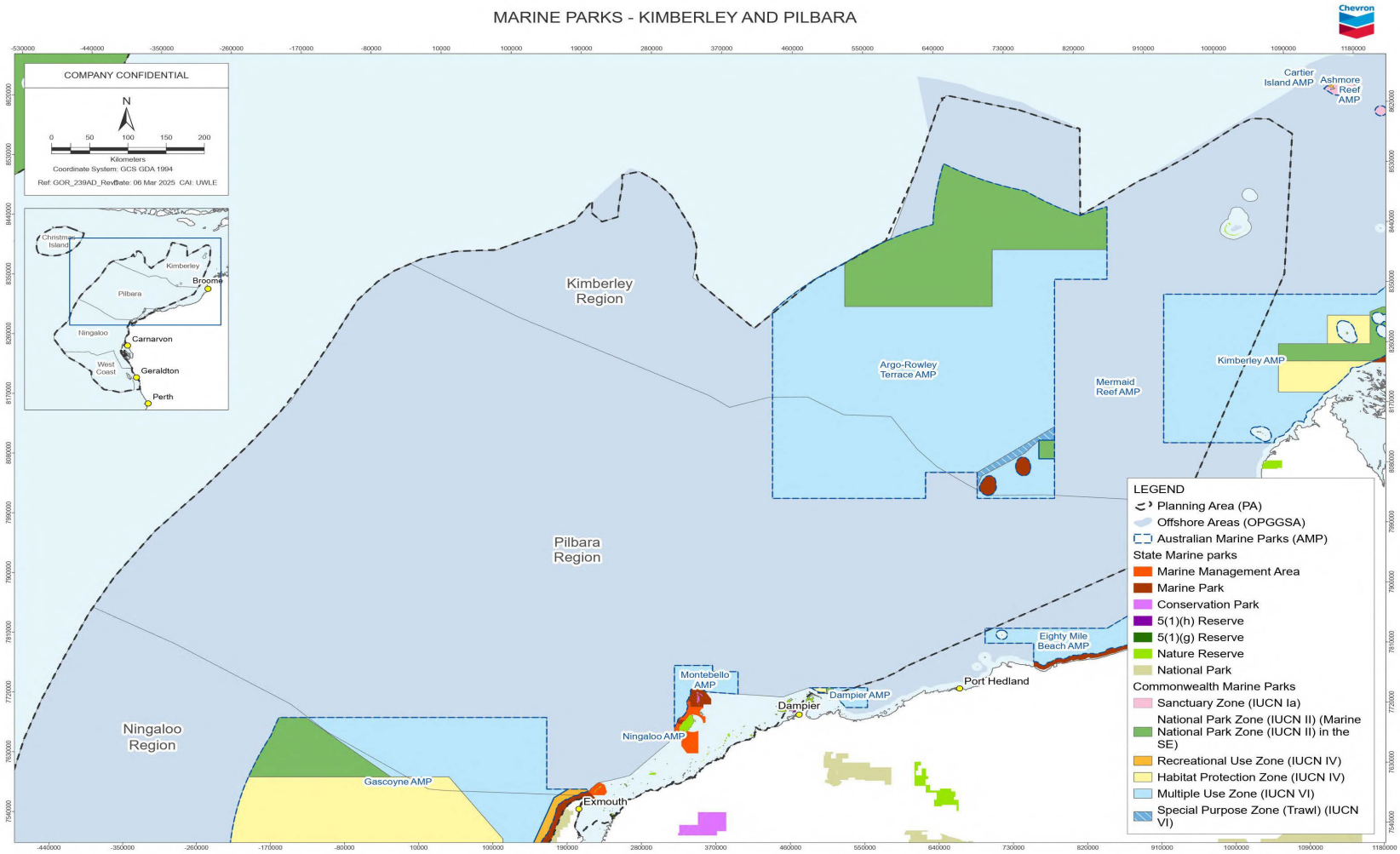

Figure 6-3: Commonwealth and state marine parks relevant to the PA, Kimberley Pilbara region

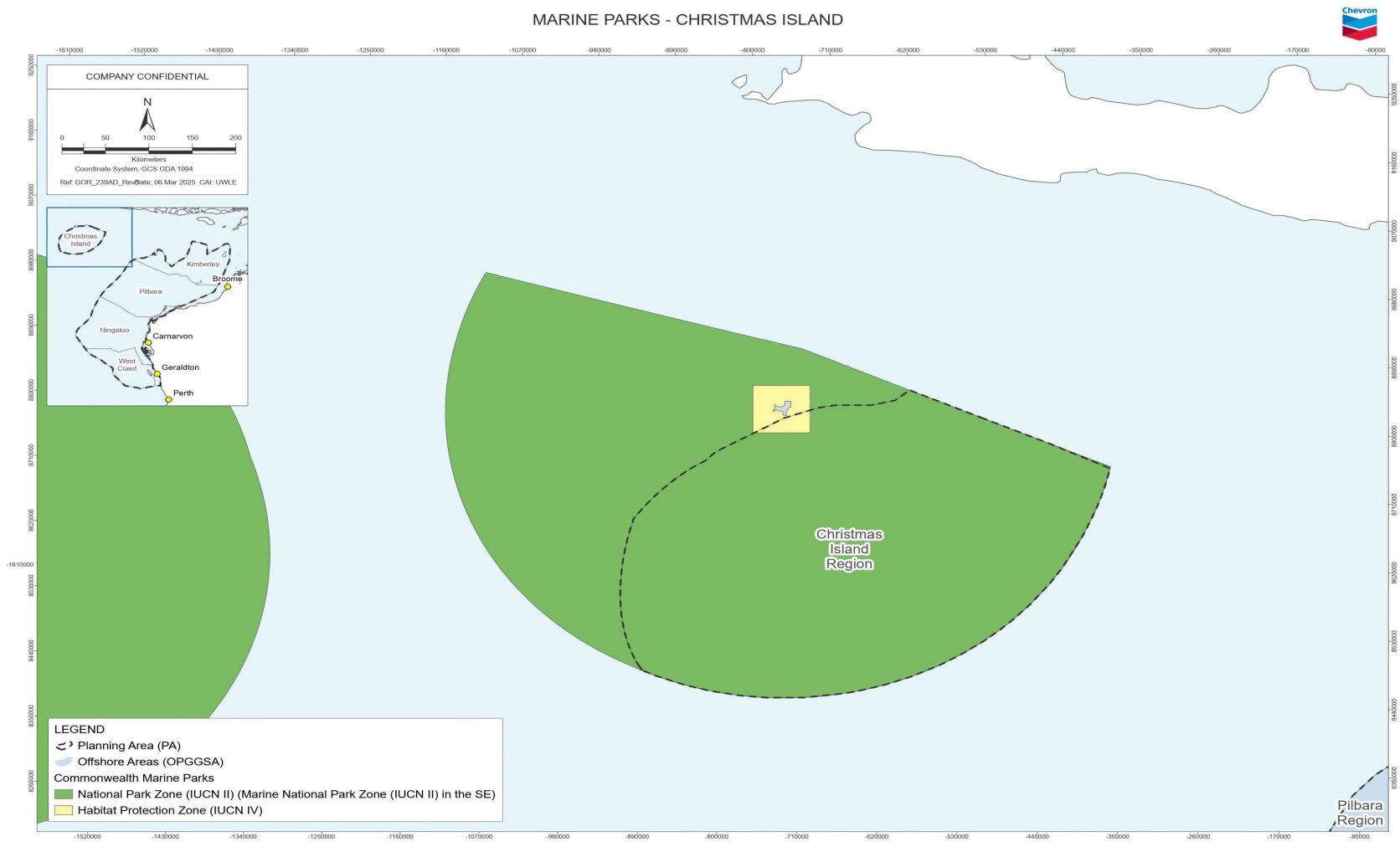

Figure 6-4: Commonwealth and state marine parks relevant to the PA, Christmas Island Region

7 heritage value and places

7.1 World Heritage properties, National and Commonwealth Heritage places

Listed World Heritage properties, and National Heritage places, are MNES under the EPBC Act, and a relevant value and sensitivity under the OPGGS(E)R.

Properties nominated for World Heritage listing are inscribed on the list only after they have been carefully assessed as representing the best examples of the world's cultural and natural heritage. At the time of writing this document, Australia has 20 properties on the World Heritage List (Ref. 739).

The National and Commonwealth Heritage Lists are Australia's list of natural, historic, and Indigenous places of outstanding significance to the nation. Both, the National and Commonwealth Heritage Lists spatial database (Ref. 740, Ref. 741) describes the place name, class (Indigenous, natural, historic), and status.

A review of the World Heritage Areas spatial database (Ref. 742), the Australia's World Heritage areas (Ref. 739), the National Heritage List spatial database (Ref. 740), the Commonwealth Heritage List spatial database (Ref. 741), searches of the online PMST (appendix a) identified the World, National and Commonwealth Heritage places that occur in the PA[14]. Table 7-1 summarises the values of these Heritage properties.

[14] Only listed World Heritage properties, National and Commonwealth Heritage places with a coastal and/or marine interface have been identified and described.

Table 7-1: World Heritage properties, National and Commonwealth Heritage places within the PA

Heritage property/place	Class	Section					Brief overview of values
		West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
World heritage property							
Shark Bay	N/A	—	✓	—	—	—	Located on the Indian Ocean coast at Australia's most westerly point, Shark Bay spans ~2.2 million hectares, with ~70% comprising marine waters. This area is renowned for its exceptional natural features, including the largest and richest seagrass beds in the world, a significant dugong population, and ancient stromatolites (dome-shaped colonies of algae considered some of the oldest life forms on Earth) (Ref. 743). Shark Bay also provide a refuge for several globally threatened species, including five species of endangered mammals (Ref. 743), found on Bernier and Dorre Islands (Ref. 743). Shark Bay is renowned for its marine fauna (Ref. 744): • a population of ~10,000 dugong and an abundance of dolphins, particularly at Monkey Mia • humpback whales, which use Shark Bay as a staging post during their WA coastal migration • green and loggerhead turtles near their southern limits, nesting on Dirk Hartog Island and Peron Peninsula beaches. Dirk Hartog Island is the most important nesting site for loggerhead turtles in WA • an important nursery ground for larval crustaceans, fishes, and jellyfish. ~25% of vascular plants (283 species) are at the limits of their range, with 51 species endemic to the region and some newly identified by science (Ref. 744). The area also supports a rich avifauna, with over 230 bird species (~35% of Australia's total) recorded, and ~100 amphibian and reptile species, many at their range limits. Notable burrowing species include the Sandhill Frog, which thrives without surface water. Shark Bay is home to three endemic sand-swimming skinks and 10 of Australia's 30 dragon lizard species (Ref. 744).

Heritage property/place	Class	Section					Brief overview of values
		West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
							Shark Bay contains Hamelin Pool, home to the world's most diverse and abundant stromatolite formations, which represent life forms from ~3.5 billion years ago (Ref. 744). Additionally, the area is one of the few marine regions dominated by carbonates unrelated to reef-building corals. This has fostered the development of the Wooramel Seagrass Bank, the largest seagrass meadow globally and the site with the highest recorded seagrass species diversity (Ref. 743).
The Ningaloo Coast	N/A	—	✓	✓	—	—	The Ningaloo Coast is located on WA's remote coast along the East Indian Ocean. The property holds a high level of terrestrial species endemism and high marine species diversity and abundance (Ref. 745). Whale sharks aggregate annually coinciding with mass coral spawning events and seasonal localised increases in productivity (Ref. 745). The integration of the Ningaloo Reef and Exmouth Peninsula karst system as a cohesive limestone structure is at the heart of the natural heritage significance of the Ningaloo Coast (Ref. 746). The marine portion of the World Heritage property contains a high diversity of habitats that includes lagoon, reef, open ocean, the continental slope, and the continental shelf (Ref. 745). Intertidal systems such as rocky shores, sandy beaches, estuaries, and mangroves are also present (Ref. 745). The most dominant marine habitat is the Ningaloo reef, which sustains both tropical and temperate marine fauna and flora, including marine reptiles and mammals (Ref. 745). The main terrestrial feature of the Ningaloo Coast is the extensive karst system and network of underground caves and water courses of the Cape Range (Ref. 745). The karst system includes hundreds of separate features such as caves, dolines, and subterranean water bodies and supports a rich diversity of highly specialised subterranean species. Above ground, the Cape Range Peninsula belongs to an arid ecoregion recognised for its high levels of species richness and endemism, particularly for birds and reptiles (Ref. 745).

Heritage property/place	Class	Section					Brief overview of values
		West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
							In addition to the natural values of the Ningaloo Coast, Indigenous values are identified under the National Heritage listing (Ref. 746). Archaeological deposits in the rock shelters on Cape Range show First Nations people sophisticated knowledge of marine resources between 35,000 and 17,000 years ago. The rock shelters are considered to provide the best evidence in Australia for the use of marine resources during the Pleistocene (Ref. 746). The evidence for standardisation in size and manufacture of the shell beads found at Mandu Creek rock shelter, coupled with the fact they provide the earliest unequivocal evidence for the creation of personal ornaments in Australia, demonstrates a high degree of creative and technical achievement (Ref. 747).
National heritage place							
Batavia Shipwreck Site and Survivor Camps Area 1629 - Houtman Abrolhos	Historic	✓	—	—	—	—	On the night of June 4, 1629, the Batavia struck a coral reef and sank in the Houtman Abrolhos Islands, 65 km off the coast of WA (Ref. 748). The Batavia is the oldest known Verenigde Oost-Indische Compagnie shipwreck on the WA coast. Due to its relatively undisturbed condition, archaeological investigations of the wreck have uncovered a wide range of historically significant artifacts (Ref. 749). The wreck site on Morning Reef is well-preserved, with substantial structural remains still intact. Similarly, the ruins of the two stone huts on West Wallabi Island are in good condition, with their walls largely preserved. Although little evidence remains of the campsites on Beacon Island, archaeological studies of the gravesites have revealed that they are in excellent condition (Ref. 749).
Dampier Archipelago (including Burrup Peninsula)	Indigenous	—	—	✓	—	—	The Dampier Archipelago, including the Burrup Peninsula, lies on the Indian Ocean coast in the west Pilbara region of northern WA, ~1,550 km north of Perth (Ref. 750). The Archipelago consists of 42 islands, islets and rocks ranging in size from <2 ha to 3,29 ha covering a total area of ~400 km^2 (Ref. 750). Formed 6,000–8,000 years ago by rising sea levels that flooded ancient coastal plains, the Archipelago is underpinned by some of

Heritage property/place	Class	Section					Brief overview of values
		West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
							the oldest rocks on Earth, dating back over 2.4 billion years to the Archaean period (Ref. 750). The region features diverse marine habitats, from wave-exposed, clear-water seaward areas with low sedimentation to sheltered coastal bays with turbid waters, as well as six species of mangroves (Ref. 750). Its warm tropical waters support abundant and highly diverse marine life, including rich coral species, bivalves, gastropods, crustaceans, worms, burrowing anemones, echinoderms, and brachiopods (Ref. 750). Additionally, the Dampier Archipelago is home to 650 species of shallow-water marine fish, including a rich reef assemblage (Ref. 750). The Dampier Archipelago (including the Burrup Peninsula) are renowned for their rock engravings, boasting one of Australia's densest concentrations. Some sites feature thousands, even tens of thousands, of images. These engravings include an exceptionally diverse range of schematised human figures, with some arranged in intricate scenes of national significance (Ref. 750). The area also contains a high density of stone arrangements. These include standing stones, stone pits, and circular stone formations. Standing stones range from solitary monoliths to extensive alignments of several hundred stones (Ref. 750). The Ngarda-Ngarli people of this region have traditional accounts of the formation of the Dampier Archipelago. For them, ancestral beings formed the landscape of the Dampier Archipelago in the Dreamtime and the spirits of these beings and other spirits such as Ngkurr, Bardi, and Gardi continue to live in the area (Ref. 750). They have left their mark in features like the Marntawarrura, or 'black hills,' said to be stained from the blood of the creative beings (Ref. 751).
Dirk Hartog Landing Site 1616 - Cape Inscription Area	Historic	—	✓	—	—	—	Cape Inscription is the site of the oldest known landings of Europeans on the WA coastline, and is associated with a series of landings and surveys by notable explorers over a 250-year period (Ref. 752). The first known European landing on the west coast of Australia was by Dirk Hartog of the Dutch East India Company's

Heritage property/place	Class	Section					Brief overview of values
		West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
							ship the Eendracht at Cape Inscription on 25 October 1616 (Ref. 752). After leaving the island, Hartog sailed northwards charting the coastline of WA to 22° south. As a result, a known part of the coastline of WA appeared on world maps for the first time, replacing the mythical southern continent of 'Terra Australis Incognita' (Ref. 752).
HMAS Sydney II and HSK Kormoran Shipwreck Sites	Historic	✓	—	—	—	—	The naval battle fought between the Australian warship *HMAS Sydney II* and the German commerce raider *HSK Kormoran* off the WA coast during World War II (November 1941) was a defining event in Australia's cultural history (Ref. 753). HMAS Sydney II was Australia's most famous warship of the time and this battle has forever linked the stories of these warships to each other. The tragic loss of HMAS Sydney II and its entire crew of 645 following the battle with HSK Kormoran remains Australia's worst naval disaster (Ref. 753). The two areas that make up the place are located ~211 km off the coast of WA The shipwrecks of the HMAS Sydney II and HSK Kormoran are within the place and are located on the sea bed ~22 km apart. The place includes the surface of the seabed and includes both the water column above the seabed and the airspace above the sea (Ref. 753).
Shark Bay	Natural	—	✓	—	—	—	Refer to the summary in the World Heritage property section above.
The Ningaloo Coast	Natural	—	✓	✓	—	—	Refer to the summary in the World Heritage property section above.
The West Kimberley	Natural	—	—	—	✓	—	The National Heritage listing of the West Kimberley recognises the natural, historic, and Indigenous stories of the region that are of outstanding heritage value to the nation (Ref. 754). The listing also recognizes the important history of non-Indigenous exploration and settlement of the Kimberley. Many non-Indigenous people have forged their own close ties to the region and have learned to live in and understand this extraordinary place (Ref. 754). The Kimberley occupies more than 420,000 km^2 on the north-western margin of the Australian continent (Ref. 754). Its rocky

Heritage property/place	Class	Section					Brief overview of values
		West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
							coastline edges the Indian Ocean, and off the coast lie thousands of islands, many fringed with coral. The Mitchell Plateau (Ngauwudu) rises to nearly 800 m above sea level at its centre, in places dropping into steep escarpments, and losing altitude as it approaches the sea. Further south, Yampi Peninsula lies in a transitional area between the high rainfall of tropical north Kimberley and the drier conditions characteristic of central WA. These different environments meet in a complex landscape of plains, dissected sandstone plateaus, and rugged mountains (Ref. 754). The central Kimberley, which includes the periphery of north Kimberley plateau country and the King Leopold Ranges, is very rugged; the physical structures here were formed by significant geological events, which folded rocks intensely, many thousands of millions of years ago. That such evidence of a distant past can today be seen so clearly in the landscape is due to the region's remarkable geological stability. This stability has also allowed the much more recent appearance of extensive limestone ranges, built from the remains of an extraordinary reef complex which, more than 300 million years ago, rivalled the Great Barrier Reef in size. The ranges have since eroded to form complex networks of caves and tunnels (Ref. 754). Dinosaur footprints and tracks are remarkable remnant of past life in the Kimberley; they are exposed in many places in the Broome sandstone, along the western length of Dampier Peninsula. This coastline is subject to one of the highest tidal ranges in the world, and many of the fossil footprints can only be seen for short periods during very low tides. Inland of Dampier Peninsula, south of the broad floodplains of the Fitzroy River, the distinctive red of the pindan country opens onto a vast expanse of desert (Ref. 754). Throughout the Kimberley, where water meets land—in estuaries, mangroves and mudflats, in moist vine thickets, along the banks of rivers and creeks, around waterholes or soaks—there is an abundance of plants and animals, some of which live only in the Kimberley, while others may have travelled from the far side of the world to nest or breed here (Ref. 754).

Heritage property/place	Class	Section					Brief overview of values
		West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
							Aboriginal people believe that their traditional countries have been formed during an era of creation often described in English as 'the Dreaming' or 'the Dreamtime'. During the Dreaming both the natural and human world are formed coterminously by ancestral creator beings who are manifestations of powerful spiritual forces that permeate the cosmos (Ref. 754).
Commonwealth heritage place							
Christmas Island Natural Areas (External territories list)	Natural	—	—	—	—	✓	Christmas Island lies at the intersection of the Australian and Malaysian regions, hosting flora and fauna representative of both. Species on the island have adapted to its seasonal climate, phosphate-rich soils, and karst-dominated terrain (Ref. 755). The island is home to three notable endemic seabird species, seven endemic land birds, and serves as a habitat or stopover for migratory birds from regions like Japan and China. Additionally, the island is renowned for its marine biodiversity, which includes numerous fish, coral, mollusc, echinoderm, and decapod crustacean species (Ref. 755). The island's diverse land crab population plays a critical ecological role, substituting the scavenging functions typically performed by small mammals and ground birds. These crabs significantly influence the recruitment and distribution of rainforest plant species, contributing to the simple structure of the island's plateau rainforest. Fourteen land crab species are present, including the abundant and endemic red crab (Ref. 755). The blue crab, uniquely appearing in its blue form on the island, may represent an endemic subspecies pending further genetic analysis. Marine plankton feeders such as whale sharks and manta rays are observed in the surrounding waters, with whale sharks likely timing their visits to coincide with the seasonal red crab larval bloom (Ref. 755). Geologically, Christmas Island is an isolated volcanic seamount capped by discontinuous limestone formations. It rises from ocean depths of 4,500 m to an altitude of 357 m at Murray Hill. The limestone layer is characterized by karst features such as caves and sinkholes, with extensive systems following fault lines (Ref. 755).

Heritage property/place	Class	Section					Brief overview of values
		West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
HMAS Sydney II and HSK Kormoran Shipwreck Sites	Historic	✓	—	—	—	—	Refer to the summary in the National Heritage place section above.
Learmonth Air Weapons Range Facility	Natural	—	✓	—	—	—	The geomorphology of Cape Range, of which the Learmonth Range Facility is a part, is significant for documenting sea level and landform changes since the late Cenozoic (around 1.8 million years ago) (Ref. 756). A series of emergent reef complexes, representing multiple periods of coral reef development, are striking features of the western side of the Learmonth Range Facility and Cape Range. The ages of these reef terraces are crucial for understanding the timing of uplift events (Ref. 756). The coastal plain of Cape Range contains a network of subterranean waterways, including caverns and fissures in the limestone beneath the plain. Among these, Bundera Sinkhole, located within the Learmonth Range Facility, stands out as the only deep anchialine system known in Australia and the only continental anchialine system identified in the Southern Hemisphere (Ref. 756). Anchialine systems are cave networks with restricted surface exposure, subterranean connections to the sea, and a blend of marine and terrestrial influences (Ref. 756). The cave fauna of Cape Range, particularly at Bundera Sinkhole, is of exceptional biogeographical significance. Bundera Sinkhole hosts several species of aquatic stygofauna, many of which are endemic to the sinkhole or the Cape Range (Ref. 756). Many of these species share their closest affinities with the fauna of anchialine caves on both sides of the North Atlantic. This narrow cave is the only known habitat for a crustacean belonging to the class *Remipedia* (Ref. 756). Potential cultural values of National Estate significance, both Indigenous and non-Indigenous, may also be associated with this site. However, these values have not yet been identified,

Heritage property/place	Class	Section					Brief overview of values
		West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
							documented, or assessed by the Australian Heritage Commission (Ref. 756).
Mermaid Reef - Rowley Shoals	Natural	—	—	—	✓	—	Rowley Shoals consists of three large, emergent shelf-edge reefs located ~260 km f off the northwestern coast of mainland Australia on the edge of the broad continental shelf (Ref. 757). Mermaid Reef, one of the three reefs, is notable for its rare environmental conditions, including clear, deep oceanic water and large tidal ranges, characteristics unique to Rowley Shoals in WA (Ref. 757). The reefs provide habitats for diverse species, some of which have not been previously recorded in WA, including fish, molluscs, and echinoderms. They are regionally significant for their faunal diversity, particularly corals, molluscs, echinoderms, and fish (Ref. 757). Mermaid Reef, along with Clerke and Imperieuse Reefs, has biogeographical importance due to the presence of species at or near the limits of their geographic ranges, such as fish previously known only from Indonesian waters. It also acts as a genetic "stepping stone," facilitating the transfer of genetic material from the Indonesian archipelago to southern reefs (Ref. 757). Rowley Shoals is among the best examples of shelf-edge reefs in Australian waters, showcasing their structural and developmental characteristics. It has been the focus of significant biological research, including major collection expeditions by the Western Australian Museum (Ref. 757). Additionally, a shipwreck off the western edge of Mermaid Reef is believed to be that of the British whaling vessel, the Lively, which was lost in the early 1800s (Ref. 757).
Ningaloo Marine Area - Commonwealth Waters	Natural	—	✓	✓	—	—	Refer to the summary in the World Heritage property section above.

Heritage property/place	Class	Section					Brief overview of values
		West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island	
Scott Reef and Surrounds - Commonwealth Area	Natural	—	—	—	✓	—	Scott Reef is a large, emergent shelf atoll located on the edge of the broad continental shelf, ~300 km off the northwestern coast of Australia and ~23 km south-west of Seringapatam Reef (Ref. 758). The reef is regionally significant for its unique faunal composition, which includes species not found in coastal WA waters and demonstrates affinities with oceanic reef habitats of the Indo-West Pacific and Indonesian regions (Ref. 758). Its sedimentary sequence, extending back to the Triassic period, provides valuable insights into long-term geomorphological processes, reef formation, and past environments (Ref. 758). Scott Reef supports a highly diverse range of marine life, including 51 fish species, 14 mollusc species, six echinoderm species, and the seagrass *Thalassia hemprichii* (Ref. 758). The reef's isolation and size contribute to the evolution of genetically distinct subspecies and endemic species. Additionally, Scott Reef, along with Seringapatam Reef, are biogeographically significant for facilitating gene flow and coral spore movement to nearby reefs such as Ashmore Reef and Rowley Shoals. Its extensive habitat diversity makes it a biodiversity hotspot, particularly for fish (Ref. 758). The reef's environmental conditions, which are clear, deep oceanic water and large tidal ranges, are rare for shelf atolls. The sand cays within Scott Reef provide critical staging habitats for migrating animals and birds in the otherwise landless Timor Sea (Ref. 758). Of the 25 bird species identified, 17 are listed under the China-Australia and Japan-Australia Migratory Bird Agreements (Ref. 758).

7.2 Underwater cultural heritage

Australia's underwater cultural heritage is protected under the *Underwater Cultural Heritage Act 2018* (Cth) (UCH Act); this legislation protects shipwrecks, sunken aircraft and other types of underwater heritage, including First Nations UCH in Australian waters[15].

Under section 15 of the UCH Act, UCH is defined as "any trace of human existence that has a cultural, historical, or archaeological character, and is located under water". The UCH Act protects physical sites and artefacts; intangible heritage values with no physical component are not protected under the Act (Ref. 759).

A desktop analysis was undertaken to determine the presence of underwater cultural heritage within the PA using searches of the online Australasian Underwater Cultural Heritage Database (Ref. 760) for known underwater cultural heritage (shipwrecks, aircraft, relics, and other underwater cultural heritage) in Australian waters.

Table 7-2 summarises the known underwater cultural heritage. The PA includes ~360 shipwrecks, including historic ones. Given the large number, specific details are not provided in this document. However, if shipwrecks are identified within an Operational Area described in a project-specific EP, CAPL will assess their significance and include detailed information in that EP, if necessary.

Table 7-2: Summary of known underwater cultural heritage

UCH	Brief overview
Historic shipwrecks (>75 years old)	Around 260 shipwrecks have been identified and classified as follows: • ~50 historic shipwrecks in the West Coast section • ~110 historic shipwrecks in the Ningaloo section • ~50 historic shipwrecks in the Pilbara section • ~50 historic shipwrecks in the Kimberley section • only one historic shipwreck, Nissei Maru, in Christmas Island section
Shipwrecks (including historic shipwrecks)	Around 360 shipwrecks have been identified and classified as follows: • ~90 shipwrecks in the West Coast section • ~115 shipwrecks in the Ningaloo section • ~95 shipwrecks in the Pilbara section • ~60 shipwrecks in the Kimberley section • only one shipwreck, Nissei Maru, in Christmas Island section
Sunken aircraft	No known sunken aircraft was identified in the PA
In situ artefacts	Only one, Point Samson Unidentified, was identified off Karratha, in the Pilbara section

7.3 Aboriginal cultural heritage

The *Aboriginal Cultural Heritage Act 1972* (WA) recognises Aboriginal cultural heritage in the WA, including within State waters. A desktop search of heritage sites within the Department of Planning, Lands and Heritage (DPLH) spatial

[15] The UCH Act applies to all Australian waters, including both State waters (coastal waters) and Commonwealth waters (extending from coastal waters to the edge of continental shelf).

dataset (Ref. 761; HOLD) was undertaken to determine the presence of Aboriginal cultural heritage (ACH) in the PA with a potential coastal and/or marine interface. Table 7-3 summarises the results of the desktop search. . Given the large numberof ACH places identified in the search (~4,700), specific details are not provided in this document. However, if ACH are identified within an Operational Area described in a project-specific EP, CAPL will assess their significance and include detailed information in that EP, if necessary.

This is considered a conservative approach, as the heritage sites within the DPLH spatial dataset (Ref. 761) include a buffer around sites to protect privacy regarding the location. As such, the identified heritage sites may not be present within the PA. There may be other Aboriginal cultural heritage within the meaning of the *Aboriginal Cultural Heritage Act 1972* (WA) present in the PA even if not within the DPLH spatial dataset (Ref. 761)

Table 7-3: Summary of known Aboriginal Cultural Heritage

ACH	Brief overview
Register	Around 2,900 ACH register places have been identified and classified as follows: • 13 ACH register places have been identified in the West Coast section • 187 ACH register places have been identified in the Ningaloo section • 2,700 ACH register places have been identified in the Pilbara section • no ACH register places have been identified in the Kimberley section • no ACH register places have been identified in the Christmas Island section
Lodged	Around 1,800 lodged places have been identified and classified as follows: • three ACH lodged places have been identified in the West Coast section • 83 ACH lodged places have been identified in the Ningaloo section • 1,789 ACH lodged places have been identified in the Pilbara section • no ACH lodged places have been identified in the Kimberley section[16] • no ACH lodged places have been identified in the Christmas Island section

7.3.1 Indigenous Protected Areas

Indigenous Protected Areas (IPAs) are protected areas of land and sea Country managed by First Nations groups to achieve biodiversity conservation outcomes for the benefit of Australians, under voluntary agreements with the Australian Government (Ref. 762). As of October 2024, there are 87 dedicated IPAs (Ref. 762). The PA does not overlap with any IPAs.

7.3.2 Native Title

Native Title recognises the rights and interests of Aboriginal and Torres Strait Islander people in land and waters according to their traditional laws and customs, and is administered under the *Native Title Act 1993* (Cth).

Native Title areas relevant to the PA are detailed in Table 7-4 .

[16] Although the ACH Inquiry system has identified one ACH, it is located outside of the Kimberley section.

Table 7-4: Determined areas under the *Native Title Act 1993* (Cth)

Tribunal ID	Name	Section				
		West Coast	Ningaloo	Pilbara	Kimberley	Christmas Island
WCD2005/001	Ngarluma/Yindjibarndi	—	—	✓	—	—
WCD2007/003	Ngarla and Ngarla #2 (Determination Area A)	—	—	✓	—	—
WCD2008/003	Thalanyji	—	—	✓	—	—
WCD2015/007	Ngarluma People	—	—	✓	—	—
WCD2018/005	Bindunbur	—	—	—	✓	—
WCD2018/006	Yaburara & Mardudhunera People	—	—	✓	—	—
WCD2018/011	Nanda People and Nanda #2	—	✓	—	—	—
WCD2018/012	Malgana Part A	—	✓	—	—	—
WCD2018/015	Kariyarra	—	—	✓	—	—
WCD2019/014	Nanda People Part B, Malgana 2 and Malgana 3	✓	✓	—	—	—
WCD2019/016	Gnulli, Gnulli #2 and Gnulli #3 - Yinggarda, Baiyungu and Thalanyji People	—	✓	✓	—	—
WCD2020/001	Yamatji Nation	✓	—	—	—	—

7.3.2.1 WCD2005/001

The Native Title determination extends over the Dampier archipelago in the west of Pilbara. The Ngarluma and Yindjibarndi people received recognition as a Native Title holder over an area of 1,562 km^2. The determination area encompasses native title rights over parts of the claim area, including rights of access and to use resources (Ref. 763).

The relevant PBC is the Yindjibarndi Aboriginal Corporation.

7.3.2.2 WCD2007/003

The Native Title determination extends over Port Hedland in the Pilbara region. The Ngarluma and Yindjibarndi people received recognition as a Native Title holder over an area of 4,631 km^2. The determination area encompasses native title rights over parts of the claim area, including rights of access and camp on the land, to take certain traditional resources from the land, to engage in ritual and ceremony, and to care for, maintain and protect from physical harm particular sites and areas of significance (Ref. 764). The Ngarla People engage in Ngarla lore, culture and custom in their continued care and protection of country (Ref. 764).

The relevant PBC is the Wanparta Aboriginal Corporation RNTBC.

7.3.2.3 WCD2008/003

The Native Title determination extends around Onslow in the Pilbara region. The Thalanyji People received recognition as a Native Title holder over an area of 11,120 km^2. The majority of the area is comprised of thirteen pastoral leases. The remainder of the claim area consisted of primarily unallocated Crown land (Ref. 765).

The relevant PBC is the Burrabalayji Thalanyji Aboriginal Corporation.

7.3.2.4 WCD2018/005

The Native Title determination extends around Broome in the Kimberley region. The Nyul Nyul people alongside Nimanburr and Jabirr Jabirr people received recognition as Native Title holders. There are heritage places in the Native Title that have existing protections registered through Commonwealth and State legislative processes (Ref. 766).

The relevant PBCs are the Gogolanyngor Aboriginal Corporation, Nimanburr Aboriginal Corporation and Nyul Nyul PBC Aboriginal Corporation.

7.3.2.5 WCD2018/006

The Native Title determination extends over the Mardie coast area. The Yaburara and Mardudhunera people received recognition as a Native Title holder over an area of 5,683 km^2. The determination area encompasses several pastoral leases, mining tenements, roads, reserves and unallocated Crown land.

The Yaburara and Mardudhunera people have maintained a physical presence in their respective part of the determination area and have a continuing physical or spiritual involvement in that area (Ref. 767). The determination area contains places of special significance, such as cultural, spiritual, and ceremonial sites and natural resources.

The relevant PBC is the Wirrawandi Aboriginal Corporation (WAC).

7.3.2.6 WCD2018/011

The Native Title determination extends around Kalbarri in the Geraldton region. The Nanda people received recognition as a Native Title holder over an area of 17,350 km^2. There are also a number of waterways and tributaries that form part of the Murchison catchment area within the claim area that are significant to the Nanda People including Long Springs, Cement Slab, Bully Pool, Wilgie Mia Pool, and Syphon Pool (Ref. 768). The Determination Area also includes some highly significant natural heritage areas: the Kalbarri National Park, the Zuytdorp Nature Reserve, and the Toolonga Nature Reserve. Most of the freehold and leasehold tenure within the Determination Area exists in and around the town of Kalbarri (Ref. 768).

The relevant PBC is the Nanda Aboriginal Corporation RNTBC.

7.3.2.7 WCD2018/012

The Native Title determination extends around Shark Bay in the southern Gascoyne region. The Malgana people received recognition as a Native Title holder over an area of 28,800 km^2. The determination area encompasses native title rights over parts of the claim area, including rights of access and camp on the land, to take certain traditional resources from the land and water, and to engage in cultural activities (Ref. 769).

The relevant PBC is the Malgana Aboriginal Corporation Registered Native Title Body Corporate.

7.3.2.8 WCD2018/015

The Native Title determination extends around Port Hedland in the Pilbara region. The Kariyarra People received recognition as a Native Title holder over an area of 17,356 km^2.

The determination area encompasses native title rights over parts of the claim area, including rights of access and camp on the Non-Exclusive area, to take certain traditional resources, to engage in cultural activities and to participate in decision-making related to the use of the Non-Exclusive area (Ref. 770). The Kariyarra People also successfully developed an Indigenous Land Use Agreement in collaboration with the Western Australian Government and Yamatji Marlpa Aboriginal Corporation (Ref. 770).

The relevant PBC is the Kariyarra Aboriginal Corporation RNTBC.

7.3.2.9 WCD2019/014

The Native Title determination extends south of Shark Bay and west of Toolonga Nature Reserve. The Malgana people received recognition as Native Title holders.

The determination area encompasses native title rights over parts of the claim area, including rights of access and camp on the land, to take certain traditional resources from the land and water, and to engage in cultural activities (Ref. 668).

The relevant PBC is the Malgana Aboriginal Corporation Registered Native Title Body Corporate. Part of the determination area overlaps the same area of land where the Malgana People and Nanda People are recognised as native title holders (Ref. 668). In the shared area, the native title rights and interests are held

by both the Malgana Aboriginal Corporation for the Malgana People, and the Nanda Aboriginal Corporation (RNTBC), for the Nanda People (Ref. 668).

7.3.2.10 WCD2019/016

The Native Title determination extends over the Ningaloo Coast region. The Yinggarda, Baiyungu, and Thalanyji people received recognition as a Native Title holder over an area of 71,354 m^2. The determination area encompasses several pastoral leases, mining tenements, roads, and reserves, as well as portions of the Kennedy Range and Cape Range national parks, Ningaloo Marine Park, Lake MacLeod, and waters in the Exmouth Gulf and Ningaloo Marine Park (Ref. 668). The Yinggarda, Baiyungu and Thalanyji people have each maintained a physical presence in their respective part of the determination area and have a continuing physical or spiritual involvement in that area (Ref. 668). The determination area contains places of special significance, such as cultural, spiritual, and ceremonial sites and natural resources (Ref. 668).

The relevant Prescribed Bodies Corporate (PBC) are the NTGAC (representing the Baiyungu and Thalanyji people) and the YAC.

7.3.2.11 WCD2020/001

The Native Title determination extends around Geraldton in the Midwest Region. The Yamatji Nation, which includes group of descendants of ancestors not included in the other underlying claims (Yamatji Marlpa Aboriginal Corporation) received recognition as a Native Title holder over an area of 48,000 km^2.

This determination provides recognition of the Yamatji Nation claim group's non-exclusive native title rights and interests over parts of the former Barnong, Menai Hills, and Kadji Kadji pastoral leases, land parcels adjacent to the Wanda Nature Reserve and within the Lucky Bay Reserve, as well as Aboriginal Lands Trust areas in Carnamah, Kadathini and Eneabba (Ref. 772).

The relevant PBC is the Bundi Yamatji Aboriginal Corporation.

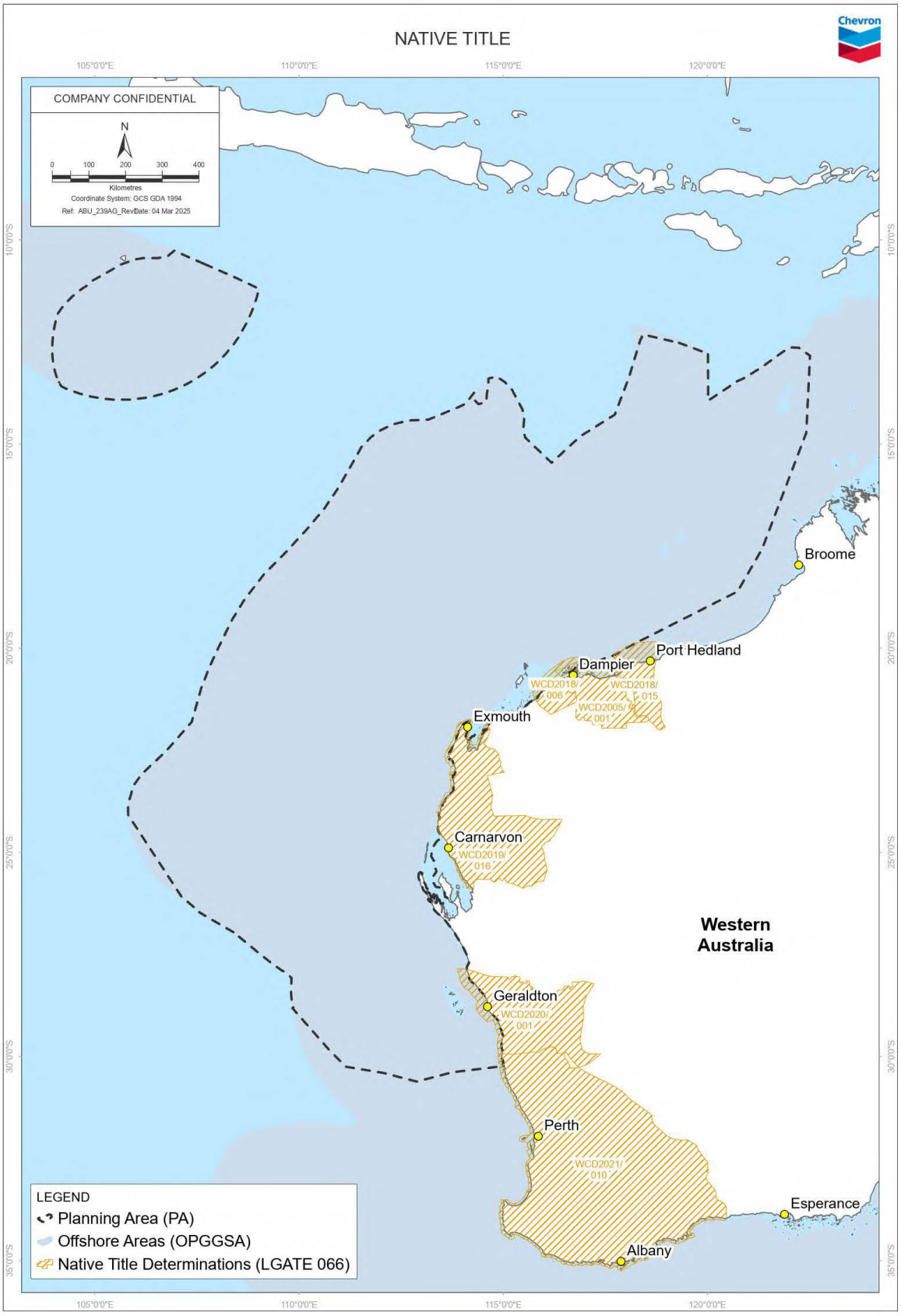

Figure 7-1: Native Title determinants relevant to the PA

8 acronyms and abbreviations

Table 8-1 defines the acronyms and abbreviations used in this document.

Table 8-1: Acronyms and abbreviations

Acronym / Abbreviation	Definition
ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ACH	Aboriginal Cultural Heritage
AFZ	Australian Fishing Zone
AMPs	Australian Marine Parks
AMSA	Australian Maritime Safety Authority
AMSIS	Australian Marine Spatial Information System
ANZG	Australian and New Zealand Governments
BAC	Baiyungu Aboriginal Corporation
BIAs	Biologically Important Areas
BKO	Breeding known to occur within area
BTAC	Buurabalayji Thalanyji Aboriginal Corporation
CALM Act	*Conservation Land Management Act 1984*
CAPL	Chevron Australia Pty Ltd
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Cth	Commonwealth (of Australia)
DAS	Distributed Acoustic Sensing
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
EEZ	Exclusive Economic Zone
EMBA	Environment that may be affected
EP	Environment Plan
EPBC	*Environmental Protection and Biodiversity Act 1999*
ES	Ecological Sustainability
FBLO	Foraging, feeding or related behaviour likely to occur within area
FBKO	Foraging, feeding or related behaviour known to occur within area
FHPA	Fish Habitat Protection Areas
HCTS	Habitat of Critical to the Survival
HWM	High water mark
IBRA	Interim Biogeographic Regionalisation for Australia
IMCRA	Integrated Marine and Coastal Regionalisation of Australia
IOT	Indian Ocean Territories
IPAs	Indigenous Protected Areas

Acronym / Abbreviation	Definition
ISQG	Interim Sediment Quality Guidelines
IUCN	International Union for Conservation of Nature
ka	kiloannum
KAC	Kariyarra Aboriginal Corporation
KEF	Key ecological feature
LNG	Liquid natural gas
LoR	Limit of Reporting
LWM	Low water mark
MAC	Murujuga Aboriginal Corporation
MCH	Mardathoonera Cultural Heritage Pty Ltd
MMF	Mackerel Managed Fishery
MNES	Matters of National Environmental Significance
MoU	Memorandum of Understanding
MRKO	Migration route known to occur within area
NAC	Nanda Aboriginal Corporation (RNTBC)
NAC	Ngarluma Aboriginal Corporation
NEPM	National Environmental Protection Measure
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NSW	New South Wales
NT	Northern Territory
NTGAC	Nganhurra Thanardi Garrbu Aboriginal Corporation
NWMR	North-West Marine Region
NWS	North West Shelf
NWSTF	North West Slope Trawl Fishery
NYFL	Ngarluma Yindjibarndi Foundation Ltd
OPGGS Act	*Offshore Petroleum and Greenhouse Gas Storage Act 2006*
OPGGS(E)R	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023
OSMP	Operational and Scientific Monitoring Program
PA	Planning Area
PAH	Polycyclic Aromatic Hydrocarbons
PBC	Prescribed Body Corporate
PM	Particulate matter
PMST	Protected Matters Search Tool
RRKAC	Robe River Kuruma Aboriginal Corporation
SA	South Australia
SKO	Species or species habitat known to occur within area

Acronym / Abbreviation	Definition
SLO	Species or species habitat likely to occur within area
SMO	Species or species habitat may occur within area
SWMR	South-West Marine Region
TAC	Total Allowable Catch
TEC	Threatened Ecological Communities
UCH	Underwater Cultural Heritage
UXO	Unexploded Ordnance
WA	Western Australia
WAC	Wirrawandi Aboriginal Corporation
WDTF	Western Deepwater Trawl Fishery
WTBF	Western Tuna and Billfish Fishery
YAC	Yinggarda Aboriginal Corporation
YMAC	Yamatji Marlpa Aboriginal Corporation

9 references

The following documentation is either directly referenced in this document or is a recommended source of background information.

Table 9-1: References

Ref No	Description	Document ID
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appendix a protected matters search reports

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 08-Jan-2025

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	2
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	4
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	74
Listed Migratory Species:	63

Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	23
Commonwealth Heritage Places:	2
Listed Marine Species:	102
Whales and Other Cetaceans:	36
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	8
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	9
Regional Forest Agreements:	None
Nationally Important Wetlands:	2
EPBC Act Referrals:	44
Key Ecological Features (Marine):	7
Biologically Important Areas:	21
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

National Heritage Places [Resource Information]

Name	State	Legal Status
Historic		
HMAS Sydney II and HSK Kormoran Shipwreck Sites	EXT	Listed place
Batavia Shipwreck Site and Survivor Camps Area 1629 - Houtman Abrolhos	WA	Listed place

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat may occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Endangered	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Phaethon rubricauda westralis Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Thalassarche carteri		
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche cauta		
Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area
Turnix varius scintillans		
Painted Button-quail (Houtman Abrolhos) [82451]	Endangered	Species or species habitat known to occur within area
Zanda latirostris listed as Calyptorhynchus latirostris		
Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Species or species habitat known to occur within area
MAMMAL		
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Migration route known to occur within area

Scientific Name	Threatened Category	Presence Text
[Balaenoptera physalus](#) Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Bettongia penicillata ogilbyi](#) Woylie [66844]	Endangered	Species or species habitat known to occur within area
[Dasyurus geoffroii](#) Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
[Eubalaena australis](#) Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
[Macroderma gigas](#) Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area
[Neophoca cinerea](#) Australian Sea-lion, Australian Sea Lion [22]	Endangered	Breeding known to occur within area
[Parantechinus apicalis](#) Dibbler [313]	Endangered	Species or species habitat may occur within area
[Petrogale lateralis lateralis](#) Black-flanked Rock-wallaby, Moororong, Black-footed Rock Wallaby [66647]	Endangered	Species or species habitat known to occur within area
PLANT		
[Androcalva bivillosa](#) Straggling Androcalva [87807]	Critically Endangered	Species or species habitat likely to occur within area
[Beyeria lepidopetala](#) Small-petalled Beyeria, Short-petalled Beyeria [18362]	Endangered	Species or species habitat likely to occur within area
[Caladenia barbarella](#) Small Dragon Orchid, Common Dragon Orchid [68686]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Caladenia bryceana subsp. cracens Northern Dwarf Spider-orchid [64556]	Vulnerable	Species or species habitat known to occur within area
Caladenia elegans Elegant Spider-orchid [56775]	Endangered	Species or species habitat known to occur within area
Caladenia hoffmanii Hoffman's Spider-orchid [56719]	Endangered	Species or species habitat known to occur within area
Caleana dixonii listed as Paracaleana dixonii Sandplain Duck Orchid [87944]	Endangered	Species or species habitat may occur within area
Chorizema humile Prostrate Flame Pea [32573]	Endangered	Species or species habitat may occur within area
Conostylis dielsii subsp. teres Irwin's Conostylis [3614]	Endangered	Species or species habitat may occur within area
Conostylis micrantha Small-flowered Conostylis [17635]	Endangered	Species or species habitat may occur within area
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat may occur within area
Drakaea concolor Kneeling Hammer-orchid [56777]	Vulnerable	Species or species habitat known to occur within area
Drummondita ericoides Morseby Range Drummondita [9193]	Endangered	Species or species habitat known to occur within area
Eucalyptus cuprea Mallee Box [56773]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Grevillea bracteosa subsp. howatharra [85002]	Critically Endangered	Species or species habitat likely to occur within area
Hypocalymma angustifolium subsp. Hutt River (S.Patrick 2982) [85023]	Endangered	Species or species habitat known to occur within area
Lechenaultia chlorantha Kalbarri Leschenaultia [16763]	Vulnerable	Species or species habitat known to occur within area
Leucopogon marginatus Thick-margined Leucopogon [12527]	Endangered	Species or species habitat likely to occur within area
Pterostylis sinuata Northampton Midget Greenhood, Western Swan Greenhood [84991]	Endangered	Species or species habitat known to occur within area
Stachystemon nematophorus Three-flowered Stachystemon [81447]	Vulnerable	Species or species habitat known to occur within area
Wurmbea tubulosa Long-flowered Nancy [12739]	Endangered	Species or species habitat may occur within area
REPTILE		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Egernia stokesii badia		
Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat may occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
SHARK		
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Centrophorus uyato		
Little Gulper Shark [68446]	Conservation Dependent	Species or species habitat likely to occur within area
Pristis pristis		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sphyrna lewini		
Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area
SPIDER		
Idiosoma nigrum		
Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharias taurus Grey Nurse Shark [64469]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
[Pristis pristis](#) Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
[Rhincodon typus](#) Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area
[Arenaria interpres](#) Ruddy Turnstone [872]	Vulnerable	Species or species habitat known to occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
[Calidris alba](#) Sanderling [875]		Species or species habitat known to occur within area
[Calidris canutus](#) Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area
[Calidris ruficollis](#) Red-necked Stint [860]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
[Charadrius leschenaultii](#) Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat may occur within area
[Limosa lapponica](#) Bar-tailed Godwit [844]		Species or species habitat known to occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
[Pandion haliaetus](#) Osprey [952]		Breeding known to occur within area
[Pluvialis fulva](#) Pacific Golden Plover [25545]		Species or species habitat known to occur within area
[Thalasseus bergii](#) Greater Crested Tern [83000]		Breeding known to occur within area
[Tringa brevipes](#) Grey-tailed Tattler [851]		Species or species habitat known to occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Defence	
Defence - GERALDTON TRAINING DEPOT "A" Company 16th Battalion [50196]	WA
Defence - GERALDTON TRAINING DEPOT "A" Company 16th Battalion [50197]	WA
Defence - GERALDTON TRAINING DEPOT "A" Company 16th Battalion [50195]	WA

Commonwealth Land Name	State
Unknown	
Commonwealth Land - [52111]	WA
Commonwealth Land - [51099]	WA
Commonwealth Land - [51098]	WA
Commonwealth Land - [52201]	WA
Commonwealth Land - [50378]	WA
Commonwealth Land - [50376]	WA
Commonwealth Land - [50375]	WA
Commonwealth Land - [50374]	WA
Commonwealth Land - [50373]	WA
Commonwealth Land - [50372]	WA
Commonwealth Land - [50371]	WA
Commonwealth Land - [50368]	WA
Commonwealth Land - [50369]	WA
Commonwealth Land - [50370]	WA
Commonwealth Land - [52214]	WA
Commonwealth Land - [51432]	WA
Commonwealth Land - [51479]	WA
Commonwealth Land - [51434]	WA
Commonwealth Land - [51886]	WA
Commonwealth Land - [51100]	WA

Commonwealth Heritage Places			[Resource Information]
Name	State	Status	
Historic			
Geraldton Drill Hall Complex	WA	Listed place	
HMAS Sydney II and HSK Kormoran Shipwreck Sites	EXT	Listed place	

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	
Bird			

Scientific Name	Threatened Category	Presence Text
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Breeding known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Ardenna pacifica as Puffinus pacificus Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Species or species habitat known to occur within area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area overfly marine area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat may occur within area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area overfly marine area
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]		Breeding known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Species or species habitat known to occur within area overfly marine area
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Breeding known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Breeding likely to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area
Pterodroma macroptera Great-winged Petrel [1035]		Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Puffinus assimilis Little Shearwater [59363]		Breeding known to occur within area
Puffinus huttoni Hutton's Shearwater [1025]		Foraging, feeding or related behaviour known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur within area overfly marine area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area
Stercorarius antarcticus as Catharacta skua Brown Skua [85039]		Species or species habitat may occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons as Sterna albifrons Little Tern [82849]		Species or species habitat may occur within area
Sternula nereis as Sterna nereis Fairy Tern [82949]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Thalasseus bergii as Sterna bergii		
Greater Crested Tern [83000]		Breeding known to occur within area
Thinornis cucullatus as Thinornis rubricollis		
Hooded Plover, Hooded Dotterel [87735]		Species or species habitat may occur within area overfly marine area
Tringa brevipes as Heteroscelus brevipes		
Grey-tailed Tattler [851]		Species or species habitat known to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area overfly marine area
Fish		
Acentronura australe		
Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Campichthys galei		
Gale's Pipefish [66191]		Species or species habitat may occur within area
Choeroichthys suillus		
Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Festucalex scalaris		
Ladder Pipefish [66216]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus subelongatus West Australian Seahorse [66722]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
[Urocampus carinirostris](#) Hairy Pipefish [66282]		Species or species habitat may occur within area
[Vanacampus margaritifer](#) Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammal		
[Arctocephalus forsteri](#) Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
[Neophoca cinerea](#) Australian Sea-lion, Australian Sea Lion [22]	Endangered	Breeding known to occur within area
Reptile		
[Aipysurus laevis](#) Olive Sea Snake, Olive-brown Sea Snake [1120]		Species or species habitat may occur within area
[Aipysurus pooleorum](#) Shark Bay Sea Snake [66061]		Species or species habitat may occur within area
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
[Ephalophis greyae as Ephalophis greyi](#) Mangrove Sea Snake [93738]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hydrophis kingii as Disteira kingii		
Spectacled Sea Snake [93511]		Species or species habitat may occur within area
Hydrophis major as Disteira major		
Olive-headed Sea Snake [93512]		Species or species habitat may occur within area
Hydrophis platura as Pelamis platurus		
Yellow-bellied Sea Snake [93746]		Species or species habitat may occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Whales and Other Cetaceans		[Resource Information]
Current Scientific Name	Status	Type of Presence
Mammal		
Balaenoptera acutorostrata		
Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis		
Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Current Scientific Name	Status	Type of Presence
[Caperea marginata](#) Pygmy Right Whale [39]		Species or species habitat may occur within area
[Delphinus delphis](#) Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
[Eubalaena australis](#) Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
[Feresa attenuata](#) Pygmy Killer Whale [61]		Species or species habitat may occur within area
[Globicephala macrorhynchus](#) Short-finned Pilot Whale [62]		Species or species habitat may occur within area
[Globicephala melas](#) Long-finned Pilot Whale [59282]		Species or species habitat may occur within area
[Grampus griseus](#) Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
[Hyperoodon planifrons](#) Southern Bottlenose Whale [71]		Species or species habitat may occur within area
[Kogia breviceps](#) Pygmy Sperm Whale [57]		Species or species habitat may occur within area
[Kogia sima](#) Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
[Lagenodelphis hosei](#) Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Lissodelphis peronii Southern Right Whale Dolphin [44]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area
Mesoplodon bowdoini Andrew's Beaked Whale [73]		Species or species habitat may occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area
Mesoplodon mirus True's Beaked Whale [54]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks	[Resource Information]
Park Name	Zone & IUCN Categories
Abrolhos	Habitat Protection Zone (IUCN IV)
Abrolhos	Multiple Use Zone (IUCN VI)
Abrolhos	Multiple Use Zone (IUCN VI)
Abrolhos	Multiple Use Zone (IUCN VI)
Abrolhos	National Park Zone (IUCN II)

Park Name	Zone & IUCN Categories
Abrolhos	National Park Zone (IUCN II)
Abrolhos	Special Purpose Zone (IUCN VI)
Abrolhos	Special Purpose Zone (IUCN VI)

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State
Abrolhos Islands	Fish Habitat Protection Area	WA
Houtman Abrolhos Islands	National Park	WA
Kalbarri	National Park	WA
Kalbarri Blue Holes	Fish Habitat Protection Area	WA
Nilligarri	Nature Reserve	WA
Oakabella	Nature Reserve	WA
Port Gregory	NRS Addition - Gazettal in Progress	WA
Unnamed WA33799	Nature Reserve	WA
Utcha Well	Nature Reserve	WA

Nationally Important Wetlands [Resource Information]

Wetland Name	State
Hutt Lagoon System	WA
Murchison River (Lower Reaches)	WA

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status
Marine Route Survey for Subsea Fibre Optic Data Cable System - Australia West	2024/09826		Completed
Midwest Offshore Wind Farm	2022/09264		Assessment

Title of referral	Reference	Referral Outcome	Assessment Status
Yogi Magnetite Project, 225km east, northeast of Geraldton, WA	2017/8124		Approval
Controlled action			
Coburn Mineral Sand Project	2003/1221	Controlled Action	Post-Approval
Construction of the Oakajee Port and Rail Project	2011/5797	Controlled Action	Post-Approval
development of land based tourist facilities on Long Island	2006/2792	Controlled Action	Post-Approval
Hematite (iron ore) Mine and Beneficiation Plant	2001/542	Controlled Action	Completed
Karara Magnetite Project	2006/3017	Controlled Action	Post-Approval
Nava-1 Cable System	2001/510	Controlled Action	Completed
Oakajee Rail Development	2010/5500	Controlled Action	Post-Approval
open cut mine & assoc infrastructure	2005/2381	Controlled Action	Post-Approval
Port Enhancement Project	2001/266	Controlled Action	Post-Approval
Tourism Facility and Associated Infrastructure	2005/2038	Controlled Action	Post-Approval
Not controlled action			
APX-West Fibre-optic telecommunications cable system, WA to Singapore	2013/7102	Not Controlled Action	Completed
Drilling between Kalbarri and Cliff Head	2005/2185	Not Controlled Action	Completed
Glenfield Beach Project	2012/6359	Not Controlled Action	Completed
Hadda 1,Flying Foam 1,Magnat 1 exploration drill	2004/1697	Not Controlled Action	Completed
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
INDIGO West Submarine Telecommunications Cable, WA	2017/8126	Not Controlled Action	Completed
Maintenance Dredging in the Geraldton Port Outer Channel	2010/5488	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Oman Australia Cable Installation, WA	2021/8922	Not Controlled Action	Completed
Oman Australia Cable - Marine Route Survey	2020/8731	Not Controlled Action	Completed
Scientific Sonar Trial	2002/680	Not Controlled Action	Completed
Seismic Survey, Bremer Basin, Mentelle Basin and Zeewyck Sub-basin	2004/1700	Not Controlled Action	Completed
Yellowfin Tuna Aquaculture Trial	2003/1115	Not Controlled Action	Completed
Not controlled action (particular manner)			
2D Marine Seismic Survey in Permit Area WA-337-P	2003/1158	Not Controlled Action (Particular Manner)	Post-Approval
2D seismic survey	2008/4493	Not Controlled Action (Particular Manner)	Post-Approval
Acheron Non-Exclusive 2D Seismic Survey	2009/4968	Not Controlled Action (Particular Manner)	Post-Approval
Acheron Non-Exclusive 2D Seismic Survey	2008/4565	Not Controlled Action (Particular Manner)	Post-Approval
Australian Square Kilometre Array Pathfinder telescope & infrastructure	2009/4891	Not Controlled Action (Particular Manner)	Post-Approval
Australia to Singapore Fibre Optic Submarine Cable System	2011/6127	Not Controlled Action (Particular Manner)	Post-Approval
develop and operate a new deepwater port	2010/5760	Not Controlled Action (Particular Manner)	Post-Approval
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Laying a submarine optical fibre telecommunications cable, Perth to Singapore and Jakarta	2014/7332	Not Controlled Action (Particular Manner)	Post-Approval
Marine reconnaissance survey	2008/4466	Not Controlled Action (Particular Manner)	Post-Approval
Marine Seismic Survey for oil and gas in Commonwealth waters off the WA coast.	2004/1802	Not Controlled Action (Particular Manner)	Post-Approval
Marine Seismic Survey in Permit WA-481P	2012/6626	Not Controlled Action (Particular Manner)	Post-Approval
North Perth Marine Survey	2011/6067	Not Controlled Action (Particular Manner)	Post-Approval
Quiberon 2D Seismic Survey, permit area WA-385P, offshore of Carnarvon	2009/5077	Not Controlled Action (Particular Manner)	Post-Approval
search for HMAS Sydney	2006/3071	Not Controlled Action (Particular Manner)	Post-Approval
Study of behavioural responses of Austn Humpback Whales to seismic surveys, offshore Dongara, WA	2013/6927	Not Controlled Action (Particular Manner)	Post-Approval
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
Exploration Drilling 2014/2015 WA-481-P	2013/7043	Referral Decision	Completed
Proposed exploration drilling activities, Abrolhos Commonwealth Marine Reserve	2013/6949	Referral Decision	Completed

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Ancient coastline at 90-120m depth	South-west
Commonwealth marine environment surrounding the Houtman Abrolhos Islands	South-west
Commonwealth marine environment within and adjacent to the west coast inshore lagoons	South-west
Perth Canyon and adjacent shelf break, and other west coast canyons	South-west
Wallaby Saddle	North-west
Western demersal slope and associated fish communities	South-west
Western rock lobster	South-west

Biologically Important Areas [Resource Information]

Scientific Name	Behaviour	Presence
Seabirds		
Anous stolidus		
Common Noddy [825]	Foraging (provisioning young)	Known to occur
Anous tenuirorstris melanops		
Australian Lesser Noddy [26000]	Foraging (provisioning young)	Known to occur
Ardenna pacifica		
Wedge-tailed Shearwater [84292]	Breeding	Known to occur
Ardenna pacifica		
Wedge-tailed Shearwater [84292]	Foraging (in high numbers)	Known to occur
Hydroprogne caspia		
Caspian Tern [808]	Foraging (provisioning young)	Known to occur
Larus pacificus		
Pacific Gull [811]	Foraging (in high numbers)	Known to occur

Scientific Name	Behaviour	Presence
Onychoprion anaethetus Bridled Tern [82845]	Foraging (in high numbers)	Known to occur
Onychoprion fuscata Sooty Tern [82847]	Foraging	Known to occur
Pelagodroma marina White-faced Storm-petrel [1016]	Foraging (in high numbers)	Known to occur
Pterodroma mollis Soft-plumaged Petrel [1036]	Foraging (in high numbers)	Known to occur
Puffinus assimilis tunneyi Little Shearwater [59363]	Foraging (in high numbers)	Known to occur
Sterna dougallii Roseate Tern [817]	Foraging (provisioning young)	Known to occur
Sternula nereis Fairy Tern [82949]	Foraging (in high numbers)	Known to occur
Seals		
Neophoca cinerea Australian Sea Lion [22]	Foraging (male)	Likely to occur
Neophoca cinerea Australian Sea Lion [22]	Foraging (male and female)	Known to occur
Sharks		
Carcharodon carcharias White Shark [64470]	Foraging	Known to occur
Whales		
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Known Foraging Area	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Migration	Known to occur

Scientific Name	Behaviour	Presence
Megaptera novaeangliae Humpback Whale [38]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration (north)	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration (north and south)	Known to occur

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data is available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on the contents of this report.

3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions when time permits.

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded breeding sites; and
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

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

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

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

Please feel free to provide feedback via the Contact us page.

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 08-Jan-2025

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	1
National Heritage Places:	2
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	4
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	62
Listed Migratory Species:	84

Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	225
Commonwealth Heritage Places:	1
Listed Marine Species:	135
Whales and Other Cetaceans:	32
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	12
Habitat Critical to the Survival of Marine Turtles:	4

Extra Information

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

State and Territory Reserves:	54
Regional Forest Agreements:	None
Nationally Important Wetlands:	4
EPBC Act Referrals:	315
Key Ecological Features (Marine):	7
Biologically Important Areas:	49
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

World Heritage Properties		[Resource Information]
Name	State	Legal Status
The Ningaloo Coast	WA	Declared property

National Heritage Places		[Resource Information]
Name	State	Legal Status
Indigenous		
Dampier Archipelago (including Burrup Peninsula)	WA	Listed place
Natural		
The Ningaloo Coast	WA	Listed place

Commonwealth Marine Area	[Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)

Listed Threatened Species	[Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Arenaria interpres		
Ruddy Turnstone [872]	Vulnerable	Species or species habitat known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Vulnerable	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Endangered	Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Endangered	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Malurus leucopterus edouardi White-winged Fairy-wren (Barrow Island), Barrow Island Black-and-white Fairy-wren [26194]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Phaethon rubricauda westralis Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Species or species habitat likely to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Species or species habitat known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area
Xenus cinereus		
Terek Sandpiper [59300]	Vulnerable	Species or species habitat known to occur within area
FISH		
Milyeringa veritas		
Cape Range Cave Gudgeon, Blind Gudgeon [66676]	Vulnerable	Species or species habitat known to occur within area
Ophisternon candidum		
Blind Cave Eel [66678]	Vulnerable	Species or species habitat known to occur within area
MAMMAL		
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Bettongia lesueur Barrow and Boodie Islands subspecies		
Boodie, Burrowing Bettong (Barrow and Boodie Islands) [88021]	Vulnerable	Species or species habitat known to occur within area
Dasyurus hallucatus		
Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
[Eubalaena australis](#) Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
[Isoodon auratus barrowensis](#) Golden Bandicoot (Barrow Island) [66666]	Vulnerable	Species or species habitat known to occur within area
[Lagorchestes conspicillatus conspicillatus](#) Spectacled Hare-wallaby (Barrow Island) [66661]	Vulnerable	Species or species habitat known to occur within area
[Lagorchestes hirsutus Central Australian subspecies](#) Mala, Rufous Hare-Wallaby (Central Australia) [88019]	Endangered	Translocated population known to occur within area
[Macroderma gigas](#) Ghost Bat [174]	Vulnerable	Species or species habitat known to occur within area
[Macrotis lagotis](#) Greater Bilby [282]	Vulnerable	Species or species habitat known to occur within area
[Osphranter robustus isabellinus](#) Barrow Island Wallaroo, Barrow Island Euro [89262]	Vulnerable	Species or species habitat likely to occur within area
[Petrogale lateralis lateralis](#) Black-flanked Rock-wallaby, Moororong, Black-footed Rock Wallaby [66647]	Endangered	Species or species habitat known to occur within area
[Pseudomys fieldi](#) Shark Bay Mouse, Djoongari, Alice Springs Mouse [113]	Vulnerable	Species or species habitat likely to occur within area
[Rhinonicteris aurantia (Pilbara form)](#) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
PLANT		
[Minuria tridens](#) Minnie Daisy [13753]	Vulnerable	Species or species habitat known to occur within area
REPTILE		

Scientific Name	Threatened Category	Presence Text
Aipysurus apraefrontalis Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus foliosquama Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Ctenotus zastictus Hamelin Ctenotus [25570]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Lerista nevinae Nevin's Slider [85296]	Endangered	Species or species habitat known to occur within area
Liasis olivaceus barroni Pilbara Olive Python [66699]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
SHARK		
Carcharias taurus (west coast population) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Congregation or aggregation known to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons Little Tern [82849]		Breeding known to occur within area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharias taurus Grey Nurse Shark [64469]		Congregation or aggregation known to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Dugong dugon Dugong [28]		Breeding known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sousa sahulensis as Sousa chinensis Australian Humpback Dolphin [87942]		Species or species habitat known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Migratory Wetlands Species		

Scientific Name	Threatened Category	Presence Text
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Vulnerable	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat known to occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Species or species habitat known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Endangered	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Phalaropus lobatus Red-necked Phalarope [838]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Species or species habitat known to occur within area
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area
Tringa totanus Common Redshank, Redshank [835]		Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Defence	
Defence - EXMOUTH ADMIN & HF TRANSMITTING [50125]	WA
Defence - EXMOUTH ADMIN & HF TRANSMITTING [50124]	WA
Defence - EXMOUTH ADMIN & HF TRANSMITTING [50129]	WA
Defence - EXMOUTH ADMIN & HF TRANSMITTING [50128]	WA
Defence - EXMOUTH ADMIN & HF TRANSMITTING [50126]	WA
Defence - EXMOUTH ADMIN & HF TRANSMITTING [50127]	WA
Defence - EXMOUTH NAVAL HF RECEIVING STATION (H/F Receiving Station, Learmonth, WA) [50130]	WA
Defence - EXMOUTH VLF TRANSMITTER STATION [50122]	WA
Defence - EXMOUTH VLF TRANSMITTER STATION [50123]	WA
Defence - KARRATHA TRAINING DEPOT [50200]	WA
Defence - KARRATHA TRAINING DEPOT [50238]	WA
Defence - KARRATHA TRAINING DEPOT [50237]	WA
Defence - LEARMONTH - RAAF BASE [50099]	WA
Defence - LEARMONTH - RAAF BASE [50097]	WA
Defence - LEARMONTH - RAAF BASE [50105]	WA
Defence - LEARMONTH - RAAF BASE [50104]	WA
Defence - LEARMONTH - RAAF BASE [50100]	WA
Defence - LEARMONTH - RAAF BASE [50098]	WA
Defence - LEARMONTH - RAAF BASE [50096]	WA
Defence - LEARMONTH - RAAF BASE [50107]	WA
Defence - LEARMONTH - RAAF BASE [50101]	WA
Defence - LEARMONTH - RAAF BASE [50106]	WA

Commonwealth Land Name	State
Defence - LEARMONTH - RAAF BASE [50103]	WA
Defence - LEARMONTH - RAAF BASE [50102]	WA
Defence - LEARMONTH - RAAF BASE [50109]	WA
Defence - LEARMONTH - RAAF BASE [50108]	WA
Defence - LEARMONTH RADAR SITE - TWIN TANKS EXMOUTH [50002]	WA
Defence - LEARMONTH RADAR SITE - VLAMING HEAD EXMOUTH [50001]	WA
Defence - LEARMONTH TRANSMITTING STATION [50239]	WA
Unknown	
Commonwealth Land - [51700]	WA
Commonwealth Land - [51703]	WA
Commonwealth Land - [51676]	WA
Commonwealth Land - [51678]	WA
Commonwealth Land - [51674]	WA
Commonwealth Land - [51677]	WA
Commonwealth Land - [51705]	WA
Commonwealth Land - [51704]	WA
Commonwealth Land - [50323]	WA
Commonwealth Land - [51709]	WA
Commonwealth Land - [51455]	WA
Commonwealth Land - [50978]	WA
Commonwealth Land - [51584]	WA
Commonwealth Land - [50975]	WA
Commonwealth Land - [50974]	WA
Commonwealth Land - [50977]	WA
Commonwealth Land - [50976]	WA
Commonwealth Land - [51707]	WA

Commonwealth Land Name	State
Commonwealth Land - [51566]	WA
Commonwealth Land - [52104]	WA
Commonwealth Land - [52110]	WA
Commonwealth Land - [51675]	WA
Commonwealth Land - [51673]	WA
Commonwealth Land - [51564]	WA
Commonwealth Land - [52108]	WA
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Commonwealth Land - [51694]	WA
Commonwealth Land - [51691]	WA
Commonwealth Land - [51692]	WA
Commonwealth Land - [51442]	WA

Commonwealth Land Name	State
Commonwealth Land - [51706]	WA
Commonwealth Land - [51443]	WA
Commonwealth Land - [51579]	WA
Commonwealth Land - [51578]	WA
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Commonwealth Land - [51596]	WA
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Commonwealth Land - [51462]	WA
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Commonwealth Land - [51464]	WA
Commonwealth Land - [51468]	WA
Commonwealth Land - [52198]	WA
Commonwealth Land - [52195]	WA

Commonwealth Land Name	State
Commonwealth Land - [51456]	WA
Commonwealth Land - [51428]	WA
Commonwealth Land - [51050]	WA
Commonwealth Land - [50989]	WA
Commonwealth Land - [52234]	WA
Commonwealth Land - [51054]	WA
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Commonwealth Land - [51589]	WA
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Commonwealth Land - [50990]	WA
Commonwealth Land - [51713]	WA
Commonwealth Land - [51586]	WA
Commonwealth Land - [51587]	WA

Commonwealth Land Name	State
Commonwealth Land - [51585]	WA
Commonwealth Land - [52220]	WA
Commonwealth Land - [51939]	WA
Commonwealth Land - [51682]	WA
Commonwealth Land - [51935]	WA
Commonwealth Land - [51934]	WA
Commonwealth Land - [51477]	WA
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Commonwealth Land - [51688]	WA
Commonwealth Land - [51575]	WA
Commonwealth Land - [51572]	WA
Commonwealth Land - [51573]	WA

Commonwealth Land Name	State
Commonwealth Land - [51570]	WA
Commonwealth Land - [51689]	WA
Commonwealth Land - [51684]	WA
Commonwealth Land - [51685]	WA
Commonwealth Land - [51680]	WA
Commonwealth Land - [51681]	WA
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Commonwealth Land - [52100]	WA
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Commonwealth Land - [50325]	WA
Commonwealth Land - [51590]	WA
Commonwealth Land - [51714]	WA
Commonwealth Land - [51717]	WA
Commonwealth Land - [51716]	WA

Commonwealth Land Name	State
Commonwealth Land - [51711]	WA
Commonwealth Land - [51446]	WA
Commonwealth Land - [51568]	WA
Commonwealth Land - [51569]	WA
Commonwealth Land - [51708]	WA
Commonwealth Land - [51715]	WA
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Commonwealth Land - [51597]	WA
Commonwealth Land - [51669]	WA
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Commonwealth Land - [50359]	WA
Commonwealth Land - [51598]	WA
Commonwealth Land - [51048]	WA
Commonwealth Land - [51049]	WA

Commonwealth Land Name	State
Commonwealth Land - [50326]	WA
Commonwealth Land - [50327]	WA
Commonwealth Land - [51567]	WA
Commonwealth Land - [51565]	WA
Commonwealth Land - [51599]	WA
Commonwealth Land - [51560]	WA
Commonwealth Land - [51449]	WA
Commonwealth Land - [51563]	WA
Commonwealth Land - [52205]	WA
Commonwealth Land - [51052]	WA
Commonwealth Land - [51051]	WA
Commonwealth Land - [51429]	WA
Commonwealth Land - [51699]	WA
Commonwealth Land - [51448]	WA
Commonwealth Land - [51595]	WA
Commonwealth Land - [51594]	WA

Commonwealth Heritage Places

[Resource Information]

Name	State	Status
Natural		
Ningaloo Marine Area - Commonwealth Waters	WA	Listed place

Listed Marine Species

[Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Ardenna pacifica as Puffinus pacificus Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Species or species habitat known to occur within area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area overfly marine area
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area overfly marine area
Calidris tenuirostris Great Knot [862]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area overfly marine area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat known to occur within area overfly marine area
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat known to occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Breeding known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Species or species habitat known to occur within area overfly marine area
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area overfly marine area
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Breeding known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Species or species habitat known to occur within area overfly marine area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Limosa limosa Black-tailed Godwit [845]	Endangered	Species or species habitat known to occur within area overfly marine area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area overfly marine area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Species or species habitat known to occur within area overfly marine area
Numenius phaeopus Whimbrel [849]		Species or species habitat known to occur within area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat known to occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Phalaropus lobatus Red-necked Phalarope [838]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur within area overfly marine area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons as Sterna albifrons Little Tern [82849]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Sternula nereis as Sterna nereis Fairy Tern [82949]		Breeding known to occur within area
Stiltia isabella Australian Pratincole [818]		Species or species habitat known to occur within area overfly marine area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalasseus bengalensis as Sterna bengalensis Lesser Crested Tern [66546]		Breeding known to occur within area
Thalasseus bergii as Sterna bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes as Heteroscelus brevipes Grey-tailed Tattler [851]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area overfly marine area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area overfly marine area
Tringa totanus Common Redshank, Redshank [835]		Species or species habitat known to occur within area overfly marine area
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Fish		
Acentronura larsonae Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area
Bhanotia fasciolata Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys latispinosus Muiron Island Pipefish [66196]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammal		

Scientific Name	Threatened Category	Presence Text
Dugong dugon Dugong [28]		Breeding known to occur within area
Reptile		
Aipysurus apraefrontalis Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus duboisii Dubois' Sea Snake, Dubois' Seasnake, Reef Shallows Sea Snake [1116]		Species or species habitat may occur within area
Aipysurus foliosquama Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus laevis Olive Sea Snake, Olive-brown Sea Snake [1120]		Species or species habitat may occur within area
Aipysurus mosaicus as Aipysurus eydouxii Mosaic Sea Snake [87261]		Species or species habitat may occur within area
Aipysurus tenuis Brown-lined Sea Snake, Mjoberg's Sea Snake [1121]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Emydocephalus annulatus Eastern Turtle-headed Sea Snake [1125]		Species or species habitat may occur within area
Ephalophis greyae as Ephalophis greyi Mangrove Sea Snake [93738]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Hydrelaps darwiniensis Port Darwin Sea Snake, Black-ringed Mangrove Sea Snake [1100]		Species or species habitat may occur within area
Hydrophis czeblukovi Fine-spined Sea Snake [59233]		Species or species habitat may occur within area
Hydrophis elegans Elegant Sea Snake, Bar-bellied Sea Snake [1104]		Species or species habitat may occur within area
Hydrophis hardwickii as Lapemis hardwickii Spine-bellied Sea Snake [93516]		Species or species habitat may occur within area
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]		Species or species habitat may occur within area
Hydrophis macdowelli as Hydrophis mcdowelli MacDowell's Sea Snake, Small-headed Sea Snake, [75601]		Species or species habitat may occur within area
Hydrophis major as Disteira major Olive-headed Sea Snake [93512]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Sea Snake, Ornate Reef Sea Snake [1111]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hydrophis peronii as Acalyptophis peronii		
Horned Sea Snake [93509]		Species or species habitat may occur within area
Hydrophis platura as Pelamis platurus		
Yellow-bellied Sea Snake [93746]		Species or species habitat may occur within area
Hydrophis stokesii as Astrotia stokesii		
Stokes' Sea Snake [93510]		Species or species habitat may occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area

Whales and Other Cetaceans		[Resource Information]
Current Scientific Name	Status	Type of Presence
Mammal		
Balaenoptera acutorostrata		
Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis		
Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Current Scientific Name	Status	Type of Presence
[Delphinus delphis](#) Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
[Eubalaena australis](#) Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
[Feresa attenuata](#) Pygmy Killer Whale [61]		Species or species habitat may occur within area
[Globicephala macrorhynchus](#) Short-finned Pilot Whale [62]		Species or species habitat may occur within area
[Grampus griseus](#) Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
[Indopacetus pacificus](#) Longman's Beaked Whale [72]		Species or species habitat may occur within area
[Kogia breviceps](#) Pygmy Sperm Whale [57]		Species or species habitat may occur within area
[Kogia sima](#) Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
[Lagenodelphis hosei](#) Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
[Megaptera novaeangliae](#) Humpback Whale [38]		Breeding known to occur within area
[Mesoplodon densirostris](#) Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa sahulensis Australian Humpback Dolphin [87942]		Species or species habitat known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
[Tursiops aduncus](#) Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
[Tursiops aduncus (Arafura/Timor Sea populations)](#) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
[Tursiops truncatus s. str.](#) Bottlenose Dolphin [68417]		Species or species habitat may occur within area
[Ziphius cavirostris](#) Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks	[Resource Information]
Park Name	Zone & IUCN Categories
Dampier	Habitat Protection Zone (IUCN IV)
Gascoyne	Habitat Protection Zone (IUCN IV)
Argo-Rowley Terrace	Multiple Use Zone (IUCN VI)
Argo-Rowley Terrace	Multiple Use Zone (IUCN VI)
Dampier	Multiple Use Zone (IUCN VI)
Eighty Mile Beach	Multiple Use Zone (IUCN VI)
Gascoyne	Multiple Use Zone (IUCN VI)
Montebello	Multiple Use Zone (IUCN VI)
Dampier	National Park Zone (IUCN II)
Gascoyne	National Park Zone (IUCN II)
Ningaloo	Recreational Use Zone (IUCN IV)
Argo-Rowley Terrace	Special Purpose Zone (Trawl) (IUCN VI)

Habitat Critical to the Survival of Marine Turtles		[Resource Information]
Scientific Name	Behaviour	Presence
Aug - Sep		

Scientific Name	Behaviour	Presence
Natator depressus		
Flatback Turtle [59257]	Nesting	Known to occur
Dec - Jan		
Chelonia mydas		
Green Turtle [1765]	Nesting	Known to occur
Nov-Feb		
Caretta caretta		
Loggerhead Turtle [1763]	Nesting	Known to occur
Nov - May		
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Nesting	Known to occur

Extra Information

State and Territory Reserves		[Resource Information]
Protected Area Name	Reserve Type	State
Airlie Island	Nature Reserve	WA
Barrow Island	Nature Reserve	WA
Barrow Island	Marine Park	WA
Barrow Island	Marine Management Area	WA
Bedout Island	Nature Reserve	WA
Bessieres Island	Nature Reserve	WA
Boodie, Double Middle Islands	Nature Reserve	WA
Bundegi Coastal Park	5(1)(h) Reserve	WA
Burnside And Simpson Island	Nature Reserve	WA
Cane River (Mount Minnie and Nanutarra)	NRS Addition - Gazettal in Progress	WA
Cape Range	Conservation Park	WA
Cape Range	National Park	WA
Eighty Mile Beach	Marine Park	WA
Giralia	NRS Addition - Gazettal in Progress	WA

Protected Area Name	Reserve Type	State
Gnandaroo Island	Nature Reserve	WA
Great Sandy Island	Nature Reserve	WA
Jurabi Coastal Park	5(1)(h) Reserve	WA
Little Rocky Island	Nature Reserve	WA
Locker Island	Nature Reserve	WA
Lowendal Islands	Nature Reserve	WA
Montebello Islands	Conservation Park	WA
Montebello Islands	Marine Park	WA
Montebello Islands	Conservation Park	WA
Muiron Islands	Nature Reserve	WA
Muiron Islands	Marine Management Area	WA
Murujuga	5(1)(h) Reserve	WA
Murujuga	National Park	WA
Ningaloo	Marine Park	WA
North Sandy Island	Nature Reserve	WA
North Turtle Island	Nature Reserve	WA
Rocky Island	Nature Reserve	WA
Round Island	Nature Reserve	WA
Rowley Shoals	Marine Park	WA
Serrurier Island	Nature Reserve	WA
Tent Island	Nature Reserve	WA
Thevenard Island	Nature Reserve	WA
Unnamed WA36907	5(1)(h) Reserve	WA
Unnamed WA36909	5(1)(h) Reserve	WA
Unnamed WA36910	5(1)(h) Reserve	WA
Unnamed WA36913	Nature Reserve	WA

Protected Area Name	Reserve Type	State
Unnamed WA36915	Nature Reserve	WA
Unnamed WA38287	5(1)(h) Reserve	WA
Unnamed WA40322	5(1)(h) Reserve	WA
Unnamed WA40828	5(1)(h) Reserve	WA
Unnamed WA40877	5(1)(h) Reserve	WA
Unnamed WA41080	5(1)(h) Reserve	WA
Unnamed WA44665	5(1)(h) Reserve	WA
Unnamed WA44667	5(1)(h) Reserve	WA
Unnamed WA44672	5(1)(h) Reserve	WA
Victor Island	Nature Reserve	WA
Weld Island	Nature Reserve	WA
Whalebone Island	Nature Reserve	WA
Whitmore,Roberts,Doole Islands And Sandalwood Landing	Nature Reserve	WA
Y Island	Nature Reserve	WA

Nationally Important Wetlands [Resource Information]

Wetland Name	State
Cape Range Subterranean Waterways	WA
De Grey River	WA
Exmouth Gulf East	WA
Leslie (Port Hedland) Saltfields System	WA

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status
Ashburton Infrastructure Project	2021/9064		Completed
Balla Balla Export Facilities ? Design Variation	2022/09254		Assessment
Browse to North West Shelf Development, Indian Ocean, WA	2018/8319		Approval
Burrup Common User Transmission Infrastructure	2022/09407		Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Burrup Peninsula Seawater Supply Scheme Upgrade	2023/09698		Completed
Dampier Seawater Desalination Plant	2022/09395		Completed
East Pilbara Network Stage 1	2024/09933		Completed
Gorgon Gas Development	2003/1294		Post-Approval
Hemi Gold Project	2023/09556		Referral Decision
Ningaloo Lighthouse Development, 17km north west Exmouth, Western Australia	2020/8693		Post-Approval
North West Shelf Project Extension, Carnarvon Basin, WA	2018/8335		Approval
Optimised Mardie Solar Salt Project	2022/9169		Post-Approval
Port Hedland Green Steel Project - Stage 1	2023/09764		Assessment
Port Hedland Solar Project	2022/09241		Post-Approval
Project Highclere Cable Lay and Operation	2022/09203		Completed
Ridley Magnetite Project	2023/09477		Referral Decision
Single Jetty Deep Water Port Renewable Hub, WA	2021/8942		Assessment
Woodside Solar Facility	2022/09328		Assessment
Action clearly unacceptable			
Highlands 3D Marine Seismic Survey	2012/6680	Action Clearly Unacceptable	Completed
Controlled action			
'Van Gogh' Petroleum Field Development	2007/3213	Controlled Action	Post-Approval
Additional Rail Infrastructure between Herb Elliott Port Facility and Cloudbreak Mine Site	2010/5513	Controlled Action	Post-Approval
Ammonium Nitrate Project	2010/5423	Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Anketell Point Iron Ore Processing & Export Port	2009/5120	Controlled Action	Post-Approval
Balla Balla Rail and Conveyor Project, WA	2015/7420	Controlled Action	Post-Approval
Balmoral South Iron Ore Mine	2008/4236	Controlled Action	Post-Approval
Binowee Iron Ore Project	2001/366	Controlled Action	Proposed Decision
Burrup North East Sand Mining Project	2008/4611	Controlled Action	Completed
Cape Lambert Port B Development	2008/4032	Controlled Action	Post-Approval
Construct and operate LNG & domestic gas plant including onshore and offshore facilities - Wheatston	2008/4469	Controlled Action	Post-Approval
Construction and operation of a Solar Salt Project, SW Onslow, WA	2016/7793	Controlled Action	Assessment Approach
Develop Jansz-Io deepwater gas field in Permit Areas WA-18-R, WA-25-R and WA-26-	2005/2184	Controlled Action	Post-Approval
Development of Angel gas and condensate field, North West Shelf	2004/1805	Controlled Action	Post-Approval
Development of an iron ore mine and associated infrastructure	2010/5630	Controlled Action	Assessment Approach
Development of a Quarry Operation to extract gravel, sand and pindan material	2012/6636	Controlled Action	Post-Approval
Development of Browse Basin Gas Fields (Upstream)	2008/4111	Controlled Action	Completed
Development of Coniston/Novara fields within the Exmouth Sub-basin	2011/5995	Controlled Action	Post-Approval
Development of Stybarrow petroleum field incl drilling and facility installation	2004/1469	Controlled Action	Post-Approval
Duplication of the Dampier Highway Stages 2 & 6	2010/5419	Controlled Action	Post-Approval
Echo-Yodel Production Wells	2000/11	Controlled Action	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Enfield full field development	2001/257	Controlled Action	Post-Approval
Equus Gas Fields Development Project, Carnarvon Basin	2012/6301	Controlled Action	Completed
Eramurra Industrial Salt Project	2021/9027	Controlled Action	Assessment Approach
Eramurra Industrial Salt Project, near Karratha, WA	2019/8448	Controlled Action	Completed
Gorgon Gas Development 4th Train Proposal	2011/5942	Controlled Action	Post-Approval
Gorgon Gas Revised Development	2008/4178	Controlled Action	Post-Approval
Greater Enfield (Vincent) Development	2005/2110	Controlled Action	Post-Approval
Greater Gorgon Development - Optical Fibre Cable, Mainland to Barrow Island	2005/2141	Controlled Action	Completed
Great Northern Pipeline - 630 km buried gas pipeline	2009/5257	Controlled Action	Completed
Learmonth Bundle Site and Launchway, WA	2017/8079	Controlled Action	Completed
Light Crude Oil Production	2001/365	Controlled Action	Post-Approval
Mardie Project, 80 km south west of Karratha, WA	2018/8236	Controlled Action	Post-Approval
Nava-1 Cable System	2001/510	Controlled Action	Completed
North Star Magnetite Project	2012/6689	Controlled Action	Post-Approval
North West Shelf Gas Venture Phase VI Expansion	2007/3436	Controlled Action	Referral Decision
Perdaman Urea Project, near Karratha, WA	2018/8383	Controlled Action	Post-Approval
Pluto Gas Project	2005/2258	Controlled Action	Completed
Pluto Gas Project Including Site B	2006/2968	Controlled Action	Post-Approval
Poondano Iron Ore Project	2010/5759	Controlled Action	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Port Hedland Outer Harbour Development and associated marine and terrestrial in	2008/4159	Controlled Action	Post-Approval
Port Hedland Spoilbank Marina, WA	2019/8520	Controlled Action	Post-Approval
Proposed technical ammonium nitrate production facility	2008/4546	Controlled Action	Post-Approval
Proposed West Pilbara Iron Ore Project	2009/4706	Controlled Action	Post-Approval
Pyrenees Oil Fields Development	2005/2034	Controlled Action	Post-Approval
Roy Hill to Port Hedland Rail Line and Associated Infrastructure	2010/5424	Controlled Action	Post-Approval
Simpson Development	2000/59	Controlled Action	Completed
Simpson Oil Field Development	2001/227	Controlled Action	Post-Approval
site preparations	2005/2391	Controlled Action	Post-Approval
The Scarborough Project - FLNG & assoc subsea infrastructure, Carnarvon Basin	2013/6811	Controlled Action	Post-Approval
Vincent Appraisal Well	2000/22	Controlled Action	Post-Approval
Widening and resurfacing two principal roads servicing the Dampier Port Authori	2010/5677	Controlled Action	Completed
Yannarie Solar Salt Project	2004/1679	Controlled Action	Completed
Yardie Creek Road Realignment Project	2021/8967	Controlled Action	Assessment Approach
Not controlled action			
'Goodwyn A' Low Pressure Train Project	2003/914	Not Controlled Action	Completed
'Van Gogh' Oil Appraisal Drilling Program, Exploration Permit Area WA-155-P(1)	2006/3148	Not Controlled Action	Completed
150m Boodarie Gas Lateral Pipeline	2014/7116	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Airlie Island soil and groundwater investigations, Exmouth Gulf, offshore Pilbara coast	2014/7250	Not Controlled Action	Completed
Ammonia Plant	2001/199	Not Controlled Action	Completed
APX-West Fibre-optic telecommunications cable system, WA to Singapore	2013/7102	Not Controlled Action	Completed
Baniyas-1 Exploration Well, EP-424, near Onslow	2007/3282	Not Controlled Action	Completed
Barrow Island 2D Seismic survey	2006/2667	Not Controlled Action	Completed
Bollinger 2D Seismic Survey 200km North of North West Cape WA	2004/1868	Not Controlled Action	Completed
Bulgarene Borefield	2006/2507	Not Controlled Action	Completed
Bultaco-2, Laverda-2, Laverda-3 and Montesa-2 Appraisal Wells	2000/103	Not Controlled Action	Completed
Cape Lambert Port A Marine Structures Refurbishment Project	2018/8370	Not Controlled Action	Completed
Carnarvon 3D Marine Seismic Survey	2004/1890	Not Controlled Action	Completed
Cazadores 2D seismic survey	2004/1720	Not Controlled Action	Completed
Construct 110km buried natural gas pipeline from Onslow, connecting to Dampier/Bunbury natural gas p	2013/7039	Not Controlled Action	Completed
Construction and operation of an unmanned sea platform and connecting pipeline to Varanus Island for	2004/1703	Not Controlled Action	Completed
Construction of a Commodities Berth, Wharf and Associated Infrastructure	2008/4129	Not Controlled Action	Completed
Construction of Loadout Facility and Laydown Area	2002/598	Not Controlled Action	Completed
Controlled Source Electromagnetic Survey	2007/3262	Not Controlled Action	Completed
Deep Gorge Boardwalk, Murujuga National Park, WA	2018/8283	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Development of Halyard Field off the west coast of WA	2010/5611	Not Controlled Action	Completed
Development of Industrial Land, Port of Dampier	2003/1293	Not Controlled Action	Completed
Development of iron ore facilities	2013/7013	Not Controlled Action	Completed
Development of iron ore resources in eastern Pilbara region, including port at P	2004/1562	Not Controlled Action	Completed
Development of Mutineer and Exeter petroleum fields for oil production, Permit	2003/1033	Not Controlled Action	Completed
Differential Global Positioning System (DGPS)	2001/445	Not Controlled Action	Completed
Dimethyl ether plant	2001/509	Not Controlled Action	Completed
Drilling of an exploration well Gats-1 in Permit Area WA-261-P	2004/1701	Not Controlled Action	Completed
Eagle-1 Exploration Drilling, North West Shelf, WA	2019/8578	Not Controlled Action	Completed
Echo A Development WA-23-L, WA-24-L	2005/2042	Not Controlled Action	Completed
Expansion of the Sino Iron Ore Mine and export facilities, Cape Preston, WA	2017/7862	Not Controlled Action	Completed
Expansion Proposal, Mineralogy Cape Preston Iron Ore Project, Cape Preston, WA	2009/5010	Not Controlled Action	Completed
Exploration drilling well WA-155-P(1)	2003/971	Not Controlled Action	Completed
Exploration of appraisal wells	2006/3065	Not Controlled Action	Completed
Exploration Well (Taunton-2)	2002/731	Not Controlled Action	Completed
Exploration Well in Permit Area WA-155-P(1)	2002/759	Not Controlled Action	Completed
Exploratory drilling in permit area WA-225-P	2001/490	Not Controlled Action	Completed
Extension of Simpson Oil Platforms & Wells	2002/685	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Gulf Fishing Lodge	2010/5499	Not Controlled Action	Completed
HCA05X Macedon Experimental Survey	2004/1926	Not Controlled Action	Completed
Hess Exploration Drilling Programme	2007/3566	Not Controlled Action	Completed
Horizon Power South Hedland Transmission Line, WA	2012/6551	Not Controlled Action	Completed
Huascaran-1 exploration well (WA-292-P)	2001/539	Not Controlled Action	Completed
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
INDIGO West Submarine Telecommunications Cable, WA	2017/8126	Not Controlled Action	Completed
Infill Production Well (Griffin-9)	2001/417	Not Controlled Action	Completed
Iron Bridge Port Facility, Port Hedland, WA	2015/7565	Not Controlled Action	Completed
Jansz-2 and 3 Appraisal Wells	2002/754	Not Controlled Action	Completed
King Bay East Rock Quarry & Industrial Estate Development	2003/1150	Not Controlled Action	Completed
Klammer 2D Seismic Survey	2002/868	Not Controlled Action	Completed
Learmonth Limestone Quarry	2001/392	Not Controlled Action	Completed
Mahimahi Aquaculture Facility	2002/891	Not Controlled Action	Completed
Maia-Gaea Exploration wells	2000/17	Not Controlled Action	Completed
Manaslu - 1 and Huascaran - 1 Offshore Exploration Wells	2001/235	Not Controlled Action	Completed
Mermaid Marine Australia Desalination Project	2011/5916	Not Controlled Action	Completed
Methanol manufacturing	2001/528	Not Controlled Action	Completed
Methanol plant	2001/521	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Montesa-1 and Bultaco-1 Exploration Wells	2000/102	Not Controlled Action	Completed
Murujuga archaeological excavation, collection and sampling, Dampier Archipelago, WA	2014/7160	Not Controlled Action	Completed
North Rankin B gas compression facility	2005/2500	Not Controlled Action	Completed
Onslow Power Infrastructure Upgrade Project, Onslow, WA	2014/7314	Not Controlled Action	Completed
Onslow Rare Earths Plant	2021/9046	Not Controlled Action	Completed
Onslow Water Supply Infrastructure Upgrade Project, Onslow, WA	2014/7329	Not Controlled Action	Completed
Pardoo Direct Shipping Ore (DSO) Project	2007/3539	Not Controlled Action	Completed
Pilbara Bulk Ore Transport System Project, WA	2016/7637	Not Controlled Action	Completed
Pilbara Transmission Project, Pilbara, WA	2018/8349	Not Controlled Action	Completed
Pipeline System Modifications Project	2000/3	Not Controlled Action	Completed
Pluto-North West Shelf Interconnector, Burrup Peninsula, WA	2018/8353	Not Controlled Action	Completed
Port Expansion and Dredging	2003/1265	Not Controlled Action	Completed
Port Hedland Channel Risk and Optimisation Project, WA	2017/7915	Not Controlled Action	Completed
Port Hedland Power Station Conversion Project	2011/6080	Not Controlled Action	Completed
Project Highclere Geophysical Survey	2021/9023	Not Controlled Action	Completed
Rail and Port Facilities	2001/474	Not Controlled Action	Completed
Relocation of approx. 670m of the Pilbara Energy Pipeline	2013/6756	Not Controlled Action	Completed
Roebourne Quarry	2017/7873	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Searipple gas and condensate field development	2000/89	Not Controlled Action	Completed
South Hedland Power Station WA	2011/5929	Not Controlled Action	Completed
Spool Base Facility	2001/263	Not Controlled Action	Completed
Stages 1 & 2 Port of Dampier Security Upgrade & Associated Works	2004/1751	Not Controlled Action	Completed
Subsea Gas Pipeline From Stybarrow Field to Griffin Venture Gas Export Pipeline	2005/2033	Not Controlled Action	Completed
sub-sea tieback of Perseus field wells	2004/1326	Not Controlled Action	Completed
Telfer Gold Mine Project - Mine and Borefield Extensions and Upgrade of Storage	2002/787	Not Controlled Action	Completed
Telfer Gold Mine Project - Power Supply and Infrastructure Corridor	2002/786	Not Controlled Action	Completed
Telstra North Rankin Spur Fibre Optic Cable	2016/7836	Not Controlled Action	Completed
Thevenard Island Retirement Project	2015/7423	Not Controlled Action	Completed
To construct and operate an offshore submarine fibre optic cable, WA	2014/7373	Not Controlled Action	Completed
WA-295-P Kerr-McGee Exploration Wells	2001/152	Not Controlled Action	Completed
Walkway Lighting Upgrade	2009/4965	Not Controlled Action	Completed
Wanda Offshore Research Project, 80 km north-east of Exmouth, WA	2018/8293	Not Controlled Action	Completed
Western Flank Gas Development	2005/2464	Not Controlled Action	Completed
Wheatstone 3D seismic survey, 70km north of Barrow Island	2004/1761	Not Controlled Action	Completed
Widening of MOF Road	2005/2305	Not Controlled Action	Completed
Wodgina Lithium Mine Expansion, Pilbara, NT	2018/8194	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Woodside Project Facilities Increase	2006/3191	Not Controlled Action	Completed
Not controlled action (particular manner)			
'Kate' 3D marine seismic survey, exploration permits WA-320-P and WA-345-P, 60km	2005/2037	Not Controlled Action (Particular Manner)	Post-Approval
'Tourmaline' 2D marine seismic survey, permit areas WA-323-P, WA-330-P and WA-32	2005/2282	Not Controlled Action (Particular Manner)	Post-Approval
"Leanne" offshore 3D seismic exploration, WA-356-P	2005/1938	Not Controlled Action (Particular Manner)	Post-Approval
2D and 3D seismic surveys	2005/2151	Not Controlled Action (Particular Manner)	Post-Approval
2D marine seismic survey	2012/6296	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Survey	2005/2146	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Survey Permit Area WA-352-P	2008/4628	Not Controlled Action (Particular Manner)	Post-Approval
2D seismic survey within permit WA-291	2007/3265	Not Controlled Action (Particular Manner)	Post-Approval
3D marine seismic survey	2008/4281	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey (WA-482-P, WA-363-P), WA	2013/6761	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey in Permit Areas WA-15-R, WA-18-R, WA-205-P, WA-253-P, WA-267-P and WA-268-P	2003/1271	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
3D Marine Seismic Survey in WA 457-P & WA 458-P, North West Shelf, offshore WA	2013/6862	Not Controlled Action (Particular Manner)	Post-Approval
3D marine seismic survey over petroleum title WA-268-P	2007/3458	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Surveys - Contos CT-13 & Supertubes CT-13, offshore WA	2013/6901	Not Controlled Action (Particular Manner)	Post-Approval
3D seismic survey	2006/2715	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey, WA	2008/4428	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey in the Carnarvon Bsin on the North West Shelf	2002/778	Not Controlled Action (Particular Manner)	Post-Approval
3D sesmic survey	2006/2781	Not Controlled Action (Particular Manner)	Post-Approval
Additional Rail Infrastructure	2012/6314	Not Controlled Action (Particular Manner)	Post-Approval
Agrippina 3D Seismic Marine Survey	2009/5212	Not Controlled Action (Particular Manner)	Post-Approval
Algae Farm and Processing Facilities	2012/6596	Not Controlled Action (Particular Manner)	Post-Approval
Ammonia Plant, Murujuga Burrup Peninsula - Renewable Hydrogen Project	2020/8739	Not Controlled Action (Particular Manner)	Post-Approval
Apache Northwest Shelf Van Gogh Field Appraisal Drilling Program	2007/3495	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Aperio 3D Marine Seismic Survey, WA	2012/6648	Not Controlled Action (Particular Manner)	Post-Approval
Artemis-1 Drilling Program (WA-360-P)	2010/5432	Not Controlled Action (Particular Manner)	Post-Approval
Atlas Boodarie Link Project, WA	2012/6506	Not Controlled Action (Particular Manner)	Post-Approval
Australia to Singapore Fibre Optic Submarine Cable System	2011/6127	Not Controlled Action (Particular Manner)	Post-Approval
Babylon 3D Marine Seismic Survey, Commonwealth Waters, nr Exmouth WA	2013/7081	Not Controlled Action (Particular Manner)	Post-Approval
Balnaves Condensate Field Development	2011/6188	Not Controlled Action (Particular Manner)	Post-Approval
Bonaventure 3D seismic survey	2006/2514	Not Controlled Action (Particular Manner)	Post-Approval
Buckland Iron Ore Mining Project, Pilbara region, WA	2013/6867	Not Controlled Action (Particular Manner)	Post-Approval
Cable Seismic Exploration Permit areas WA-323-P and WA-330-P	2008/4227	Not Controlled Action (Particular Manner)	Post-Approval
Cape Preston East - Iron Ore Export Facilities, Pilbara, WA	2013/6844	Not Controlled Action (Particular Manner)	Post-Approval
Cerberus exploration drilling campaign, Carnarvon Basin, WA	2016/7645	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
CGGVERITAS 2010 2D Seismic Survey	2010/5714	Not Controlled Action (Particular Manner)	Post-Approval
Charon 3D Marine Seismic Survey	2007/3477	Not Controlled Action (Particular Manner)	Post-Approval
Consturction & operation of the Varanus Island kitchen & mess cyclone refuge building, compression p	2013/6952	Not Controlled Action (Particular Manner)	Post-Approval
Cue Seismic Survey within WA-359-P, WA-361-P and WA-360-P	2007/3647	Not Controlled Action (Particular Manner)	Post-Approval
CVG 3D Marine Seismic Survey	2012/6654	Not Controlled Action (Particular Manner)	Post-Approval
Dampier Marine Services Facility including 300m Wharf and Dredging Works	2009/5108	Not Controlled Action (Particular Manner)	Post-Approval
DAVROS MC 3D marine seismic survey northwaet of Dampier, WA	2013/7092	Not Controlled Action (Particular Manner)	Post-Approval
Decommissioning of the Legendre facilities	2010/5681	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Drilling Program	2010/5532	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Northwest Shelf 2D Seismic Survey	2007/3260	Not Controlled Action (Particular Manner)	Post-Approval
Demeter 3D Seismic Survey, off Dampier, WA	2002/900	Not Controlled Action (Particular Manner)	Post-Approval
Diesel Fuel Bunker Operation	2012/6289	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Draeck 3D Marine Seismic Survey, WA-205-P	2006/3067	Not Controlled Action (Particular Manner)	Post-Approval
Dredging of marine sediment to enable construction of eight berths and a turnin	2010/5678	Not Controlled Action (Particular Manner)	Post-Approval
Drilling 35-40 offshore exploration wells in deep water	2008/4461	Not Controlled Action (Particular Manner)	Post-Approval
Earthworks for kitchen/mess, cyclone refuge building & Compression Plant, Varanus Island	2013/6900	Not Controlled Action (Particular Manner)	Post-Approval
Eendracht Multi-Client 3D Marine Seismic Survey	2009/4749	Not Controlled Action (Particular Manner)	Post-Approval
Effect of marine seismic sounds to demersal fish and pearl oysters, north-west WA	2018/8169	Not Controlled Action (Particular Manner)	Post-Approval
Enfield M3 & Vincent 4D Marine Seismic Surveys	2008/3981	Not Controlled Action (Particular Manner)	Completed
Enfield M3 4D, Vincent 4D & 4D Line Test Marine Seismic Surveys	2008/4122	Not Controlled Action (Particular Manner)	Post-Approval
Enfield M4 4D Marine Seismic Survey	2008/4558	Not Controlled Action (Particular Manner)	Post-Approval
Enfield oilfield 3D Seismic Survey	2006/3132	Not Controlled Action (Particular Manner)	Post-Approval
Exmouth West 2D Marine Seismic Survey	2008/4132	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Exploration drilling of Zeus-1 well	2008/4351	Not Controlled Action (Particular Manner)	Post-Approval
Fletcher-Finucane Development, WA26-L and WA191-P	2011/6123	Not Controlled Action (Particular Manner)	Post-Approval
Foxhound 3D Non-Exclusive Marine Seismic Survey	2009/4703	Not Controlled Action (Particular Manner)	Post-Approval
Gazelle 3D Marine Seismic Survey in WA-399-P and WA-42-L	2010/5570	Not Controlled Action (Particular Manner)	Post-Approval
Geco Eagle 3D Marine Seismic Survey	2008/3958	Not Controlled Action (Particular Manner)	Post-Approval
Glencoe 3D Marine Seismic Survey WA-390-P	2007/3684	Not Controlled Action (Particular Manner)	Post-Approval
Greater Western Flank Phase 1 gas Development	2011/5980	Not Controlled Action (Particular Manner)	Post-Approval
Grimalkin 3D Seismic Survey	2008/4523	Not Controlled Action (Particular Manner)	Post-Approval
Guacamole 2D Marine Seismic Survey	2008/4381	Not Controlled Action (Particular Manner)	Post-Approval
Harmony 3D Marine Seismic Survey	2012/6699	Not Controlled Action (Particular Manner)	Post-Approval
Harpy 1 exploration well	2001/183	Not Controlled Action (Particular Manner)	Post-Approval
Honeycombs MC3D Marine Seismic Survey	2012/6368	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Huzzas MC3D Marine Seismic Survey (HZ-13) Carnarvon Basin, offshore WA	2013/7003	Not Controlled Action (Particular Manner)	Post-Approval
Huzzas phase 2 marine seismic survey, Exmouth Plateau, Northern Carnarvon Basin, WA	2013/7093	Not Controlled Action (Particular Manner)	Post-Approval
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval
John Ross & Rosella Off Bottom Cable Seismic Exploration Program	2008/3966	Not Controlled Action (Particular Manner)	Post-Approval
Judo Marine 3D Seismic Survey within and adjacent to WA-412-P	2009/4801	Not Controlled Action (Particular Manner)	Post-Approval
Judo Marine 3D Seismic Survey within and adjacent to WA-412-P	2008/4630	Not Controlled Action (Particular Manner)	Post-Approval
Julimar Brunello Gas Development Project	2011/5936	Not Controlled Action (Particular Manner)	Post-Approval
Klimt 2D Marine Seismic Survey	2007/3856	Not Controlled Action (Particular Manner)	Post-Approval
Koolama 2D Seismic Survey Dampier Basin	2010/5420	Not Controlled Action (Particular Manner)	Post-Approval
Laverda 3D Marine Seismic Survey and Vincent M1 4D Marine Seismic Survey	2010/5415	Not Controlled Action (Particular Manner)	Post-Approval
Laying a submarine optical fibre telecommunications cable, Perth to Singapore and Jakarta	2014/7332	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Leopard 2D marine seismic survey	2005/2290	Not Controlled Action (Particular Manner)	Post-Approval
Lion 2D Marine Seismic Survey	2007/3777	Not Controlled Action (Particular Manner)	Post-Approval
Macedon Gas Field Development	2008/4605	Not Controlled Action (Particular Manner)	Post-Approval
Marine Geotechnical Drilling Program	2008/4012	Not Controlled Action (Particular Manner)	Post-Approval
Marine reconnaissance survey	2008/4466	Not Controlled Action (Particular Manner)	Post-Approval
Millstream 20GL Pipeline, Bungaroo, Borefield Integration	2012/6379	Not Controlled Action (Particular Manner)	Post-Approval
MOF Road Widening and Resurfacing Works	2011/5843	Not Controlled Action (Particular Manner)	Post-Approval
Moosehead 2D seismic survey within permit WA-192-P	2005/2167	Not Controlled Action (Particular Manner)	Post-Approval
Munmorah 2D seismic survey within permits WA-308/9-P	2003/970	Not Controlled Action (Particular Manner)	Post-Approval
Nelson Point Dredging	2009/4920	Not Controlled Action (Particular Manner)	Post-Approval
Nickol Bay Quarry Eastern Extension Proposal, Burrup Peninsula, WA	2013/6915	Not Controlled Action (Particular Manner)	Post-Approval
Ocean Bottom Cable Seismic Program, WA-264-P	2007/3844	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Ocean Bottom Cable Seismic Survey	2005/2017	Not Controlled Action (Particular Manner)	Post-Approval
Offshore Canning Multi Client 2D Marine Seismic Survey	2010/5393	Not Controlled Action (Particular Manner)	Post-Approval
Offshore Drilling Campaign	2011/5830	Not Controlled Action (Particular Manner)	Post-Approval
Offshore Fibre Optic Cable Network Construction & Operation, Port Hedland WA to Darwin NT	2014/7223	Not Controlled Action (Particular Manner)	Post-Approval
Onslow Seawater Desalination Plant Marine Geophysical Investigation	2020/8794	Not Controlled Action (Particular Manner)	Post-Approval
Orcus 3D Marine Seismic Survey in WA-450-P	2010/5723	Not Controlled Action (Particular Manner)	Post-Approval
Osprey and Dionysus Marine Seismic Survey	2011/6215	Not Controlled Action (Particular Manner)	Post-Approval
Outer Canning exploration drilling program off NW coast of WA	2012/6618	Not Controlled Action (Particular Manner)	Post-Approval
Phoenix 3D Seismic Survey, Bedout Sub-Basin	2010/5360	Not Controlled Action (Particular Manner)	Post-Approval
Pomodoro 3D Marine Seismic Survey in WA-426-P and WA-427-P	2010/5472	Not Controlled Action (Particular Manner)	Post-Approval
Port Headland Outer Harbour Pre-construction Pilling program	2012/6341	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Port of Port Hedland channel marker replacement project, WA	2017/8010	Not Controlled Action (Particular Manner)	Post-Approval
Port Walcott upgrade, dredging & spoil disposal, & channel realignment	2006/2806	Not Controlled Action (Particular Manner)	Post-Approval
Pyrenees 4D Marine Seismic Monitor Survey, HCA12A	2012/6579	Not Controlled Action (Particular Manner)	Post-Approval
Pyrenees-Macedon 3D marine seismic survey	2005/2325	Not Controlled Action (Particular Manner)	Post-Approval
Realignment of the Great Northern Highway	2010/5793	Not Controlled Action (Particular Manner)	Post-Approval
Reindeer gas reservior development, Devil Creek, Carnarvon Basin - WA	2007/3917	Not Controlled Action (Particular Manner)	Post-Approval
Repsol 3d & 2D Marine Seismic Survey	2012/6658	Not Controlled Action (Particular Manner)	Post-Approval
Rose 3D Seismic Program	2008/4239	Not Controlled Action (Particular Manner)	Post-Approval
Rydal-1 Petroleum Exploration Well, WA	2012/6522	Not Controlled Action (Particular Manner)	Post-Approval
Santos Winchester three dimensional seismic survey - WA-323-P & WA-330-P	2011/6107	Not Controlled Action (Particular Manner)	Post-Approval
Scarborough Development nearshore component, NWS, WA	2018/8362	Not Controlled Action (Particular Manner)	Post-Approval
Skorpion Marine Seismic Survey WA	2001/416	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Sovereign 3D Marine Seismic Survey	2011/5861	Not Controlled Action (Particular Manner)	Post-Approval
Stag 4D & Reindeer MAZ Marine Seismic Surveys, WA	2013/7080	Not Controlled Action (Particular Manner)	Post-Approval
Stag Off-bottom Cable Seismic Survey	2007/3696	Not Controlled Action (Particular Manner)	Post-Approval
Stybarrow 4D Marine Seismic Survey	2011/5810	Not Controlled Action (Particular Manner)	Post-Approval
Stybarrow Baseline 4D marine seismic survey	2008/4530	Not Controlled Action (Particular Manner)	Post-Approval
The Dampier Heavy Load Out Facility Berth and Swing Basin Expansion	2012/6271	Not Controlled Action (Particular Manner)	Post-Approval
Tidepole Maz 3D Seismic Survey Campaign	2007/3706	Not Controlled Action (Particular Manner)	Post-Approval
Tortilla 2D Seismic Survey, WA	2011/6110	Not Controlled Action (Particular Manner)	Post-Approval
Triton 3D Marine Seismic Survey, WA-2-R and WA-3-R	2006/2609	Not Controlled Action (Particular Manner)	Post-Approval
Undertake a 3D marine seismic survey	2010/5695	Not Controlled Action (Particular Manner)	Post-Approval
Undertake a three dimensional marine seismic survey	2010/5679	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Undertake a three dimensional marine seismic survey	2010/5715	Not Controlled Action (Particular Manner)	Post-Approval
upgrade of 3 community recreation sites	2005/2349	Not Controlled Action (Particular Manner)	Post-Approval
Vincent M1 and Enfield M5 4D Marine Seismic Survey	2010/5720	Not Controlled Action (Particular Manner)	Post-Approval
Warramunga Non-Inclusive 3D Seismic Survey	2008/4553	Not Controlled Action (Particular Manner)	Post-Approval
West Anchor 3D Marine Seismic Survey	2008/4507	Not Controlled Action (Particular Manner)	Post-Approval
West Panaeus 3D seismic survey	2006/3141	Not Controlled Action (Particular Manner)	Post-Approval
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone 3D MAZ Marine Seismic Survey	2011/6058	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone Iago Appraisal Well Drilling	2008/4134	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone Iago Appraisal Well Drilling	2007/3941	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
3D Marine Seismic Survey in the offshore northwest Carnarvon Basin	2011/6175	Referral Decision	Completed
3D Seismic Survey	2008/4219	Referral Decision	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Referral decision			
Bianchi 3D Marine Seismic Survey, Carnavon Basin, WA	2013/7078	Referral Decision	Completed
construction of a new loadout facility and associated laydown area south of the	2002/579	Referral Decision	Completed
CVG 3D Marine Seismic Survey	2012/6270	Referral Decision	Completed
Enfield 4D Marine Seismic Surveys, Production Permit WA-28-L	2005/2370	Referral Decision	Completed
Mardie Salt Project, Pilbara region, WA	2018/8183	Referral Decision	Completed
Outer Harbour Development and associated marine and terrestial infrastructure	2008/4148	Referral Decision	Completed
Relocation of 2 heritage sites to National Heritage Place	2010/5709	Referral Decision	Completed
Rose 3D Seismic acquisition survey	2008/4220	Referral Decision	Completed
Stybarrow Baseline 4D Marine Seismic Survey (Permit Areas WA-255-P, WA-32-L, WA-	2008/4165	Referral Decision	Completed
Two Dimensional Transition Zone Seismic Survey - TP/7 (R1)	2010/5507	Referral Decision	Completed
Varanus Island Compression Project	2012/6698	Referral Decision	Completed

Key Ecological Features

[Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Ancient coastline at 125 m depth contour	North-west
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	North-west
Commonwealth waters adjacent to Ningaloo Reef	North-west
Continental Slope Demersal Fish Communities	North-west
Exmouth Plateau	North-west
Glomar Shoals	North-west

Name	Region
Mermaid Reef and Commonwealth waters surrounding Rowley Shoals	North-west

Biologically Important Areas

[Resource Information]

Scientific Name	Behaviour	Presence
Dugong		
Dugong dugon Dugong [28]	Breeding	Known to occur
Dugong dugon Dugong [28]	Calving	Known to occur
Dugong dugon Dugong [28]	Foraging (high density seagrass beds)	Known to occur
Dugong dugon Dugong [28]	Nursing	Known to occur
Marine Turtles		
Caretta caretta Loggerhead Turtle [1763]	Foraging	Known to occur
Caretta caretta Loggerhead Turtle [1763]	Internesting buffer	Known to occur
Caretta caretta Loggerhead Turtle [1763]	Nesting	Known to occur
Chelonia mydas Green Turtle [1765]	Aggregation	Known to occur
Chelonia mydas Green Turtle [1765]	Basking	Known to occur
Chelonia mydas Green Turtle [1765]	Foraging	Known to occur
Chelonia mydas Green Turtle [1765]	Foraging	Likely to occur
Chelonia mydas Green Turtle [1765]	Internesting	Known to occur

Scientific Name	Behaviour	Presence
Chelonia mydas Green Turtle [1765]	Internesting buffer	Known to occur
Chelonia mydas Green Turtle [1765]	Mating	Known to occur
Chelonia mydas Green Turtle [1765]	Migration corridor	Known to occur
Chelonia mydas Green Turtle [1765]	Nesting	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Foraging	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Foraging	Likely to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting buffer	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Mating	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Migration corridor	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Nesting	Known to occur
Natator depressus Flatback Turtle [59257]	Aggregation	Known to occur
Natator depressus Flatback Turtle [59257]	Foraging	Known to occur
Natator depressus Flatback Turtle [59257]	Internesting	Known to occur

Scientific Name	Behaviour	Presence
Natator depressus Flatback Turtle [59257]	Internesting buffer	Known to occur
Natator depressus Flatback Turtle [59257]	Mating	Known to occur
Natator depressus Flatback Turtle [59257]	Migration corridor	Known to occur
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur
River shark		
Pristis zijsron Green Sawfish [68442]	Foraging	Known to occur
Pristis zijsron Green Sawfish [68442]	Nursing	Known to occur
Pristis zijsron Green Sawfish [68442]	Pupping	Known to occur
Seabirds		
Ardenna pacifica Wedge-tailed Shearwater [84292]	Breeding	Known to occur
Fregata ariel Lesser Frigatebird [1012]	Breeding	Known to occur
Phaethon lepturus White-tailed Tropicbird [1014]	Breeding	Known to occur
Sterna dougallii Roseate Tern [817]	Breeding	Known to occur
Sterna dougallii Roseate Tern [817]	Resting	Known to occur
Sternula albifrons sinensis Little Tern [82850]	Breeding	Known to occur
Sternula albifrons sinensis Little Tern [82850]	Resting	Known to occur

Scientific Name	Behaviour	Presence
Sternula nereis Fairy Tern [82949]	Breeding	Known to occur
Sula leucogaster Brown Booby [1022]	Breeding	Known to occur
Thalasseus bengalensis Lesser Crested Tern [66546]	Breeding	Known to occur
Sharks		
Rhincodon typus Whale Shark [66680]	Foraging	Known to occur
Rhincodon typus Whale Shark [66680]	Foraging (high density prey)	Known to occur
Whales		
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Foraging	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration (north and south)	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Resting	Known to occur

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data is available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on the contents of this report.

3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions when time permits.

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded breeding sites; and
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

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

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

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

Please feel free to provide feedback via the Contact us page.

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 08-Jan-2025

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	2
National Heritage Places:	4
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	3
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	88
Listed Migratory Species:	88

Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	25
Commonwealth Heritage Places:	3
Listed Marine Species:	132
Whales and Other Cetaceans:	34
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	14
Habitat Critical to the Survival of Marine Turtles:	3

Extra Information

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

State and Territory Reserves:	34
Regional Forest Agreements:	None
Nationally Important Wetlands:	8
EPBC Act Referrals:	59
Key Ecological Features (Marine):	8
Biologically Important Areas:	31
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Legal Status
Shark Bay, Western Australia	WA	Declared property
The Ningaloo Coast	WA	Declared property

National Heritage Places [Resource Information]

Name	State	Legal Status
Historic		
HMAS Sydney II and HSK Kormoran Shipwreck Sites	EXT	Listed place
Dirk Hartog Landing Site 1616 - Cape Inscription Area	WA	Listed place
Natural		
Shark Bay, Western Australia	WA	Listed place
The Ningaloo Coast	WA	Listed place

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Vulnerable	Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Endangered	Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Endangered	Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Malurus leucopterus leucopterus White-winged Fairy-wren (Dirk Hartog Island), Dirk Hartog Black-and-White Fairy-wren [26004]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Phaethon rubricauda westralis Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Roosting known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
[Thalassarche steadi](#) White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area
[Xenus cinereus](#) Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area
[Zanda latirostris listed as Calyptorhynchus latirostris](#) Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Species or species habitat known to occur within area
CRUSTACEAN		
[Kumonga exleyi](#) Cape Range Remipede [86875]	Vulnerable	Species or species habitat known to occur within area
FISH		
[Milyeringa veritas](#) Cape Range Cave Gudgeon, Blind Gudgeon [66676]	Vulnerable	Species or species habitat known to occur within area
[Ophisternon candidum](#) Blind Cave Eel [66678]	Vulnerable	Species or species habitat known to occur within area
MAMMAL		
[Balaenoptera borealis](#) Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Balaenoptera musculus](#) Blue Whale [36]	Endangered	Migration route known to occur within area
[Balaenoptera physalus](#) Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Scientific Name	Threatened Category	Presence Text
Bettongia lesueur lesueur Burrowing Bettong (Shark Bay), Boodie [66659]	Vulnerable	Species or species habitat known to occur within area
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat known to occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Translocated population known to occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Lagorchestes hirsutus bernieri Rufous Hare-wallaby (Bernier Island) [66662]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes hirsutus dorreae Rufous Hare-wallaby (Dorre Island) [66663]	Vulnerable	Species or species habitat known to occur within area
Lagostrophus fasciatus fasciatus Banded Hare-wallaby, Merrnine, Marnine, Munning [66664]	Vulnerable	Species or species habitat known to occur within area
Leporillus conditor Wopilkara, Greater Stick-nest Rat [137]	Vulnerable	Translocated population known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Translocated population known to occur within area

Scientific Name	Threatened Category	Presence Text
[Neophoca cinerea](#) Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat may occur within area
[Perameles bougainville](#) Shark Bay Bandicoot [278]	Endangered	Species or species habitat known to occur within area
[Petrogale lateralis lateralis](#) Black-flanked Rock-wallaby, Moororong, Black-footed Rock Wallaby [66647]	Endangered	Species or species habitat known to occur within area
[Pseudomys fieldi](#) Shark Bay Mouse, Djoongari, Alice Springs Mouse [113]	Vulnerable	Species or species habitat likely to occur within area
[Rhinonicteris aurantia (Pilbara form)](#) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
PLANT		
[Androcalva bivillosa](#) Straggling Androcalva [87807]	Critically Endangered	Species or species habitat may occur within area
[Beyeria lepidopetala](#) Small-petalled Beyeria, Short-petalled Beyeria [18362]	Endangered	Species or species habitat likely to occur within area
[Caladenia barbarella](#) Small Dragon Orchid, Common Dragon Orchid [68686]	Endangered	Species or species habitat may occur within area
[Caladenia bryceana subsp. cracens](#) Northern Dwarf Spider-orchid [64556]	Vulnerable	Species or species habitat known to occur within area
[Caladenia elegans](#) Elegant Spider-orchid [56775]	Endangered	Species or species habitat may occur within area
[Caladenia hoffmanii](#) Hoffman's Spider-orchid [56719]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Drakaea concolor Kneeling Hammer-orchid [56777]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus beardiana Beard's Mallee [18933]	Vulnerable	Species or species habitat known to occur within area
Hypocalymma longifolium Long-leaved Myrtle [8081]	Vulnerable	Species or species habitat likely to occur within area
Lechenaultia chlorantha Kalbarri Leschenaultia [16763]	Vulnerable	Species or species habitat known to occur within area
Stachystemon nematophorus Three-flowered Stachystemon [81447]	Vulnerable	Species or species habitat known to occur within area
Wurmbea tubulosa Long-flowered Nancy [12739]	Endangered	Species or species habitat may occur within area
REPTILE		
Aipysurus apraefrontalis Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
Aipysurus foliosquama Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Ctenotus zastictus Hamelin Ctenotus [25570]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Egernia stokesii badia		
Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
SHARK		
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Congregation or aggregation known to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Centrophorus uyato		
Little Gulper Shark [68446]	Conservation Dependent	Species or species habitat likely to occur within area
Pristis clavata		
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
[Sphyrna lewini](#) Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area
SPIDER		
[Idiosoma nigrum](#) Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
[Anous stolidus](#) Common Noddy [825]		Species or species habitat likely to occur within area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Ardenna carneipes](#) Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
[Ardenna pacifica](#) Wedge-tailed Shearwater [84292]		Breeding known to occur within area
[Calonectris leucomelas](#) Streaked Shearwater [1077]		Species or species habitat may occur within area
[Diomedea amsterdamensis](#) Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
[Diomedea exulans](#) Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
[Fregata ariel](#) Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons Little Tern [82849]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area

Migratory Marine Species

Scientific Name	Threatened Category	Presence Text
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharias taurus Grey Nurse Shark [64469]		Congregation or aggregation known to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Dugong dugon Dugong [28]		Breeding known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sousa sahulensis as Sousa chinensis Australian Humpback Dolphin [87942]		Species or species habitat known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Vulnerable	Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Species or species habitat known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Endangered	Roosting known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area

Scientific Name	Threatened Category	Presence Text
[Pandion haliaetus](#) Osprey [952]		Breeding known to occur within area
[Phalaropus lobatus](#) Red-necked Phalarope [838]		Species or species habitat known to occur within area
[Pluvialis fulva](#) Pacific Golden Plover [25545]		Species or species habitat known to occur within area
[Pluvialis squatarola](#) Grey Plover [865]	Vulnerable	Roosting known to occur within area
[Thalasseus bergii](#) Greater Crested Tern [83000]		Breeding known to occur within area
[Tringa brevipes](#) Grey-tailed Tattler [851]		Roosting known to occur within area
[Tringa glareola](#) Wood Sandpiper [829]		Roosting known to occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area
[Tringa stagnatilis](#) Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area
[Xenus cinereus](#) Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Defence	
Defence - CARNARVON TRAINING DEPOT [50235]	WA

Commonwealth Land Name	State
Defence - EXMOUTH VLF TRANSMITTER STATION [50123]	WA
Defence - EXMOUTH VLF TRANSMITTER STATION [50122]	WA
Defence - LEARMONTH - AIR WEAPONS RANGE [50193]	WA
Defence - LEARMONTH RADAR SITE - VLAMING HEAD EXMOUTH [50001]	WA
Unknown	
Commonwealth Land - [50266]	WA
Commonwealth Land - [50346]	WA
Commonwealth Land - [51433]	WA
Commonwealth Land - [51883]	WA
Commonwealth Land - [51881]	WA
Commonwealth Land - [50352]	WA
Commonwealth Land - [51097]	WA
Commonwealth Land - [51095]	WA
Commonwealth Land - [51096]	WA
Commonwealth Land - [52235]	WA
Commonwealth Land - [52236]	WA
Commonwealth Land - [51882]	WA
Commonwealth Land - [50367]	WA
Commonwealth Land - [50366]	WA
Commonwealth Land - [50362]	WA
Commonwealth Land - [50361]	WA
Commonwealth Land - [51885]	WA
Commonwealth Land - [50365]	WA
Commonwealth Land - [50364]	WA
Commonwealth Land - [50363]	WA

Commonwealth Heritage Places			[Resource Information]
Name	State	Status	
Historic			

Name	State	Status
HMAS Sydney II and HSK Kormoran Shipwreck Sites	EXT	Listed place
Natural		
Learmonth Air Weapons Range Facility	WA	Listed place
Ningaloo Marine Area - Commonwealth Waters	WA	Listed place

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Ardenna pacifica as Puffinus pacificus Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Roosting known to occur within area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area overfly marine area
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area overfly marine area
Calidris tenuirostris Great Knot [862]	Vulnerable	Roosting known to occur within area overfly marine area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area overfly marine area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat known to occur within area overfly marine area
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]		Breeding known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area overfly marine area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area overfly marine area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area overfly marine area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area overfly marine area
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area overfly marine area
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Breeding known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Species or species habitat known to occur within area overfly marine area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Endangered	Roosting known to occur within area overfly marine area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area overfly marine area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area overfly marine area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat known to occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Phalaropus lobatus Red-necked Phalarope [838]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Roosting known to occur within area overfly marine area
Pterodroma macroptera Great-winged Petrel [1035]		Foraging, feeding or related behaviour known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Puffinus assimilis Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area overfly marine area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area overfly marine area
Stercorarius antarcticus as Catharacta skua Brown Skua [85039]		Species or species habitat may occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons as Sterna albifrons Little Tern [82849]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Sternula nereis as Sterna nereis Fairy Tern [82949]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Thalasseus bengalensis as Sterna bengalensis Lesser Crested Tern [66546]		Breeding known to occur within area
Thalasseus bergii as Sterna bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes as Heteroscelus brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area overfly marine area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area overfly marine area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
[Xenus cinereus](#) Terek Sandpiper [59300]	Vulnerable	Roosting known to occur within area overfly marine area
Fish		
[Acentronura australe](#) Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
[Bulbonaricus brauni](#) Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
[Campichthys galei](#) Gale's Pipefish [66191]		Species or species habitat may occur within area
[Choeroichthys brachysoma](#) Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
[Choeroichthys suillus](#) Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
[Doryrhamphus negrosensis](#) Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
[Festucalex scalaris](#) Ladder Pipefish [66216]		Species or species habitat may occur within area
[Filicampus tigris](#) Tiger Pipefish [66217]		Species or species habitat may occur within area
[Halicampus brocki](#) Brock's Pipefish [66219]		Species or species habitat may occur within area
[Halicampus spinirostris](#) Spiny-snout Pipefish [66225]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus subelongatus West Australian Seahorse [66722]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
[Urocampus carinirostris](#) Hairy Pipefish [66282]		Species or species habitat may occur within area
[Vanacampus margaritifer](#) Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammal		
[Dugong dugon](#) Dugong [28]		Breeding known to occur within area
[Neophoca cinerea](#) Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat may occur within area
Reptile		
[Aipysurus apraefrontalis](#) Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
[Aipysurus duboisii](#) Dubois' Sea Snake, Dubois' Seasnake, Reef Shallows Sea Snake [1116]		Species or species habitat may occur within area
[Aipysurus foliosquama](#) Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
[Aipysurus laevis](#) Olive Sea Snake, Olive-brown Sea Snake [1120]		Species or species habitat may occur within area
[Aipysurus mosaicus as Aipysurus eydouxii](#) Mosaic Sea Snake [87261]		Species or species habitat may occur within area
[Aipysurus pooleorum](#) Shark Bay Sea Snake [66061]		Species or species habitat may occur within area
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Emydocephalus annulatus Eastern Turtle-headed Sea Snake [1125]		Species or species habitat may occur within area
Ephalophis greyae as Ephalophis greyi Mangrove Sea Snake [93738]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Hydrophis elegans Elegant Sea Snake, Bar-bellied Sea Snake [1104]		Species or species habitat may occur within area
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]		Species or species habitat may occur within area
Hydrophis major as Disteira major Olive-headed Sea Snake [93512]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Sea Snake, Ornate Reef Sea Snake [1111]		Species or species habitat may occur within area
Hydrophis peronii as Acalyptophis peronii Horned Sea Snake [93509]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hydrophis platura as Pelamis platurus Yellow-bellied Sea Snake [93746]		Species or species habitat may occur within area
Hydrophis stokesii as Astrotia stokesii Stokes' Sea Snake [93510]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area

Whales and Other Cetaceans [Resource Information]

Current Scientific Name	Status	Type of Presence
Mammal		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
[Eubalaena australis](#) Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
[Feresa attenuata](#) Pygmy Killer Whale [61]		Species or species habitat may occur within area
[Globicephala macrorhynchus](#) Short-finned Pilot Whale [62]		Species or species habitat may occur within area
[Globicephala melas](#) Long-finned Pilot Whale [59282]		Species or species habitat may occur within area
[Grampus griseus](#) Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
[Indopacetus pacificus](#) Longman's Beaked Whale [72]		Species or species habitat may occur within area
[Kogia breviceps](#) Pygmy Sperm Whale [57]		Species or species habitat may occur within area
[Kogia sima](#) Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
[Lagenodelphis hosei](#) Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
[Megaptera novaeangliae](#) Humpback Whale [38]		Breeding known to occur within area
[Mesoplodon densirostris](#) Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa sahulensis Australian Humpback Dolphin [87942]		Species or species habitat known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks	[Resource Information]
Park Name	Zone & IUCN Categories
Abrolhos	Habitat Protection Zone (IUCN IV)
Carnarvon Canyon	Habitat Protection Zone (IUCN IV)
Gascoyne	Habitat Protection Zone (IUCN IV)
Gascoyne	Habitat Protection Zone (IUCN IV)
Abrolhos	Multiple Use Zone (IUCN VI)
Abrolhos	Multiple Use Zone (IUCN VI)
Gascoyne	Multiple Use Zone (IUCN VI)
Shark Bay	Multiple Use Zone (IUCN VI)
Abrolhos	National Park Zone (IUCN II)
Gascoyne	National Park Zone (IUCN II)
Ningaloo	National Park Zone (IUCN II)

Park Name	Zone & IUCN Categories
Ningaloo	Recreational Use Zone (IUCN IV)
Ningaloo	Recreational Use Zone (IUCN IV)
Abrolhos	Special Purpose Zone (IUCN VI)

Habitat Critical to the Survival of Marine Turtles [Resource Information]

Scientific Name	Behaviour	Presence
Aug - Sep		
Natator depressus		
Flatback Turtle [59257]	Nesting	Known to occur
Dec - Jan		
Chelonia mydas		
Green Turtle [1765]	Nesting	Known to occur
Nov-Feb		
Caretta caretta		
Loggerhead Turtle [1763]	Nesting	Known to occur

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State
Bernier And Dorre Islands	Nature Reserve	WA
Cape Range	National Park	WA
Cape Range (South)	National Park	WA
Chinamans Pool	Nature Reserve	WA
Dirk Hartog Island	National Park	WA
Faure Island	Private Nature Reserve	WA
Francois Peron	National Park	WA
Freycinet, Double Islands etc	Nature Reserve	WA
Hamelin Pool	Marine Nature Reserve	WA
Hamelin Station	Conservation Reserve	WA
Jurabi Coastal Park	5(1)(h) Reserve	WA

Protected Area Name	Reserve Type	State
Kalbarri	National Park	WA
Kalbarri Blue Holes	Fish Habitat Protection Area	WA
Koks Island	Nature Reserve	WA
Miaboolya Beach	Fish Habitat Protection Area	WA
Monkey Mia Reserve	5(1)(h) Reserve	WA
Nanga Station	NRS Addition - Gazettal in Progress	WA
Ningaloo	Marine Park	WA
Nyingguulu (Ningaloo) Coastal Reserve	5(1)(h) Reserve	WA
One Tree Point	Nature Reserve	WA
Part Murchison house	NRS Addition - Gazettal in Progress	WA
Point Quobba	Fish Habitat Protection Area	WA
Sedimentary Deposits Reserve	5(1)(g) Reserve	WA
Shark Bay	Marine Park	WA
Shell Beach	Conservation Park	WA
Tamala Pastoral Lease (Part)	NRS Addition - Gazettal in Progress	WA
Unnamed WA26400	5(1)(h) Reserve	WA
Unnamed WA37338	5(1)(h) Reserve	WA
Unnamed WA37383	5(1)(h) Reserve	WA
Unnamed WA37500	5(1)(g) Reserve	WA
Unnamed WA44688	5(1)(h) Reserve	WA
Unnamed WA49144	Conservation Park	WA
Yaringga	NRS Addition - Gazettal in Progress	WA
Zuytdorp	Nature Reserve	WA

Nationally Important Wetlands	[Resource Information]
Wetland Name	State
Bundera Sinkhole	WA
Cape Range Subterranean Waterways	WA
Hamelin Pool	WA
Lake MacLeod	WA
Learmonth Air Weapons Range - Saline Coastal Flats	WA
McNeill Claypan System	WA
Murchison River (Lower Reaches)	WA
Shark Bay East	WA

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Marine Route Survey for Subsea Fibre Optic Data Cable System - Australia West	2024/09826		Completed
Midwest Offshore Wind Farm	2022/09264		Assessment
Monkey Mia Dolphin Resort Solar Farm	2023/09700		Referral Decision
Ningaloo Lighthouse Development, 17km north west Exmouth, Western Australia	2020/8693		Post-Approval
Project Highclere Cable Lay and Operation	2022/09203		Completed
Controlled action			
Boating Facility	2002/830	Controlled Action	Completed
Coburn Mineral Sand Project	2003/1221	Controlled Action	Post-Approval
Development of Stybarrow petroleum field incl drilling and facility installation	2004/1469	Controlled Action	Post-Approval
Enfield full field development	2001/257	Controlled Action	Post-Approval
Mauds Landing Marina	2000/98	Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Nava-1 Cable System	2001/510	Controlled Action	Completed
Pyrenees Oil Fields Development	2005/2034	Controlled Action	Post-Approval
Shark Bay Resources Dredging	2020/8717	Controlled Action	Post-Approval
Shark Bay Salt Facilities upgrade for direct ocean disposal of bitterns discharge	2011/5984	Controlled Action	Completed
Yardie Creek Road Realignment Project	2021/8967	Controlled Action	Assessment Approach
Not controlled action			
Accommodation Units Sunday Island Bay, Dirk Hartog Island, WA	2015/7540	Not Controlled Action	Completed
APX-West Fibre-optic telecommunications cable system, WA to Singapore	2013/7102	Not Controlled Action	Completed
archaeological surveys & excavation at historic sites, Cape Inscription	2006/3027	Not Controlled Action	Completed
Boating Facility	2002/832	Not Controlled Action	Completed
Carnarvon Power Station Development Project	2010/5669	Not Controlled Action	Completed
Clearing of vegetation for borrow pit and infrastructure areas	2017/7947	Not Controlled Action	Completed
Drilling between Kalbarri and Cliff Head	2005/2185	Not Controlled Action	Completed
Expansion of Monkey Mia Resort	2003/1146	Not Controlled Action	Completed
Extention to the existing Blind Strait Black Lip Pearl Oyster Farm	2004/1342	Not Controlled Action	Completed
Flood Management works	2006/3127	Not Controlled Action	Completed
Hadda 1,Flying Foam 1,Magnat 1 exploration drill	2004/1697	Not Controlled Action	Completed
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
INDIGO West Submarine Telecommunications Cable, WA	2017/8126	Not Controlled Action	Completed
Project Highclere Geophysical Survey	2021/9023	Not Controlled Action	Completed
Realignment of Access track, Bottle Bay, Shark Bay	2004/1780	Not Controlled Action	Completed
Spool Base Facility	2001/263	Not Controlled Action	Completed
Useless Loop Road Upgrade	2000/83	Not Controlled Action	Completed
Not controlled action (particular manner)			
2D seismic survey	2008/4493	Not Controlled Action (Particular Manner)	Post-Approval
Acheron Non-Exclusive 2D Seismic Survey	2009/4968	Not Controlled Action (Particular Manner)	Post-Approval
Acheron Non-Exclusive 2D Seismic Survey	2008/4565	Not Controlled Action (Particular Manner)	Post-Approval
Australia to Singapore Fibre Optic Submarine Cable System	2011/6127	Not Controlled Action (Particular Manner)	Post-Approval
Coverack Marine Seismic Survey	2001/399	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Northwest Shelf 2D Seismic Survey	2007/3260	Not Controlled Action (Particular Manner)	Post-Approval
Eendracht Multi-Client 3D Marine Seismic Survey	2009/4749	Not Controlled Action (Particular Manner)	Post-Approval
Exmouth West 2D Marine Seismic Survey	2008/4132	Not Controlled Action (Particular Manner)	Post-Approval
Guacamole 2D Marine Seismic Survey	2008/4381	Not Controlled Action	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		(Particular Manner)	
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval
Laying a submarine optical fibre telecommunications cable, Perth to Singapore and Jakarta	2014/7332	Not Controlled Action (Particular Manner)	Post-Approval
Marine reconnaissance survey	2008/4466	Not Controlled Action (Particular Manner)	Post-Approval
Palta-1 exploration well in Petroleum Permit Area WA-384-P	2011/5871	Not Controlled Action (Particular Manner)	Post-Approval
Quiberon 2D Seismic Survey, permit area WA-385P, offshore of Carnarvon	2009/5077	Not Controlled Action (Particular Manner)	Post-Approval
Salsa 3D Marine Seismic Survey	2010/5629	Not Controlled Action (Particular Manner)	Post-Approval
Sampling of Stromatolites, additional sites, Mamelin Pool,WA	2013/7071	Not Controlled Action (Particular Manner)	Post-Approval
Sampling of Stromatolites and Sediments	2012/6307	Not Controlled Action (Particular Manner)	Post-Approval
Skorpion Marine Seismic Survey WA	2001/416	Not Controlled Action (Particular Manner)	Post-Approval
Supply of road building material areas Shark Bay Region WA	2012/6280	Not Controlled Action (Particular Manner)	Post-Approval
Tantabiddi Boat Ramp Sand Bypassing	2015/7411	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Tortilla 2D Seismic Survey, WA	2011/6110	Not Controlled Action (Particular Manner)	Post-Approval
Undertake a three dimensional marine seismic survey	2010/5679	Not Controlled Action (Particular Manner)	Post-Approval
Useless Loop Port Maintenance Works and Infrastructure Upgrade	2009/4791	Not Controlled Action (Particular Manner)	Post-Approval
Warramunga Non-Inclusive 3D Seismic Survey	2008/4553	Not Controlled Action (Particular Manner)	Post-Approval
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
Geoscientific field-trip to Shark Bay	2012/6380	Referral Decision	Completed
Power Station Development	2009/4957	Referral Decision	Completed

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Ancient coastline at 90-120m depth	South-west
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	North-west
Commonwealth waters adjacent to Ningaloo Reef	North-west
Continental Slope Demersal Fish Communities	North-west
Exmouth Plateau	North-west
Wallaby Saddle	North-west
Western demersal slope and associated fish communities	South-west

Name	Region
Western rock lobster	South-west

Biologically Important Areas

[Resource Information]

Scientific Name	Behaviour	Presence
Dugong		
Dugong dugon Dugong [28]	Breeding	Known to occur
Dugong dugon Dugong [28]	Calving	Known to occur
Dugong dugon Dugong [28]	Foraging	Known to occur
Dugong dugon Dugong [28]	Foraging (high density seagrass beds)	Known to occur
Dugong dugon Dugong [28]	Migration	Known to occur
Dugong dugon Dugong [28]	Nursing	Known to occur
Marine Turtles		
Caretta caretta Loggerhead Turtle [1763]	Internesting	Known to occur
Caretta caretta Loggerhead Turtle [1763]	Internesting buffer	Known to occur
Caretta caretta Loggerhead Turtle [1763]	Nesting	Known to occur
Chelonia mydas Green Turtle [1765]	Internesting buffer	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting buffer	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Nesting	Known to occur

Scientific Name	Behaviour	Presence
Natator depressus Flatback Turtle [59257]	Internesting buffer	Known to occur
Seabirds		
Ardenna pacifica Wedge-tailed Shearwater [84292]	Breeding	Known to occur
Ardenna pacifica Wedge-tailed Shearwater [84292]	Foraging (in high numbers)	Known to occur
Hydroprogne caspia Caspian Tern [808]	Foraging (provisioning young)	Known to occur
Larus pacificus Pacific Gull [811]	Foraging (in high numbers)	Known to occur
Onychoprion anaethetus Bridled Tern [82845]	Foraging (in high numbers)	Known to occur
Onychoprion fuscata Sooty Tern [82847]	Foraging	Known to occur
Pelagodroma marina White-faced Storm-petrel [1016]	Foraging (in high numbers)	Known to occur
Puffinus assimilis tunneyi Little Shearwater [59363]	Foraging (in high numbers)	Known to occur
Sterna dougallii Roseate Tern [817]	Breeding	Known to occur
Sternula nereis Fairy Tern [82949]	Breeding	Known to occur
Thalasseus bengalensis Lesser Crested Tern [66546]	Breeding	Known to occur
Sharks		

Scientific Name	Behaviour	Presence
Rhincodon typus Whale Shark [66680]	Foraging (high density prey)	Known to occur
Whales		
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Foraging	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration (north)	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration (north and south)	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Resting	Known to occur

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data is available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on the contents of this report.

3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions when time permits.

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded breeding sites; and
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

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

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

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

Please feel free to provide feedback via the Contact us page.

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 08-Jan-2025

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	9
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	38
Listed Migratory Species:	71

Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	2
Listed Marine Species:	121
Whales and Other Cetaceans:	29
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	9
Habitat Critical to the Survival of Marine Turtles:	2

Extra Information

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

State and Territory Reserves:	5
Regional Forest Agreements:	None
Nationally Important Wetlands:	1
EPBC Act Referrals:	59
Key Ecological Features (Marine):	5
Biologically Important Areas:	32
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

National Heritage Places [Resource Information]

Name	State	Legal Status
Natural		
The West Kimberley	WA	Listed place

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Vulnerable	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Endangered	Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Endangered	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Papasula abbotti		
Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Phaethon lepturus fulvus		
Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Phaethon rubricauda westralis		
Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Breeding known to occur within area
Pluvialis squatarola		
Grey Plover [865]	Vulnerable	Species or species habitat known to occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area
Xenus cinereus		
Terek Sandpiper [59300]	Vulnerable	Species or species habitat known to occur within area
MAMMAL		
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
REPTILE		

Scientific Name	Threatened Category	Presence Text
Aipysurus apraefrontalis Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
Aipysurus foliosquama Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus fuscus Dusky Sea Snake [1119]	Endangered	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
SHARK		
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Glyphis garricki Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat likely to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Foraging, feeding or related behaviour known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Breeding known to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons Little Tern [82849]		Breeding known to occur within area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Sula sula Red-footed Booby [1023]		Breeding known to occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area

Scientific Name	Threatened Category	Presence Text
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
Carcharias taurus Grey Nurse Shark [64469]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Dugong dugon Dugong [28]		Foraging, feeding or related behaviour likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Pristis pristis		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat likely to occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sousa sahulensis as Sousa chinensis		
Australian Humpback Dolphin [87942]		Species or species habitat known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations)		
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cecropis daurica		
Red-rumped Swallow [80610]		Species or species habitat may occur within area
Hirundo rustica		
Barn Swallow [662]		Species or species habitat known to occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres		
Ruddy Turnstone [872]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
[Calidris alba](#) Sanderling [875]		Species or species habitat known to occur within area
[Calidris canutus](#) Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area
[Calidris ruficollis](#) Red-necked Stint [860]		Species or species habitat known to occur within area
[Calidris tenuirostris](#) Great Knot [862]	Vulnerable	Species or species habitat known to occur within area
[Charadrius leschenaultii](#) Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
[Charadrius mongolus](#) Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
[Limnodromus semipalmatus](#) Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area
[Limosa lapponica](#) Bar-tailed Godwit [844]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Limosa limosa Black-tailed Godwit [845]	Endangered	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Species or species habitat known to occur within area
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area
Tringa totanus Common Redshank, Redshank [835]		Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Heritage Places		[Resource Information]
Name	State	Status
Natural		
Mermaid Reef - Rowley Shoals	WA	Listed place
Scott Reef and Surrounds - Commonwealth Area	EXT	Listed place

Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus		
Common Noddy [825]		Foraging, feeding or related behaviour known to occur within area
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Arenaria interpres		
Ruddy Turnstone [872]	Vulnerable	Species or species habitat known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris alba		
Sanderling [875]		Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area overfly marine area
Calidris tenuirostris Great Knot [862]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Cecropis daurica as Hirundo daurica Red-rumped Swallow [80610]		Species or species habitat may occur within area overfly marine area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area overfly marine area
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area overfly marine area
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Breeding known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Endangered	Species or species habitat known to occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area overfly marine area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Numenius phaeopus Whimbrel [849]		Species or species habitat known to occur within area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Breeding known to occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Sternula albifrons as Sterna albifrons Little Tern [82849]		Breeding known to occur within area
Sternula nereis as Sterna nereis Fairy Tern [82949]		Breeding known to occur within area
Stiltia isabella Australian Pratincole [818]		Species or species habitat known to occur within area overfly marine area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Sula sula Red-footed Booby [1023]		Breeding known to occur within area
Thalasseus bengalensis as Sterna bengalensis Lesser Crested Tern [66546]		Breeding known to occur within area
Thalasseus bergii as Sterna bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes as Heteroscelus brevipes Grey-tailed Tattler [851]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area overfly marine area
Tringa totanus Common Redshank, Redshank [835]		Species or species habitat known to occur within area overfly marine area
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Fish		

Scientific Name	Threatened Category	Presence Text
Acentronura larsonae Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area
Bhanotia fasciolata Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys latispinosus Muiron Island Pipefish [66196]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammal		
Dugong dugon Dugong [28]		Foraging, feeding or related behaviour likely to occur within area
Reptile		
Aipysurus apraefrontalis Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
Aipysurus duboisii Dubois' Sea Snake, Dubois' Seasnake, Reef Shallows Sea Snake [1116]		Species or species habitat may occur within area
Aipysurus foliosquama Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Aipysurus fuscus Dusky Sea Snake [1119]	Endangered	Species or species habitat known to occur within area
Aipysurus laevis Olive Sea Snake, Olive-brown Sea Snake [1120]		Species or species habitat may occur within area
Aipysurus mosaicus as Aipysurus eydouxii Mosaic Sea Snake [87261]		Species or species habitat may occur within area
Aipysurus tenuis Brown-lined Sea Snake, Mjoberg's Sea Snake [1121]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnstone's Crocodile [1773]		Species or species habitat may occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Emydocephalus annulatus Eastern Turtle-headed Sea Snake [1125]		Species or species habitat may occur within area
Ephalophis greyae as Ephalophis greyi Mangrove Sea Snake [93738]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Hydrelaps darwiniensis Port Darwin Sea Snake, Black-ringed Mangrove Sea Snake [1100]		Species or species habitat may occur within area
Hydrophis coggeri Cogger's Sea Snake [25925]		Species or species habitat may occur within area
Hydrophis elegans Elegant Sea Snake, Bar-bellied Sea Snake [1104]		Species or species habitat may occur within area
Hydrophis hardwickii as Lapemis hardwickii Spine-bellied Sea Snake [93516]		Species or species habitat may occur within area
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]		Species or species habitat may occur within area
Hydrophis macdowelli as Hydrophis mcdowelli MacDowell's Sea Snake, Small-headed Sea Snake, [75601]		Species or species habitat may occur within area
Hydrophis major as Disteira major Olive-headed Sea Snake [93512]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Sea Snake, Ornate Reef Sea Snake [1111]		Species or species habitat may occur within area
Hydrophis peronii as Acalyptophis peronii Horned Sea Snake [93509]		Species or species habitat may occur within area
Hydrophis platura as Pelamis platurus Yellow-bellied Sea Snake [93746]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hydrophis stokesii as Astrotia stokesii		
Stokes' Sea Snake [93510]		Species or species habitat may occur within area
Lepidochelys olivacea		
Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Whales and Other Cetaceans		[Resource Information]
Current Scientific Name	Status	Type of Presence
Mammal		
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis		
Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Feresa attenuata		
Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus		
Short-finned Pilot Whale [62]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Indopacetus pacificus Longman's Beaked Whale [72]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia sima Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa sahulensis Australian Humpback Dolphin [87942]		Species or species habitat known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks [Resource Information]

Park Name	Zone & IUCN Categories
Kimberley	Habitat Protection Zone (IUCN IV)
Argo-Rowley Terrace	Multiple Use Zone (IUCN VI)
Argo-Rowley Terrace	Multiple Use Zone (IUCN VI)
Eighty Mile Beach	Multiple Use Zone (IUCN VI)
Kimberley	Multiple Use Zone (IUCN VI)
Argo-Rowley Terrace	National Park Zone (IUCN II)
Kimberley	National Park Zone (IUCN II)
Mermaid Reef	National Park Zone (IUCN II)
Argo-Rowley Terrace	Special Purpose Zone (Trawl) (IUCN VI)

Habitat Critical to the Survival of Marine Turtles [Resource Information]

Scientific Name	Behaviour	Presence
Aug - Sep		
Natator depressus		
Flatback Turtle [59257]	Nesting	Known to occur
Dec - Jan		
Chelonia mydas		
Green Turtle [1765]	Nesting	Known to occur

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State
Bedout Island	Nature Reserve	WA
Lacepede Islands	Nature Reserve	WA
Rowley Shoals	Marine Park	WA
Scott Reef	Nature Reserve	WA
Unnamed WA44672	5(1)(h) Reserve	WA

Nationally Important Wetlands [Resource Information]

Wetland Name	State

Wetland Name	State
Mermaid Reef	EXT

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Browse to North West Shelf Development, Indian Ocean, WA	2018/8319		Approval
Marine Route Survey for Subsea Fibre Optic Data Cable System - Australia West	2024/09826		Completed
Controlled action			
2-D seismic survey Scott Reef	2000/125	Controlled Action	Post-Approval
Browse FLNG Development, Commonwealth Waters	2013/7079	Controlled Action	Post-Approval
Conduct an exploration drilling campaign	2010/5718	Controlled Action	Completed
Develop Ichthys gas-condensate field permit area W	2006/2767	Controlled Action	Completed
Development of Browse Basin Gas Fields (Upstream)	2008/4111	Controlled Action	Completed
Ichthys Gas Field, Offshore and onshore processing facilities and subsea pipeline	2008/4208	Controlled Action	Post-Approval
Torosa South Initial Appraisal Drilling	2007/3500	Controlled Action	Completed
Not controlled action			
3D marine seismic survey in WA 314P and WA 315P	2004/1927	Not Controlled Action	Completed
Adele Trend TQ3D Seismic Survey	2001/252	Not Controlled Action	Completed
Drilling of exploration wells, Permit areas WA-301-P to WA-305-P	2002/769	Not Controlled Action	Completed
P30 Hydrocarbon Exploration Well	2001/293	Not Controlled Action	Completed
Not controlled action (particular manner)			
2 (3D) Marine Seismic Surveys	2009/4994	Not Controlled Action (Particular Manner)	Completed
2D seismic survey in permit areas WA-274P and WA-281P	2004/1521	Not Controlled Action	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		(Particular Manner)	
2 geotechnical surveys - preliminary and final	2006/2886	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey	2008/4437	Not Controlled Action (Particular Manner)	Post-Approval
3D marine seismic Survey - Maxima 3D MSS	2006/2945	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey, Browse Basin, WA	2009/5048	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey, near Scott Reef, Browse Basin	2005/2126	Not Controlled Action (Particular Manner)	Post-Approval
Aurora MC3D Marine Seismic Survey	2010/5510	Not Controlled Action (Particular Manner)	Post-Approval
Bassett 3D Marine Seismic Survey	2010/5538	Not Controlled Action (Particular Manner)	Post-Approval
Cartier East and Cartier West 3D Marine Seismic Surveys		Not Controlled Action (Particular Manner)	Post-Approval
Caswell MC3D Marine Seismic Survey	2012/6594	Not Controlled Action (Particular Manner)	Post-Approval
Conduct an exploration drilling campaign	2011/5964	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Northwest Shelf 2D Seismic Survey	2007/3260	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Endurance 3D Marine Seismic Data Acquisition Survey	2007/3667	Not Controlled Action (Particular Manner)	Post-Approval
Exploration Drilling Campaign	2011/6047	Not Controlled Action (Particular Manner)	Post-Approval
Exploration Drilling Program - Permit areas - WA-314-P, WA-315-P, WA-398-P.	2008/4064	Not Controlled Action (Particular Manner)	Post-Approval
Geoscience Australia - Marine survey in Browse Basin to acquire data to assist assessment of CO2 sto	2013/6747	Not Controlled Action (Particular Manner)	Post-Approval
Gicea 3D Marine Seismic Survey	2008/4389	Not Controlled Action (Particular Manner)	Post-Approval
Gigas 2D Pilot Ocean Bottom Cable Marine Seismic Survey	2007/3839	Not Controlled Action (Particular Manner)	Post-Approval
Ichthys 3D Marine Seismic Survey	2010/5550	Not Controlled Action (Particular Manner)	Post-Approval
Kingtree & Ironstone-1 Exploration Wells	2011/5935	Not Controlled Action (Particular Manner)	Post-Approval
Koolama 2D Seismic Survey Dampier Basin	2010/5420	Not Controlled Action (Particular Manner)	Post-Approval
Kraken, Lusca & Asperus 3D Marine Seismic Survey	2013/6730	Not Controlled Action (Particular Manner)	Post-Approval
Mariner Non-Exclusive 2D Seismic Survey	2011/6172	Not Controlled Action (Particular Manner)	Post-Approval
Offshore Canning Multi Client 2D Marine Seismic Survey	2010/5393	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Offshore Fibre Optic Cable Network Construction & Operation, Port Hedland WA to Darwin NT	2014/7223	Not Controlled Action (Particular Manner)	Post-Approval
Offshore Gas Exploration Drilling Campaign	2012/6384	Not Controlled Action (Particular Manner)	Post-Approval
Outer Canning exploration drilling program off NW coast of WA	2012/6618	Not Controlled Action (Particular Manner)	Post-Approval
Pilot Appraisal Well - Torosa South 1	2008/3991	Not Controlled Action (Particular Manner)	Post-Approval
Repsol 3d & 2D Marine Seismic Survey	2012/6658	Not Controlled Action (Particular Manner)	Post-Approval
Rosebud 3D Marine Seismic Survey in WA-30-R and TR/5	2012/6493	Not Controlled Action (Particular Manner)	Post-Approval
Schild MC3D Marine Seismic Survey	2012/6373	Not Controlled Action (Particular Manner)	Post-Approval
Schild Phase 11 MC3D Marine Seismic Survey, Browse Basin	2013/6894	Not Controlled Action (Particular Manner)	Post-Approval
Scott Reef Seismic Research	2006/2647	Not Controlled Action (Particular Manner)	Post-Approval
Torosa-5 Apraisal Well, WA-30-R	2008/4430	Not Controlled Action (Particular Manner)	Post-Approval
Tridacna 3D Ocean Bottom Cable Marine Seismic Survey	2011/5959	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Vampire 2D Non Exclusive Seismic Survey, WA	2010/5543	Not Controlled Action (Particular Manner)	Post-Approval
Veritas Voyager 2D Marine Seismic Survey	2009/5151	Not Controlled Action (Particular Manner)	Post-Approval
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval
Woodside Southern Browse 3D Seismic Survey, WA	2007/3534	Not Controlled Action (Particular Manner)	Post-Approval
Zeemeermin MC3D seismic survey, Browse Basin, Offshore WA	2009/5023	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
Aurora extension MC3D Marine Seismic Survey	2011/5887	Referral Decision	Completed
BRSN08 3D Marine Seismic Survey	2008/4582	Referral Decision	Completed
Experimental Study of Behavioural and Physiological Impact on Fish of Seismic Ex	2006/2625	Referral Decision	Completed
Pilot Appraisal Well - Torosa South-1	2008/3985	Referral Decision	Completed
Seismic Data Acquisition, Browse Basin	2010/5475	Referral Decision	Completed

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Ancient coastline at 125 m depth contour	North-west
Canyons linking the Argo Abyssal Plain with the Scott Plateau	North-west
Continental Slope Demersal Fish Communities	North-west

Name	Region
Mermaid Reef and Commonwealth waters surrounding Rowley Shoals	North-west
Seringapatam Reef and Commonwealth waters in the Scott Reef Complex	North-west

Biologically Important Areas

[Resource Information]

Scientific Name	Behaviour	Presence
Dugong		
Dugong dugon Dugong [28]	Foraging	Likely to occur
Marine Turtles		
Caretta caretta Loggerhead Turtle [1763]	Foraging	Known to occur
Chelonia mydas Green Turtle [1765]	Foraging	Likely to occur
Chelonia mydas Green Turtle [1765]	Foraging	Known to occur
Chelonia mydas Green Turtle [1765]	Internesting	Known to occur
Chelonia mydas Green Turtle [1765]	Internesting	Likely to occur
Chelonia mydas Green Turtle [1765]	Internesting buffer	Known to occur
Chelonia mydas Green Turtle [1765]	Nesting	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting buffer	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Nesting	Known to occur
Natator depressus Flatback Turtle [59257]	Foraging	Known to occur
Natator depressus Flatback Turtle [59257]	Internesting	Known to occur

Scientific Name	Behaviour	Presence
Natator depressus Flatback Turtle [59257]	Internesting buffer	Known to occur
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur
Seabirds		
Ardenna pacifica Wedge-tailed Shearwater [84292]	Breeding	Known to occur
Fregata ariel Lesser Frigatebird [1012]	Breeding	Known to occur
Fregata minor Greater Frigatebird [1013]	Breeding	Known to occur
Phaethon lepturus White-tailed Tropicbird [1014]	Breeding	Known to occur
Sterna dougallii Roseate Tern [817]	Breeding	Known to occur
Sternula albifrons sinensis Little Tern [82850]	Breeding	Known to occur
Sternula albifrons sinensis Little Tern [82850]	Resting	Known to occur
Sula leucogaster Brown Booby [1022]	Breeding	Known to occur
Sula sula Red-footed Booby [1023]	Breeding	Known to occur
Thalasseus bengalensis Lesser Crested Tern [66546]	Breeding	Known to occur
Sharks		
Rhincodon typus Whale Shark [66680]	Foraging	Known to occur
Whales		

Scientific Name	Behaviour	Presence
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Foraging	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Calving	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration (north and south)	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Nursing	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Resting	Known to occur

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data is available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on the contents of this report.

3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions when time permits.

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded breeding sites; and
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

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

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

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

Please feel free to provide feedback via the Contact us page.

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 08-Jan-2025

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	32
Listed Migratory Species:	36

Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	85
Commonwealth Heritage Places:	10
Listed Marine Species:	58
Whales and Other Cetaceans:	25
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	1
Australian Marine Parks:	2
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	2
EPBC Act Referrals:	68
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity
Hosnies spring	Within Ramsar site
The dales	Within Ramsar site

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Accipiter hiogaster natalis		
Christmas Island Goshawk [82408]	Endangered	Species or species habitat known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Chalcophaps indica natalis		
Christmas Island Emerald Dove, Emerald Dove (Christmas Island) [67030]	Endangered	Species or species habitat known to occur within area
Fregata andrewsi		
Christmas Island Frigatebird, Andrew's Frigatebird [1011]	Endangered	Breeding known to occur within area
Ninox natalis		
Christmas Island Hawk-Owl, Christmas Boobook [66671]	Vulnerable	Species or species habitat known to occur within area
Papasula abbotti		
Abbott's Booby [59297]	Endangered	Species or species habitat known to occur within area
Phaethon lepturus fulvus		
Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Breeding known to occur within area
Phaethon rubricauda westralis		
Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Breeding known to occur within area
Turdus poliocephalus erythropleurus		
Christmas Island Thrush [67122]	Endangered	Species or species habitat likely to occur within area
MAMMAL		
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Crocidura trichura		
Christmas Island Shrew [86568]	Critically Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
[Pteropus natalis](#) Christmas Island Flying-fox, Christmas Island Fruit-bat [87611]	Critically Endangered	Species or species habitat known to occur within area
PLANT		
[Asplenium listeri](#) Christmas Island Spleenwort [65865]	Critically Endangered	Species or species habitat known to occur within area
[Pneumatopteris truncata](#) fern [68812]	Critically Endangered	Species or species habitat known to occur within area
[Tectaria devexa](#) Cave Fern [14767]	Endangered	Species or species habitat likely to occur within area
REPTILE		
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
[Cryptoblepharus egeriae](#) Christmas Island Blue-tailed Skink, Blue-tailed Snake-eyed Skink [1526]	Critically Endangered	Species or species habitat likely to occur within area
[Cyrtodactylus sadleiri](#) Christmas Island Giant Gecko [86865]	Endangered	Species or species habitat known to occur within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
[Eretmochelys imbricata](#) Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
[Lepidochelys olivacea](#) Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Lepidodactylus listeri		
Christmas Island Gecko, Lister's Gecko [1711]	Critically Endangered	Species or species habitat known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Species or species habitat likely to occur within area
Ramphotyphlops exocoeti		
Christmas Island Blind Snake, Christmas Island Pink Blind Snake [1262]	Vulnerable	Species or species habitat likely to occur within area
SHARK		
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sphyrna lewini		
Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Fregata andrewsi		
Christmas Island Frigatebird, Andrew's Frigatebird [1011]	Endangered	Breeding known to occur within area
Fregata ariel		
Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor		
Great Frigatebird, Greater Frigatebird [1013]		Breeding known to occur within area
Phaethon lepturus		
White-tailed Tropicbird [1014]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
[Phaethon rubricauda](#) Red-tailed Tropicbird [994]		Breeding known to occur within area
[Sula leucogaster](#) Brown Booby [1022]		Breeding known to occur within area
[Sula sula](#) Red-footed Booby [1023]		Breeding known to occur within area
Migratory Marine Species		
[Balaenoptera borealis](#) Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
[Balaenoptera edeni](#) Bryde's Whale [35]		Species or species habitat likely to occur within area
[Balaenoptera musculus](#) Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
[Balaenoptera physalus](#) Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
[Carcharhinus longimanus](#) Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
[Carcharodon carcharias](#) White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat may occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
Cecropis daurica Red-rumped Swallow [80610]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Hirundo rustica		
Barn Swallow [662]		Species or species habitat known to occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat known to occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Environment and Heritage	
Commonwealth Land - Christmas Island National Park [94102]	CI
Commonwealth Land - Christmas Island National Park [94103]	CI

Commonwealth Land Name	State
Commonwealth Land - Christmas Island National Park [94105]	CI
Commonwealth Land - Christmas Island National Park [94104]	CI
Commonwealth Land - Christmas Island National Park [94101]	CI
Unknown	
Commonwealth Land - [94210]	CI
Commonwealth Land - [94217]	CI
Commonwealth Land - [94215]	CI
Commonwealth Land - [94214]	CI
Commonwealth Land - [94219]	CI
Commonwealth Land - [94218]	CI
Commonwealth Land - [94242]	CI
Commonwealth Land - [94240]	CI
Commonwealth Land - [94237]	CI
Commonwealth Land - [94236]	CI
Commonwealth Land - [94229]	CI
Commonwealth Land - [94204]	CI
Commonwealth Land - [94209]	CI
Commonwealth Land - [94216]	CI
Commonwealth Land - [94206]	CI
Commonwealth Land - [94208]	CI
Commonwealth Land - [94212]	CI
Commonwealth Land - [94213]	CI
Commonwealth Land - [94249]	CI
Commonwealth Land - [94248]	CI
Commonwealth Land - [94211]	CI
Commonwealth Land - [94221]	CI
Commonwealth Land - [94239]	CI

Commonwealth Land Name	State
Commonwealth Land - [94234]	CI
Commonwealth Land - [94230]	CI
Commonwealth Land - [94202]	CI
Commonwealth Land - [94201]	CI
Commonwealth Land - [94232]	CI
Commonwealth Land - [94233]	CI
Commonwealth Land - [94262]	CI
Commonwealth Land - [94280]	CI
Commonwealth Land - [94260]	CI
Commonwealth Land - [94220]	CI
Commonwealth Land - [94228]	CI
Commonwealth Land - [94223]	CI
Commonwealth Land - [94222]	CI
Commonwealth Land - [94225]	CI
Commonwealth Land - [94224]	CI
Commonwealth Land - [94227]	CI
Commonwealth Land - [94226]	CI
Commonwealth Land - [94235]	CI
Commonwealth Land - [94238]	CI
Commonwealth Land - [94244]	CI
Commonwealth Land - [94258]	CI
Commonwealth Land - [94205]	CI
Commonwealth Land - [94207]	CI
Commonwealth Land - [94241]	CI
Commonwealth Land - [94247]	CI
Commonwealth Land - [94246]	CI
Commonwealth Land - [94245]	CI

Commonwealth Land Name	State
Commonwealth Land - [94276]	CI
Commonwealth Land - [94243]	CI
Commonwealth Land - [94273]	CI
Commonwealth Land - [94270]	CI
Commonwealth Land - [94275]	CI
Commonwealth Land - [94272]	CI
Commonwealth Land - [94269]	CI
Commonwealth Land - [94268]	CI
Commonwealth Land - [94271]	CI
Commonwealth Land - [94278]	CI
Commonwealth Land - [94274]	CI
Commonwealth Land - [94277]	CI
Commonwealth Land - [94265]	CI
Commonwealth Land - [94264]	CI
Commonwealth Land - [94267]	CI
Commonwealth Land - [94266]	CI
Commonwealth Land - [94203]	CI
Commonwealth Land - [94261]	CI
Commonwealth Land - [94279]	CI
Commonwealth Land - [94263]	CI
Commonwealth Land - [94254]	CI
Commonwealth Land - [94253]	CI
Commonwealth Land - [94256]	CI
Commonwealth Land - [94255]	CI
Commonwealth Land - [94250]	CI
Commonwealth Land - [94231]	CI
Commonwealth Land - [94252]	CI

Commonwealth Land Name	State
Commonwealth Land - [94251]	CI
Commonwealth Land - [94257]	CI
Commonwealth Land - [94259]	CI

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Historic		
Administrators House Precinct	EXT	Listed place
Drumsite Industrial Area	EXT	Listed place
Industrial and Administrative Group	EXT	Listed place
Malay Kampong Group	EXT	Listed place
Malay Kampong Precinct	EXT	Listed place
Phosphate Hill Historic Area	EXT	Listed place
Poon Saan Group	EXT	Listed place
Settlement Christmas Island	EXT	Listed place
South Point Settlement Remains	EXT	Listed place
Natural		
Christmas Island Natural Areas	EXT	Listed place

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Cecropis daurica as Hirundo daurica Red-rumped Swallow [80610]		Species or species habitat known to occur within area overfly marine area
Fregata andrewsi Christmas Island Frigatebird, Andrew's Frigatebird [1011]	Endangered	Breeding known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Breeding known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area overfly marine area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
[Phaethon lepturus fulvus](#) Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Breeding known to occur within area
[Phaethon rubricauda](#) Red-tailed Tropicbird [994]		Breeding known to occur within area
[Sula leucogaster](#) Brown Booby [1022]		Breeding known to occur within area
[Sula sula](#) Red-footed Booby [1023]		Breeding known to occur within area
Fish		
[Choeroichthys brachysoma](#) Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
[Choeroichthys sculptus](#) Sculptured Pipefish [66197]		Species or species habitat may occur within area
[Corythoichthys amplexus](#) Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
[Corythoichthys flavofasciatus](#) Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
[Corythoichthys haematopterus](#) Reef-top Pipefish [66201]		Species or species habitat may occur within area
[Corythoichthys intestinalis](#) Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
[Corythoichthys schultzi](#) Schultz's Pipefish [66205]		Species or species habitat may occur within area
[Cosmocampus banneri](#) Roughridge Pipefish [66206]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Cosmocampus maxweberi Maxweber's Pipefish [66209]		Species or species habitat may occur within area
Doryrhamphus baldwini Redstripe Pipefish [66718]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus macrorhynchus Whiskered Pipefish, Ornate Pipefish [66222]		Species or species habitat may occur within area
Halicampus mataafae Samoan Pipefish [66223]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish [66229]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippichthys spicifer Belly-barred Pipefish, Banded Freshwater Pipefish [66232]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Micrognathus brevirostris thorntail Pipefish, Thorn-tailed Pipefish [66254]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Reptile		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat likely to occur within area

Whales and Other Cetaceans		[Resource Information]
Current Scientific Name	Status	Type of Presence
Mammal		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area

Current Scientific Name	Status	Type of Presence
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Indopacetus pacificus Longman's Beaked Whale [72]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia sima Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat may occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Commonwealth Reserves Terrestrial [Resource Information]

Name	State	Type
Christmas Island	EXT	National Park (Commonwealth)

Australian Marine Parks [Resource Information]

Park Name	Zone & IUCN Categories
Christmas Island	Habitat Protection Zone (IUCN IV)
Christmas Island	National Park Zone (IUCN II)

Extra Information

Nationally Important Wetlands [Resource Information]

Wetland Name	State
"The Dales", Christmas Island	EXT
Hosine's Spring, Christmas Island	EXT

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status
Aerial Baiting of Yellow Crazy Ants	2012/6438		Completed
Marine Route Survey for Subsea Fibre Optic Data Cable System - Australia West	2024/09826		Completed
Controlled action			
Christmas Island Airport Expansion	2001/434	Controlled Action	Post-Approval
Christmas Island Port Facility	2001/435	Controlled Action	Post-Approval
Construction of mobile phone tower	2002/694	Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Cultural Appearance Upgrade of the Chinese Literary Association Building	2007/3568	Controlled Action	Completed
East Christmas Island Phosphate Mines (9 sites)	2001/487	Controlled Action	Completed
Exploration for Mineable Phosphate, Christmas Island	2000/43	Controlled Action	Completed
Lily Beach Recreational Facilities	2001/395	Controlled Action	Post-Approval
Lily Beach Rock Pool Development	2001/400	Controlled Action	Completed
Nava-1 Cable System	2001/510	Controlled Action	Completed
Phosphate Mining in South Point Christmas Island	2012/6653	Controlled Action	Post-Approval
Proposed exploration drilling programme for Christmas Island	2016/7779	Controlled Action	Completed
Road Upgrade/Construction between Lily Beach Road and Port Faci	2001/436	Controlled Action	Post-Approval
Salvage, transport and processing of phosphate resource with extended airport si	2003/1217	Controlled Action	Post-Approval
Yellow Crazy Ant Biological Control	2013/6836	Controlled Action	Post-Approval
Not controlled action			
96-108 Gaze Road - Residential upgrade	2006/2632	Not Controlled Action	Completed
Aerial Baiting, Yellow Crazy Ant Supercolonies, Christmas Island, WA	2019/8492	Not Controlled Action	Completed
APX-West Fibre-optic telecommunications cable system, WA to Singapore	2013/7102	Not Controlled Action	Completed
Boat Ramp Construction	2001/237	Not Controlled Action	Completed
Building of a carport adjacent to residential house	2004/1538	Not Controlled Action	Completed
Christmas Island/Construction of a double storey shed/carport at MQ387 Gaze Road	2004/1561	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Christmas Island Fuel Consolidation Project, Christmas Island	2012/6454	Not Controlled Action	Completed
Community Recreation Centre	2003/1279	Not Controlled Action	Completed
courtyard shower & handbasin facilities	2006/2803	Not Controlled Action	Completed
Dwelling demolition, maintenance and carpark/carport/storage shed works	2004/1837	Not Controlled Action	Completed
Extension of a Masonary Brick Wall adjacent to the Poon Saan Club by 500 mm	2004/1564	Not Controlled Action	Completed
Flying Fish Cove Christmas Island Boat Ramp Maintenance	2021/8924	Not Controlled Action	Completed
Flying Fish Cove Landslide Mitigation Project	2020/8616	Not Controlled Action	Completed
Garage and Office Facilities	2004/1919	Not Controlled Action	Completed
Housing and Garden Maintenance Works	2004/1487	Not Controlled Action	Completed
Hydroponics Research Program	2007/3338	Not Controlled Action	Completed
Identification of unmarked grave, exhumation/identification of remains which may belong to a sailor	2006/2992	Not Controlled Action	Completed
INDIGO West Submarine Telecommunications Cable, WA	2017/8126	Not Controlled Action	Completed
Internal and external modifications Lot 1014 Gaze Road	2004/1807	Not Controlled Action	Completed
Light Industrial Subdivision Development	2004/1799	Not Controlled Action	Completed
Lot 1056 Extensions and Alterations	2004/1801	Not Controlled Action	Completed
Maintenance of Tai Jin House, Smith Point	2009/4933	Not Controlled Action	Completed
Mobile Radio Communications System Upgrade	2002/718	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Placement of bitumen/ concrete on rail sections of heritage listed incline, Christmas Island	2013/7009	Not Controlled Action	Completed
Power Station Diesel Generator Replacement	2009/4685	Not Controlled Action	Completed
Proposed sale or lease of Crown land, 11 lots, Christmas Island	2018/8220	Not Controlled Action	Completed
Realignment of Gaze Road Service Road and Gaze Road Junction	2004/1735	Not Controlled Action	Completed
Refurbishment and Extension of Seaview Lodge	2012/6353	Not Controlled Action	Completed
renovate free-standing servant's quarters	2006/2811	Not Controlled Action	Completed
Replacement of deteriorating flat roof at rear of Mosque and extending side verandahs, Christmas Is	2013/6851	Not Controlled Action	Completed
Residential upgrade, 2 Coconut Grove	2007/3295	Not Controlled Action	Completed
Stormwater Remediation Project, Christmas Island	2019/8467	Not Controlled Action	Completed
Subdivision of Lot 571 on DP 26701	2008/4230	Not Controlled Action	Completed
Subdivision of Part 7 of Lot 1014	2009/4851	Not Controlled Action	Completed
Supermarket Extensions	2006/2515	Not Controlled Action	Completed
Upgrade of Residence, Coconut Grove	2006/2728	Not Controlled Action	Completed
Verandah Extension to Existing Breezeway Unit, Gaze Road	2005/1970	Not Controlled Action	Completed
Not controlled action (particular manner)			
Addition of Verandah to Block of Four Units	2005/2315	Not Controlled Action (Particular Manner)	Post-Approval
Asbestos Removal from Commonwealth Owned Assests including Commonwealth Heritage	2009/4873	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Australia to Singapore Fibre Optic Submarine Cable System	2011/6127	Not Controlled Action (Particular Manner)	Post-Approval
Baiting Efficacy Trial of Feral Cat Bait and PAPP Toxicant	2008/4383	Not Controlled Action (Particular Manner)	Post-Approval
Commonwealth Marine/Flying Fish Cove Jetty Extension	2012/6675	Not Controlled Action (Particular Manner)	Post-Approval
Crazy Ant Aerial Baiting Control Program	2002/722	Not Controlled Action (Particular Manner)	Post-Approval
Helicopter baiting of exotic yellow crazy ant supercolonies, Christmas Island, Indian Ocean	2009/5016	Not Controlled Action (Particular Manner)	Post-Approval
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval
Laying a submarine optical fibre telecommunications cable, Perth to Singapore and Jakarta	2014/7332	Not Controlled Action (Particular Manner)	Post-Approval
New Housing Program	2011/6056	Not Controlled Action (Particular Manner)	Post-Approval
Swimming Pool modification	2007/3312	Not Controlled Action (Particular Manner)	Post-Approval
Trials of a bait delivery system for the control of Yellow Crazy Ants	2009/4763	Not Controlled Action (Particular Manner)	Post-Approval
Water supply upgrade	2005/2269	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
Alterations and Improvements to existing residence at Lot 3015	2009/5039	Referral Decision	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Referral decision			
Gaze Rd, Christmas Island			
Rocky Point Dwelling Redevelopment	2005/2203	Referral Decision	Referral Decision

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data is available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on the contents of this report.

3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions when time permits.

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded breeding sites; and
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

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

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

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

Please feel free to provide feedback via the Contact us page.

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Appendix H Joint Industry OSM Framework OMPs and SMPs

The Operational Monitoring Plans (OMPs) and Scientific Monitoring Plans (SMPs) referenced in this OSM-BIP form part of the AEP Joint Industry Operational and Scientific Monitoring Framework. The plans listed below are framework-level parent documents that are finalised in the event of an actual spill, as outlined in Section 15.

Operational Monitoring Plans (OMPs)

Plan	Title	Source Framework Document	Version Date
OM1	Hydrocarbon Characterisation	Hydrocarbon Properties and Weathering Behaviour	11 February 2021
OM2	Hydrocarbon in Water Assessment	Water Quality Assessment	29 April 2020
OM3	Hydrocarbon in Sediment Assessment	Sediment Quality Assessment	29 April 2020
OM4a	Surface Dispersant Effectiveness Monitoring	Surface Chemical Dispersant Fate and Effectiveness Assessment	11 February 2021
OM4b	Subsea Dispersant Injection Effectiveness Monitoring	Subsea Dispersant Injection Effectiveness Assessment	9 February 2021
OM5	Rapid Marine Fauna Surveillance	Marine Fauna Assessment (Cetaceans, Pinnipeds, Dugongs, Reptiles, Fish, Seabirds and Shorebirds)	11 February 2021
OM6	Shoreline Clean-up Assessment	Shoreline Cleanup Assessment Technique	11 February 2021
OM7	Air Quality Modelling	Air Quality Modelling (Responder Health and Safety)	9 March 2018

Scientific Monitoring Plans (SMPs)

Plan	Title	Source Framework Document	Version Date
SM1	Water Quality Impact Assessment	Water Quality Impact Assessment	5 May 2020
SM2	Sediment Quality Impact Assessment	Sediment Quality Impact Assessment	5 May 2020
SM3	Intertidal and Coastal Habitat Assessment	Intertidal and Coastal Habitat Assessment	5 May 2020
SM4	Seabirds and Shorebirds Assessment	Seabirds and Shorebirds	5 May 2020
SM5	Marine Mega-fauna Assessment	Marine MegaFauna (Whale Shark, Dugong and Cetaceans; Pinnipeds; Reptiles)	11 November 2020 / 5 May 2020 / 5 May 2020
SM6	Benthic Habitat Assessment	Benthic Habitat Assessment	5 May 2020
SM7	Marine Fish and Elasmobranch Assemblages Assessment	Marine Fish and Elasmobranch Assemblages Assessment	26 October 2020
SM8	Fisheries Impact Assessment	Commercial and Recreational Fisheries Impact Assessment	5 May 2020

SM9	Heritage Features Assessment	Heritage Features Assessment	December 2025
SM10	Social Impact Assessment	Social Impact Assessment	4 December 2020

Appendix I Monitoring Units in the OSM Planning Area

Table I-1 lists, for each monitoring unit in Table 8-2, the named receptors with their habitats, features and designations, the BIAs and HCTS at each named receptor, and the BIAs, HCTS and KEFs located within the unit but outside the named receptors. The habitats, features and designations column is a cited resource from which the key OSM considerations for each unit can be derived (Section 8.1).

Table I-1: Monitoring units in the OSM Planning Area: named receptors, habitats, features and designations, and BIAs, HCTS and KEFs

Monitoring unit	Named receptors	Habitats, features and designations	BIAs and HCTS at the named receptor	BIAs, HCTS and KEFs outside the named receptors but within the unit
Barrow	Barrow Island	Fringing reef (Biggada Reef) with seagrass, macroalgae and deep-water habitat; largest intertidal sand and mudflat community at Bandicoot Bay; mangroves; turtle nesting beaches (east coast) (RPS BBG 2005; DSEWPaC 2012c). Coral reefs at Biggada Reef (west), Dugong and Batman reefs (south-east) and the Lowendal Shelf edge; mangroves sparse and east coast only; seagrass sparse (*Halophila ovalis*, *Syringodium isoetifolium*) (DEC 2007a; Chevron 2015). Turbidity and suspended sediment off the east coast are generally low (under 5 mg/L), indicating clear water (CAPL 2018). Barrow Island Marine Management Area (State); Barrow Island Marine Park (State); Barrow Island Nature Reserve; Boodie, Double, Middle Islands Nature Reserve.	Humpback whale: migration. Turtles - flatback (VU) and hawksbill (VU): nesting, internesting buffer, mating and foraging; green (VU): nesting, internesting, internesting buffer, mating, foraging and basking; loggerhead (EN): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - fairy tern (VU), lesser crested tern and wedge-tailed shearwater: breeding (colony) and breeding-season foraging; roseate tern: breeding-season foraging.	Whale shark (VU): foraging - in the east of the unit. Pygmy blue whale (EN): migration - in the west of the unit. Humpback whale: migration - in the east of the unit. Turtles - flatback (VU), green (VU) and hawksbill (VU): internesting buffer - in the east of the unit. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU) - in the south-east of the unit. Seabirds - fairy tern (VU) and wedge-tailed shearwater: breeding-season foraging - in the east of the unit; roseate tern: breeding (colony) and breeding-season foraging - in the south-east of the unit. KEFs - Ancient coastline at 125 m depth contour - in the centre of the unit; Continental Slope Demersal Fish Communities - in the centre of the unit; Exmouth Plateau - in the west of the unit.

Monitoring unit	Named receptors	Habitats, features and designations	BIAs and HCTS at the named receptor	BIAs, HCTS and KEFs outside the named receptors but within the unit
	Lowendal Islands	Islands on intertidal and shallow subtidal limestone pavement with significant coral reefs on the Lowendal Shelf, *Sargassum*-dominated macroalgae and small mangrove stands (Varanus and Bridled islands) (URS 2009; Astron 2014; Astron 2016). More than 40 limestone islands and islets, mainly bare but several covered with white sand dunes; mangroves occupy less than 0.1% of the coastline (Bancroft 2011; DEC 2007a). Varanus Island is a classified contaminated site, with hydrocarbons found in the soil and groundwater (DBCA 2020). Barrow Island Marine Management Area (State); Lowendal Islands Nature Reserve.	Humpback whale: migration. Turtles - flatback (VU) and green (VU): internesting buffer; hawksbill (VU): nesting, internesting, internesting buffer, mating and foraging; loggerhead (EN): nesting and internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - fairy tern (VU), lesser crested tern, roseate tern and wedge-tailed shearwater: breeding (colony) and breeding-season foraging.	-
	Barrow-Montebello Surrounds*	Sand-veneered limestone pavement less than 5 m deep with fringing coral patches, macroalgae (about 40% of benthic area) and filter feeder communities dominant below about 10 m (BHPBIO 2011; Chevron 2010). Across the Montebello/Barrow Islands marine conservation reserves, very complex seabed and island topography supports subtidal coral reefs, macroalgal and seagrass communities, subtidal soft-bottom communities, rocky shores and intertidal reef platforms (DEC 2007a). Main habitats are macroalgae-dominated limestone reefs and subtidal reef platform and sand mosaics, with reef habitats concentrated around the islands; coral reefs (at least 150 hard coral species), mangroves and subtidal soft-bottom habitats are also common (DEC 2007a; Pitcher et al. 2016). Barrow Island Marine Management Area (State); Barrow Island Marine Park (State); Montebello Islands Marine Park (State; includes sanctuary zones).	Whale shark (VU): foraging (edge only). Humpback whale: migration. Turtles - flatback (VU): nesting (edge only), internesting, internesting buffer, mating and foraging; green (VU): nesting, internesting, internesting buffer, mating and foraging; hawksbill (VU): nesting (edge only), internesting (edge only), internesting buffer, mating (edge only) and foraging (edge only); loggerhead (EN): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - fairy tern (VU), lesser crested tern, roseate tern and wedge-tailed shearwater: breeding (colony) and breeding-season foraging.	-
	Poivre Reef*	No habitat information available.	Humpback whale: migration. Turtles - flatback (VU), green (VU) and hawksbill (VU): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - fairy tern (VU), roseate tern and wedge-tailed shearwater: breeding-season foraging.	-

Monitoring unit	Named receptors	Habitats, features and designations	BIAs and HCTS at the named receptor	BIAs, HCTS and KEFs outside the named receptors but within the unit
Southern Pilbara	Southern Islands Coast	Small offshore islands (Serrurier and others) with macroalgae on limestone pavement and soft sediments; extensive beaches backed by dunes on Serrurier Island (Oliver 1990). Chain of low-lying limestone and sand-cay islands with structurally complex reefs (Serrurier, Bessieres, Thevenard) (DBCA 2020; CSIRO 2017; CSIRO 2021). Mangroves are present around Bessieres Island (Butler et al. 2017). Bessieres, Gnandaroo, Locker, Rocky, Round, Serrurier, Tent, Victor and Y Island Nature Reserves. Adjoins Ningaloo Coast (World Heritage).	Dugong: calving, nursing, breeding and foraging. Whale shark (VU): foraging (edge only). Humpback whale: resting and migration. Southern right whale (EN): reproduction and habitat critical to survival. Turtles - green (VU) and hawksbill (VU): internesting buffer and foraging (edge only); flatback (VU): nesting, internesting buffer and foraging (edge only); loggerhead (EN): internesting buffer. Turtle HCTS - flatback (VU), green (VU), hawksbill (VU) and loggerhead (EN). Seabirds - lesser crested tern and roseate tern: breeding (colony) (edge only) and breeding-season foraging; fairy tern (VU): breeding-season foraging (edge only); wedge-tailed shearwater: breeding (colony) and breeding-season foraging.	Dugong: calving, nursing, breeding and foraging - in the south of the unit. Whale shark (VU): foraging - in the east of the unit. Pygmy blue whale (EN): migration - in the north-west of the unit. Humpback whale: migration - in the east of the unit. Southern right whale (EN): reproduction and habitat critical to survival - in the south of the unit. Turtles - green (VU) and loggerhead (EN): internesting buffer - in the south of the unit; flatback (VU): nesting and internesting buffer - in the east of the unit; hawksbill (VU): internesting buffer - in the east of the unit. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU) - in the centre of the unit; loggerhead (EN) - in the south of the unit. Seabirds - fairy tern (VU) and lesser crested tern: breeding (colony) and breeding-season foraging - in the east of the unit; roseate tern: breeding-season foraging - in the east of the unit; wedge-tailed shearwater: breeding-season foraging - in the east of the unit, breeding (colony) - in the south-east of the unit. KEFs - Ancient coastline at 125 m depth contour - in the centre of the unit; Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula - in the south-west of the unit; Continental Slope Demersal Fish Communities -running along the west of the unit.

Monitoring unit	Named receptors	Habitats, features and designations	BIAs and HCTS at the named receptor	BIAs, HCTS and KEFs outside the named receptors but within the unit
	Thevenard Islands	Small offshore island with macroalgae associated with limestone pavement and protected soft sediments. Thevenard Island beaches are used by marine turtles in summer for nesting and resting (Parks and Wildlife Service n.d.a). Structurally complex reefs with rich fish assemblages (CSIRO 2017; CSIRO 2021). Thevenard Island is a classified contaminated site: hydrocarbons have been found in the soil, and petroleum hydrocarbons, heavy metals and contaminants relating to waste water treatment in groundwater (DBCA 2020). Thevenard Island Nature Reserve.	Humpback whale: migration. Turtles - flatback (VU) and hawksbill (VU): nesting and internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - fairy tern (VU), lesser crested tern and wedge-tailed shearwater: breeding (colony) and breeding-season foraging; roseate tern: breeding-season foraging.	-
	Muiron Islands	Low limestone islands with some sandy beaches, macroalgae and seagrass beds in shallow waters (mainly eastern sides) and coral reef to 5 m around South Muiron and eastern North Muiron (CALM 2005b). Mangroves are present around the Muiron Islands (Butler et al. 2017). Sponge community hotspot in the channel to North West Cape, and rocky intertidal and oyster reef habitats (WAMSI 2025). Muiron Islands Marine Management Area (State); Muiron Islands Nature Reserve; The Ningaloo Coast (World and National Heritage).	Dugong: calving (edge only), nursing (edge only), breeding (edge only) and foraging (edge only). Whale shark (VU): foraging. Humpback whale: migration. Turtles - flatback (VU) and hawksbill (VU): internesting buffer; green (VU) and loggerhead (EN): nesting and internesting buffer. Turtle HCTS - flatback (VU), green (VU), hawksbill (VU) and loggerhead (EN). Seabirds - wedge-tailed shearwater: breeding (colony) and breeding-season foraging.	-
	Brewis Reef*	No habitat information available.	Humpback whale: migration. Turtles - flatback (VU): nesting and internesting buffer; hawksbill (VU): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - fairy tern (VU) and lesser crested tern: breeding-season foraging; wedge-tailed shearwater: breeding (colony) and breeding-season foraging.	-

Monitoring unit	Named receptors	Habitats, features and designations	BIAs and HCTS at the named receptor	BIAs, HCTS and KEFs outside the named receptors but within the unit
	Rosily Shoals*	No habitat information available.	Humpback whale: migration. Turtles - flatback (VU) and hawksbill (VU): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - lesser crested tern, roseate tern and wedge-tailed shearwater: breeding-season foraging; fairy tern (VU): breeding (colony) and breeding-season foraging.	-
	Ashburton Island	Ashburton Island (32.2 ha, perimeter 2.1 km) shows typical round island features, including an extensive reef flat (DBCA 2020). Unvested Crown land proposed as a Class A reserve within the Pilbara Inshore Islands Nature Reserve (DBCA 2020).	Humpback whale: migration. Turtles - flatback (VU): nesting and internesting buffer; hawksbill (VU): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - lesser crested tern: breeding-season foraging; wedge-tailed shearwater: breeding (colony) and breeding-season foraging. Marine turtle nesting - documented (DBCA 2020).	-
	Flat Island	Flat Island is 28.3 ha, with a perimeter of 2.2 km (DBCA 2020). Unvested Crown land proposed as a Class A reserve within the Pilbara Inshore Islands Nature Reserve (DBCA 2020).	Humpback whale: migration. Turtles - flatback (VU): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - wedge-tailed shearwater: breeding (colony) and breeding-season foraging. Wedge-tailed shearwaters, bridled terns and crested terns - documented (DBCA 2020).	-

Monitoring unit	Named receptors	Habitats, features and designations	BIAs and HCTS at the named receptor	BIAs, HCTS and KEFs outside the named receptors but within the unit
	Fly Island	Fly Island is 29.0 ha, with a perimeter of 2.1 km (DBCA 2020). Unvested Crown land proposed as a Class A reserve within the Pilbara Inshore Islands Nature Reserve (DBCA 2020).	Dugong: calving, nursing, breeding and foraging. Humpback whale: resting and migration. Turtles - flatback (VU): internesting buffer. Turtle HCTS - flatback (VU), green (VU), hawksbill (VU) and loggerhead (EN). Seabirds - wedge-tailed shearwater: breeding-season foraging. Wedge-tailed shearwaters and ospreys - documented (DBCA 2020).	-
	Observation Island	Observation Island is 18.4 ha, with a perimeter of 1.6 km (DBCA 2020). Unvested Crown land proposed as a Class A reserve within the Pilbara Inshore Islands Nature Reserve (DBCA 2020).	Humpback whale: migration. Turtles - flatback (VU), green (VU) and loggerhead (EN): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - wedge-tailed shearwater: breeding (colony) and breeding-season foraging. Wedge-tailed shearwaters and ospreys - documented (DBCA 2020).	-
	Peak Island	Peak Island is 6.3 ha, with a perimeter of 1.3 km (DBCA 2020). Unvested Crown land proposed as a Class A reserve within the Pilbara Inshore Islands Nature Reserve (DBCA 2020).	Humpback whale: migration. Turtles - flatback (VU), green (VU) and loggerhead (EN): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - wedge-tailed shearwater: breeding (colony) and breeding-season foraging. Bridled terns and ospreys - documented (DBCA 2020).	-

Monitoring unit	Named receptors	Habitats, features and designations	BIAs and HCTS at the named receptor	BIAs, HCTS and KEFs outside the named receptors but within the unit
	Table Island	Table Island is 2.6 ha, with a perimeter of 0.7 km (DBCA 2020). Unvested Crown land proposed as a Class A reserve within the Pilbara Inshore Islands Nature Reserve (DBCA 2020).	Humpback whale: migration. Turtles - flatback (VU): nesting and internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - wedge-tailed shearwater: breeding (colony) and breeding-season foraging. Crested terns, bridled terns and ospreys - documented (DBCA 2020).	-
	Tortoise Island	Tortoise Island is 4.9 ha, with a perimeter of 0.9 km (DBCA 2020). Unvested Crown land proposed as a Class A reserve within the Pilbara Inshore Islands Nature Reserve (DBCA 2020).	Humpback whale: migration. Turtles - flatback (VU): nesting and internesting buffer; hawksbill (VU): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - lesser crested tern: breeding-season foraging; wedge-tailed shearwater: breeding (colony) and breeding-season foraging. Marine turtle nesting - documented (DBCA 2020).	-
	Australind Shoal*	No habitat information available.	Humpback whale: migration. Turtles - flatback (VU): nesting and internesting buffer; hawksbill (VU): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - lesser crested tern: breeding-season foraging; wedge-tailed shearwater: breeding (colony) and breeding-season foraging.	-
	Baylis Patches*	No habitat information available.	Humpback whale: migration. Turtles - flatback (VU): nesting and internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - wedge-tailed shearwater: breeding (colony) and breeding-season foraging.	-

Monitoring unit	Named receptors	Habitats, features and designations	BIAs and HCTS at the named receptor	BIAs, HCTS and KEFs outside the named receptors but within the unit
	Fairway Reef*	No habitat information available.	Humpback whale: migration. Turtles - flatback (VU), green (VU) and loggerhead (EN): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - wedge-tailed shearwater: breeding (colony) and breeding-season foraging.	-
	Glennie Patches*	No habitat information available.	Humpback whale: migration. Turtles - flatback (VU): nesting and internesting buffer; hawksbill (VU): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - lesser crested tern: breeding-season foraging; wedge-tailed shearwater: breeding (colony) and breeding-season foraging.	-
	Inner Northwest Patch*	No habitat information available.	Humpback whale: migration. Turtles - flatback (VU): nesting and internesting buffer; hawksbill (VU): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - lesser crested tern: breeding-season foraging; wedge-tailed shearwater: breeding (colony) and breeding-season foraging.	-
	Locker Reef*	No habitat information available.	Humpback whale: migration. Turtles - flatback (VU): nesting and internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - wedge-tailed shearwater: breeding (colony) and breeding-season foraging.	-

Monitoring unit	Named receptors	Habitats, features and designations	BIAs and HCTS at the named receptor	BIAs, HCTS and KEFs outside the named receptors but within the unit
	Outtrim Patches*	No habitat information available. Muiron Islands Marine Management Area (State).	Humpback whale: migration. Turtles - flatback (VU), green (VU) and loggerhead (EN): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - wedge-tailed shearwater: breeding (colony) and breeding-season foraging.	-
	Roller Shoal*	No habitat information available.	Humpback whale: migration. Turtles - flatback (VU): nesting and internesting buffer; hawksbill (VU): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - lesser crested tern and wedge-tailed shearwater: breeding-season foraging.	-
	Santo Rock*	No habitat information available.	Humpback whale: migration. Turtles - flatback (VU): nesting and internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - wedge-tailed shearwater: breeding (colony) and breeding-season foraging.	-
	Spider Reef*	No habitat information available.	Humpback whale: migration. Turtles - flatback (VU): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - wedge-tailed shearwater: breeding (colony) and breeding-season foraging.	-

Monitoring unit	Named receptors	Habitats, features and designations	BIAs and HCTS at the named receptor	BIAs, HCTS and KEFs outside the named receptors but within the unit
	Tongue Shoals*	No habitat information available.	Humpback whale: migration. Turtles - flatback (VU): nesting and internesting buffer; hawksbill (VU): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - lesser crested tern: breeding-season foraging; wedge-tailed shearwater: breeding (colony) and breeding-season foraging.	-
Middle Pilbara	Middle Islands Coast	Small, low Pilbara islands (under 12 m high, foredunes around a central depression) with fringing coral reefs and sandy beaches; mangrove thickets occur on some islands (DBCA 2020). Chain of low-lying limestone and sand-cay islands off a coast of wide intertidal mud and sand flats, limestone ridge barrier coasts, active dunes and arid mangroves at river deltas (Stul et al. 2014; DBCA 2020). Great Sandy, Little Rocky, North Sandy and Weld Island Nature Reserves.	Humpback whale: migration. Turtles - green (VU) and hawksbill (VU): foraging; flatback (VU): internesting buffer and foraging. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - lesser crested tern: breeding-season foraging (edge only); roseate tern: breeding-season foraging; wedge-tailed shearwater: breeding (colony) and breeding-season foraging.	Humpback whale: migration - in the west of the unit. Turtles - flatback (VU): nesting - in the south-west of the unit, internesting buffer - in the west of the unit; hawksbill (VU): internesting buffer - in the west of the unit. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU) - in the west of the unit. Seabirds - fairy tern (VU), roseate tern and wedge-tailed shearwater: breeding (colony) and breeding-season foraging - in the west of the unit; lesser crested tern: breeding-season foraging - in the west of the unit. Also contains part of Southern Islands Coast (Southern Pilbara unit), including Airlie Island - see the Southern Islands Coast and Airlie Island rows.
	Penguin Bank*	No habitat information available.	Humpback whale: migration. Turtles - flatback (VU): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - lesser crested tern, roseate tern and wedge-tailed shearwater: breeding-season foraging.	-

Monitoring unit	Named receptors	Habitats, features and designations	BIAs and HCTS at the named receptor	BIAs, HCTS and KEFs outside the named receptors but within the unit
	Ripple Shoals*	No habitat information available.	Humpback whale: migration. Turtles - flatback (VU), green (VU) and hawksbill (VU): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - roseate tern and wedge-tailed shearwater: breeding-season foraging.	-
	Trap Reef*	No habitat information available.	Humpback whale: migration. Turtles - flatback (VU) and hawksbill (VU): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - fairy tern (VU), lesser crested tern and wedge-tailed shearwater: breeding (colony) and breeding-season foraging; roseate tern: breeding-season foraging.	-
	Airlie Island	Airlie Island is 33.5 ha, with a perimeter of 2.6 km (DBCA 2020); structurally complex reefs (DBCA 2020; CSIRO 2017; CSIRO 2021). All of Airlie Island is a classified contaminated site from former oil production (1991 to 2002; decommissioning began in 2016-17), with hydrocarbons found in the soil and groundwater (DBCA 2020). Airlie Island Nature Reserve.	Humpback whale: migration. Turtles - flatback (VU): nesting and internesting buffer; hawksbill (VU): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - lesser crested tern and wedge-tailed shearwater: breeding-season foraging; roseate tern: breeding (colony) and breeding-season foraging. Wedge-tailed shearwater: significant breeding colony, monitored since the mid-1980s, with an apparent decline in nesting between 2005-06 and 2012-13 - documented (DBCA 2020).	-

Monitoring unit	Named receptors	Habitats, features and designations	BIAs and HCTS at the named receptor	BIAs, HCTS and KEFs outside the named receptors but within the unit
Montebello	Montebello Islands	Over 100 mostly rocky islands (rocky shore 81% of shoreline) on sand-veneered limestone pavement with fringing coral reefs, macroalgae, sparse seagrass, lagoon mangroves and intertidal sand and mudflats (DEC 2007a; Chevron 2010). Six mangrove species form lagoonal assemblages regarded as globally unique; the largest stand (about 15 ha, trees to 5 m) is in Stephenson Channel, Hermite Island (Semeniuk 1997; DEC 2007a). Coastlines are irregular, with lagoons, channels, intertidal embayments, barrier and fringing reefs and undercut reef platforms (Bancroft 2011). Marine sediments retain radionuclide contamination from the nuclear weapons tests 70 years after detonation (Williams-Hoffman et al. 2025). About 120 km west of Dampier (Parks and Wildlife Service 2022). Montebello Islands Marine Park (State; includes sanctuary zones); Montebello Islands Conservation Park.	Humpback whale: migration. Turtles - flatback (VU): nesting, internesting (edge only), internesting buffer, mating and foraging; green (VU): nesting, internesting, internesting buffer, mating and foraging; hawksbill (VU): nesting, internesting buffer, mating and foraging; loggerhead (EN): nesting and internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - fairy tern (VU) and roseate tern: breeding (colony) and breeding-season foraging; lesser crested tern: breeding (colony) (edge only) and breeding-season foraging; wedge-tailed shearwater: breeding-season foraging.	Whale shark (VU): foraging - in the south-east of the unit. Pygmy blue whale (EN): migration - in the west of the unit. Humpback whale: migration - in the south-east of the unit. Turtles - flatback (VU), green (VU) and hawksbill (VU): internesting buffer - in the south-east of the unit. Turtle HCTS - flatback (VU) - in the centre of the unit; green (VU) and hawksbill (VU) - in the south-east of the unit. Seabirds - wedge-tailed shearwater: breeding-season foraging - in the centre of the unit. KEFs - Ancient coastline at 125 m depth contour - in the centre of the unit; Continental Slope Demersal Fish Communities - in the centre of the unit.
	Montebello AMP*	Shallow shelf environments less than 15 m to 150 m deep, protecting shelf and slope habitats with pinnacle and terrace sea floor features; includes part of the Ancient Coastline at 125 m KEF (Director of National Parks 2018a). The ancient coastline escarpment at 125 m provides hard substrate amid soft sediments, likely supporting sponges, corals, crinoids, molluscs and echinoderms (DSEWPaC 2012a; Director of National Parks 2018a). Along the Scarborough pipeline route the seabed is flat to gently undulating soft sediment (mainly sand with biogenic gravel), with patchy sponges, soft corals (including gorgonians) and hydroids (Advisian 2019); Trial (Tryal) Rocks are two coral reefs emergent at low tide (Director of National Parks 2018a). About 80 km west of Dampier, offshore of Barrow Island (Director of National Parks 2018a). Montebello AMP (Multiple Use Zone IUCN VI). KEF - Ancient coastline at 125 m depth contour (edge only - north-west corner of the AMP).	Whale shark (VU): foraging. Humpback whale: migration. Turtles - flatback (VU), hawksbill (VU) and loggerhead (EN): internesting buffer; green (VU): nesting (edge only), internesting (edge only), internesting buffer, mating (edge only) and foraging (edge only). Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - lesser crested tern, roseate tern and wedge-tailed shearwater: breeding-season foraging; fairy tern (VU): breeding (colony) (edge only) and breeding-season foraging.	-

Monitoring unit	Named receptors	Habitats, features and designations	BIAs and HCTS at the named receptor	BIAs, HCTS and KEFs outside the named receptors but within the unit
	Barrow-Montebello Surrounds*	Sand-veneered limestone pavement less than 5 m deep with fringing coral patches, macroalgae (about 40% of benthic area) and filter feeder communities dominant below about 10 m (BHPBIO 2011; Chevron 2010). Across the Montebello/Barrow Islands marine conservation reserves, very complex seabed and island topography supports subtidal coral reefs, macroalgal and seagrass communities, subtidal soft-bottom communities, rocky shores and intertidal reef platforms (DEC 2007a). Main habitats are macroalgae-dominated limestone reefs and subtidal reef platform and sand mosaics, with reef habitats concentrated around the islands; coral reefs (at least 150 hard coral species), mangroves and subtidal soft-bottom habitats are also common (DEC 2007a; Pitcher et al. 2016). Barrow Island Marine Management Area (State); Barrow Island Marine Park (State); Montebello Islands Marine Park (State; includes sanctuary zones).	Whale shark (VU): foraging (edge only). Humpback whale: migration. Turtles - flatback (VU): nesting (edge only), internesting, internesting buffer, mating and foraging; green (VU): nesting, internesting, internesting buffer, mating and foraging; hawksbill (VU): nesting (edge only), internesting (edge only), internesting buffer, mating (edge only) and foraging (edge only); loggerhead (EN): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - fairy tern (VU), lesser crested tern, roseate tern and wedge-tailed shearwater: breeding (colony) and breeding-season foraging.	-
	Montebello Shoals*	No habitat information available. Montebello Islands Marine Park (State); Barrow Island Marine Management Area (State); Montebello Islands Conservation Park.	Humpback whale: migration. Turtles - flatback (VU) and green (VU): nesting, internesting, internesting buffer, mating and foraging; hawksbill (VU): nesting, internesting buffer, mating and foraging; loggerhead (EN): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and hawksbill (VU). Seabirds - lesser crested tern, roseate tern and wedge-tailed shearwater: breeding-season foraging; fairy tern (VU): breeding (colony) and breeding-season foraging.	-

Monitoring unit	Named receptors	Habitats, features and designations	BIAs and HCTS at the named receptor	BIAs, HCTS and KEFs outside the named receptors but within the unit
Ningaloo Offshore	Gascoyne AMP*	Park water depths range from 15 m to 6,000 m (Director of National Parks 2018a), a continuous depth corridor with canyon, terrace, ridge, knoll, deep hole/valley and continental rise features and sponge gardens in the south. Shelf and upper slope (under 800 m) has rocky outcrops and mesophotic reefs with sponges, bryozoans, hydroids and octocorals; deeper slope and abyssal plains are sparsely populated soft sediment (Untiedt et al. 2025). Ecosystems are influenced by the Leeuwin Current, Leeuwin Undercurrent and Ningaloo Current, with seasonal and sporadic upwelling on the continental slope (Director of National Parks 2018a). Gascoyne AMP (National Park Zone IUCN II, Habitat Protection Zone IUCN IV, Multiple Use Zone IUCN VI). Adjoins Ningaloo Marine Park (State) and Ningaloo Coast (World Heritage). KEFs - Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula; Continental Slope Demersal Fish Communities (edge only); Exmouth Plateau.	Pygmy blue whale (EN): foraging and migration. Humpback whale: migration. Turtles - hawksbill (VU) and loggerhead (EN): internesting buffer; flatback (VU): internesting buffer (edge only). Turtle HCTS - green (VU) (edge only) and loggerhead (EN). Seabirds - roseate tern: breeding (colony) (edge only) and breeding-season foraging; wedge-tailed shearwater: breeding-season foraging.	Pygmy blue whale (EN): migration - in the south-east of the unit.
Ningaloo Nearshore	Ningaloo Coast North	Fringing coral reef enclosing a lagoon (200 m to over 7 km wide) with macroalgae on shallow limestone lagoonal platforms, seagrass in sandy patches, limestone pavements and headland platforms at North West Cape, and mangroves at Mangrove Bay (CALM 2005b; van Keulen and Langdon 2011). Shoreline intertidal reefs shaped by tidal and wave action are a prominent feature of the Ningaloo Marine Park coastline (CALM 2005b), with rocky shores and sandy beaches (DBCA 2022d). Much of the reef area is shallow, flat lagoon intersected by narrow, deeper channels that aid water circulation (Kobryn et al. 2022). Marginal tidal range and higher water clarity (DEWHA 2007). Ningaloo AMP (National Park Zone IUCN II, Recreational Use Zone IUCN IV); Muiron Islands Marine Management Area (State); Ningaloo Marine Park (State; includes sanctuary zones); Warnangura National Park (Cape Range); Nyinggulara National Park; Jurabi Coastal Park; Nyinggulu (Ningaloo) Coastal Reserves; The Ningaloo Coast (World and National Heritage); Ningaloo Marine Area - Commonwealth Waters (Commonwealth Heritage). KEF - Commonwealth waters adjacent to Ningaloo Reef.	Dugong: calving, nursing, breeding and foraging. Whale shark (VU): foraging. Pygmy blue whale (EN): migration. Humpback whale: resting and migration. Southern right whale (EN): migration, reproduction and habitat critical to survival. Turtles - hawksbill (VU) and loggerhead (EN): nesting and internesting buffer; flatback (VU): internesting buffer; green (VU): nesting (edge only) and internesting buffer. Turtle HCTS - flatback (VU), green (VU) and loggerhead (EN). Seabirds - fairy tern (VU), roseate tern and wedge-tailed shearwater: breeding (colony) and breeding-season foraging.	Dugong: calving, nursing, breeding and foraging - in the north of the unit. Humpback whale: resting and migration - in the north of the unit. Southern right whale (EN): reproduction and habitat critical to survival - in the north of the unit. Turtles - flatback (VU), green (VU), hawksbill (VU) and loggerhead (EN): internesting buffer - in the north of the unit. Turtle HCTS - flatback (VU), green (VU) and loggerhead (EN) - in the north-east of the unit. Seabirds - fairy tern (VU): breeding (colony) - in the south of the unit; roseate tern: breeding-season foraging - in the west of the unit; wedge-tailed shearwater: breeding-season foraging - in the centre of the unit. Also contains part of Southern Islands Coast (Southern Pilbara unit) - see that row.

Monitoring unit	Named receptors	Habitats, features and designations	BIAs and HCTS at the named receptor	BIAs, HCTS and KEFs outside the named receptors but within the unit
	Ningaloo Coast South	Southern Ningaloo fringing reef, where coral cover is highest (around Coral Bay); shallow flat lagoons with coral and algal communities over sand or limestone pavement, intersected by narrow, deeper channels that aid water circulation (Miller et al. 2015; Kobryn et al. 2022). Shoreline intertidal reefs shaped by tidal and wave action are a prominent feature of the Ningaloo Marine Park coastline (CALM 2005b), with rocky shores and sandy beaches (DBCA 2022d); mangroves at Coral Bay (Butler et al. 2017). Marginal tidal range and higher water clarity (DEWHA 2007). Weather and oceanographic conditions can trap coral spawn in Bills Bay (Coral Bay), causing deoxygenation; the March 2022 event was the seventh recorded (Richards et al. 2024). Ningaloo Marine Park (State; includes sanctuary zones); Point Quobba Fish Habitat Protection Area (State); Nyinggulu (Ningaloo) Coastal Reserves; The Ningaloo Coast (World and National Heritage).	Humpback whale: resting (edge only) and migration. Southern right whale (EN): migration. Turtles - loggerhead (EN): nesting (edge only) and internesting buffer. Turtle HCTS - loggerhead (EN). Seabirds - fairy tern (VU): breeding (colony) and breeding-season foraging.	-
	Ningaloo - Outer Coast North*	Outer fringing reef slope of northern Ningaloo with hard corals dominant at 20 to 30 m, corals uncommon below 40 m, and the steepest shelf break of the region (Waples and Hollander 2008; DEWHA 2008b). Deep forereef coral and algal communities of Ningaloo Reef, beside a continental shelf that narrows to about 7 km wide around North West Cape (Kobryn et al. 2022; DEWHA 2007). Ningaloo Reef has a well-developed spur and groove system of coral fingers separated by coral sand channels, and extensive filter-feeding communities have been recorded at 20 to 200 m (DEWHA 2008b; CALM 2005b). Canyons interact with the Leeuwin Current to draw cooler, nutrient-rich water onto the shelf, and strong internal tides may aid upwelling at the canyon heads (Brewer et al. 2007). Gascoyne AMP (Multiple Use Zone IUCN VI); Ningaloo AMP (National Park Zone IUCN II, Recreational Use Zone IUCN IV); The Ningaloo Coast (World and National Heritage); Ningaloo Marine Area - Commonwealth Waters (Commonwealth Heritage). KEFs - Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula; Commonwealth waters adjacent to Ningaloo Reef; Continental Slope Demersal Fish Communities.	Dugong: calving, nursing, breeding and foraging. Whale shark (VU): foraging. Pygmy blue whale (EN): foraging and migration. Humpback whale: migration. Turtles - flatback (VU), green (VU), hawksbill (VU) and loggerhead (EN): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and loggerhead (EN). Seabirds - fairy tern (VU) and roseate tern: breeding (colony) and breeding-season foraging; wedge-tailed shearwater: breeding-season foraging.	-

Monitoring unit	Named receptors	Habitats, features and designations	BIAs and HCTS at the named receptor	BIAs, HCTS and KEFs outside the named receptors but within the unit
	Exmouth Gulf Coast	Shallow embayment whose subtidal benthos is mostly unvegetated sediment (about 60.5%), with filter-feeding communities (about 24%), seagrass meadows (about 8.1%) and coral reef (about 1.9%); many reefs are marginal or turbid systems (WAMSI 2025). Subtidal and intertidal habitats including cyanobacterial mats, seagrass meadows (mainly eastern margins), mangroves, coral communities and salt flats (WAMSI 2025); saltmarsh (Butler et al. 2017). Macroalgal beds line the eastern side, salt flats are the largest intertidal habitat, and oyster reefs occur in the south-west (WAMSI 2025). Tidal sandwaves or sandbanks about 5 to 10 m high occur in the inner-most reaches of the gulf (DEWHA 2008b). Turbid, low-light conditions (Richards et al. 2025), with lower turbidity in summer and higher in winter (Evans et al. 2025). Ningaloo Marine Park (State; includes sanctuary zones); Bay of Rest, Burnside and Simpson Island, Giralia, Islam Islets, Tent Island, Whalebone Island and Whitmore, Roberts, Doole Islands and Sandalwood Landing Nature Reserves; Bundegi Coastal Park; Cape Range and Shothole Canyon Conservation Parks; Giralia (Jarralya) National Park; Warnangura National Park (Cape Range); The Ningaloo Coast (World and National Heritage).	Dugong: calving, nursing, breeding and foraging. Humpback whale: resting and migration. Southern right whale (EN): migration, reproduction and habitat critical to survival. Turtles - flatback (VU), hawksbill (VU) and loggerhead (EN): internesting buffer; green (VU): nesting (edge only) and internesting buffer. Turtle HCTS - flatback (VU), green (VU) and loggerhead (EN). Seabirds - wedge-tailed shearwater: breeding-season foraging.	-
	North West Reef*	No habitat information available. Ningaloo Marine Park (State).	Dugong: calving, nursing, breeding and foraging. Humpback whale: migration. Southern right whale (EN): migration, reproduction and habitat critical to survival. Turtles - flatback (VU), green (VU), hawksbill (VU) and loggerhead (EN): internesting buffer. Turtle HCTS - flatback (VU), green (VU) and loggerhead (EN). Seabirds - wedge-tailed shearwater: breeding-season foraging.	-

Monitoring unit	Named receptors	Habitats, features and designations	BIAs and HCTS at the named receptor	BIAs, HCTS and KEFs outside the named receptors but within the unit
Offshore Environs	Rankin Bank*	Three carbonate sedimentary banks rising steeply from 80 to 120 m to 20 to 40 m, with macroalgae and hard corals above 40 m and encrusting corals reaching about 12.5% cover above 40 m; sand increases with depth (Abdul Wahab et al. 2018). Turbidity was low during survey, with beam transmission above 95% at all depths (Abdul Wahab et al. 2018). The three shoals within the 50 m contour reach water depths of about 18 to 30.5 m (AIMS 2014b).	Whale shark (VU): foraging. Turtles - flatback (VU): internesting buffer. Seabirds - wedge-tailed shearwater: breeding-season foraging. Diverse demersal fish communities - documented (Appendix C).	Whale shark (VU): foraging - in the centre of the unit. Pygmy blue whale (EN): migration - across most of the unit. Turtles - flatback (VU): internesting buffer - in the south of the unit. Turtle HCTS - flatback (VU) - in the south of the unit. Seabirds - wedge-tailed shearwater: breeding-season foraging - in the south of the unit. KEFs - Ancient coastline at 125 m depth contour - in the east of the unit; Continental Slope Demersal Fish Communities - in the south-west of the unit; Exmouth Plateau - in the south-west of the unit; Glomar Shoals - in the south-east of the unit.
	Glomar Shoals*	Large outer-shelf shoal rising from 70 to 80 m to a 40 m plateau; corals, sponges and macroalgae on hard substrate above 40 m, benthic cover about 2% at 60 to 80 m and coarse sediment below 60 m (Abdul Wahab et al. 2018). The coarse sediments indicate a high-energy environment subject to strong seafloor currents (Falkner et al. 2009). Frequent cyclones stimulate periodic bursts of productivity through increased vertical mixing (Abdul Wahab et al. 2018). About 150 km north of Dampier (Falkner et al. 2009). **KEF - Glomar Shoals.**	Whale shark (VU): foraging. Seabirds - wedge-tailed shearwater: breeding-season foraging.	-
Control	Control sites	-	-	-

** Submerged receptor that has no features above the sea surface.*

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