GOVERNMENT OF WESTERN AUSTRALIA

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SECURING 5 MILLION HECTARES OVER 5 YEARS

Houtman Abrolhos Islands National Park

draft management plan

2021

Department of **Biodiversity, Conservation and Attractions**
Conservation and Parks Commission

GOVERNMENT OF WESTERN AUSTRALIA

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Front cover photos
Main: Pelsaert Island. *Photo – Rory Chapple/DBCA*
Top left: Lesser noddy (*Anous tenuirostris melanops*). *Photo – Anthony Desmond/DBCA*
Top right: Australian sealion (*Neophoca cinerea*). *Photo – Clare Atkins/DBCA*
Header photo: Morley and Wooded islands. *Photo – Nathan Greenhill/DBCA*

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VISION

In collaboration with other State Government agencies and the community, protect the exceptional natural, cultural heritage and community values of the park. Provide world-class sustainable visitor experiences and tourism opportunities while retaining the unique Abrolhos sense of place.

Suomi Island in the Easter Group. Photo – Clare Atkins/DBCA

EXECUTIVE SUMMARY

The Houtman Abrolhos Islands (the 'Abrolhos Islands') is an archipelago of 210[1] islands, islets and rocks about 60 kilometres west of Geraldton, in the Midwest Region of Western Australia. The area covered by the *Houtman Abrolhos Islands National Park draft management plan 2021* (the plan/this plan) comprises 189 islands (184 unoccupied islands and parts of five occupied islands) of the archipelago which make up Houtman Abrolhos Islands National Park (the park). The park was created on 25 July 2019 commemorating the 400-year anniversary of Dutch navigator Frederick de Houtman's sighting and naming of the islands and surrounding waters and coral reef of the *Houtman Abrolhos* (the Abrolhos). Despite their low-lying and, in parts, desolate landscape, the Abrolhos Islands have a rich biodiversity and cultural heritage, which attracts a small, but increasing number of visitors.

This plan aims to protect the values of the park, providing a summary of management direction and operations proposed to be undertaken.

Objectives, strategies, and key performance indicators (KPIs) are used to highlight management priorities, with a focus on:

- managing the natural values
- managing cultural heritage values
- managing visitor use and community values
- managing resource use and
- research and monitoring.

These are used by the Conservation and Parks Commission to assess implementation of the plan by the Department of Biodiversity, Conservation and Attractions (the department).

The park is one of a suite of tenures that make up the Abrolhos. The surrounding State waters and islands adjacent to the park are managed by Department of Primary Industries and Regional Development (DPIRD). The Western Australian Museum (WA Museum) has legislative responsibility for the protection of maritime archaeological sites located in the park. Other State Government agencies and local government also have jurisdiction at the Abrolhos. Therefore, through this plan, the department is committed to collaborating with other relevant agencies to ensure a complementary and whole-of-government approach to managing the Abrolhos, which is enabled through a hierarchy of different planning documents, prepared by each agency. The *Houtman Abrolhos Islands Strategic Direction 2020-24* (Strategic Direction) provides the overarching vision, direction, and key initiatives for the Abrolhos and sets out the framework that will guide the collaborative management of the lands and waters of the Abrolhos by DBCA, DPIRD, WA Museum and other relevant State Government agencies. This plan is one of several plans that sit under the Strategic Direction (see *Figure 1. Abrolhos planning framework*).

[1] The total island count for the Houtman Abrolhos is based on the land area that has been assigned a cadastral land parcel by Landgate and is accurate as of June 2020. The department acknowledges that total island counts have varied over time and that a range of figures have been reported in the literature. At the time of writing, DBCA identified a further five islands, islets and rocks with no cadaster assigned and has recommended to Landgate that these be reassessed. The total count of islands, islets and rocks may change over the life of the plan as sea level changes and swell, tides and wave actions result in some islands becoming permanently covered by sea water or new islands emerging.

Managing natural values

The park supports a range of significant native fauna. It provides habitat for the largest and most species-rich populations of seabirds in Western Australia including the vulnerable Australian lesser noddy (*Anous tenuirostris melanops*) and Australian fairy tern (*Sternula nereis nereis)*. The park is also important for internationally significant migratory shorebirds, including four critically endangered species. The vulnerable Australian sea lion (*Neophoca cinerea*) uses many of the islands for haulout and breeding and the endangered Abrolhos painted button-quail (*Turnix varius scintillans*) is endemic to the Wallabi Group. Tammar wallabies (*Notamacropus eugenii derbianus*) are one of only two terrestrial mammals in the park and several priority flora species and significant vegetation communities also exist. Protection of these values, through the management of weeds and pest animals is a key focus for this plan. Maintaining the cat and rat-free status of the park and minimising the impacts of the house mouse and weeds, using a range of biosecurity measures, will be important.

Based on these significant values, the management plan identifies value rich islands with particularly important natural values and the management direction that will ensure the protection of these, especially in relation to visitor access and improving visitor awareness of their importance.

Managing cultural heritage values

The park contains significant maritime cultural heritage values, being the location of several shipwreck survivor camps associated with internationally significant shipwrecks. These include the National Heritage Listed areas associated with the *Batavia (1629)*. Other important cultural heritage includes remnants of the guano mining industry, commercial fishing heritage and sites associated with the tourism industry and defence.

The key direction for managing cultural heritage in the park is the protection of the National Heritage listed values on Beacon Island and interpreting these for visitors. This plan outlines strategies to ensure

The National Heritage Listed Beacon Island, the location of *Batavia* shipwreck survivor camp. Photo – Nathan Greenhill/DBCA.

that the department meets its obligations associated with the protection of these significant maritime cultural heritage values. The plan identifies value rich islands with important cultural heritage values and the management direction that will ensure the protection of these, especially in relation to visitor access and improving visitor awareness of their importance.

Managing visitor use and community values

The Abrolhos Islands provide a unique visitor experience. Visitors are attracted to its rugged character, remoteness, and the significant natural and cultural heritage values. Current visitation is low because the park is only accessible via recreational boat, charter flight or commercial tour (either on a boat or aircraft). People visit the park for nature appreciation (bird watching and photography), to discover maritime heritage values (Batavia shipwreck survivor camps) and to access adjacent waters for marine activities (swimming, fishing, snorkelling, and surfing). The focus of visitor management in the park will be to enhance these experiences, and to minimise the impacts of visitation to the natural and cultural values.

A key Government intent in the creation of the park is the encouragement of investment in tourism development and opportunities at the Abrolhos and the plan outlines a framework for how these will be established and managed in the park. Licensed and accredited commercial operators will provide visitors the opportunity to experience the environments, wildlife, and maritime heritage, of the park.

DBCA recognises the importance of creating tourism opportunities and development at the Abrolhos, especially the associated economic benefits for the Geraldton, Mid West and Western Australian community. The plan outlines the publicly advertised competitive process for the selection of a suitable developer and operator, with any development in the park to be managed by a lease or licence with appropriate conditions. Any development is likely to have marine and terrestrial components, so collaboration with DPIRD, WA Museum, MWDC and Tourism Western Australia (Tourism WA) will be essential to ensure seamless planning and management of tourism at the Abrolhos, regardless of tenure.

Quality visitor facilities that reflect the unique character of the Abrolhos will be provided for whilst minimising and managing impacts to natural and cultural heritage values. The development of visitor infrastructure, interpretation and appropriate access is initially focused on East Wallabi and Beacon islands. The plan proposes the consideration and possible development of visitor infrastructure at North, West Wallabi, Long, Rat, Leo, Morley, Pelsaert and Gun islands, to enhance visitor experiences and protect natural and cultural values.

There has been a long history of community involvement in the management of the Abrolhos Islands. The department will continue to work with the community to provide opportunities for community involvement which foster a sense of stewardship and support for park management.

Managing economic and resource use

Access for commercial fishing, and infrastructure for utilities and services also occur in the park. The focus for managing these resources is to minimise the impacts of these activities on the park's values.

INVITATION TO COMMENT

This draft management plan has been released for a two-month period to provide the public with an opportunity to comment on how the park is proposed to be managed during the next 10 years.

To ensure your submission is as effective as possible:

- be clear and concise
- refer your points to the page numbers or specific sections in the plan
- say whether you agree or disagree with any or all of the management arrangements – clearly state your reasons, particularly if you disagree
- give sources of information where possible
- suggest alternatives for those aspects of the plan with which you disagree.

The draft management plan will be reviewed in light of submissions, according to the criteria outlined below. A summary of public submissions will be made available along with the final management plan.

The draft management plan **may be** modified if a submission:

- provides additional information of direct relevance to management
- indicates a change in (or clarifies) government legislation or management policy
- proposes strategies that would better achieve management objectives
- indicates omissions, inaccuracies, or a lack of clarity.

The draft management plan **may not be** modified if a submission:

- clearly supports proposals in the plan or makes general or neutral statements
- refers to issues beyond the scope of the plan
- refers to issues that are already noted within the plan or already considered during its preparation
- is one among several widely divergent viewpoints received on the topic but the approach in the plan is still considered the best option
- contributes options that are not feasible (generally due to conflict with legislation or government policy)
- is based on unclear or factually incorrect information.

The plan can be viewed and submissions made online at www.dbca.wa.gov.au/haveyoursay

Alternatively, you can write to:

Aboriginal Engagement, Planning and Lands Branch
Parks and Wildlife Service
Department of Biodiversity, Conservation and Attractions
Locked Bag 104
Bentley Delivery Centre WA 6983

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1. Planning area

This plan covers all 184 unoccupied islands and parts of five occupied islands of the park[1], comprising a total of 189 islands and 1564 hectares, vested in the Conservation and Parks Commission for the purpose of "national park" (see *Appendix 1, Map 1*). Seventy-nine islands are named, and the remaining 110 islands, islets and rocks are not officially named. There are three main island groups: Wallabi (including North Island), Easter and Pelsaert (See Maps 1, 2, 2a, 3, 3a, 4 and 4a), spread over 100km from north to south. The park boundary is at high water mark for all the islands except for Beacon and East Wallabi islands, where a portion of the park extends over the water as a curtilage to include the jetties which provide boat access to these islands. The intertidal portion of land adjacent to the jetty curtilage areas on these islands is also part of the park (see *Visitor access – boat access*).

Other islands of the Abrolhos, not covered by this plan, are a Class A reserve[2] (Reserve 20253), vested in the Minister for Fisheries for the purpose of "conservation of flora and fauna, tourism and for purposes associated with the fishing and aquaculture industries" and managed by DPIRD. Most of Reserve 20253 is leased and occupied by commercial rock lobster fishers and aquaculture operators. Reserve 20253 also comprises the intertidal area between high water mark and low water mark on all the islands of the Abrolhos, including those in the park. Five islands of the Abrolhos comprise both park and Reserve 20253: North Island, West Wallabi Island, Rat Island, Leo Island and Newman Island. The park portions of these islands are covered by this plan.

Two leasehold areas in Reserve 20253 contain a lighthouse. Currently, these are managed under a lease agreement between Department of Planning, Lands and Heritage (DPLH) and Australian Maritime Safety Authority (AMSA). Upon expiration of this lease, the areas will become a reserve gazetted under section 5(1)(h) of the CALM Act for the purpose of "lighthouse" (see *Utilities and services*).

The State waters surrounding the park are gazetted for the purpose of a Fish Habitat Protection Area (FHPA), which extends to high water mark on all the islands. The FHPA is managed by DPIRD and is not covered by this plan.

2. Key values and management issues

This plan focuses on the protection of the significant natural, cultural heritage, visitor use, economic and resource use values of the park. It outlines protection of these values and the management of the pressures, threats, risks, or challenges to these values. Table 1 summarises the key values, management issues and opportunities that are considered in this plan.

[1] Reserve 53379
[2] Reserve 20253

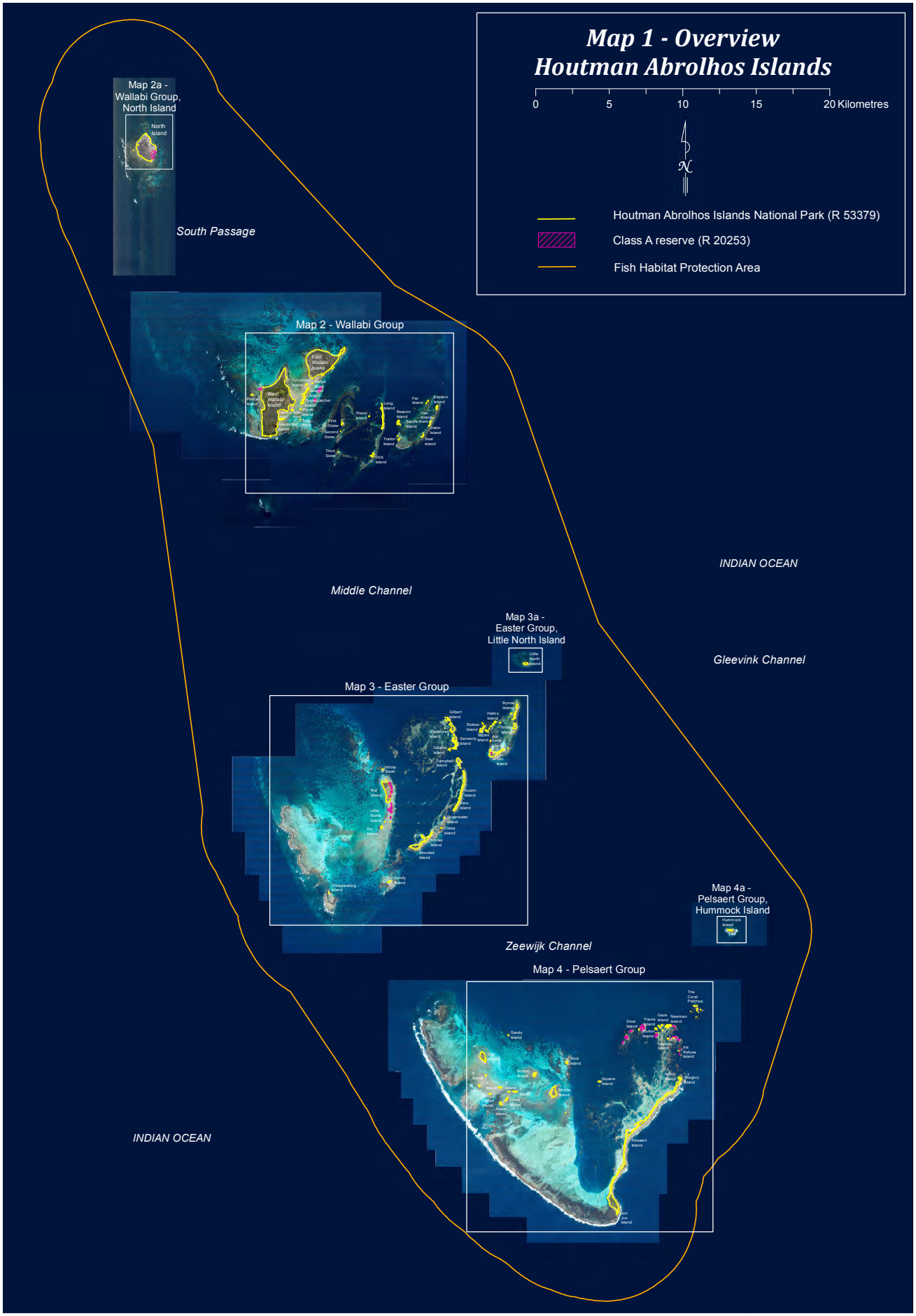
Table 1. Summary of key values, issues, and opportunities

Values	Management issues	Opportunities
Natural		
• Large and species-rich populations of seabirds and internationally significant migratory shorebirds. • Important area for Australian sea lion haulout and breeding. • Only known location of Abrolhos painted button-quail. • Several priority plant species and significant vegetation communities.	• Maintaining a strict biosecurity regime, particularly to prevent the establishment of rats, cats, and other pest animals. • Visitor disturbance impacts on fauna such as seabird and shorebird nesting sites and sea lion pupping habitat. • Impacts from weeds. • Sea level rise, increased wave action and storm surge, and other impacts associated with climate change. • Gaps in knowledge of natural and biodiversity values.	• An increased focus on terrestrial management that has previously not been a priority. • Provide greater protection to threatened seabirds. • In collaboration with DPIRD, introduce biosecurity management across the park and Reserve 20253 to minimize the risk of the introduction and spread of weeds and pest animals across the Abrolhos Islands. • Research and monitoring of the values to inform adaptive management. • Provide and manage visitor access to protect key values
Cultural heritage		
• Internationally significant and National heritage listed *Batavia* shipwreck site and survivor camp areas. • The location of numerous shipwrecks and associated important maritime archaeological sites on various islands. • Remnants of the guano mining industry. • Social history of the Abrolhos, including the guano mining and rock lobster fishing industries' activity and camps, contributing to the unique identity and sense of place of the Abrolhos.	• Impacts on maritime archaeological sites from disturbance. • Providing visitor access to cultural heritage without impacting these values.	• Further research associated with maritime archaeological sites. • Development of education and interpretation programs that interpret the incredible history and cultural heritage of the Abrolhos that is innovative, engaging and encourages appropriate visitor behaviour. • Tourism and commercial opportunities associated with cultural heritage values. • Provide and manage visitor access to protect values.

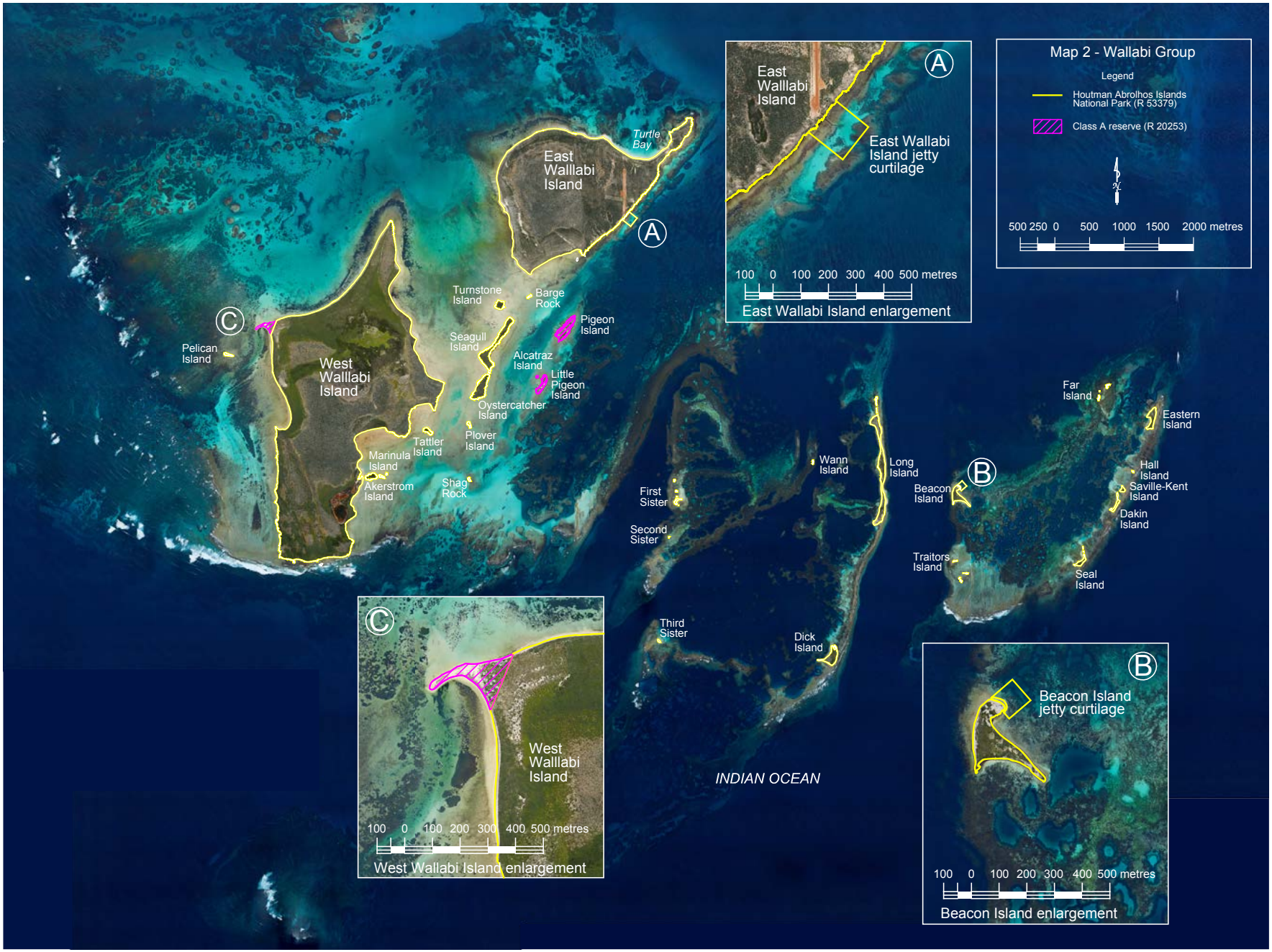
Values	Management issues	Opportunities
Visitor use and community		
• Visitors are attracted to the park's remoteness, natural and cultural heritage values, and unique sense of place • A range of cultural and nature-based visitor experiences including day trips and camping • Boat and plane-based commercial tours providing one day and multiple day access • Growing tourism interest and associated economic opportunities	• Impacts to natural and cultural values from inappropriate visitor access or activities (for example disturbance to breeding birds and sea lions) at sensitive sites • Visitor safety resulting from changeable weather conditions and extreme weather events, difficult terrain, remote location, absence of drinking water, fuel and supplies, and limited communication with the mainland • Achieving a balance between providing visitor access and opportunities for tourism, while also protecting the values and maintaining the unique sense of place of the park.	• Improved access and visitor facilities. • Potential for overnight stays to be accommodated to extend visitor experiences on the islands. • Development of innovative and engaging information, and interpretation programs that tell the stories of the Abrolhos. • Potential growth in tourism offerings with associated economic benefits for the Geraldton, Midwest, and Western Australian community. • Increased awareness of the Abrolhos and a greater appreciation of its unique values.

Beach on North Island in the Wallabi Group. Photo – Clare Atkins/DBCA.

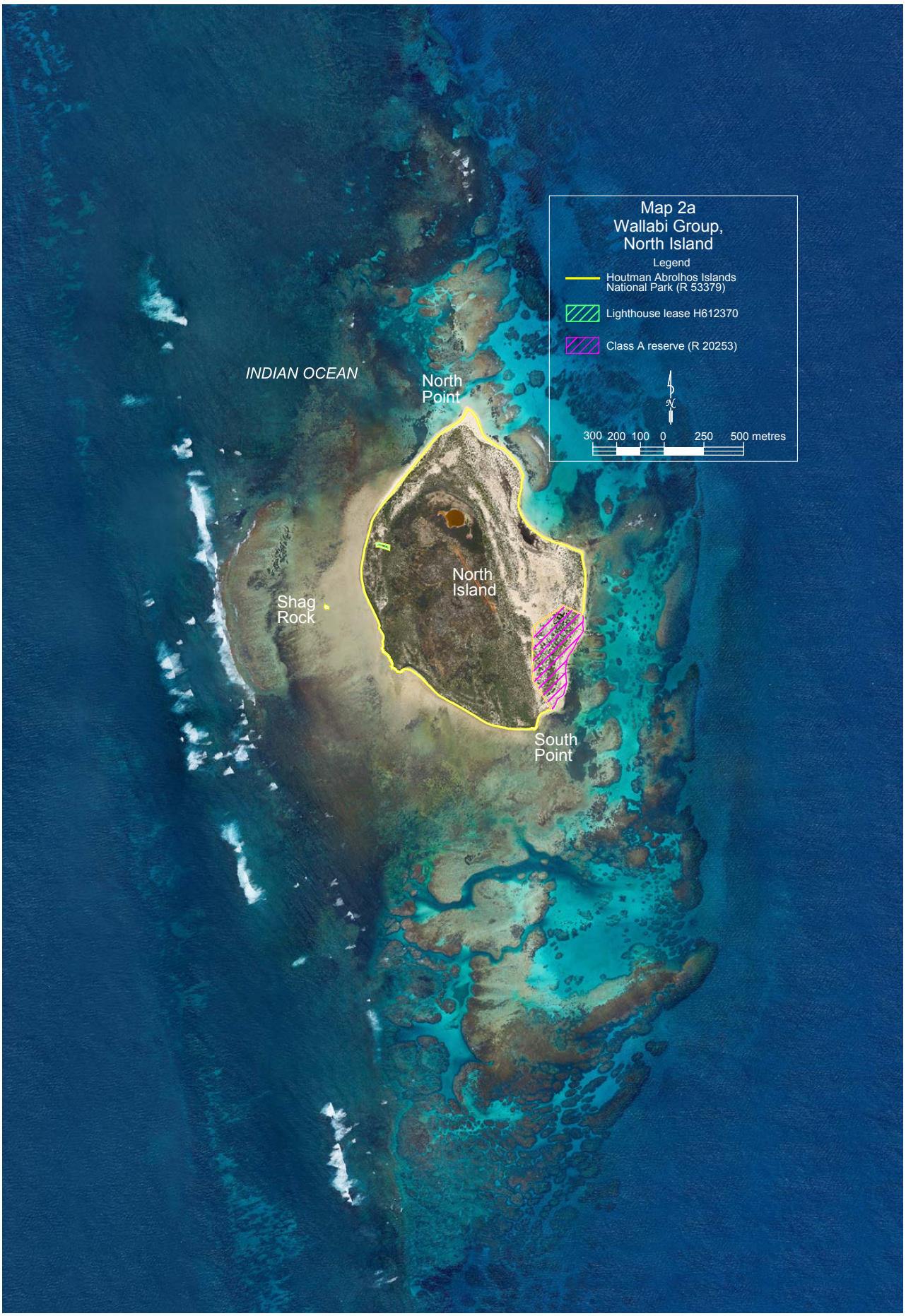
Map 1. Houtman Abrolhos Islands National Park overview



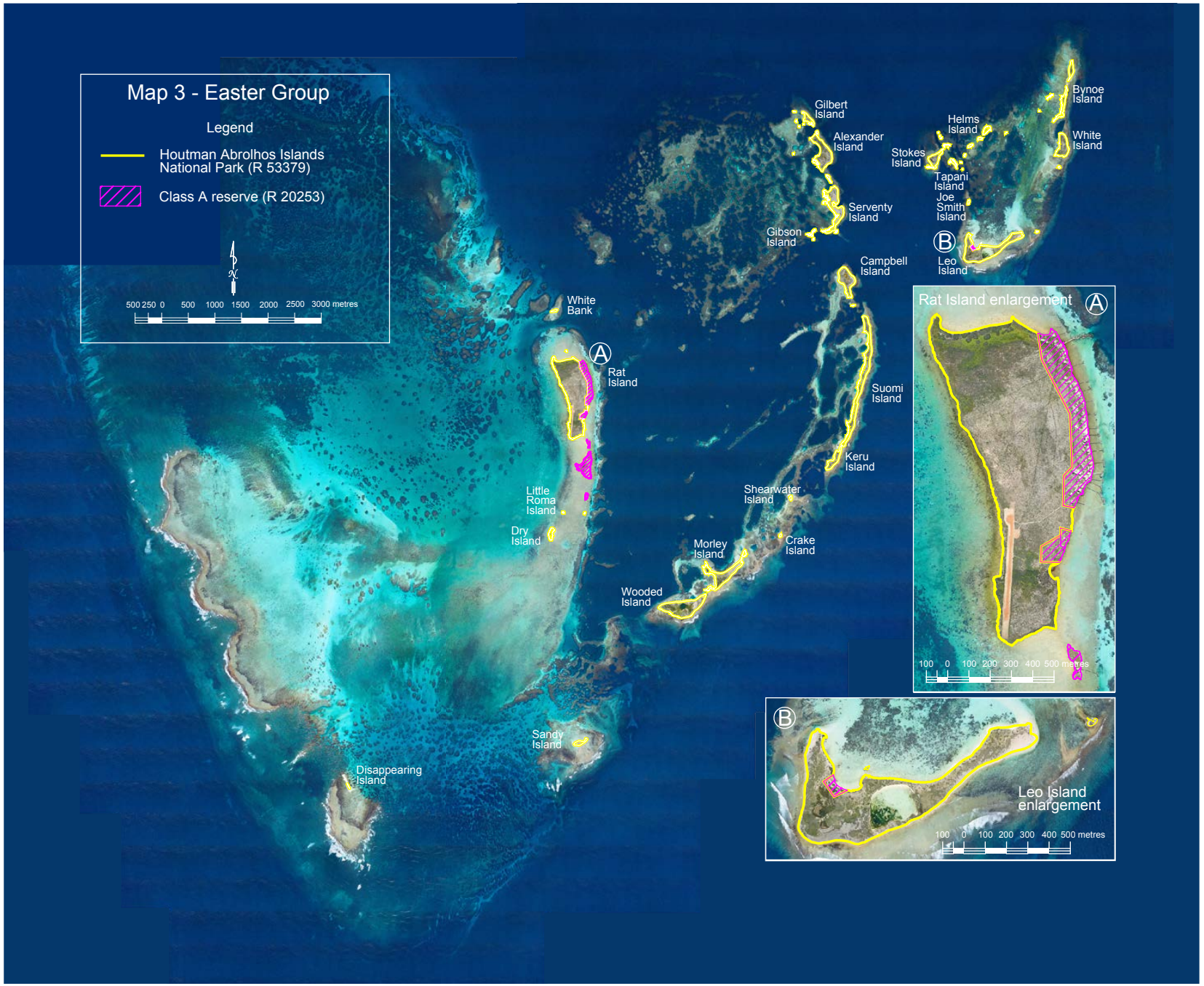
Map 2. Wallabi Group



Map 2a. Wallabi Group, North Island



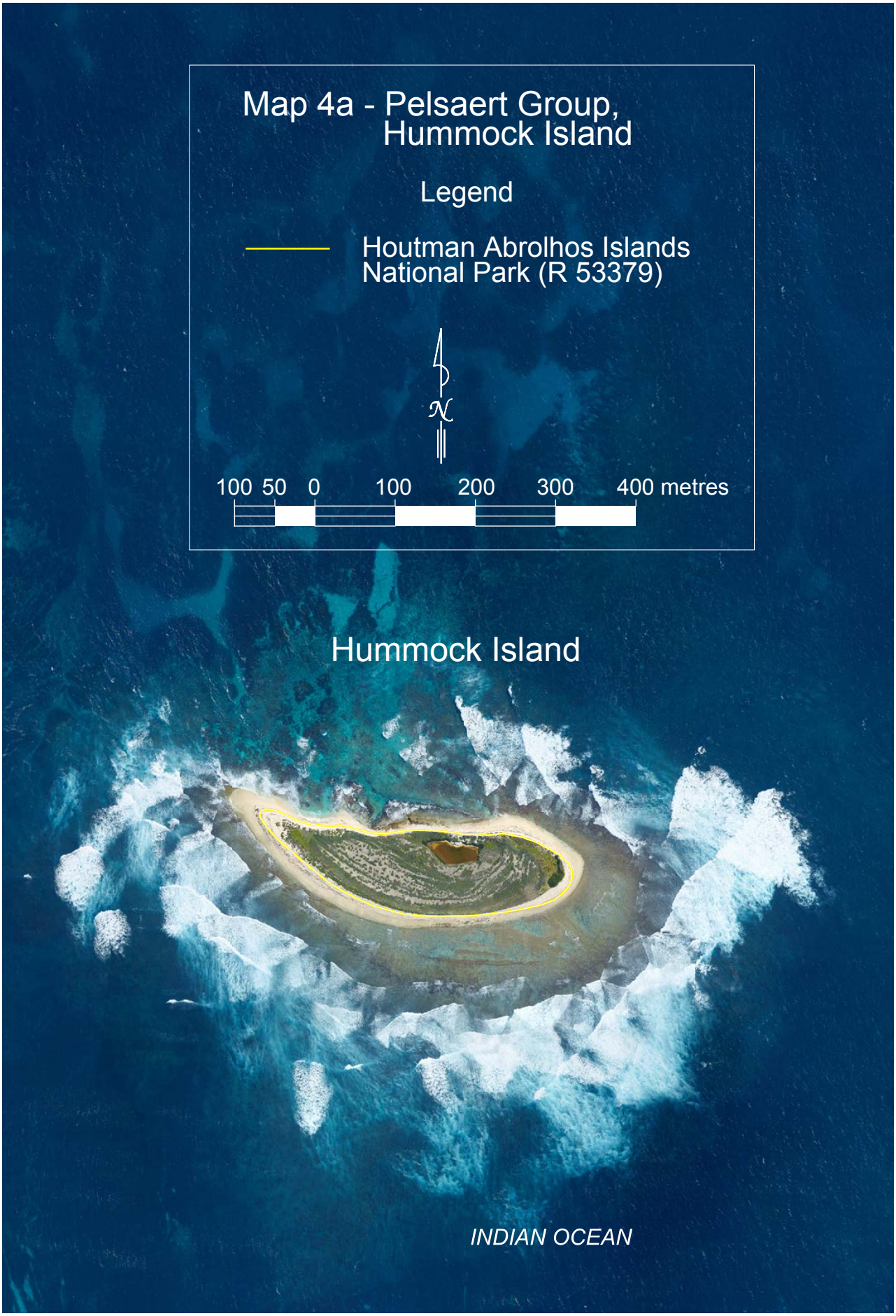
Map 3. Easter Group



Map 3a. Easter Group, Little North Island

Map 4. Pelsaert Group

Map 4a. Pelsaert Group, Hummock Island



MANAGEMENT DIRECTION AND CONTEXT

3. Management context

Legislation and policy

The park will be managed in accordance with the provisions of the *Conservation and Land Management Act 1984* (CALM Act). The *Biodiversity Conservation Act 2016* (Biodiversity Conservation Act), the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and other relevant legislation and policies[4] that apply to the management of the park, are mentioned throughout this plan and can be obtained from the State Law Publisher or Federal Register of Legislation.

Whole-of-government management and administration

A range of State Government agencies have management responsibilities at the Abrolhos. With the creation of the park in July 2019, the State Government committed to developing a collaborative, whole-of-government approach to managing the lands and waters of the Abrolhos and creating sustainable economic opportunities.

DBCA has primary responsibility for managing the park in accordance with the CALM Act, including protecting its values and facilitating land-based tourism and recreation experiences for the community.

The department's Midwest Regional office in Geraldton is responsible for the day-to-day management of the park and implementation of this plan and is supported by staff from specialist branches within the department. Work towards addressing the objectives, strategies and KPIs in this plan will be completed by the department's Midwest Region unless stated otherwise.

DPIRD delivers services to support management of the Abrolhos in accordance with the *Fish Resources Management Act 1994* (FRM Act). DPIRD has primary responsibility for management of the FHPA and Reserve 20253, most of which is currently under lease agreements with Abrolhos Islands Bodies Corporate (Bodies Corporate). DPIRD manages fishing and aquaculture, fishing-based tourism, and moorings, and administers the lease arrangements with the commercial fishing and aquaculture industries. DPIRD and the Mid West Development Commission (MWDC) are also responsible for facilitating regional opportunities to drive economic growth and job creation.

As part of this collaborative approach to managing the Abrolhos, the department and DPIRD have several areas of shared responsibility across the park, Reserve 20253 and the FHPA. These include:

- management of marine and terrestrial fauna and terrestrial flora, terrestrial habitats, coastal use, and seascapes
- maritime heritage
- shared infrastructure such as operational bases and camps, communications infrastructure, jetties, and airstrips

[4] Departmental policies can be found at: www.dbca.wa.gov.au/about-us/36-policies-and-legislation. The Conservation and Parks Commission Position Statements can be found at www.conservation.wa.gov.au/publications/position-statement
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- managing tourism and visitation
- scientific research
- joint patrols, shared vessel use and cross-authorisation of staff for compliance with legislation and regulations administered by the other agencies
- joint community engagement, education, and interpretation for visitors and the public and
- knowledge sharing about natural and cultural values and the history and management of issues.

The WA Museum is responsible for the management of underwater cultural heritage and maritime archaeological sites under the Commonwealth *Underwater Cultural Heritage Act 2018* (UCH Act) and the State *Maritime Archaeology Act 1973* (MA Act). The department will work collaboratively with the WA Museum to manage all relevant legislative responsibilities and to ensure that park management minimises impacts to cultural heritage values.

The department works with several other entities that have important statutory responsibilities and deliver services that support management of the Abrolhos including Tourism WA, Department of Transport, Department of Health and City of Greater Geraldton.

While this plan is one of a suite of management plans that apply to the Abrolhos tenure (see *Planning framework*), the natural, cultural heritage, visitor use, economic and resource use values of the islands and waters are implicitly linked. The department is committed to a well-integrated management approach capable of managing the values across the varying tenures and ensuring its cross-jurisdictional responsibilities are met.

For the most part, the management direction and proposals outlined in this plan apply to the park. However, given the shared responsibilities across the range of tenures, in both the marine and terrestrial environments, some objectives, strategies and KPIs relate to the management of the Abrolhos more broadly and these are highlighted where applicable.

Planning framework

This plan applies to the islands that are included in the park. The other islands and the waters surrounding the park are a range of tenures and managed for different purposes. The plans that apply to the Abrolhos, that have been prepared or are in preparation by other agencies, are outlined in Figure 1.

The *Houtman Abrolhos Islands Strategic Direction 2020-24* (Strategic Direction) outlines the overarching vision, key initiatives, and the direction for the whole-of-government management approach for the Abrolhos. This broad document informs the planning and management of the park, Reserve 20253 and the FHPA and discusses five key management themes including:

- nature conservation and cultural heritage protection
- tourism
- sustainable fisheries and aquaculture
- Abrolhos community and
- governance.

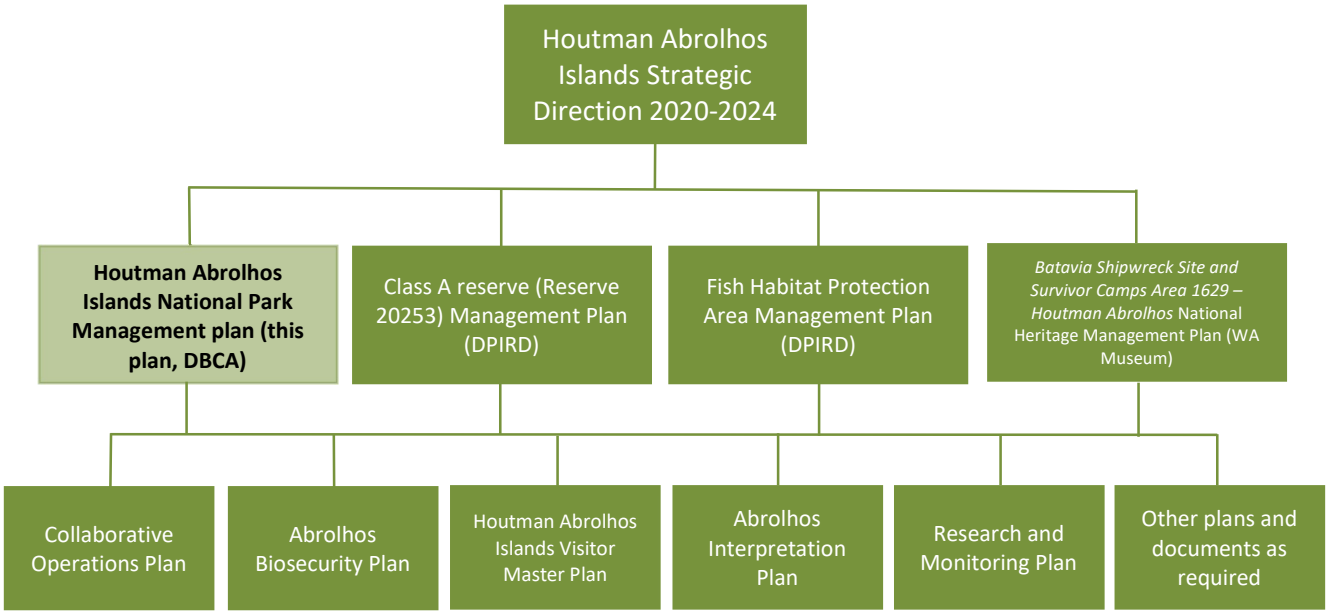


Figure 1: Abrolhos planning framework

The Strategic Direction was prepared jointly by DBCA, DPIRD, MWDC and Tourism WA. It outlines key management priorities for these agencies and their responsibilities across the lands and waters of the Abrolhos, especially the development and management of new tourism opportunities. The Strategic Direction also advocates development of a governance framework built on collaborative partnerships across key government agencies, with management responsibilities at the Abrolhos, and other stakeholders.

This plan is informed by the Strategic Direction, together with plans for Reserve 20253 and the FHPA (prepared by DPIRD), and the *Batavia Shipwreck Site and Survivor Camps Area 1629 – Houtman Abrolhos National Heritage management plan* (prepared by WA Museum). Operational plans (some examples of which are shown in Figure 1), which are more prescriptive and reviewed more regularly, sit underneath. At the time of writing, some operational plans have been prepared and others will be completed over the life of the plan.

Abrolhos Islands Bodies Corporate

Outside the park, most of the adjacent Reserve 20253 is leased and occupied by commercial rock lobster fishers and aquaculture operators who hold commercial rock lobster Managed Fishery Licences with *Zone A* quota and/or aquaculture licences. These licence holders are permitted to establish camps in Reserve 20253 by way of a lease with the Minister for Fisheries. In 2007, these leaseholders formed the Abrolhos Islands Bodies Corporate which comprises four constituted 'bodies corporate': North Island, Wallabi Group, Easter Group, and Southern Group.

Commercial rock lobster fishers and aquaculture operators work year-round at the Abrolhos (see *Commercial fishing and aquaculture*). Therefore, the Bodies Corporate are an important neighbour and key stakeholder associated with the management of the park.

Body Corporate members use infrastructure within the park for access to their camps within Reserve 20253. Leaseholders and others accessing Reserve 20253 for Body Corporate business use the three airstrips and the East Wallabi Island public jetty, located in the park (See *Visitor access*). The department supports this continued access. However, a 'user pays' approach will be adopted through

the application of aircraft landing fees (see *Visitor access – air access*) for Body Corporate members using the airstrips in the park.

Term of the plan

This plan will guide the management of the park until it is reviewed or replaced by another management plan.

Management objective: To work collaboratively across government and with the Abrolhos community to ensure a cooperative approach to management.

Management strategies

1. In collaboration with DPIRD, WA Museum and other relevant State and local government agencies, plan, prepare and deliver effective, strategic, and efficient park management to address shared responsibilities, ensure complementary management and share knowledge and resources.
2. Contribute to the development of a joint decision-making framework and cross jurisdictional authorisation between agencies with responsibilities at the Abrolhos (across the park, Reserve 20253, FHPA and National Heritage Listed sites).
3. Meet regularly with Abrolhos Islands Bodies Corporate and the Abrolhos community to resolve matters of mutual concern.
4. Continue to provide Body Corporate members access to park infrastructure such as airstrips and public jetties, where appropriate.

4. Island classification based on values

During the planning process, an analysis of the values of each island within the park was completed. Several values were identified as being a priority for protection and sensitive to impacts of other uses of the park, particularly visitation. These values are:

- seabird breeding
- sea lion pupping
- migratory shorebirds
- maritime cultural heritage
- Abrolhos painted button-quail
- carpet python
- tammar wallabies
- mangroves and
- conservation significant flora and vegetation communities.

Detail about the significance of these values is outlined in *Managing natural values* and *Managing cultural heritage values*. Of these values, breeding seabirds, sea lions with pups, migratory shorebirds and maritime cultural heritage are particularly vulnerable to disturbance from visitor activities. Islands with one or more of these values are identified as 'value rich' and there are 27 of these in the park (see *Maps 5, 5a, 6, 6a, and 7*).

Roseate terns (*Sterna dougallii gracilis*) in flight. Photo- Anthony Desmond/DBCA.

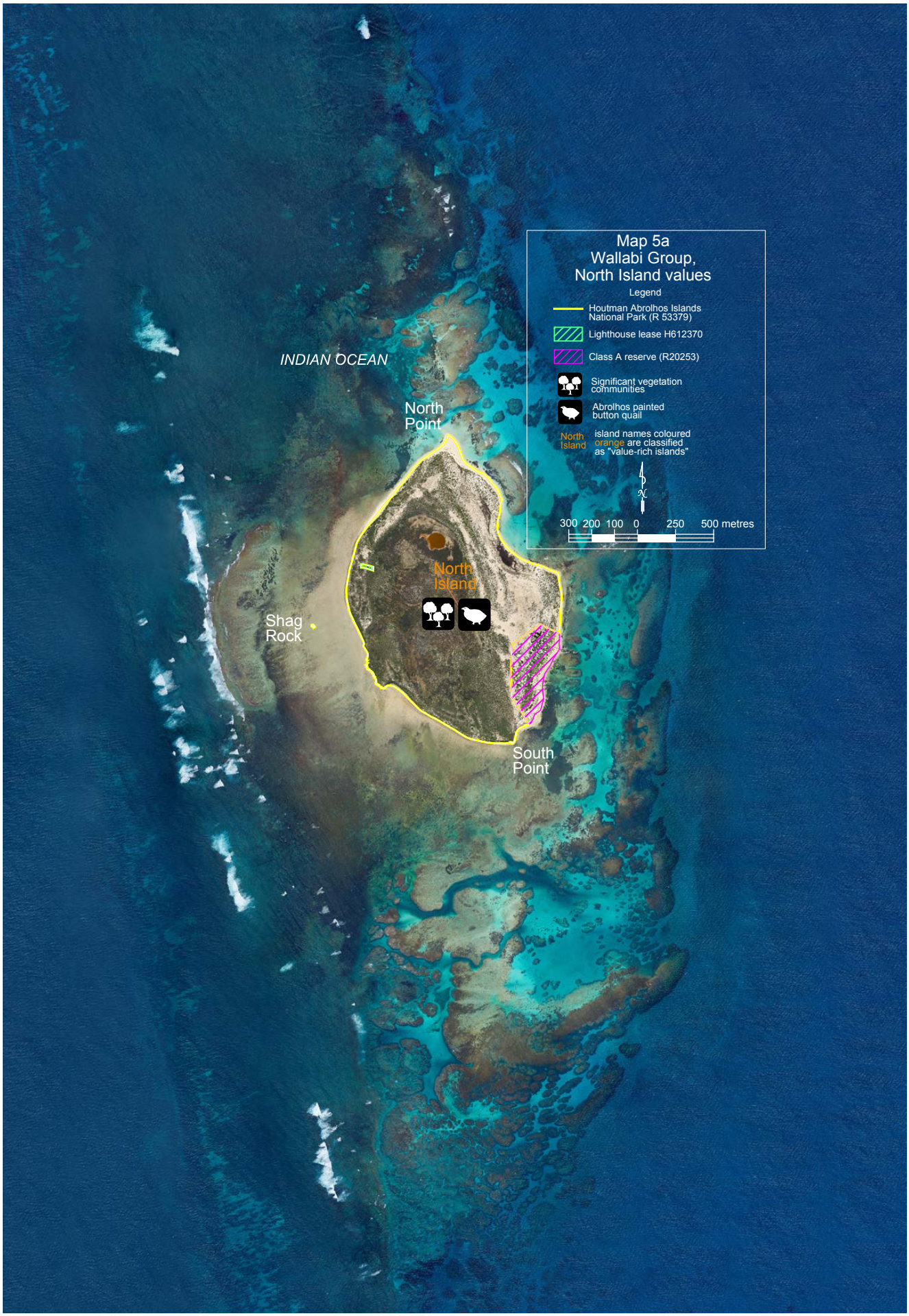
Of the value rich islands, 11 also have important visitor use values. These are:

- North Island
- West Wallabi Island
- East Wallabi Island
- Beacon Island
- Long Island
- White Bank
- Leo Island
- Morley Island
- Wooded Island
- Pelsaert Island and
- Gun Island.

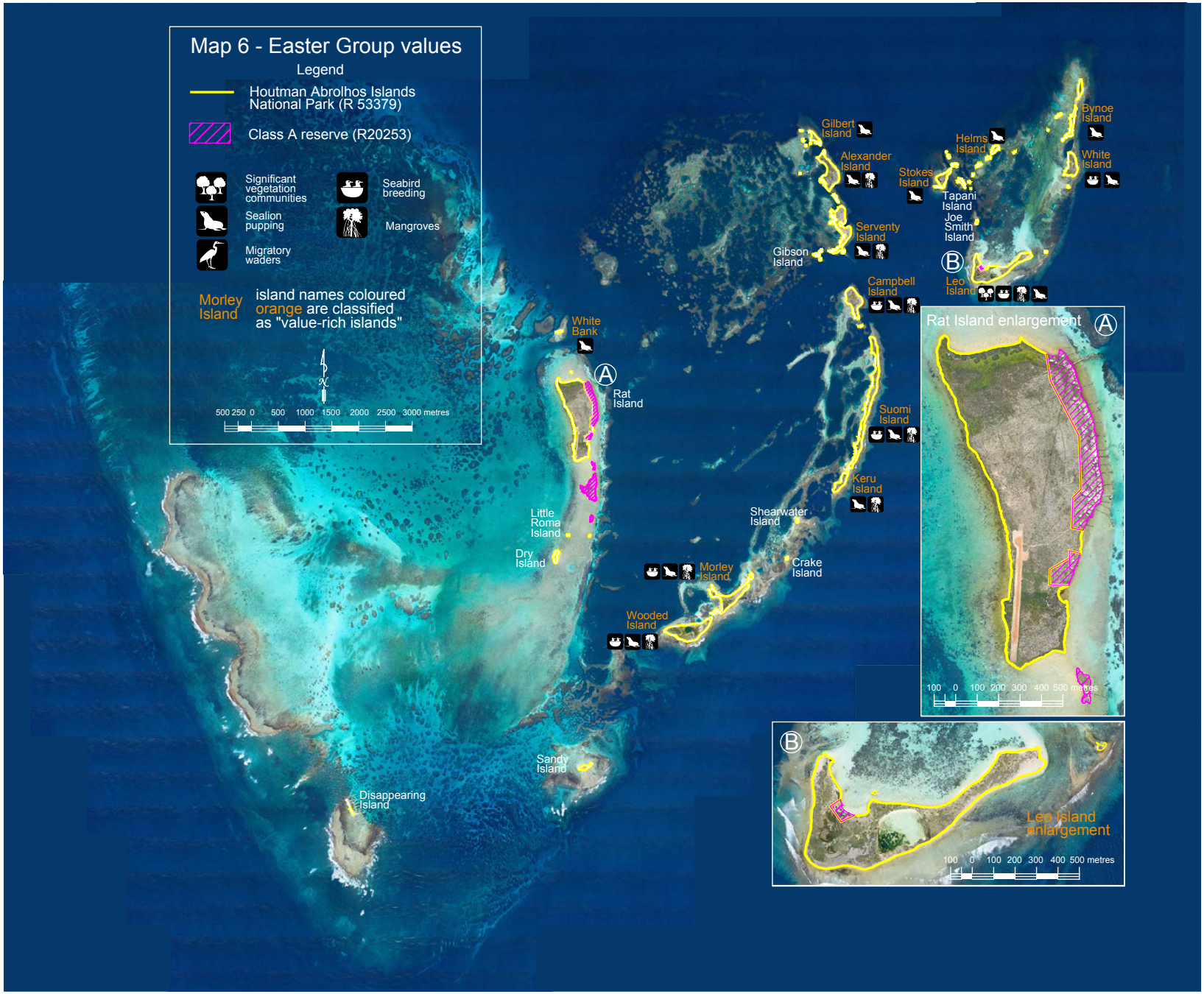
Throughout the plan, a range of management strategies specifically address the protection of these value rich islands from the impacts of visitation. A summary of these islands, their values and relevant management approach is provided in *Appendix 2*

Map 5. Value rich islands – Wallabi Group

Map 5a. Value rich islands – Wallabi Group, North Island



Map 6. Value rich islands – Easter Group



Map 6a. Value rich islands – Easter Group, Little North Island

Map 7. Value rich islands – Pelsaert Group

5. Performance assessment

Progress towards achieving the objectives of this plan will be demonstrated by regular monitoring, evaluation, and reporting to investigate the effectiveness of management actions and identify opportunities for improvement. These are key elements of an adaptive management framework, enabling actions to be properly evaluated and revised where needed. KPIs will be used to assess the implementation and success of this plan.

The KPIs (comprising performance measures, measurable management targets and reporting requirements[5]) have been identified for selected values and management issues and are presented in the relevant management tables throughout this plan. The KPIs are linked to management objectives and strategies. Not all objectives and strategies have associated KPIs and those that do, reflect the highest conservation and management priorities of the department. Objectives and strategies with KPIs will provide the focus for management of the park. For the outcome-based KPIs, any sustained change (for example a continuous decrease or increase) will trigger the need for additional investigation to determine the cause of that change and therefore the requirement for, and type of, management intervention.

The measurement and tracking of the progress of implementing the plan will aim to:

- determine whether management strategies are achieving their desired goals
- show trends in the condition of values and levels of threat
- demonstrate the effectiveness of investment in management strategies
- link local management outcomes to broader programs and
- help with securing future funding for sustaining action.

As a newly created national park, the description of baseline conditions will be important in this initial plan. This is reflected in the plan, in that the included KPIs are focused on assessing achievement of management outputs (availability of baseline data and reports) as well as management outcomes (protection of a particular value). Protocols for measuring and reporting on KPIs (details of the data required, calculation methods and data presentation) will be identified in the research and monitoring program to be developed for the park.

Greater detail about how, what, when, where and why data is collected, to address the KPIs, will be provided in the research and monitoring (see *Research and Monitoring*), operations and project plans (see *Planning framework*).

The Conservation and Parks Commission is the statutory body responsible for periodic assessment of this plan and will measure the success of this plan in accordance with the CALM Act. The department will provide information to the Conservation and Parks Commission on request to enable an assessment of the plan's implementation as well as an assessment of how the plan is performing against the strategic and management objectives. This dual output and outcome-based approach provides a robust framework to support adaptive park management. The department will regularly assess the adequacy of the plan and any need for amendments.

[5] While reporting requirements may be annual, determining reliable trends might not be possible for several years.

MANAGING NATURAL VALUES

The significant natural values of the Abrolhos Islands have long been recognised. Following the wreck of *Batavia* in 1629, Francisco Pelsaert observed tammar wallabies, becoming the first European to sight an Australian marsupial. Since the mid-1800s, visiting naturalists have studied and described the diversity of plants and animals of the archipelago. In 1840, Captain John Lort Stokes, aboard HMS *Beagle*, was the first to note the biodiversity of the Abrolhos, observing mangroves, seabirds, sea lions, tammar wallabies, Abrolhos spiny-tailed skinks and probably bush rats. John Gilbert spent two months at the Abrolhos in 1843 and described its extensive seabird populations. During the twentieth century, CG Gibson published notes on seabirds of the Abrolhos in 1908, the vertebrate fauna was described by Alexander in 1921, and PM O'Loughlin led four expeditions of Aquinas College students detailing terrestrial and marine plants and animals of the islands of the Wallabi and Pelsaert Groups in the 1960s. Also, during the 1960s, GM Storr wrote several publications about the vegetation and vertebrate fauna. Since the 1980s, research on the natural values of the Abrolhos Islands has expanded with research projects investigating island geology, seabirds, reptiles, the Abrolhos painted button-quail, tammar wallaby, flora and vegetation communities.

Protection of the distinctive assemblage of native animals in the park (in particular seabirds, migratory shorebirds, the Abrolhos painted button-quail, sea lion and tammar wallaby) and their habitats will be a priority for this plan. Conservation of significant vegetation communities such as mangroves, stands of *Eucalyptus oraria*, salt marshes, and pavement limestone and dune communities are also important. The 27 value rich islands (see *Appendix 2 - Value rich islands and their management*), which are the most important for the protection of these values, will be the focus for management and conservation over the life of the plan. This will be achieved through the implementation of biosecurity programs (such as weed and pest animal management), monitoring and ensuring that development of visitor facilities, interpretation and tourism occurs in a way that minimises the impacts to these islands and their values.

Natural values strategic objective

To protect and promote the biodiversity values, manage biosecurity threats, and educate the community on the unique terrestrial environment.

6. Physical environment

Climate and climate change

The park experiences a Mediterranean climate with warm, dry summers and cool, wet winters. A Bureau of Meteorology automatic weather station is located on North Island and climate information has been collected since 1990. Average maximum temperatures in February are 28.3^{o}C and 21.1^{o}C in July. North Island receives an average of 278.3mm rainfall annually with most of this falling during winter. Strong winds influence the park for most of the year, particularly southerly winds in the summer. Storm events are frequent, mostly during the winter when gales are experienced four to ten times per year (France 1985).

Ocean conditions also have a strong influence on island landforms, causing the accumulation of sand, shells, coral rubble and shingle on some islands and their erosion on others. A persistent swell,

averaging 1.2m in height, impacts from the south and west most of the time. Wave impact energy and winds are the strongest on the south western island and reef margins. (Collins et al. 1998).

The International Panel on Climate Change has identified sea-level rise as the most significant threat of climate change to islands worldwide and most face substantial risk from higher sea-levels, tides and coastal flooding and erosion (Church et al. 2013, Oppenheimer et al. 2019). Burbidge (2008) suggested that climate change impacts on individual Western Australian islands are unknown, but some islands may be completely inundated, and beaches could reduce in size or disappear. In the park, most islands are less than three metres in elevation, so impacts from sea level rise and storm surge are likely to be significant.

In addition, increases in ocean water temperatures will result in the degradation of coral reefs through coral bleaching and coral death, which in turn will affect depositional and erosional forces acting on shorelines and compound the impacts of inundation and storm surge. Most islands in the Houtman Abrolhos are protected by coral reefs, which minimises island erosion by reducing wave impact. Reef degradation will reduce that protection and increase erosion. Ocean acidification, caused by the increased uptake of CO_2 from the atmosphere, also causes coral bleaching. Although a process that occurs outside the park in the marine environment, it may affect a range of marine organisms, leading to the disruption of marine and terrestrial food chains.

Burbidge (2008) also suggested that the Leeuwin current is likely to become stronger. This may impact on seabird breeding success rates. Probable air temperature increases, and reductions in winter rainfall, are likely to have drought impacts on island biota. Changes in the intensity of tropical cyclones are also likely (Nurse et al. 2014, Oppenheimer et al. 2019).

Management strategies outlined in this plan aim to increase the resilience of species and ecosystems and decrease their vulnerability to a changing climate. Uncertainty about appropriate responses to the effects of climate change means that removing or minimising other pressures (for example weeds, pest animals and physical disturbance) is likely to be one of the best available options to conserve biodiversity in the immediate future. In some cases, the impacts from these pressures may far exceed those of climate change, at least in the short term.

Climate vulnerability assessments and more research will be important to better understand climate change impacts at a species and community level, and management of the park should be adapted based on new information.

Geology, landforms, and soils

The geology and geomorphology of the Abrolhos Islands has been extensively described by Fairbridge (1946), Teichert (1946), France (1985), Eisenhauer et al. (1993), Collins et al. (1991), Collins et al. (1993a and 1993b), Zhu et al. (1993), Wyrwoll et al. (2006), Collins et al. (1997).

Geology

All islands in the Abrolhos are comprised of coral reef limestone, formed during the Pleistocene, (at least 125,000 years ago) (Teichert, 1946). The carbonate platforms on which the islands lie were formed in last interglacial period, about 18,000 years ago. During periods of glaciation, the Abrolhos Islands would have been connected to the mainland (Playford et al., 1971), originally as low hills on the edge of Western Australia, located approximately 120m above sea level, and at least 5km inland. Around 11000-12000 years ago, at the end of this glacial period, melting ice caused sea levels to rise. By about 6000 years ago, the seas reached their current level, and the island groups were completely cut off from the mainland and each other.

Landforms

The Abrolhos Islands comprise three groups of numerous small, low-lying islands, mostly less than 4.5m above sea level (apart from East and West Wallabi Islands which are up to 15.2m). From north to south, these are the Wallabi Group (including North Island), the Easter Group and the Pelsaert Group. The islands rise from three carbonate submarine platforms, 36.5m deep and separated from the mainland by the 45-51m deep Geelvink Channel (Playford et al. 1971). The carbonate platforms are also separated from each other by deep channels; the Middle and Zeewijk channels (see Map 1).

The Abrolhos Islands are the most southern, well-developed coral reefs in the Indian Ocean. Each island group varies in its geomorphology but generally each platform is fringed by extensive coral-algal reefs on the southern, western and eastern sides (windward and leeward reefs), by broken reefs to the north and with a lagoon in the centre.

East Wallabi Island is one of the aeolianite islands in the park. Photo – Michael Raykos/DBCA

There are five types of islands based on their geomorphology:

1. Aeolianite islands are the largest, oldest and most biodiverse, comprising a core of reef limestone and a broad flat surface 2–3m in height (representative of the mainland before isolation) and covered by extensive sand dunes (for example, East and West Wallabi islands).
2. High rock islands are up to one kilometre across, flat topped and rocky, sparsely vegetated and a few metres in elevation, representing small remnants of the ancient mainland, but without the sand dunes or size of the aeoleonite islands. Coasts are dominated by a well-developed intertidal notch cut into 2–4m cliffs (for example, Rat, Gun, and Middle islands).
3. Cemented coral shingle or sand cays are flat-topped, have an undercut shape, are usually 2–10m wide and 1–1.5m above sea level. Coral shingles and shell fragments are cemented by coralline algae and marine cements (for example, First Sister and Gibson islands).
4. Low coral-shingle or sand cays are oval to elongated islands, 1–2m in elevation, with coral shingle forming parallel ridges and associated carbonate sands that form narrow beaches (2–3m wide). These islands are the most recently formed in the archipelago (for example, Disappearing Island and White Bank).
5. Composite islands are combinations of three island types. They are long and narrow, have a core of emergent coral reef and cemented and overlapping coral rubble covered by elongated coral shingle ridges of 1–4m (for example, Pelsaert, Long, Keru and Suomi islands). (France, 1985).

The wind, currents, and tides have a considerable impact on the size, shape and landforms of the islands and most have a north-south alignment because of tidal currents.

White Bank is one of the low sand cay islands in the park. Photo – Clare Atkins/DBCA

Soils

Soils of the park are comprised of limestone and reef fragments of varying size. These include:

- Shingle deposits originating from pieces of coral that break off reefs in the vicinity of surf zones and are thrown onto tidal platforms by waves and currents. The coral material is then broken up and distributed along the coast of islands, forming beach ridges.
- Coquina and shell sand deposits that are typical on larger islands that face away from the open ocean (for example, the west coast of Pelsaert Island and east and south coasts West Wallabi Island). These range from pure shell beds to sands comprised of finely ground fragments of shells.
- Guano and rock phosphate soils. The main deposits are on Pelsaert, Rat and West Wallabi islands, but many smaller islands also had guano. These accumulated in depressions, such as old lagoons or valleys.
- Sand, which is uncommon and only found on the sandy beaches and dunes of North, East Wallabi and West Wallabi islands. Dune sands are comprised of calcium carbonate (Teichert, 1946).

Other sediments and fragments of materials are found in island soils. These include coarse rudites in gravel ridges (comprised of mainly coral, but also shells), shelly sands (found on the low cays and are heavily burrowed by birds, which adds phosphate content) and soil-like sediments associated with guano and phosphate formation (France, 1985).

Managing impacts to geology, landforms, and soils

There are a range of known impacts to the soils and geological features of the park. Sandy beaches and dunes are vulnerable to erosion particularly if the surface vegetation is removed. This can result from storm surge, bushfire, trampling by visitors or tammar wallaby overgrazing (which has occurred on North Island, see *Native animals of conservation significance*). Visitor activity can also impact on coral shingle. The collection of rock and other material for building construction has occurred and shell grit has been excavated from Long Island for use in cement production.

The geomorphology and landforms of many islands in the park have been altered by historical activities associated with the fishing industry, petroleum exploration and guano mining and natural disturbance

associated with weather events and burrowing seabird activity. The rehabilitation of this disturbance is not possible.

Future soil disturbance is likely during excavations associated with the construction of visitor facilities, jetties, the operations base and other infrastructure. The department uses its Disturbance Approval System to assess impacts on the natural values and the environment of all disturbance activities on department-managed lands by DBCA and/or external proponents.

Hydrology

Despite most islands being less than 10 hectares in size, there are several important hydrological features in the park. More than 50 tidal ponds and lagoons are found on various islands. These range from small depressions in the shoreline beyond high water mark, to ponds up to 100m in length. They can be highly diverse with distinctive invertebrate fauna and therefore are of ecological significance (Black and Johnson, 1997). The tidal ponds also provide important habitat for significant fauna and are used by sea lions for pupping.

Some tidal ponds also support mangrove communities, which in turn support a large variety of algae, plankton, molluscs, crustaceans, and fish. This also attracts some species of seabirds, which use the mangroves for breeding (Harvey et al. 2001).

Freshwater seeps and sinkholes are found on East Wallabi, West Wallabi, Rat, Middle and Murray islands, where rainwater drains into small shallow limestone caverns. Freshwater in these limestone sinkholes were used by *Batavia* shipwreck survivors on East and West Wallabi islands and *Zeewijk* shipwreck survivors on Middle and Murray islands (see *Maritime cultural heritage*).

Tidal ponds have been impacted by inappropriate human and management activities. For example, diesel fuel has been used to control mosquitoes in the tidal pond on North Island. Climate change and associated sea level rise may affect these ponds in the long term, by inundating them with sea water.

Management objective: To protect and conserve geological features, landforms, soils, and hydrology.

Management strategies

1. Assess the potential for impact on the geological and hydrological values from development and human activities (including management), take action to mitigate or minimize these (or assess the impacts) and refer to the Environmental Protection Authority (EPA) where appropriate.

7. Biological environment

The biogeography and the resulting biodiversity of islands in the park are strongly influenced by their geological history. Sea level rise and the separation of the Abrolhos Islands from the mainland enabled remaining and new colonising species to evolve in isolation, resulting in the evolution of a unique and, in parts, endemic suite of flora and fauna. The oldest islands (for example, East Wallabi, West Wallabi and North islands) are the most complex and biologically diverse. They support the greatest variety of plant species and both coastal and mainland vegetation communities. These provide habitat for the greatest diversity of reptiles, terrestrial birds, as well as the Abrolhos Islands' only two mammals: the tammar wallaby and bush rat (*Rattus fuscipes*), which would have been present when the islands were still connected to the mainland. The younger coral shingle and sand cays (for example, Travia and Gaze islands) have much less vegetation diversity, with some not supporting any plant life. The animal diversity of these islands is also much lower.

Vegetation and ecological communities

The park is in the Geraldton Hills Interim Biogeographic Rationalisation for Australia (IBRA)[6] subregion of the Geraldton Sandplains Bioregion.

Harvey et al. (2001) identified several communities of conservation significance in the park. These are:

- Mangrove communities (*Avicennia marina*) which are found on 33 islands. These are highly productive, supporting other species such as algae, molluscs and crustaceans and provide breeding habitat for fish, birds, and sea lions. The intense biological and chemical activities involving various components of the ecosystem also causes them to act as sinks, concentrating pollutants.
- *Atriplex cinerea* dwarf shrubland, which are found throughout the park on islands with sandy shell grit soils (for example, West Wallabi and Pelsaert islands). Where soils are deep enough, this community is suitable for burrowing seabirds.
- Flora rich pavement limestone, dunes, and consolidated dunes on North, East and West Wallabi islands. These are easily eroded after disturbance and regenerate slowly due to their unstable nature and exposure to strong, prevailing winds.
- *Eucalyptus oraria* on East Wallabi Island, which are the only stand of eucalypt on the Abrolhos Islands and one of only two eucalypt species found on Western Australian islands south of Dirk Hartog Island and west of Albany, making this a unique disjunct population.
- Salt lake and saltbush flats on islands such as North and West Wallabi islands, which are not common elsewhere on the Abrolhos Islands. There is a large patch of old *Tecticornia halocnemoides* subsp. *tenuis* on Leo Island, a taxon that is not found anywhere else in the Houtman Abrolhos.

Mangroves provide essential habitat for seabird nesting and sea lion pupping in the park. Conservation of these areas has been identified as a priority in this management plan. Photo – Clare Atkins/DBCA

[6] IBRA provides a national and regional planning framework for the systematic development of a comprehensive, adequate, and representative 'CAR' National Reserve System. This divides Western Australia into 26 biogeographic regions and smaller subregions, based on dominant landscape characteristics of climate, lithology, geology, landform, and vegetation (CALM 2003)

Subtropical and temperate coastal saltmarsh is a threatened ecological community (TEC) protected under the Commonwealth EPBC Act and listed as 'vulnerable'. This community is found across six States in Australia. Keighery (2013) identified the distribution of coastal saltmarsh in Western Australia, referring to the mangroves and saltmarshes that occur around lagoons in the park. However, he noted that the inclusion of the island lagoonal marshes in Western Australia in this TEC is unclear. Recent survey work has identified and mapped the extent of this tidal-influenced community on North Island, but further mapping and assessment of the extent and condition of the saltmarsh community in the remainder of the park is required.

Harvey et al. (2001) identified several impacts to the flora and vegetation of the Abrolhos Islands, mainly being associated with disturbance, predominantly human activities. These include the effects of weed infestation (see *Biosecurity – Weeds*), clearing, landfill, trampling in areas used by visitors (see *Managing the visitor use and community values*) and grazing by tammar wallabies (see *Native animals and habitats*).

Plants

There are 190 native plant species, representing 64 families, that have been recorded in the park. The dominant plant families (the most species rich) are Asteraceae (daisies– 20 species), Chenopodiaceae (salt bush – 30 species) and Poaceae (grasses – 16 species) (Department of Biodiversity, Conservation and Attractions 2019, Harvey et al. 2001). East and West Wallabi islands have the greatest diversity of flora with 124 and 97 plant species recorded, respectively, reflecting the larger size of these islands.

Plants of conservation significance

Of the native plant species of conservation significance in the park, there are five priority[7] flora species, including one 'priority 2' species (*Chthonocephalus tomentellus*), three 'priority 3' species (*Balladonia aervoides*, *Spergularia nesophila*, and *Bossiaea calcicola*) and one 'priority 4' species (*Lepidium puberulum*).

Dwarf stands of *Eucalyptus oraria* on East Wallabi Island are of conservation significance being the only eucalypt community in the park. Photo – Clare Atkins/DBCA

Native animals and habitats

To date, 177 species of native animals have been recorded in the park, including three mammals, 27 reptiles, 123 birds and 26 invertebrates, although it is likely this is an underrepresentation of species diversity, especially in relation to invertebrates. Surveys of native fauna in the park, especially seabirds, have been extensive.

[7] Priority species are possibly threatened species that do not meet survey criteria or are otherwise data deficient (Department of Biodiversity, Conservation and Attractions 2019).

Native animals of conservation significance

Native animals of conservation significance recorded in the park include:

- 20 species listed as 'threatened'[8] under the Biodiversity Conservation Act:
  - four critically endangered bird species – curlew sandpiper (*Calidris ferruginea*), great knot (*Calidris tenuirostris*), eastern curlew (*Numenius madagascariensis*) and bar-tailed godwit (*Limosa lapponica menzbieri*)
  - seven endangered bird species – red knot (*Calidris canutus*), greater sand plover (*Charadrius leschenaultii leschenaultia*), lesser sand plover (*Charadrius mongolus*), Australian lesser noddy (*Anous tenuirostris melanops*), Abrolhos painted button-quail, Indian lesser nosed albatross (*Thalassarche carteri*) and wedge-tailed shearwater (*Ardenna pacifica*) and
  - nine vulnerable species – Australian sea lion (*Neophoca cinerea*), Houtman Abrolhos Island dwarf bearded dragon (*Pogona minor minima*), fairy tern (*Sternula nereis*), greater sand plover (*Charadrius leschenaultia*), grey-headed albatross (*Thalassarche chrysostoma*), flesh-footed shearwater (*Ardenna carneipes*), white-chinned petrel (*Procellaria aequinoctialis*), Atlantic yellow-nosed albatross (*Thalassarche chlororhynchos*), wandering albatross (*Diomedea exulans*) and shy albatross (*Thalassarche cauta*).
- 31 bird species listed as 'migratory' under the Biodiversity Conservation Act, with many of these listed under the China–Australia Migratory Bird Agreement, Japan–Australia Migratory Bird Agreement and the Republic of Korea–Australia Migratory Bird Agreement.
- 15 species listed as 'threatened' under the EPBC Act (four critically endangered, five endangered and six vulnerable).
- 44 bird species listed as 'migratory' under the EPBC Act and
- six 'priority 4' species.

Lesser noddy (*Anous tenuirostris melanops*) on its nest amongst the mangroves. Photo – Rory Chapple/DBCA

There are two national recovery plans that apply to the management of threatened fauna in the park. These include recovery plans for the Australian sea lion (Commonwealth of Australia 2013) and for 10 species of seabirds, including the Australian lesser noddy (Australian Government 2005). At the time of writing, a national recovery plan for the Australian fairy tern is in preparation (Commonwealth of Australia 2019a). There are interim recovery plans for the Abrolhos painted button-quail (Department of Biodiversity, Conservation and Attractions 2018a) and for eight species of threatened migratory shorebirds that visit Western Australia, seven of which visit the park (Department of Biodiversity, Conservation and Attractions 2018b).

The park provides important habitat for the conservation-significant Australian sea lion, Abrolhos painted button-quail, and a large variety of seabirds and migratory and resident shorebirds. The

[8] Threatened fauna are species which have been adequately searched for and are deemed to be, in the wild, threatened and have been gazetted as such. Threatened species are listed by order of the Minister in the category of critically endangered, endangered, or vulnerable under section 19 (1) or is a rediscovered species to be regarded as threatened under section 26(2) of the Biodiversity Conservation Act.

protection of these species is a particular focus of this plan and further background and impacts are outlined below.

Australian sea lion

The Abrolhos Islands represent the most northern location in the distribution of Australian sea lion and are used by the species for haulout and breeding. Sea lions breed every 17-18 months and pupping season lasts for 4-6 months, so the timing of pupping seasons varies from year to year. Sea lions use all three island groups for haulout, with significant activity occurring on East Wallabi, West Wallabi, Long, Beacon, Seal, Little Sandy, Rat, Wooded, Morley, Gun, Middle, and Pelsaert islands. Sea lion breeding appears to be restricted to the Easter and Pelsaert island groups, with pups recorded on Gilbert, Alexander, Serventy, Campbell, Helm, White, Stokes, Suomi, Stick, and Square islands (Campbell 2005).

The sea lion population at the Abrolhos Islands has declined significantly in the last 400 years, with historical numbers estimated at 300-580, compared with only 76-96 individuals recorded since 1950. Campbell (2005) attributed this decline to shipwreck survivors living on seal meat, commercial sealing activity and culling by whaling crews between the seventeenth and twentieth centuries, the decline of mangroves, which are used by mothers and seal pups for protection from sun and rises in sea water temperatures forcing sea lions further south. Observations by western rock lobster fishers and ongoing survey work suggest that the sea lion population has been low but stable since the 1950s. Sea lions return to the same site every year, so recruitment from outside of the Abrolhos is almost non-existent. The department conducts irregular sea lion surveys by counting pup numbers during pupping seasons.

Sea lions are vulnerable to human disturbance. Visitor activities at the Abrolhos (both in the park and in the water) have the potential to disturb sea lions and individuals may display signs of fright or aggression when people approach them too closely. Human disturbance during the pupping season can be particularly detrimental when fleeing mothers result in reduced pup suckling times, pups being trampled, or mothers relocating to suboptimal habitat. These impacts can contribute towards reduced pup growth rates in a species where population recovery is slow because of low fecundity (Department of Sustainability, Environment, Water, Population and Communities 2013). To manage these impacts, visitor access to islands where sea lion breeding occurs will be restricted during pupping seasons (see *Visitor access – Special access*).

Other possible impacts to the sea lion population in the park include disease, prey depletion, competition, habitat degradation, and the inundation of low-lying islands (used for haulout and breeding) due to sea-level rise. Oil spills and entanglement in equipment and waste from the fishing industry have been identified as marine threats to sea lions across their Australian distribution.

Abrolhos painted button-quail

The painted button-quail is a small, ground-dwelling bird, with two subspecies. The mainland subspecies (*Turnix varius varius*) is widespread but uncommon along the coast of eastern Australia, southern South Australia, and south-west WA, including the Midwest Region. The Abrolhos painted button-quail is found only on East Wallabi, West Wallabi and North islands (although numbers on North Island are very low or presumed extinct), inhabiting all available habitats except for bare limestone. During recent surveys, the painted button-quail has also been recorded on Seagull Island. The Abrolhos painted button-quail scratches for seeds and insects on the ground. While feeding, they create distinctive circular depressions in the soil or leaf litter which are known as “platelets”. These platelets have also been recorded on Oystercatcher, Seagull and Turnstone islands, although it is unlikely that these smaller islands support viable populations. The Abrolhos painted button-quail is one of the most imperilled birds in Australia, with probable extinction in the next 20 years unless

adequate measures are introduced to protect this species (Department of Biodiversity, Conservation and Attractions, 2018a).

Habitat degradation is a key threat to the Abrolhos painted button-quail, with populations susceptible to rapid decline or local extinction without access to suitable habitat. On North Island, it is likely that the population of button-quail is locally extinct as a result of habitat destruction following the introduction of the tammar wallaby. In Western Australia, the tammar wallaby is a priority species, known from six mainland locations and five islands in Western Australia (Bamford and Browne-Cooper 2015). Within the park, the tammar wallaby occurs naturally on East and West Wallabi islands and was thought to be originally introduced to North Island in the 1920s. Prior to this, the tammar wallaby had not been recorded on North Island (Stokes 1846 in Storr 1960). The individuals introduced to North Island in the 1920s subsequently died out, but more were introduced from East Wallabi Island in 1985 (Chant 2005). Genetic work has found that the North Island population is more closely related to that of West Wallabi Island, suggesting that the introduction of tammar wallaby from East Wallabi Island was unsuccessful and a subsequent, undocumented but more successful introduction from West Wallabi Island occurred (Miller et al. 2011).

The North Island population increased to over 450 in the early 2000s and vegetation surveys showed a significant impact on the vegetation of the island from overgrazing, ringbarking, and trampling, resulting in reduced cover, reduced plant recruitment and spread of sand drifts. Trials of various control methods (fertility control, shooting and translocating tammar wallabies off North Island) between 2005 and 2008, reduced the population to 50-70 animals. These trials stopped in 2008 and the population increased to about 1000 animals by 2012. No button-quail were found on North Island during surveys in 2013 and 2017, leading to the suggestion they may be locally extinct. A control program was reinstated in 2018 and regular control since then has reduced tammar wallaby numbers dramatically. This control will continue until the tammar wallaby is eradicated from North Island. Once this has occurred, the reintroduction of button-quails to North Island will be considered.

The tammar wallaby (*Notamacropus eugenii derbianus*) is one of only two mammal species in the park, occurring naturally on East and West Wallabi islands. Photo - Anthony Desmond/DBCA

Numbers of tammar wallaby on West Wallabi Island are not monitored but the population is thought to be increasing around the fishing camps on the western side of the island. Button-quail are also sensitive to changes to habitat, resulting from impacts of visitation. An area on North Island was fenced to measure the impacts of grazing, by tammar wallaby, on vegetation and button-quail habitat. This monitoring will be continued to measure changes in the extent and condition of button-quail habitat, that may result from the impacts of visitation as well as tammar wallaby grazing.

Other impacts on button-quail populations in the park are from pest animals, especially rodents. Currently, only the house mouse is present on several islands, including North Island (see *Biosecurity – Pest animals*). The house mouse competes with button-quail for food. The park is now free from black rats but an accidental introduction to East or West Wallabi islands would have severe impacts on the button-quail population through both predation and competition for food. The spread of weeds on these islands also modifies and degrades vegetation quality. A major bushfire could also result in significant population declines or local

extinction if all or most of the island is burnt (see *Fire*). Similarly, sea level rise associated with climate change may result in the loss of button-quail habitat.

Other conservation significant birds

The Abrolhos Islands support a diverse range of bird species that inhabit the full suite of island habitats. These include seabirds[9], shorebirds[10], waterbirds[11], raptors[12] and terrestrial birds. Monitoring and research on birds at the Abrolhos Islands has been extensive, particularly in relation to seabirds. Prior to 1991, seabird surveys were more general and based on short field visits to the Abrolhos Islands. Since then, more thorough population surveys were completed by Burbidge and Fuller (1989), Johnstone (1991a and 1991b), Fuller et al. (1994) and Burbidge and Fuller (2004). Long term seabird research, with a focus on seabird breeding and population ecology has been carried out since 1991 (Surman, 1992, 1994, 1997, 1998, Surman and Wooller 1995, 2000, 2003, Gaughan et al. 2002, Surman and Nicholson 2007, 2008, 2009a, 2009b, 2015, 2016a, 2016b, 2016c, and Surman et al. 2016).

The Abrolhos Islands are an important seabird breeding location in Australia and globally (Surman and Nicholson 2009b). The park supports some of the largest populations and greatest species richness of seabirds off the coast of Western Australia (Dunlop et al. 2004). The islands are shared by sub-tropical (cool water) and tropical species, and littoral and oceanic foragers (Storr et al. 1986, Dunlop and Wooller 1990). The location of the Abrolhos Islands on the edge of the continental shelf, in a transition zone between tropical and temperate marine environments, together with the influence of the Leeuwin current, has resulted in a large diversity of fish, coral and algae. In turn, this supports the rich diversity of seabirds that nest and breed in the park. All Australian lesser noddies, 80 percent of brown noddies and 40 percent of sooty terns found in Australia nest in the park. One of the largest breeding colonies of wedge-tailed shearwaters, the highest numbers of white-breasted sea eagles and ospreys in the eastern Indian Ocean, and the most northern breeding colonies of little shearwater and white-faced storm petrel in the Indian Ocean are also supported (Surman and Nicholson 2009b).

The Australian subspecies of the lesser noddy is restricted to the Abrolhos Islands and only nests in mangroves within the park on Morley, Wooded and Pelsaert islands. The Pacific gull has disjunct populations across Australia and the Abrolhos Islands are home to the west coast sub-population. Populations in south-eastern Australia have been impacted by invasion of kelp gull and are vulnerable to human disturbance while breeding, making the Abrolhos sub-population important. Large populations of roseate terns (a species that is threatened, globally) breed in the park during the autumn and spring. West Wallabi Island also supports an unusually large population of white-bellied sea eagle, mostly likely a result of the year-round availability of prey, such as tammar wallabies and shearwaters (Dunlop et al. 2004).

Surman and Nicholson (2007 and 2009) surveyed 192 of the Abrolhos Islands (within the park and Reserve 20253) and recorded seabirds breeding on 148 of these. From these data, important seabird breeding islands, based on the number of species of breeding seabirds and the total number of individuals, include Pelsaert, Gun, Murray and Middle islands in the Pelsaert Group and Morley,

[9] Seabirds are associated with the sea, derive most of their food from it and mostly breed in colonies (Surman and Nicholson 2009). At the Abrolhos Islands, some are resident, and some are migratory. These include noddies, shearwaters, gulls, petrels, albatrosses, penguins, fulmars, terns, gannets, prions, tropicbirds, skuas and boobies.

[10] Shorebirds, also known as waders, are mostly associated with wetland and coastal habitats where they wade and feed in the shallow waters (Department of Biodiversity, Conservation and Attractions 2017). At the Abrolhos Islands, some are resident, and some are migratory. These include sandpipers, turnstones, sanderlings, knots, stints, plovers, stilts, pranticoles, oystercatchers, godwits, curlews, whimbrels, avocets, tattlers, greenshanks, lapings and egrets.

[11] Waterbirds are difficult to define, mainly due to the large diversity of Australian birds associated with water bodies. Generally, waterbirds are those that depend on waterways, wetlands, and shorelines (so there is some overlap with shorebirds). However, not all shorebirds are waterbirds.

[12] Raptors are birds which capture their prey with curved talons (Surman and Nicholson 2009b)

Wooded, Leo, Suomi, Bynoe, Campbell and Little North islands in the Easter Group. West Wallabi and Dick islands in the Wallabi Group are also important for seabird breeding. Seabird species such as lesser noddies, brown noddies and wedge-tailed shearwaters return to the same nesting location each year, whereas some ground-nesting seabird species (such as roseate and crested terns) have transient nest locations and the relative importance of breeding locations can change over time. Therefore, important nesting sites in the park may vary over the life of the plan.

The islands of the park are also important for migratory birds, with 31 and 44 species listed under the Biodiversity Conservation Act and the EPBC Act respectively recorded here. Migratory shorebirds travel up to 13000km from their breeding grounds in the northern hemisphere to the Abrolhos Islands during their non-breeding seasons. Surman and Nicholson (2009b) noted 16 species of migratory waders, found along shorelines, on tidal flats and on tidal ponds of many islands. Large flocks were recorded on the eastern shore of West Wallabi Island, the sandy beaches of East and West Wallabi islands and on Pelsaert Island. The critically endangered curlew sandpiper, great knot, eastern curlew, and bar-tailed godwit all visit the park in varying numbers to rest and feed between August and April. Important habitats include salt lakes and tidal ponds, beaches, and tidal flats. These species are also vulnerable to human activities, which can interrupt their feeding and/or roosting. Using their energy reserves to avoid disturbance can impact on their capacity to migrate (Department of Biodiversity, Conservation and Attractions 2018b).

A shearwater fledgling entering a nesting burrow. The park hosts the largest breeding colonies of wedge-tailed and little shearwaters in the eastern Indian Ocean. *Inset* – wedge-tailed shearwater (*Ardenna pacifica*) fledgling. Photos – Anthony Desmond/DBCA

The Abrolhos Islands have been identified as a Key Biodiversity Area[13] (KBAs) (Reaney and Maurer 2018).

Dunlop et al. (2004) prepared the Abrolhos Seabird Management Strategy and identified a range of existing and potential issues impacting on seabird populations at the Abrolhos Islands. The most significant of these were:

- Introduced predators, namely black rats, and feral cats, which have the greatest impact to small body-weight birds. Rats were recorded on Rat Island by John Stokes in 1846, most likely introduced by crew from a visiting ship or shipwreck survivors prior to that. By the end of 1930s, because of the impacts from rats, cats and guano mining, 1.5 million terns and all other seabirds disappeared from Rat Island and did not re-establish on other islands (see *Biosecurity – Pest animals*).
- Visitor impacts. Visitors to islands can trample seabird nests and burrows and impact on reproduction by disturbing roosting birds, resulting in the abandonment of eggs and fledglings. Lights from boats, campers and campfires can cause disorientation in seabirds that are active at night. Buildings, communications towers (which birds can fly into at night) and aircraft take-offs and landings also impact on bird populations at the Abrolhos Islands. Infrastructure also provides perching opportunities for raptors and barn owls, leading to potential increases in predation.
- Increaser species. Some seabirds increase in abundance in response to food supplementation. At the Abrolhos Islands, this is mainly silver gulls on inhabited islands, where they feed on organic waste. Silver gulls predate on other seabirds (especially eggs) if numbers are too high. Pied cormorants nest on woody vegetation and the subsequent, heavy guano deposition has a toxic effect, causing other seabirds to abandon habitat. Increasing pied cormorant numbers, especially in the mangroves on Wooded Island, reduces the amount of nesting habitat available for the lesser noddy.
- Habitat degradation resulting from the modification of seabird habitat by guano mining, grazing by introduced tammar wallabies on North Island, impacts from weeds (changes to vegetation structure) and changes to mangroves from drought, storms and impacts from pied cormorants and lesser noddies themselves.
- Climate change. Reduced breeding and increased reproductive failure of tropical pelagic seabirds has occurred at the Abrolhos Islands during strong El Niño – Southern Oscillation (ENSO) events. Species impacted include wedge-tailed shearwaters, sooty terns, brown noddies, lesser noddies, roseate terns, and little shearwaters. Sea level rise will impact mangrove communities in the future.
- Marine pollution (contaminants and plastics). Marine pollution is increasing world-wide, especially microplastics, which is ingested by seabirds. Seabirds at the Abrolhos have been found to use marine debris as nesting material (C Surman 2020 pers. comm. 26 October 2020). Commercial vessels pass close by on their way to the Port of Geraldton, therefore, a potential major oil spill poses a small risk (see *Waste disposal, contamination, and pollution*).

Management objective: Identify and conserve native flora, fauna, and ecological communities including populations of threatened and conservation significant species.

Management strategies

1. Conserve species and communities of conservation significance, consistent with priorities established by recovery plans.

[13] Key Biodiversity Areas (KBAs) are sites contributing significantly to the global persistence of biodiversity. The KBAs Program is an international, non-governmental conservation partnership which designates sites of global importance for bird and biodiversity conservation, based on strict scientific criteria. The new Global Standard for the Identification of KBAs was launched in September 2016 and the KBAs program is the successor and extension of BirdLife International's Important Bird Areas (IBAs) program, expanding to encompass all wildlife, plants, and ecosystems.

2. Identify knowledge gaps relating to flora, fauna, ecological communities, and habitats and encourage research to support evidence-based decision making.
3. Improve community and visitor education and understanding of important natural values (sea lions, seabirds, button-quail).
4. Build capacity to respond to emergencies.

Australian sea lions

5. Continue to implement a monitoring program for sea lion breeding success in the park.

Abrolhos painted button-quail

6. Implement and review the *Abrolhos Painted Button-Quail (*Turnix varius varius*) Interim Recovery Plan* (DBCA, 2018).
7. Eradicate the introduced tammar wallaby population on North Island.
8. Monitor the condition and extent of vegetation on islands where Abrolhos painted button-quail is or was present.

Other conservation significant birds

9. Monitor seabird populations, with a focus on islands where visitor access and facilities are provided.
10. Monitor populations of silver gulls and implement control measures if numbers are impacting on seabird breeding success.

Key performance indicator

Performance measure	Target	Reporting
Extent of area covered by mangroves.	The area covered by mangroves does not decline over the life of the plan.	Every 5 years
Changes in quality and extent of vegetation by visitor activities.	No decrease in the extent or quality of vegetation cover at selected camping/day use areas over the life of the plan.	Annually
Knowledge of temperate coastal saltmarsh TEC is adequate to guide management.	TEC boundaries and condition are mapped, and major threats identified.	End 2024
Australian sea lion breeding success.	Australian sea lion pup counts during breeding seasons do not decline over the life of the plan.	Every 5 years.
Persistence of the Abrolhos painted button-quail and East and West Wallabi Islands.	The population size of Abrolhos painted button-quail on East and West Wallabi Islands increases over the life of the plan.	Every 5 years.
Eradication of the tammar wallaby from North Island.	All tammar wallabies are eradicated from North Island.	End 2022.
Disturbance to burrowing seabird habitat by visitor activities.	Number (percentage) of collapsed burrows recorded during burrowing seabird breeding seasons on islands used by visitors (West Wallabi, Beacon, Leo, Morley, Wooded, Gun, Pelsaert Islands) does not increase over the life of the plan.	Annually
Disturbance to ground-nesting seabird nests, eggs,	Number (percentage) of damage to ground-nesting seabird nests, eggs, or fledglings recorded during seabird breeding seasons on islands used by visitors	Annually

or fledglings by visitor activities.	(West Wallabi, Beacon, Leo, Morley, Wooded, Gun, Pelsaert Islands) does not increase over the life of the plan.	
Seabird nesting success.	Reduction in the breeding success of key seabird species is not beyond the limits of acceptable change over the life of the plan.	Annually

8. Biosecurity

Biosecurity describes actions taken to mitigate the risks and impacts to the economy, the environment, social amenity and human health from pests and diseases (COAG 2012). The introduction of weeds and non-indigenous fauna to islands world-wide has had a greater impact on island biodiversity than any other threatening process. There are many examples, and it remains one of the strongest drivers for flora and fauna extinction (Nias et al. 2010). Adverse impacts on ecosystems include species competition and predation, and modification of the structure, function, and composition of ecosystems. Weeds and pest animals are difficult and expensive to manage once established because they reproduce quickly, spread rapidly, and may be impossible to eradicate. Even with regular monitoring, weeds and pest animals may remain undetected until the populations become significant. Island populations of native flora and fauna can be more vulnerable to local extinction, especially where islands are small, resulting in restricted habitats and low genetic diversity, making them more vulnerable to the impacts of weeds and pest animals.

A range of weeds and pest animals have been introduced to the park and their threats to island biodiversity are significant. Pest species can be introduced to islands by boats and aircraft containing contaminated material (clothing, luggage, other goods, building and construction materials, vehicles, and machinery), debris floating onto islands, birds, and wind. Pest animals can fly, swim or drift onto islands. The movement of people and materials to and between the islands poses the highest risk of weeds and pest animals being introduced. The key pathways for the introduction of weeds and pest animals to the park are via boat and aircraft access on islands with jetties and airstrips. Surveillance and eradication efforts within the park will be focussed on islands with this infrastructure (North, East and West Wallabi, Beacon and Rat islands). Biosecurity management will also focus on important islands for visitor access, where there is a higher risk of weed and pest animal introductions from boat access (West Wallabi, Long, Wooded, Morley, Leo, Pelsaert and Gun islands). Increased visitation brings the increased risk of visitors bringing pets to the islands or inadvertently introducing pest animals. Public education will be important in ensuring boat users understand the significant natural values, the risks associated with the introduction of weeds and pest animals, and a code of conduct for maintaining quarantine standards.

Biosecurity management on Western Australian islands should comprise appropriate quarantine conditions, surveillance for new infestations of weeds and pest fauna, and work towards eradicating these (Conservation Commission 2009). Surveillance is of considerable importance in detecting the establishment of new infestations. The biological cost of infestation rises as the duration of infestation increases. Preventing the introduction of pest species on islands is by far more economical, and success more likely, than eradication once they establish. Protecting the Abrolhos Islands from biosecurity risks is the responsibility of all land managers, users and visitors to the park and to the neighbouring Reserve 20253 and all will need to work collaboratively to ensure the islands remain pest-free. All staff and researchers from within and outside the department will be encouraged to conduct opportunistic assessments of populations of weeds and pest animals while visiting islands for other work.

In collaboration with DPIRD and other key stakeholders, a biosecurity plan will be prepared for Abrolhos Islands that:

- Provides a risk assessment for the potential pathways for weeds and pest animals to be introduced to and spread within the park and the adjacent Reserve 20253 and outlines a program to reduce these risks.
- Outlines good biosecurity management, to prevent the introduction of new weeds and pest animals with the potential to impact on natural values.
- Includes hygiene protocols for island activities to limit the introduction and spread of weeds and pest animals.
- Includes strategies for surveillance to detect new weed and pest animal incursions and the management responses to these.
- Allows for adaptive management.

Weeds

Environmental weeds are plants that invade natural ecosystems and negatively affect the survival of native flora and fauna. Other adverse environmental impacts from weeds include the reduction of biodiversity, competition with native species for space, light, nutrients and water, disruption of ecosystem processes, changes to and loss of fauna habitat and resources, alteration of fire regimes, and loss of landscape and scenic values.

Weeds pose a significant threat to islands across Australia, including the Abrolhos Islands. Currently, 110 weed species have been recorded on the Abrolhos Islands and most were introduced by the guano mining and fishing industries. The disturbance associated with these activities promoted the introduction and spread of weeds across the archipelago. Weeds were first introduced when guano mining commenced and chaff was brought to feed horses used in the guano industry, spreading seeds on islands where they were used. Helms (1902) reported the establishment of *Sonchus oleraceus*, *Spergula arvensis* and *Chenopodium murale*. Clearing of native vegetation during the guano mining process also allowed the establishment of more robust weed species that outcompeted native species.

More weeds were introduced to the Abrolhos Islands when camps were constructed by rock lobster fishers in the late 1950s and 1960s. Weeds were introduced to inhabited islands as garden plants and the number of weed species is higher on inhabited islands (Abbott 1980). Harvey et al. (2001) recorded 34, 29 and 26 weed species on Rat, Pigeon and North islands, respectively. On East Wallabi, West Wallabi and North islands 20-35% of the total plant species recorded are introduced. These mainly occur in disturbed areas.

There have been fewer instances of contemporary weed introductions. Most weeds in the park are winter annuals and new species have been introduced to islands from seed transported in cargo, on visitor's shoes, clothing or in luggage and gravel. Sticky fruits (for example from African boxthorn) can also get caught in bird's plumage and get distributed between different islands (Harvey et al. 2001).

The department manages weeds by focusing on reducing the impacts of existing priority weed populations on key natural, cultural, and visitor use values, whilst also preventing and eradicating new infestations in a cost-effective manner. A list of high-priority weeds within the park has been determined based on their impacts to island flora, fauna, and ecological communities, regional rankings within the *Midwest Region weed prioritisation database* (revised biennially) and the findings of Lohr and Keighery (2016) (see *Table 2*). Two weed species, Paterson's curse (*Echium plantagineum*) and common prickly pear (O*puntia stricta*) are declared pests under section 22(2) of the *Biosecurity*

Above - Ice plant (*Mesembryanthemum crystallinum*) is a highly invasive groundcover weed. Crimson carpets of ice plant can be found on many islands in the park including this patch on Pelsaert Island. *Inset* – Ice plant in flower. Photo – Isaac Hatch/DBCA.

and Agricultural Management Act 2007 (BAM Act)[14] and subject to management. African boxthorn (*Lycium ferocissimum*), common prickly pear and Athel pine (*Tamarix aphylla*) are Weeds of National Significance (WONS)[15] found in the park. Priorities for weed management may change during the life of this plan.

Several long-term weed control programs have been implemented at the Abrolhos Islands. Crown beard (*Verbesina encelioides*) is a key priority weed species and has been the target of ongoing control. It is highly invasive, competes aggressively with native vegetation and impacts on the presence of suitable nesting habitat for seabirds. Since 2001, the department and its predecessors have been removing crown beard from East Wallabi Island, where it was introduced in gravel brought to the island for airstrip maintenance. At the time of writing, crown beard is still found outside the park on Pigeon Island (within Reserve 20253). Crown beard has not been recorded recently on Rat, North and East Wallabi islands and regular monitoring will be essential to ensure this status is maintained (as seed can remain viable for up to 7 years).

[14] Weeds declared section 22 (2) of the BAM Act are subject to import, control and keeping requirements. Under the BAM Act, weeds subject to C3 management will have some form of management applied to alleviate their harmful impacts, reduce numbers or distribution, or prevent and contain its spread.

[15] Weeds of National Significance have been agreed by Australian Governments based on their invasiveness, potential for spread and environmental, social, and economic impacts and ability to be successfully managed.

Table 2. Priority weed species in the park

Common name	Species name	Ecological impact	Location	Comments	Proposed management
Mother of millions	*Bryophyllum delagoense*	High	Rat Island (also Pigeon Island).	Covers half of Rat Island and spreads easily due to disturbance from seabird burrowing and high nutrients associated with seabird guano. Not common elsewhere in WA.	Eradication.
Pig's ear	*Cotyledon orbiculata*	Unknown	Rat Island (also Pigeon Island).		Monitoring.
Ice plant	*Mesembryanthemum crystallinum*	High	Widespread within the park.	Highly invasive	Control and containment to prevent spread to other islands.
Patersons curse	*Echium plantagineum*	High	East Wallabi, Rat and North islands (also Pigeon Island).	Declared pest under section 22(2) of the BAM Act 2007. Highly invasive but control measures have prevented spread.	Monitoring (seeds can persist in seedbank for up to 6 years) and eradication.
Veldt grass	*Ehrharta brevifolia* var. *cuspidata*	Unknown	East Wallabi and Pelsaert islands.		Control and containment to prevent spread to other islands.
Perennial veldt grass	*Ehrharta calycina*	High	Unknown		Determine distribution and prioritisation for control.
Annual veldt grass	*Ehrharta longifolia*	Unknown	Various islands in Wallabi and Pelsaert Group.		Determine distribution and prioritisation for control.

Common name	Species name	Ecological impact	Location	Comments	Proposed management
Mexican fleabane	*Erigeron karvinskianus*	Unknown	Gun and Murray islands.		Control and containment to prevent spread to other islands.
Painted spurge	*Euphorbia cyathophora*	Low	Unknown		Determine distribution and prioritisation for control.
Geraldton carnation weed	*Euphorbia terracina*	High	Rat Island		Control and containment to prevent spread to other islands.
African boxthorn	*Lycium ferocissimum*	High	Arthur, Davis, Eight, Gun, Pelsaert, Seven, Sid Liddon, Sweet, Three and Wooded islands.	Vector of introduction unknown. A dangerous trap for wildlife, especially fledgling seabirds. An aggressive invader	Eradication.
Common prickly pear	*Opuntia stricta*	High	Rat Island (also Basile Island).	Declared pest species in WA and a Weed of National Significance.	Removal.
Timothy	*Phleum pratense*	Unknown	Gun Island		Control and containment to prevent spread to other islands.
Buckshorn plantain	*Plantago coronopus*	Unknown	Little Rat Island		Control and containment to prevent spread to other islands.

Common name	Species name	Ecological impact	Location	Comments	Proposed management
Dwarf jade plant	*Portulacaria afra*	Unknown	Rat Island	Escaped ornamental garden plant. Could become a serious weed if it spreads to other islands.	Control and containment to prevent spread to other islands.
Bushy starwort	*Symphyotrichum squamatum*	Unknown	Unknown		Control and containment to prevent spread to other islands. Seeds are wind distributed.
Sea spinach	*Tetragonia decumbens*	High	Various islands in the Easter Group.		Determine distribution and prioritisation for control.
Crown beard	*Verbesina encelioides*	High	East Wallabi (historically), and North islands (also Pigeon Island).	Highly invasive, allelopathic, competes aggressively with native vegetation and has the potential for the establishment of a monoculture if not controlled, reduces nesting ability of seabirds.	Eradication.

Pest animals

Pest animals can have significant impacts on natural ecosystems directly by predation, habitat destruction, competition for food and space, or indirectly through environmental degradation by selective grazing and spreading weeds and diseases.

Currently, the only pest animal species identified in the park is the house mouse (*Mus musculus*), predominantly found on North Island but anecdotally recorded on others such as Gun Island, the numbered islands and other islands in the Pelsaert Group. The house mouse can predate on seabird eggs and chicks when they are found to be the only introduced rodent (Department of Biodiversity, Conservation and Attractions 2018b). Further surveys are required to determine their distribution and impact. The house mouse is controlled on Rat Island, when there are populations outbreaks and this may need to be expanded to other islands, depending on its impacts.

Together with foxes and cats, the introduction of rats has had a dramatic impact on fauna on Australian islands. Black rats (*Rattus rattus*) have been linked to 54% of bird extinctions worldwide (King 1985) and have partially or wholly replaced the native rodents in numerous locations (Burbidge and Manly 2002, Harris 2009). Black rats have been implicated in local extinctions of island seabird populations as well as having detrimental impacts on invertebrate communities (Jones et al. 2008, Towns et al. 2009). Black rats have been known to indirectly affect island soil nitrogen levels, the rate of litter decomposition, and soil stability through their predation of island populations of burrowing birds. They have also affected the structure and composition of vegetation through selective predation of plant material, which in turn impacts upon the fauna that rely on the vegetation for food and shelter (Banks and Hughes 2012).

Black rats were recorded on Rat Island by Lieutenant John Lort Stokes on the HMS *Beagle* in April 1840, when he surveyed and named the island after its rat infestation. Rats were thought to be introduced by crew of a visiting sailing ship or shipwreck survivors (Dunlop et al. 2015). Guano mining on Rat Island created significant disturbance to seabird nesting habitat and saw the introduction of cats by miners. These three factors resulted in the demise of the most important seabird colony in the eastern Indian Ocean. However, the pest management efforts undertaken on Rat Island in the 1990s saw the removal of black rats and cats. Baiting eradicated rats from Rat Island and several others by 1991 and the last cat died in 2000. Following this, seabirds recolonised, together with land birds, reptiles, and invertebrates (Dunlop et al. 2015).

Historically, several other pest animals were also found in the park. Goats were pastured on East Wallabi Island (Storr 1960 and Storr et al. 1986) and rabbits were introduced to North Island, but both did not establish. Rabbits were also once detected on Wooded and Morley islands but no longer occur there.

The focus of pest animal management in the park will be on preventing the introduction of pest animals to the park, particularly rats and cats, mainly through the implementation of biosecurity measures and community education. In addition to the preparation of a biosecurity plan, planning for weed and pest animal control will be undertaken that:

- identifies weed and pest animal control priorities and methods for control
- outlines a monitoring program to map the location and extent of existing and new high priority weed and pest animal populations and
- allows for adaptive management.

Management objective: Minimise the impacts of weeds and pest animals on key values through prevention, eradication, containment, and control.

Management strategies

1. In collaboration with DPIRD, prepare and implement a biosecurity plan for the Abrolhos Islands (covering the park and Reserve 20253) that:
   - provides a risk assessment for the potential pathways for weeds and pest animals to be introduced to and spread within the park and Reserve 20253 and outlines a program to reduce these risks
   - outlines good biosecurity management, to prevent the introduction of new weeds and pest animals with the potential to impact on natural values
   - includes hygiene protocols for island activities to limit the introduction and spread of weeds and pest animals
   - includes strategies for surveillance to detect new weed and pest animal incursions and the management responses to these and
   - allows for adaptive management.

   and weed and pest animal control plans for the Abrolhos Islands (covering the park and Reserve 20253) that:
   - identifies weed and pest animal control priorities and methods for control (as per priorities outlined in Table 2 for weeds)
   - outlines a monitoring program to map the location and extent of existing and new high priority weed and pest animal populations and
   - allows for adaptive management.
2. Develop and implement biosecurity requirements for the fishing, aquaculture, tourism industries, and other operations on the Abrolhos Islands.
3. Develop and implement an education program for visitors, tourism operators and other park users about the importance of biosecurity for the protection of important natural and cultural heritage values and the risks associated with weed and pest animal introductions.

Key performance indicator

Performance measure	Target	Reporting
Biosecurity and weed and pest animal control plans.	The biosecurity and weed and pest animal control plans are developed and implemented.	Every 5 years
The presence of crown beard in the park, particularly on high value islands.	Islands in the park remain free of crown beard.	Annually
The presence of pest vertebrates on the Abrolhos Islands.	Islands of the Abrolhos (the park and Reserve 20253) that are pest-free, remain so over the life of the plan.	Annually

9. Fire

Most islands in the Abrolhos are small with sparse, salt tolerant vegetation that does not readily carry bushfire. In addition, with a history of low visitation rates, the risk of ignition is also low. Consequently, bushfires in the park have been rare. Knowledge about the fire ecology of island vegetation and communities is also limited.

Two bushfires were recorded in eastern dunes of North Island, one in October 1935 and one around 1945 (Storr 1960). Despite these fires occurring over seventy years ago, vegetation has been slow to

recover, resulting in dune blowouts. No prescribed burning has occurred. East Wallabi, West Wallabi and North islands are likely to be the most susceptible to fire, due to their larger area and more dense vegetation that is more likely to carry fire.

A bushfire on any island could see the entire island being burnt, resulting in the loss of vegetation cover and habitat for fauna (especially the Abrolhos painted button-quail). In the event of a bushfire occurring, it is unlikely that resources could be deployed from the mainland in time to effectively suppress it. Fire prevention is therefore the best tool available for managing the risk of bushfire in the park. Visitors and other island users will not be permitted to light fires and information will be provided highlighting the impacts of fire on the park values and to visitor safety. Campers will be encouraged to bring their own enclosed flame gas cookers (see *Visitor activities – camping*).

Management objective: Minimise the impacts of bushfire on life, property, and key values.

Management strategies

1. Prohibit visitors from lighting fires in the park.
2. Provide information to island visitors and users on the impact that fire can have on island values and visitor safety.
3. Monitor the effects of bushfires that do occur in the park.
4. Rehabilitate fire affected areas where necessary.

10. Waste disposal and pollution

Pollution and waste disposal in the park come from a variety of sources, some of which are outside the park boundaries and include:

- light pollution from vessels moored at islands and
- waste produced by the fishing and aquaculture industries, visitor activities and marine debris.

Light pollution can disorientate night migrating birds such as shearwaters, petrels, and albatrosses causing collisions, entrapment, stranding, grounding, and interfering with their navigation (being drawn off course from usual migration route). The birds' ability to successfully forage may also be impacted, which is critical for migratory species being able to replace energy reserves in preparation for migration or breeding. These behavioural responses may cause injury and/or death. Light emissions can result in young fledglings becoming disorientated where rookeries are located close to lights (Van Doren et al. 2017 and Commonwealth of Australia 2019b).

Marine debris washed ashore on Morley Island. Photo – Clare Atkins/DBCA

Visitors to the park sometimes leave behind rubbish and toilet waste (see *Visitor activities*), impacting on the aesthetic of camping and day-use sites. Low levels of waste from fishing and aquaculture industry activities can also end up in the waters surrounding the Abrolhos Islands and be washed ashore within the park. Marine debris from further afield, especially plastics such as plastic bottles, crates, buckets, packing

materials, plastic microbeads, fishing nets, cigarette butts, rope, food packaging, fishing gear and plastic bags can also make its way to the Abrolhos Islands. Seabirds and sea lions can become entangled in fishing line, nets, and packaging. Seabirds can eat smaller plastics and plastic bags, causing serious injury or death.

No rubbish bins or rubbish removal services will be provided in the park and visitors will be encouraged not to leave rubbish behind and to travel with portable chemical toilets. Body Corporate members voluntarily conduct regular clean-ups of islands in Reserve 20253 and the park.

Boating activities in the waters surrounding the Abrolhos Islands can result in pollutants from ship spills anti-fouling paints used on hulls and bilge pumping, from both recreational and commercial boats, washing up onto beaches and islands in the park. A major shipping lane is located to the west of the Houtman Abrolhos. In 2017, Department of Transport assessed shoreline values and the risk of marine oil spills in the Midwest. The overall risk from an oil spill was classified as low, based on navigational hazards (the Abrolhos was identified as the key hazard in the area), environmental conditions (wind, currents, swell etc), shipping density and interactions with commercial fishing and recreational boats, and the likely exposure to oil (there are low levels of petroleum production and exploration activity in the Midwest). The greatest risk in the Midwest is the potential for rare, but large spills from oil tankers, a significant distance from shore (Navigatus Consulting 2018).

Management of waste and pollution in the park will be through consultation with the fishing and aquaculture industries and other stakeholder groups, and education of visitors and users to remove rubbish.

Management objective: To minimise the impact of waste, and pollution on the key values.

Management strategies

1. Liaise with the fishing and aquaculture industry and other users about waste management and pollution.
2. Educate visitors and other users about appropriate rubbish and waste disposal and use of lights (see *Visitor Use*).

11. Ecosystem rehabilitation

Many of the islands in the park are highly disturbed, with most impacts being the result of historical guano mining, petroleum exploration, visitor activities, commercial fishing activities, fires, storms, cyclones, weed infestations, and impacts from pest animals (such as tammar wallabies on North Island).

It is the department's first preference to avoid significant disturbance to the park and management will aim to minimise impacts on park ecosystems. The necessity for, and complexity of ecosystem rehabilitation varies according to the type and extent of disturbance. In some cases, natural regeneration with little or no intervention may be preferred. Physical values (such as water, nutrients, topsoil, and organic matter) and biological values (such as flora and vegetation recovery) are assessed to determine healthy ecosystem functioning following rehabilitation. Remote sensing can demonstrate overall rehabilitation success and programs may require additional information (such as targeted fauna surveys) to demonstrate full ecosystem rehabilitation and recovery.

Local provenance of native species should be used for rehabilitation purposes to ensure the greatest degree of success, enable new vegetation to blend into the existing environment, and limit the

introduction of weeds and disease. Sources of brushing material (branches of trees and shrubs used to stabilise mobile dune systems) should also be free of disease. Rehabilitation on islands in the park can be difficult because of the variable rainfall and exposure to strong, salt-laden winds and it can be a long time before the benefits of rehabilitation are observed.

A range of rehabilitation works have been carried out in the park, in conjunction with several other key stakeholders. Between 2013-2017, the Abrolhos Restoration Project was implemented, a collaboration between Batavia Coast Maritime Institute, Northern Agricultural Catchments Council, Conservation Council of Western Australia, and the then Departments of Parks and Wildlife and Fisheries, targeting the restoration and rehabilitation of several islands. This included weed control (such as the removal of ice plant from Rat Island), beach clean-ups and revegetation. In conjunction with the eradication of rats and cats from Rat Island, this resulted in seabirds, terrestrial birds, reptiles, and invertebrates recolonising this island.

Management objective: To minimise the impact of disturbance on key values.

Management strategies

1. Ensure that degraded or disturbed areas are rehabilitated according to departmental rehabilitation standards, policies, and guidelines.
2. Collaborate with DPIRD and other key stakeholders to carry out rehabilitation of degraded or disturbed areas.

MANAGING CULTURAL HERITAGE VALUES

The Abrolhos Islands are associated with the earliest periods of European history in Australia. Rich archaeological, maritime, historical, and cultural heritage values in the park include some evidence of prehistoric Aboriginal life, early Dutch and British exploration and trade, guano mining, and commercial fishing and aquaculture activities. Whilst some sites are protected under legislation, there are many yet to be afforded this level of protection (Stanbury 1991).

The WA Museum is the statutory authority responsible for the management and protection of shipwrecks, associated sites, and relics under the State MA Act and the Commonwealth UCH Act. As land managers of many maritime archaeological sites covered by these two Acts, the department will work with the WA Museum regarding its management obligations to protect these sites.

Batavia is one of Australia's most significant shipwreck sites and, together with the survivor camps in the Wallabi Group, was inscribed on the National Heritage List (NHL) in 2006 due to its outstanding heritage value to the nation under the EPBC Act. Western Australia is required to manage the site in accordance with a five-year Heritage Management Plan, prepared by WA Museum, which identifies the National Heritage values and provides a framework for managing these culturally significant locations.

Aerial view of Beacon Island excavations undertaken by WA Museum and the University of WA in 2018. Photo - WA Museum/University of WA

Other known significant terrestrial cultural heritage sites in the park include the survivor camps associated with the wreck of *Zeewijk* (1727) as well as cultural heritage features relating to nineteenth-century guano mining and early commercial fishing industries (Anderson 2020). However, the cultural heritage values of the Abrolhos Islands remain dynamic and changing. With almost 50 undiscovered historic wrecks in the vicinity of the park, additional cultural heritage may be discovered over the life of this plan.

Cultural heritage values in the park can be impacted by climate and weather conditions, shearwater nesting activity, and uncontrolled visitor access. Therefore, the department, WA Museum and DPIRD will collaborate to ensure:

- appropriate visitor access to islands with significant cultural heritage values
- visitor information and interpretation is provided to minimise damage or loss to known cultural heritage sites and materials and
- contemporary and innovative interpretation tells the stories associated with the *Batavia* and *Zeewijk* and other historical events.

Cultural heritage values strategic objective

To protect the extraordinary cultural heritage values and promote and interpret these to visitors and the community.

12. Aboriginal cultural heritage

Little is known about Aboriginal cultural heritage values in the park. Archaeological evidence is limited to a single artefact, excavated from Beacon Island in 1967 during a WA Museum expedition to search for material from the *Batavia* shipwreck (see *Maritime cultural heritage* section). The artefact is an Eocene fossiliferous chert flake most likely older than 6000BP (Marwick 2002).

This artefact is the only evidence of Aboriginal occupation at the Abrolhos. It is unlikely that Aboriginal people accessed the Abrolhos Islands once they became separated from the mainland (Marwick 2002), though there may be Dreaming stories relating to sea-level rise. Prehistoric archaeological surveys were carried out on the remnant mainland landforms of East Wallabi and West Wallabi islands in the mid-1980s, but no material was located. Marwick (2002) concluded that future research at the Abrolhos Islands may uncover further evidence of Aboriginal occupation. Ethnographic evidence from the more recent past may include oral histories relating to shipwrecks and contacts with shipwreck survivors, and from Aboriginal people who lived and worked in fishing and other maritime industries at the islands.

13. Maritime cultural heritage

Dutch navigator Frederik de Houtman was the first European to encounter the Abrolhos on 29 July 1619. He named the islands the *Abrolhos* after a Portuguese phrase meaning “open your eyes”, which was used by sailors in the 1600s to warn of offshore reefs or other spiked obstructions in the sea.

Forty-nine vessels are known to have been wrecked at the Abrolhos since 1629. Of these, 29 are historic, including two Dutch East India Company (VOC) ships: *Batavia* (1629) and *Zeewijk* (1727). *Batavia* and *Zeewijk* are among the earliest European underwater archaeological sites in Australia and are protected by both State and Commonwealth legislation. The *Batavia Shipwreck Site and Survivor Camps Area 1629 – Houtman Abrolhos*, is listed as a National Heritage Place under the Commonwealth EPBC Act and managed under the WA Museum’s Heritage Management Plan (Anderson 2020) (see *Management context – National Heritage*).

Coins recovered from *Batavia* (1629) shipwreck. Photo - Patrick Baker/WA Museum

The UCH Act automatically protects all shipwrecks, and their associated relics, over 75 years old in marine areas to low water mark (in both Commonwealth and State waters excluding inland waters and enclosed bays). Seven wrecks are gazetted as historic shipwrecks under this Act, including *Batavia* (1629), *Zeewijk* (1727), *Ocean Queen* (1842), *Hadda* (1877), *Ben Ledi* (1879), *Marten* (1879) and *Windsor* (1908), and almost all of these have associated maritime cultural heritage on nearby islands in the park.

The MA Act automatically protects all pre-1900 historic shipwrecks, relics, and other maritime related structures below and above the low water mark and in inland State waters. This legislation prevents the unlawful alteration, destruction, damage, looting and theft of maritime heritage values. Maritime archaeological sites in the park that are protected under this Act include:

This coastal limestone structure was built by survivors of the *Batavia* shipwreck in 1629. It is believed to be the oldest European-built structure on the Australian continent. Photo – Wendy van Duivenvoorde/WA Museum

- Beacon Island – archaeological features relating to *Batavia* shipwreck, survivor camp, shipwreck and massacre victims, graves, *Hadda* (1877) shipwreck survivor camp, a cairn, and a coral limestone structure.
- East Wallabi Island – sinkholes visited by survivors of *Batavia* and other colonial-era coastal shipping to obtain fresh water, and the cairns built to identify wells.
- West Wallabi Island – a coastal limestone structure associated with *Batavia*, an inland limestone structure, natural limestone sinkholes containing fresh water, fireplaces, and middens of unknown origin.
- Small islands of the Morning Reef complex, including Traitors Island, and possibly used by *Batavia* shipwreck survivors.
- Long Island – occupation and massacre site of *Batavia* shipwreck survivors, gallows, and execution site of *Batavia* mutineers.
- Gun Island – *Zeewijk* shipwreck survivor camp, and place where the rescue sloop was built (so the survivors could leave the island and reach Batavia).
- Middle Island – natural sinkholes used by *Zeewijk* shipwreck survivors to obtain fresh water, burial site from the *Venus* (1851) shipwreck, and two stone structures associated with early commercial fishing.
- Pelsaert Island - shipwreck survivor camps of *Zeewijk*, *Marten*, *Ben Ledi*, and *Ocean Queen.*
- Murray Island – natural sinkholes used by *Zeewijk* shipwreck survivors to obtain fresh water
- Mangrove Island – used by *Zeewijk* shipwreck survivors to cut timber. (Stanbury 1991 and 1993).

Of the remaining 24 vessels known to have been wrecked at the Abrolhos, most are fishing boats from the 1950-70s era. Potentially historic drift material, such as timber flotsam, has also been located on some islands in the park, most notably Pelsaert Island.

The Department of Planning, Lands and Heritage (DPLH) maintains the State Register of Heritage Places, a statutory list of places of important cultural heritage significance that represent the story of Western Australia's history and development and that are protected under the *Heritage Act 2018*. The Heritage Council of Western Australia (the Heritage Council) makes assessments on the significance and eligibility of sites for protection under this Act. A draft heritage assessment for the Houtman Abrolhos Islands includes the *Batavia* shipwreck and survivor camps, and other cultural heritage related to guano mining and commercial fishing. These have been nominated to be assessed by the Heritage Council for inclusion on the State Register. Once registered, the department will ensure it meets its legislative responsibilities to protect these sites.

Batavia (1629)

Batavia is Australia's second oldest known shipwreck, the oldest known VOC wreck and was the catalyst for one of the most tragic stories in Australia's maritime history (Green et al. 2004). On 4 June 1629, during its maiden voyage from Holland (Netherlands) to Batavia (Jakarta), *Batavia* was wrecked on Morning Reef. Whilst the ship's Commander, Francisco Pelsaert, and 48 other passengers departed to the mainland in search of water (and then onwards to Jakarta to organise a rescue mission), a brutal mutiny erupted that resulted in the violent deaths of 115 men, women, and children (Ariese 2012). The mutineers, led by the ship's under merchant Jeronimus Cornelisz, began systematically murdering shipwreck survivors, to carry out their plan of commandeering the rescue boat when it arrived.

A soldier, Weibbe Hayes, and several others were sent by Cornelisz to West Wallabi Island to search for water. Later joined by several other escape parties, Hayes and his loyalists were attacked by the mutineers but eventually succeeded in capturing Cornelisz. When Pelsaert returned with the rescue party aboard *Sardam*, he was intercepted by Hayes who told him that mutineers planned to seize the rescue ship. Cornelisz and the mutineers were arrested. Seven were subsequently placed on trial and then executed on Seals Island (Long Island), two were marooned on the mainland (becoming the first known European residents of Australia), and the others returned to Batavia with the remaining shipwreck survivors where they were also tried and executed (Anderson 2020 and Ariese 2012).

The *Batavia* shipwreck site and survivor camp areas (on Beacon, Long, East Wallabi and West Wallabi islands) are included on Australia's National Heritage List, due to their importance to the history of the discovery and charting of Western Australia's coastline. The sites in the park include graves, ruins of two stone structures believed to be the oldest European-built structures on the Australian continent (Department of Environment and Energy 2019), and the site of Australia's first prosecutions and formal executions (Gerritsen 2011).

Zeewijk (1727)

On 9 June 1727, during its maiden voyage to Batavia, the VOC ship *Zeewijk* was wrecked on Half-Moon Reef at the Abrolhos (Ariese 2012). The survivors salvaged parts of the wreck and used local mangrove timber to build a camp and a boat (a *sloop*) on Gun Island, where they lived for almost nine months. They eventually sailed their vessel to Batavia.

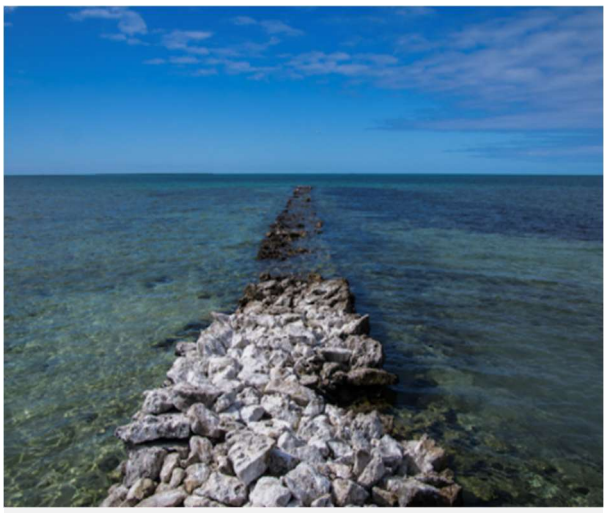
In the park, significant sites associated with *Zeewijk* include Gun Island (survivor camp relics and graves yet to be discovered), Middle Island (well sites) and the southern parts of Pelsaert Island (where shipwreck debris and mangrove timbers were collected to build the sloop).

A strip of dune on the western extent of Gun Island is considered the most archaeologically significant site related to *Zeewijk* survivors' activities on the islands. It is the only area of the island that was not excavated during guano mining activities in the late nineteenth and early twentieth centuries and where, during the 1970s, the WA Museum uncovered relics from the *Zeewijk* survivor camp (Paterson et al. 2019).

Ceramic sherds from *Zeewijk* (1727) found during excavations undertaken by WA Museum. Photo – Patrick Baker/WA Museum

Records show that 16 men died during the months that *Zeewijk*'s crew were camped on Gun Island, and it is assumed that their bodies were buried on the island (Ariese 2012). Although several graves have been discovered (two in the late nineteenth century and several in the 1960s), no *Zeewijk*-related grave sites have been identified in recent times. It is possible that material that was bulldozed in the 1950s, to construct the oil drill pad and borrow pit associated with petroleum exploration in the area, may have contained *Zeewijk*-related material, including human remains.

Zeewijk survivors found potable water in wells on Middle and Murray islands, which were also used by other European naturalists and explorers who later visited the Abrolhos. The wells on Middle Island were also used by guano miners (Paterson et. al 2019).



Remains of the jetty at Sweet Island, originally constructed to support guano industry activity, are of heritage significance as a representation of Western Australia's early economic history. Photo – WA Museum.

Other early shipwrecks

There is speculation that another VOC ship was wrecked in the Pelsaert Group, but there are varying opinions amongst maritime archaeologists and historians as to its exact location and no archaeological material has ever been found to support this. Journal records from *Zeewijk* survivors suggest another undiscovered VOC wreck in the vicinity, with the undiscovered *Fortuyn* (1724) or *Aagtekerke* (1726) being possible contenders. This theory represents the potential for further maritime archaeological discoveries in the park and its surrounding waters (Green 2018).

Managing impacts to maritime cultural heritage

The department will ensure that known maritime archaeological sites are not impacted by park management operations, development, tourism, visitor access or any other issues. Regular communication and collaboration between the department and WA Museum to discuss issues relating to management of maritime archaeological sites and shipwrecks at the Abrolhos will continue over the life of the plan.

14. Other cultural heritage

Guano mining (1844 – 1945)

Guano mining was one of the first profitable export industries established in Western Australia. Formed by a build-up of seabird excrement, guano is a natural source of nitrogen and phosphorus. It was used by farmers in the nineteenth century as a fertiliser prior to the manufacture of commercial fertilisers (Stanbury 1982).

The rich guano deposits at the Abrolhos Islands, a result of long and uninterrupted periods of seabird habitation, were first observed in 1840 (Stanbury 1982). By 1884, guano mining operations were fully established, with the entire archipelago leased for mining guano (Green 2018). Mining operations continued until the early 1900s, when demand for Abrolhos guano fell due to the discovery of richer deposits elsewhere, and the manufacture of commercial fertilisers in Western Australia (Stanbury

1982). Between 1943 and 1945 guano mining in the Abrolhos briefly resumed because of Japanese military activity affecting guano mining industries in the Pacific Ocean region.

Guano mining was undertaken throughout the Abrolhos Islands, most notably on Gun, Pelsaert and Rat islands. Mining operations resulted in vegetation clearing, rocks being overturned, piled up, moved, and used in the construction of causeways, jetties, and huts. As a result, there were devastating impacts to the habitats for seabirds and other fauna. Guano mining is thought to have been responsible for the extinction of the entire reptile assemblage on Dry Island, and of the Houtman Abrolhos spiny-tailed skink from Rat Island (although it is still found on several other islands within the Wallabi Group) (How et al. 2019). The remains of mining activity and associated infrastructure (including rubble walls with stone kerbing, structures, stone jetties, tramway beds and stone-walled structures) can still be seen on these and many other islands (Paterson et al. 2019). The visible remnants of the guano mining industry at the Abrolhos are an important part of Western Australia's early economic history. Islands and sites of heritage significance include:

Guano mining activities permanently altered the landscape of many of the islands. Piles of discarded limestone such as these at Sid Liddon Island, are considered sites of heritage significance representing Western Australia's early economic history. Photo – WA Museum.

- Pelsaert Island – settlement site, guano mining field, two jetties, limestone causeway, quarry, and remains of a wooden punt.
- Sweet Island – encampment site, transportation facilities, rock walls, causeway, and jetty.
- Gun Island – occupation site, quarry, tramline foundations, rockpiles, causeway and jetty.
- West Wallabi Island (south and west sides) – stone cairns, tramway, jetty, and evidence of stock yard and built structure.
- Rat Island – stone landings and jetties, tramway embankments, tramline sections, bale straps, stone foundations, stone walls, stone hut, historic settlement area, well and rock holes, wells' cairn, and graves.
- One, Three, Eight and Davis islands – mining activity (Stanbury 1991 and 1993).
- Dry Island – a cairn.

Fishing

The fishing industry was established at the Abrolhos in the late 1800s when William Saville-Kent, the Commissioner of Fisheries was appointed by the State Government to investigate its suitability as a profitable fishery in 1897. Initially, finfish, whales, seals, and sea cucumbers were caught. Development of the western rock lobster fishing industry commenced in the 1920s and expanded during World War II when canned lobster was supplied to armed forces. During this time, some of the first fishing camps were constructed on the islands and by the 1930s, more rock lobster fishers were living and working at the Abrolhos. As entire fishing families moved to the Abrolhos, the fishing camps expanded, a church was built on Basile Island, a school and nursing post on Rat Island, and pub on Pigeon Island. These facilities encouraged greater social connection amongst the fishers and a strong sense of community developed over several generations. This has also resulted in an important sense of stewardship for the protection of the values of the Abrolhos and its way of life. Although the fishing camps are located outside of the park, their distinctive and colourful buildings (constructed from transportable, reclaimed, or recycled materials) have a unique aesthetic and social history and make a strong contribution to the identity and sense of place of the Abrolhos.

Tourism

Tourism activities at the Abrolhos first commenced in the early 1900s and the tourism potential of the park was recognised when the Abrolhos Islands were declared a Class A reserve (in 1929) for the purpose of "Public Recreation and Tourist Resort". Throughout the twentieth century, many efforts were made to encourage tourism at the Abrolhos. Between the 1930s and 1950s tourists visited by boat and aircraft and, after World War II, a tourist resort was established on Pelsaert Island, using buildings that had previously been occupied by guano miners working for the British Phosphate Commission. Due to a lack of fresh water, poor quality food and accommodation, and the long and difficult boat trip to get there, this tourism venture was unsuccessful. It only operated for several years, was later closed, and the buildings demolished. This was followed by several major tourism proposals in the 1960s and later that were never developed (Fisheries Western Australia, 2001).

Holiday makers on Pelsaert Island c.a. 1946. Photo – WA Museum (MA1100/32)

Defence

In 1942, a Royal Australian Air Force post was established on East Wallabi Island (near Turtle Bay) and the airstrip was constructed. This was used for flying training for staff and cadets from Geraldton. East Wallabi and West Wallabi islands were also used for training exercises during World War II (Department of Fisheries 2012).

Management objective: Collaborate with relevant stakeholders to identify and protect cultural heritage sites in accordance with relevant legislation.

Management strategies

1. Control access to, protect, maintain and monitor known or identifiable cultural heritage consistent with relevant legislation and departmental policies such as *Corporate Policy Statement 18 - Recreation, Tourism and Visitor Services*.
2. Consult with the WA Museum, DPIRD, State Heritage Office, Abrolhos fishing community, research institutions and stakeholders to identify, research, document, interpret, and monitor impacts to known sites of cultural heritage or historical significance and report discoveries of new material to WA Museum.
3. Consider the cultural heritage values of the fishing and aquaculture industries and their associated communities in planning for and managing the park.

Key performance indicator

Performance measure	Target	Reporting
Protection and monitoring of known or identifiable cultural heritage sites.	No further disturbance without formal approval and consultation.	Annually

MANAGING VISITOR USE AND COMMUNITY VALUES

The park provides a unique visitor experience that is very different to those available in other national parks in the Midwest and across the State. Visitors arrive either by boat or charter flight and, because of this, visitor numbers are low. Visitors value the opportunities available in a wild and remote park, with limited facilities.

Visitors are also attracted to the unique sense of place and character of the Abrolhos Islands, resulting from the landscape, natural values, and the history and culture of the fishing and aquaculture community. Visitor activities include swimming, fishing, snorkelling, surfing, wind/kite surfing, walking, bird watching and other nature appreciation. The focus of visitor management in the park will be to enhance visitor experiences, maintain the sense of remoteness of the Abrolhos, and to protect the natural and cultural values. To achieve this, there will be a reliance on visitors adopting a "leave no trace" philosophy. Education and interpretation will outline the importance of visitors observing these principles, such as camping only in designated areas, bringing their own portable chemical toilets, appropriately disposing of all rubbish and toilet waste upon their return to the mainland, not lighting campfires, maintaining low light environments at night, and avoiding wildlife disturbance.

The development of visitor infrastructure, interpretation and appropriate access is initially focusing on East Wallabi and Beacon islands. Future opportunities for the development of visitor infrastructure to enhance visitor experiences and protect natural and cultural values will be considered at North, West Wallabi, Long, Rat, Leo, Morley, Wooded, Pelsaert and Gun islands. These opportunities will be investigated, following further public consultation and assessment of impacts on natural and cultural values. These islands will be the focus of visitor use over the life of the plan. Opportunities for visitor use on other islands may be considered, subject to an assessment of impacts to the natural and cultural values, visitor demand, and social and economic benefits.

Visitor use and community values strategic objective

To provide high-quality visitor experiences, facilities and tourism opportunities that share the unique stories of the park's extraordinary natural environment, cultural heritage, and people and reflect its unique character.

15. Visitor use planning

Visitor research and planning

The appeal of the Abrolhos Islands to visitors and for tourism has long been recognised (see *Other cultural heritage – tourism*). Over the past 30 years several research projects and plans have been completed, investigating and planning for visitor use (Abrolhos Islands Task Force for the Abrolhos Islands Consultative Committee 1989, AICC 1995, Fisheries Western Australia 2001, Webster et al. 2002, Ogier 2013, TRC Tourism 2013 and Evolve Solutions 2014).

The department's understanding of current visitor use patterns (where visitors go and what they do) is limited. Future research will therefore focus on improving knowledge about visitation to the park and adapting management based on this.

Visitor numbers and trends

Visitor numbers and statistics for the Abrolhos Islands have been collected from a variety of sources in the past ten years, using a range of collection methods. Therefore, accurately determining the overall visitation to the park has not been possible. DPIRD requires visitors arriving on recreational vessels, tourism operators, charter operators, and some commercial fishers to complete a *Notification to travel to the Abrolhos Islands Fish Habitat Protection Area (FHPA)*. DPIRD has used this registration system to collect data since 2016/17. Passenger numbers to the Abrolhos Islands have also been recorded by local aircraft charter businesses since 2004/05. This information provides a very basic understanding of overall visitor numbers and trends, and the changes and seasonality in visitation.

Overall visitation to the Abrolhos Islands is low. Between 2006/07 and 2009/10, charter aircraft passengers to the Abrolhos Islands averaged around 3341 passengers annually. By 2017/18, these numbers had more than doubled, increasing to 7263 passengers overall and a significant increase in visitor numbers to East Wallabi Island occurred (due to charter flight companies increased marketing to international, particularly Chinese tourists, resulting in more tourists visiting East Wallabi Island on day tours for swimming, snorkelling, and beach walking activities). During this time, an average of 25% of charter aircraft passengers were tourists and 75% non-tourists (commuting fishers or their families).

When considering the data from DPIRD's registration system, small recreational boats made up most vessel access to the FHPA between 2016/17 and 2019/20. Eighty-one percent of vessels carried between one and five passengers. Visitation was highly seasonal, with most vessels recorded between February and May, (with a peak in April coinciding with the most favourable weather conditions and school and public holidays) and in September. Most boats visited islands in the Pelsaert group (being the closest to Geraldton and providing large areas of protected lagoon, accessible islands, and navigable waters), followed by the Easter and Wallabi groups. Most vessels came from Geraldton, although boats from other ports were more likely during the April school and public holiday periods. Most recreational boating visitors stayed between one and five days.

As part of the DPIRD notification and registration process, boat users are required to nominate which island group they are travelling to. However, the notification form does not specifically ask users if they are going to the islands in the park, so the department does not have a good understanding what proportion of visitors to the FHPA are also visiting the park. There are likely to be recreational boat users who just visit the FHPA for fishing activities, without visiting the park. The department will work with DPIRD to modify this registration process to capture more information about recreational boat visitors to the park.

Visitor master planning

A visitor master planning process, covering all the Abrolhos Islands, occurred concurrently during the preparation of this plan. This process considered existing visitor use, developed direction for current and future visitor use across the three island groups, and outlined a framework for tourism management and the protection of the unique sense of place and experience that defines the character of the Abrolhos. Future opportunities were identified which will guide the visitor infrastructure development within the park. It also outlined a coordinated approach to visitor management and tourism across government and the community.

Stakeholders were consulted during the visitor master planning process. A workshop was held in early 2019 to workshop visitor use, opportunities, and tourism at the Abrolhos. Feedback received was used in the visitor master planning process which, in turn, has informed the preparation of this section of

the plan. Proposals for visitor use will be tested when this plan is released as a draft for public comment and visitor master planning will then be finalised on completion of the final management plan.

More detailed master planning and site planning for proposed visitor use will be undertaken as required. Site planning considers the specific facilities to be constructed and their impact on the landscape and visual amenity. Site planning will aim to ensure that facilities are sensitive to the impacts on natural and cultural values and complement the environment and the existing structures.

Visitor safety

The department's visitor risk management program is guided by *Corporate Policy Statement No.53: Visitor risk management* (DPaW 2015) and the associated guideline. This program is implemented in the park to identify and manage risks that may cause injury or death, in a way that does not unnecessarily diminish visitor enjoyment.

Although boating activities occur outside the park, issues associated with boating safety are a key consideration for visitors accessing the park, particularly those who arrive at the Abrolhos Islands aboard private vessels. Boat access can be hazardous, with reefs rising out of deep water and can remain unseen until close by. Good visibility is required to navigate reef systems. The Abrolhos Islands are remote from the mainland and landing and safely securing a boat once on an island can be difficult if a mooring is not available, due to strong tides and changing wind direction. Weather conditions can also be highly changeable. Safe landing sites are not available on all islands. Access on and off some islands can be difficult, particularly for visitors with mobility issues.

Other risks to park visitors include:

- An absence of drinking water, food supplies and fuel which means that recreational boat visitors must be self-sufficient.
- Weather conditions that can change very quickly, and extreme weather events that are possible (winter storms).
- Diseases and injury associated with wildlife.
- Difficulties in accessing emergency services. Limited phone reception and distance from the mainland result in long response times for emergency services. VHF radios or satellite phones are the most reliable means of communication (see *Utilities and services – digital and telecommunications*).
- Risks from recreating in the marine environment (risk of drowning in strong currents and swells and bites and stings from marine life).
- Risk of cliff collapse. Limestone overhangs are common on many islands, which can be highly unstable, and can collapse without warning.
- Falls and slips on uneven terrain.
- Sunburn and wind exposure.

Emergency response arrangements for the park are developed by the Local Emergency Management Committee for the City of Greater Geraldton, in which the Abrolhos Islands are included.

The Royal Flying Doctor Service (RFDS) is unable to access the Abrolhos Islands as all three existing airstrips do not meet requirements for RFDS aircraft, being too short for landing or take-off, and there is limited scope to meet these requirements in the future. However, the department will support the use of helicopters for emergency response. In past emergencies, patients have been transferred to the mainland via charter plane, helicopter, or boat.

Information, education, and interpretation

Information, education, and interpretation are of critical importance for the park to raise awareness about its values, promote support for its management, and to encourage community involvement and appropriate visitor behaviour. Communication is also vital to managing visitor risk ensuring visitors have safe and enjoyable experiences in the park and the adjacent FHPA. The delivery of off-site information will be a focus for interpretation of the park's values. The use of signage will be limited on the islands as it is costly to maintain and detracts from the remote visitor experience.

The incredible history of the Abrolhos, its exceptional natural and cultural values and the volume of stories and information that is available is of great interest to park visitors. Much information is held by the WA Museum, who is a key contributor in preparing and delivering interpretation and education about the Abrolhos Islands. Different stories about the Abrolhos are told at the WA Museum *Boola Bardip* in Perth, the Shipwreck and Maritime museums in Fremantle, and the Museum of Geraldton. These sites will continue to play a key role in contributing to visitor's understanding of the park values, visitor use and safety, appropriate behaviour for accessing the park and important management messages (such as biosecurity measures and 'leave no trace' principles).

Interpretation will cover both marine and terrestrial areas (the park and the surrounding FHPA) to promote understanding and appreciation of the values of the Abrolhos. The department's *Explore Parks* website will be a key location for information about the park, with links to the DPIRD and WA Museum websites.

Management objective: Maintain the park's unique visitor experience by improving the awareness, enjoyment, and appreciation of its values and understanding of risks and safety by visitors, through the provision of a range of interpretative and educational material, and visitor infrastructure.

Management strategies

1. Plan and construct visitor infrastructure and facilities that provide high-quality visitor experiences and maintains the remoteness, character, and sense of place of the Abrolhos.
2. Plan and implement programs to collect data and information about visitor numbers and activities within the park.
3. Manage visitor numbers, especially to islands with sensitive natural and cultural values through strategies such as site design, education, marketing, and access restrictions (see *Visitor Access*).
4. Undertake regular visitor risk assessments to identify risks associated with visitor use and manage these according to departmental policy and other legislative requirements.
5. Communicate with visitors, the community, and stakeholders about visitor safety in the park.
6. Collaborate with DPIRD, WA Museum and other relevant stakeholders to plan, prepare and implement an integrated promotion and interpretation program that:
   - promotes visitor awareness, appreciation and understanding of the natural and cultural values
   - highlights visitor safety and appropriate behaviour
   - facilitates exceptional contemporary storytelling and
   - is delivered to suit a wide range of visitors and park users across a variety of platforms.
7. Maintain partnerships with key stakeholders to strengthen the delivery of experiences and information outside of the park.

Key performance indicator		
Performance measure	**Target**	**Reporting**
Visitor safety.	The number of serious incidents[16] per 100,000 as a proportion of recorded visits remains stable or decreases over the life of the plan.	Annually

16. Visitor access

Access to the park can be difficult, expensive, and weather-dependent, and is only possible by boat or aircraft. This is reflected in the low visitor numbers compared with other parks in the Midwest.

Air access

Most visitors travel to the Abrolhos Islands by small, fixed wing aircraft. There are three designated unsealed airstrips located in the park, on North, East Wallabi and Rat islands. The airstrips at North and East Wallabi islands are short, with limited scope for extension due to landform and habitat values, therefore limiting the size and type of aircraft that can use them (including RFDS). Rat Island's airstrip has the potential to be extended and may be considered over the life of the plan (although it is unlikely that any extension would meet RFDS requirements).

Flights to the park are mainly provided by two aircraft charter companies based in Geraldton and occasionally a charter company from Kalbarri. Most aircraft passengers (an average of 75%) are commercial fishers or people providing support to the fishing and aquaculture industries (such as goods and provisions). Passenger numbers to East Wallabi Island have increased significantly since 2014/15, because of changes to the fishing industry and their shift to a fly-in, fly-out workforce.

Rat Island airstrip is one of three within the park. Landing fees will allow for the continued maintenance of these airstrips. Photo – Isaac Hatch/DBCA

[16] Serious incidents are those requiring medical treatment.

Helicopters have also been used to access the Abrolhos Islands in the past but are not currently used by the existing aircraft charter companies. There are several helicopter landing pads adjacent to lighthouses and in Reserve 20253, adjacent to the park.

Public aircraft access to airstrips on North, Rat and East Wallabi islands will be permitted in accordance with the *Conservation and Land Management Regulations 2002* (CALM Regulations) and Civil Aviation Safety Authority (CASA) guidelines. As per CALM Act Regulations, landing fees will apply for all passengers of charter flights or tours, and for pilots and passengers of private aircraft. Helicopter access to existing airstrips and approved landing sites will also be permitted.

Impacts to seabirds from all types of aircraft are well documented, especially in relation to noise and during breeding, nesting, and fledgling periods. Birds respond by increasing scanning, alert, avoidance, and escape behaviours (Hoang 2013). Helicopters have a greater impact than small, fixed wing aircraft. The altitude at which disturbance to seabirds occurs varies between species and some become habituated where aircraft flyovers are frequent. Guidelines to minimise aircraft impacts to seabirds, shorebirds and raptors will be developed in consultation with charter flight operators.

Boat access

Private recreational boats account for an average of 75% of boat traffic into the FHPA (although the proportion of visitors to the FHPA, on private recreational boats, who also visit the park is unknown). To a lesser extent, boat visitors to the park also arrive on commercial tours or are Body Corporate members and their family and friends recreating in the park.

Vessels use one of the 38 public moorings in the FHPA that are managed by DPIRD. These moorings are located adjacent to accessible islands including East Wallabi (Turtle Bay), Long, Morley, Wooded, and Leo islands, and on the western side of Pelsaert Island. Once moored, boat visitors use tenders to access the islands in the park. There are also several recommended anchorages in deep water adjacent to islands. Although the moorings and anchorages are outside of the park, these provide an essential service for visitors accessing the park. DPIRD approval is required for the construction of new moorings in the FHPA. Therefore, the department will collaborate with DPIRD in planning for, locating, and managing moorings in the FHPA to ensure that the location of moorings minimises impacts on the natural and cultural values of the park (especially bird nesting locations, sea lion habitat and significant maritime archaeological sites) and allows visitor access to islands at appropriate landing points. Smaller vessels may land directly on islands with accessible sand or coral beaches. There are few islands directly accessible for large vessels.

To improve visitor access to the park, a new jetty is planned for East Wallabi Island allowing vessels up to 20m (65ft) in length to access the island. Photo – Tourism WA

New jetties are being constructed at East Wallabi and Beacon islands to allow safer access for fishers, commercial tour operators and visitors. Vessels up to 20m (65 feet) in length will be able to access the East Wallabi Island jetty and smaller vessels, up to 7m (22 feet) in length, the Beacon Island jetty. The construction of public jetties at other islands in the park may be considered over the life of the plan.

Outside of the park, camps, and jetties in Reserve 20253, that are occupied by commercial rock lobster fishers and aquaculture operators, are private property and not accessible to park visitors. Visitor access to these areas is only by invitation of the relevant Body Corporate members.

Pedestrian access

Once visitors arrive at an island within the park, either by aircraft or boat, access to features and points of interest is on foot. Pedestrian access is largely unmodified, and visitors require a moderate level of physical ability to get onto and around most islands. There is a raised boardwalk in the middle of Pelsaert Island, allowing access from one side of the island to the other. On East Wallabi Island, there are two walk trails: one linking the jetty and airstrip to Turtle Bay and one from the beach shelter at the northern end of Turtle Bay to a lookout at the northern end of the island. Over time, worn pathways have been created by pedestrian access on some other islands.

Uncontrolled pedestrian access presents a threat to several fauna values in the park. Visitors to islands can trample seabird nests and burrows and impact on their breeding success (see *Native animals and habitats – Birds*). Australian sea lions are vulnerable to disturbance by visitors, especially during breeding season, when pups are present (see *Native animals and habitats – Australian sea lions*). Approach distances are managed in accordance with the *Biodiversity Conservation Regulations 2018.* Mangrove communities are also vulnerable to trampling by visitors, which can change the suitability for nesting lesser noddy and other fauna that uses this habitat.

Visitors are encouraged to walk on beaches around the edge of islands, rather than across the centre of islands and over vegetation, especially on sandy islands that are important for burrowing seabirds such as shearwaters. Boardwalks and walk trails will be constructed on East Wallabi, Beacon, Leo, Morley, Pelsaert and Gun islands where required to protect these fauna values, protect cultural heritage values, improve visitor safety and provide pedestrian access from air strips and jetties to visitor destinations and facilities in the park. Other walk trails may be considered on other islands over the life of the plan if required.

Vehicle access

The only vehicles used in the park are quad bikes or all-terrain vehicles (ATVs), which are used on several islands for management purposes. Quad bike use is associated with the commercial fishing and aquaculture industries for transporting materials within fishing camps and between the airstrips and fishing camps in Reserve 20253 (on North, West Wallabi and Rat islands). There is some use of ATVs by departmental staff for management purposes.

If used off access tracks, quad bikes can impact significantly on natural values, particularly on nesting seabirds. Quad bikes and ATVs will continue to be permitted in the park, where they are used to support commercial fishing and aquaculture operations or as authorised, on designated access routes only. Any vehicle used in the park must be by lawful authority. DPIRD has a similar policy for vehicle use in Reserve 20253.

Value rich islands

As outlined in Maps 5, 5a, 6, 6a and 7 and Appendix 2 (*Value rich islands and their management*), certain islands in the park support natural and cultural heritage values that are particularly sensitive to disturbance by visitors. Due to the presence of these significant values, a range of access restrictions, applied under the CALM Regulations, will be considered for some of these islands and at certain times.

Seasonal visitor access restrictions will be considered for all or parts of West Wallabi, Leo, Morley, Wooded, White Bank, Pelsaert and Gun islands due to their importance for sea lion pupping and seabird breeding. Other value rich islands (see *Appendix 2*) will also be subject to seasonal visitor access restrictions. However, these have limited appeal for visitation and visitor access to them will not be promoted over the life of the plan. Typically, most seabirds that breed in the park have eggs and chicks between September and February (Surman 1998). Therefore, it is likely that visitor access closures to all or parts of these islands will be considered at this time each year. These closures will fall outside the peak periods for visitation (between March and May). The Australian sea lion, breed and have pups at different times each year. Sea lion breeding and pupping will be monitored and seasonal closures to visitor access will be based on monitoring outcomes. Over time, if other sensitive areas are being impacted by visitor use, further visitor access restrictions may be considered, subject to monitoring outcomes, scientific advice, and stakeholder consultation.

Birdwatchers and visitors with an interest in wildlife and photography are keen to visit important seabird islands during breeding seasons, especially lesser noddies on Pelsaert, Wooded and Morley islands. This also represents an additional visitor opportunity within the park. Assmussen (2020) suggested that limited and controlled visitor access to a small number of seabird breeding sites at the Abrolhos Islands may be possible without unacceptable impacts to seabird breeding. Seabirds become habituated to the regular and predictable presence of visitors, who access the breeding populations under strict guidelines. Providing this opportunity via commercial operator licensing (see *Commercial operations*) will be considered over the life of the plan, subject to the development of appropriate licence conditions and monitoring.

Outside of the park, the camps on Reserve 20253 are occupied by rock lobster fishers and aquaculture operators and used to operate their commercial businesses. These are private property and visitor access to the camps and jetties is not permitted, without permission from the owner. This message will be included in visitor information and interpretation.

Management objective: Provide access to visitors that enables their enjoyment of nature and culture-based opportunities that contributes towards the creation of a high-quality visitor destination and minimises the impacts on natural and cultural values.

Management strategies

1. Provide visitor access to islands within the park, consistent with departmental policy and guidelines and in consultation with visitors and stakeholders, subject to appropriate monitoring and review of these arrangements.
2. Continue to permit aircraft access to North, East Wallabi and Rat islands, subject to departmental policy and Standard Operating Procedures and CASA guidelines.
3. Maintain airstrips on North, East Wallabi and Rat islands according to departmental policy and Standard Operating Procedures and CASA guidelines to ensure long term, safe, and sustainable use for fixed wing aircraft and helicopters.
4. Liaise with aircraft charter companies regarding the management of aircraft access to the park and impacts to seabirds, shorebirds, and raptors.
5. Continue to permit helicopter access to airstrips on North, East Wallabi and Rat islands and approved landing sites on other islands.
6. Build and maintain public jetties at Beacon and East Wallabi islands.
7. Consider infrastructure to provide access to other islands, subject to visitor demand and impacts on natural and cultural heritage values.
8. Collaborate with DPIRD and Department of Transport to ensure that any mooring plan is complementary to park management and that the construction of new moorings in the FHPA minimises impacts on the natural and cultural heritage values of the park.
9. Permit the use of quad bikes and other ATVs in the park for uses associated with park management access, commercial fishing, and aquaculture industries, subject to lawful authority and minimising impacts on the natural and cultural heritage values.
10. Provide pedestrian access within the park that connects jetties and airstrips with visitor destinations and facilities, allows enjoyment and protection of natural and cultural values by visitors and protects visitor safety.
11. Consider implementing seasonal visitor access restrictions for all or parts of West Wallabi, Leo, Morley, Wooded, White Bank, Pelsaert and Gun islands and other value rich islands, as required, subject to monitoring outcomes, scientific advice, and stakeholder consultation.
12. Consider providing visitor access to a limited number of seabird breeding colonies during breeding seasons, subject to appropriate commercial operator licence conditions, monitoring outcomes, scientific advice, and stakeholder consultation.
13. Provide information to park visitors about access to and within the park, and areas where visitor access is restricted (for example, to camps and jetties occupied by commercial rock lobster fishers and aquaculture operators and islands or parts of islands subject to seasonal closures).

Turtle Bay at East Wallabi Island is within walking distance from the airstrip and is popular for walking, swimming, snorkelling and spotting tammar wallabies. Photo – Clare Atkins/DBCA

17. Visitor activities

Day use

Visitor access to the park is predominantly for day use activities.

Kite surfing and wind surfing is popular off Morley, Wooded and Leo islands (Easter Group) and off Third Sister Island (Wallabi Group), between September and June. Kite surfers use beach areas to set up their equipment. Peak periods for this activity in the park coincide with breeding seasons for many species of seabirds. Consequently, some beaches may be closed to kite and windsurfing on Leo, Morley, and Wooded islands during seabird breeding times (See *Access – Access to value rich islands*).

The priority for the development of visitor facilities and infrastructure for day use will be on East Wallabi, and Beacon islands. The development of day-use facilities will also be considered on North, West Wallabi, Long, Rat, Leo, Morley, Wooded, Pelsaert and Gun islands over the life of the plan. Opportunities for day use may be considered on other islands, providing that impacts to important natural and cultural heritage values can be minimised.

Camping

Prior to the creation of the park, camping was not permitted on any of the Abrolhos Islands. Low levels of unmanaged camping occurred over many years, mainly in the Pelsaert Group by visitors on recreational boats visiting from Geraldton. Camping is mainly by visitors who have travelled to the Abrolhos on small to medium sized boats (under 32 feet [10m] in length) without on-board accommodation.

Air charter operators have also expressed an interest in offering passengers the opportunity to camp overnight on islands with airstrips.

Camping in the park is not always a pleasant experience. Weather conditions can be highly changeable, tidal movement and swell can restrict access to moored or anchored boats from lagoons and beaches, there are few level areas to camp on, islands are very exposed, with no shade, shelter or wind protection, sand flies are common, and, during seabird breeding seasons, seabirds are noisy and can collide with campers.

The department acknowledges, however, that there is demand for low-impact, low-cost camping in the park. Therefore, low-impact camping will be permitted at designated sites for small numbers of campers in the park, subject to:

- a booking system
- a code of conduct and rules for camping
- campers being self-sufficient and adopting 'leave no trace' principles (ie removing all toilet waste and rubbish)
- no campfires
- no disturbance of wildlife, biodiversity, or cultural heritage values
- the seasonal closure of campsite areas to manage wildlife, biodiversity, or cultural heritage values (for example, during periods of seabird breeding and sea lion pupping) and
- monitoring the impacts of camping and making changes to management based on monitoring outcomes.

Potential locations are the northern end of Pelsaert Island and on North Island. Other locations will be considered for camping over the life of the plan, providing that impacts to important natural and cultural heritage values can be minimised.

Domestic animals

As domestic animals may impact on wildlife, they are generally not allowed in national parks, aside from in a designated area. Approved assistance dogs (guide dogs) and specially trained dogs for search and rescue operations, security or educational purposes or feral animal control are the exception. Given the biosecurity risk that domestic animals pose to the significant natural values of the park, no domestic animals will be permitted.

Management objective: Provide for a range of activities for visitors that encourages the appreciation and understanding of the natural and cultural values of the park and minimises visitor impacts to these.

Management strategies

1. Plan, develop and maintain day-use facilities and visitor infrastructure on East Wallabi, and Beacon islands, that are consistent with department policy, visitor access restrictions as outlined in *Visitor Access – Access to value rich islands* and are designed and constructed to minimise impacts to natural and cultural values and maintain the sense of place at the Abrolhos.
2. Consider the development of day-use facilities and visitor infrastructure on North, West Wallabi, Long, Rat, Leo, Morley, Wooded, Pelsaert and Gun islands, subject to access restrictions as outlined in *Visitor Access – Access to value rich islands* and are designed and constructed to minimise impacts to natural and cultural values and maintain the sense of place at the Abrolhos.

3. Define appropriate access points to islands to promote safe visitor access, to minimise impacts on natural and cultural values and provide information about these to visitors.
4. Designate the northern end of Pelsaert Island and an appropriate location on North Island for low-level, low-impact camping, subject to the conditions outlined above.
5. Implement a booking system for camping in designated sites and include on the department's online booking system.
6. Develop and implement a monitoring program to determine and measure visitor impacts on natural and cultural heritage values (for example, footprint/disturbance zone, compaction, or vegetation cover of camping areas, impacts to cultural heritage sites).
7. Prohibit domestic animals within the park, except for guide dogs and approved assistance dogs for other medical impairments and specially trained dogs for search and rescue operations.

18. Commercial operations

Commercial tour operators provide services that allow visitors to experience the environment of Western Australia's national and marine parks and other conservation reserves. They widen the opportunities and services available to visitors and underpin the regional tourism industry, which provides an important economic contribution. Research indicates that when people have a positive experience of nature in a park, they become advocates for the conservation of that place. In this way, authorised commercial operators are partners with the department in helping visitors to access, experience and enjoy parks.

Legislation that governs the management of the State's parks and reserves requires commercial operators to obtain permission to conduct their activities, to abide by specific conditions and to pay fees and charges towards the conservation and management of parks, which is given by way of licences and leases. Licences allow commercial operators to enter and use lands and waters managed under the CALM Act to conduct activities such as guided tours. Leases can be granted for commercial services that occupy land, require exclusive rights of access, and/or require substantial infrastructure.

Licences and leases allow the department to assess, authorise and regulate access for commercial operations and to monitor the operations to ensure natural and cultural values are protected.

Under the CALM Act, licences and leases are granted with approval from the Minister in consultation with the Conservation and Parks Commission. The CALM Act requires licences and leases to be consistent with the purpose of the park and with the management plan. In assessing applications for licences and leases, the department considers whether the proposed activity is complementary to the protection of the natural, cultural and heritage values of the park.

Licences

Licences are the key instrument used to authorise and manage the activities of commercial tour operators. There are two types of licences – unrestricted 'T class' and restricted 'E class' licences. The department decides which type of licence is appropriate for each commercial activity based on the requirements of the management plan and/or an assessment of the circumstances.

Unrestricted T class licences are granted for common tour activities such as vessel or walking tours where there is no need to restrict the number of operators conducting such activities.

Restricted E class licences are applied where there is a need to restrict the number of licences to protect natural, cultural heritage values, or for public safety reasons. These licences are restricted in

number, but they are not exclusive. Restricted E class licences are generally allocated through an expression of interest process to select the most competitive operator/s. Holders of restricted E class licences pay higher licence charges reflecting the higher costs of management and the restricted market opportunity.

The department's *Commercial Operator Handbook* outlines the standard conditions that apply to all commercial operators on CALM Act land and additional licence conditions may be applied to individual licences as required. These conditions are reviewed regularly.

Prior to the creation of the park, thirty charter boat and tour companies were licensed with DPIRD to run tours to the Abrolhos Islands. Most of these were charter fishing tours, operating in the FHPA, and at least six operated tours that landed on islands. Three aircraft charter companies also offer day trips to the park (See *Visitor access – air access*). Interest from commercial operators seeking licences to run tours and activities in the park is likely to increase over the life of the plan. An established cruise ship industry exits in Geraldton, with local charter flight companies offering passengers day tours to the Abrolhos via aircraft from Geraldton. The expedition ship industry is an emerging market that have expressed interest in accessing the park (from the surrounding marine area). Although these only represent a very small proportion of tours to the park, tours to the Abrolhos Islands are very popular among cruise ship passengers. It is likely that demand from these industries will increase in the future, although the extent of which is unknown. Additional licence conditions may apply to tours from cruise ships to manage large passenger numbers and ensure visitor safety, a quality experience and to manage impacts.

Commercial operations licensing in the park commenced 1 July 2020. The number of commercial operators with licences to operate in the park will be monitored over the life of the plan. All commercial operators with licences to operate in the park will have to comply with standard conditions specific to the park and consider appropriate behaviour for tour participants, impacts on natural and cultural heritage values, group sizes, appropriate island access points, approach distances for sea lions and seabird colonies, and pre-approved activities. These may change over the life of the plan.

Given the sensitivities and values of Beacon Island, the limited pedestrian space, risks to visitors and the potential for high levels of visitors drawn by the *Batavia* heritage, consideration may be given to implementing additional licence conditions for this island. The current licence conditions limit any tour group size to a maximum of thirty participants. WA Museum recommends that operators should have a minimum of two staff members per group attend tour groups visiting Beacon Island to manage liability and visitor safety and to ensure impacts are avoided. The department is considering whether this would be an appropriate licence requirement and feedback on this is invited through submissions to the draft plan. The department and WA Museum will continue to monitor visitation to the island and to consult with tour operators on its conservation.

The department is currently managing tour operators using unrestricted 'T class' licences. The establishment of restricted E class licences may be considered over the life of the plan to protect the significant values if required. DBCA will consult with tourism operators if this is proposed and any such restricted E class licences will be allocated through a competitive process.

Leases

Leases are the key instrument used to enable tourism operations that require occupancy of land, such as tourism accommodation. As leases authorise long term and (usually) exclusive access to land, a lease opportunity is generally granted through a competitive expression of interest process and involves a high level of assessment to ensure the proposal is compatible with the conservation of park values.

Visitor fees

The department applies a user-pays policy through the collection of visitor fees, which can include park entry fees, camping fees, fees for permits or fees for services (such as guided tours). Revenue raised from visitor fees contributes towards maintaining and developing visitor facilities or management of the park.

Landing fees will be applied to all aircraft passengers landing on airstrips in the park, in accordance with the CALM Regulations. Revenue from these will contribute to the management of the air strips.

Currently, the introduction of park entry fees is not viable due to the multiple access points to the park (making fee collection difficult). However, park entry fees may be considered over the life of the plan if a feasible method of fee collection is developed. The introduction of camping fees is likely if camp sites become bookable on the department's online campsite booking system.

Tourism development

Most visitors to the Abrolhos are day visitors. Commercial tour operators provide opportunities for visitors to access the islands on a day tour by boat or aircraft, generally from Geraldton or Kalbarri. Some tours offer overnight accommodation on-board.

At the time of writing, no formal overnight accommodation is provided for visitors to the park. The potential for tourism development on the islands has been discussed for many years and was an issue raised during stakeholder consultation associated with the development of this plan, with stakeholders noting that overnight accommodation could be provided on-board vessels, in fishing camps in Reserve 20253 or in the park. It is recognised that providing for overnight accommodation at the Abrolhos would significantly expand the tourism potential of the islands, allowing visitors to engage with and explore the islands over a longer period as well as increase the contribution of tourism to the regional economy.

The department generally adopts a public-private partnership approach to tourism development using licences and/or leases. This allows the department to manage and regulate the values of the land whilst recognising that a tourism operator is generally best placed to manage and maximise a commercial tourism business. Where a restricted commercial development opportunity exists and there is likely to be interest from more than one party, as is the case at the Abrolhos, the department applies a publicly advertised competitive process to ensure that the most suitable applicant/s is selected and the best outcomes for the State are achieved. Any licences or leases granted for tourism development would include conditions and key performance indicators to allow the department to monitor impacts and operator performance.

Any tourism development in the park would need to be assessed to ensure that it enhances, or at least does not unacceptably impact on, the natural and cultural heritage values, the visitor experience, and the sense of place of the Abrolhos. Any development proposal in the park would need to be consistent with the purpose of the park and with this plan. The proponent would also be required to obtain approvals under any other relevant legislation, which may include the *Environmental Protection Act 1986* (Environmental Protection Act) and the EPBC Act as well as State Planning Policies under the *Planning and Development Act 2005*.

In planning for and assessing any commercial tourism development at the Abrolhos, consideration would be given to whether the proposal:

- is consistent with the purpose of the park and with the management plan

- preferably enhances, or at least does not unacceptably impact on, the natural and cultural heritage values, the visitor experience, and the sense of place of the Abrolhos
- can be implemented in a way that avoids, minimises, and manages unacceptable environmental impacts
- broadens the spectrum of visitor experiences and/or accommodation available whilst maintaining the sense of place of the Abrolhos
- provides for universal access
- positively contributes to the management of the islands
- will not create unacceptable cumulative impacts of tourism operations, recognising that development on the islands will be restricted to ensure that the natural, heritage and cultural values and the remote and undeveloped sense of place are retained
- is acceptable and meets the requirements of other relevant legislation and policy
- manages visitor safety
- is financially viable and
- is logistically feasible in terms of the provision of power, water, and wastewater treatment.

Any competitive process to select a proponent for a commercial development opportunity would include assessment of:

- whether the proponent has the necessary skills and experience
- the viability of the proposal
- whether the proponent has the required financial resources to undertake the project to a satisfactory level
- whether the proposal represents value for money for the State
- whether the proposal delivers the best business and management outcomes for the State (that is, for the broader community) and
- if the proposal is aligned with relevant State Government policies.

From the planning undertaken to date, tourism development including overnight accommodation will only be approved where there are no unacceptable impacts on the significant natural and cultural heritage values. Development on most of the islands within the park is not likely to be appropriate or viable due to their small size, low profile above sea level, difficulty in gaining safe access and significant natural and cultural heritage values. In considering built tourism development, particularly overnight accommodation, there will be a preference that this occurs on inhabited islands within the park (North, West Wallabi, Rat, Leo, and Newman islands) and these are likely to hold the most potential for further tourism development. It should also be noted high-end overnight accommodation would likely seek a location away from key day trip destinations to obtain a sense of exclusivity. Other island locations may be considered over the life of the plan, but proponents may be required to provide further justification and address additional criteria, especially in relation to value rich islands. Further investigation and assessment would be required in progressing any tourism proposal, in accordance with the factors outlined above.

The management of tourism operations in Reserve 20253 and in the FHPA is managed by DPIRD under the FRM Act. Therefore, any future tourism development in these areas requires consideration, approval, and management by DPIRD and the relevant Body Corporate. It is acknowledged that given the logistics involved in any tourism development at the Abrolhos, and its significant marine values, any tourism development is likely to have marine and terrestrial components. Therefore, coordination will be required to plan, assess, and manage tourism development across different tenures. Any such developments would likely increase visitation to the adjacent areas of the park and the requirements and impacts will need to be considered early in the planning process and managed accordingly. The

department is working collaboratively with DPIRD, WA Museum, MWDC and Tourism WA to ensure seamless planning and management of tourism at the Abrolhos regardless of tenure.

Management objective: To ensure that commercial activities are compatible with the values of the park and the range of services, facilities, and experiences available to visitors are extended through the involvement of private enterprise.		
Management strategies 1. Ensure that any tourism development delivers a high-quality experience for visitors and avoids and minimises unacceptable impacts on the natural and cultural values of the park and the sense of place of the Abrolhos. 2. In collaboration with DPIRD, WA Museum, MWDC, Tourism WA and other key stakeholders identify and progress tourism development opportunities at the Abrolhos, across land tenures. 3. Following completion of the final plan, conduct a competitive process to ascertain commercial interest in tourism development at the Abrolhos and grant authorisation for any approved proposals in collaboration with DPIRD, WA Museum, MWDC and Tourism WA. 4. Plan for, assess and manage any tourism development in accordance with the factors outlined in this plan. 5. Refer tourism development proposals for assessment under the Environmental Protection Act and the EPBC Act, where relevant. 6. Assess and grant licences and leases for commercial operations according to departmental policy and ensure that operators demonstrate a commitment to protect and promote the park's values, behave appropriately and respectfully at sensitive sites, and conduct operations according to departmental policy and licence/lease conditions. 7. Include requirements in licences and leases to require operators to provide information to allow assessment and monitoring of the impacts of tourism activity and compliance with conditions as required. 8. Apply conditions to licences and leases to ensure accurate natural and cultural heritage information is provided to visitors and that visitation to sensitive sites is appropriate. 9. Apply landing fees to all charter/tour aircraft passengers, and all occupants of private aircraft, landing at airstrips in the park. 10. Monitor the impacts of tourism operations to ensure that any development maintains the sense of place and is broadly acceptable to the community. 11. Consider providing the opportunity for public comment on any commercial tourism development of a significant scale in the park.		
Key performance indicator		
Performance measure	**Target**	**Reporting**
Commercial operator compliance.	Commercial operator licence breaches and instances of non-compliance with specific park conditions does not increase over the life of the plan.	Annually

19. Community involvement

Involving park neighbours, relevant government agencies, key stakeholders and the wider community is an integral part of the department's operations. It increases the capacity to undertake works programs, research, and monitoring, and fosters communication links, sense of place and understanding within the community of the significant values of the park.

The fishing and aquaculture industries have created a vibrant community with a strong sense of stewardship at the Abrolhos Islands. This community has a keen interest in the management of the park. More broadly, there is also very strong interest in the management of the park by many in the Geraldton and wider community. Community groups, research and educational institutions, conservation groups, State and local government, industry groups, peak bodies, recreational groups, tour operators and volunteers have contributed to research on key values and management programs such as revegetation, weed control, flora and fauna surveys, rubbish collection and clean-ups. The department will continue to encourage the involvement of these groups wherever possible.

Management objective: Promote and facilitate community involvement in and support for the management of the park and increased community understanding and appreciation of its natural and cultural values.

Management strategies

1. Engage with the community, develop partnerships, collaborate with stakeholders, and provide and promote opportunities for involvement in the planning and management of the park to foster greater appreciation of its natural and cultural heritage values.
2. Continue to support volunteer involvement in management activities in the park.

MANAGING ECONOMIC AND RESOURCE USE VALUES

Economic and resource use value strategic objective

Minimise the impact of resource use and development on key values.

20. Commercial fishing and aquaculture

Commercial fishing for western rock lobster, saucer scallops, mackerel and demersal scalefish such as pink snapper and baldchin groper occurs in the FHPA adjacent to the park. Commercial fishers and aquaculture operators have camps and jetties on Reserve 20253 as part of their commercial activities (see *Management arrangements with Abrolhos Islands Bodies Corporate*).

The western rock lobster fishery is the largest single-species fishery in Australia and a world leader in its management. In 2016-17, the fishery contributed $505 million directly and indirectly to the Western Australian economy, and the fishery and processing combined contributed $39 million to Geraldton, accounting for 24% of the town's economy (Acil Allen Consulting 2017). Changes in the fishery over recent years has resulted in reduced occupation of fishing camps in Reserve 20253 by commercial rock lobster fishers.

A range of aquaculture leases operate within the FHPA, including western rock oysters, coral, seaweed, clams, sea cucumbers, sponges, sea urchins, cuttlefish, green algae and marine finfish (yellow tail kingfish). The 3000-hectare Midwest Aquaculture Development Zone has been established between

Fishing camps and jetties within Reserve 20253 are private property. There is no public access to these areas and facilities. Photo – Nathan Greenhill/DBCA

the Easter Group and the Pelsaert Group to encourage large-scale commercial aquaculture development in the area.

The department's *Corporate Policy Statement No. 39: Access for Commercial Fishing* addresses commercial fishers accessing the fishery through department-managed lands while protecting natural values, cultural heritage values, and visitor use.

Infrastructure associated with commercial rock lobster fishing and aquaculture operations is within the Bodies Corporate lease areas, in Reserve 20253. However, access to Reserve 20253 for Body Corporate members and contractors carrying out works associated with these operations is through the park. For example, the airstrips on Rat, East Wallabi and North islands (located in the park) are used by Body Corporate members for air access and Wallabi Group Body Corporate members use the East Wallabi Island jetty to access the airstrip from islands in Reserve 20253 (see *Abrolhos Islands Bodies Corporate*). Access through the park and use of the airstrips, jetties and other park facilities for rock lobster fishing and aquaculture operations and activities will continue to be permitted.

Management objectives: In collaboration with the industry and DPIRD, allow access for commercial fishing and aquaculture, in a manner that is consistent with maintaining the values of the park.
Ensure that park management, especially visitor use, does not impact on commercial fishing and aquaculture operations.

Management strategies

1. Allow access through the park and to park facilities, such as airstrips and jetties, for commercial fishing and aquaculture operations and activities, according to existing legislation and departmental policies.
2. Liaise with DPIRD to ensure commercial fishing and aquaculture activities are compatible with park values.

21. Utilities and services

There is a range of infrastructure in the park that provide essential services in and around the islands and waters of the Abrolhos.

Australian Marine Safety Authority maintain two lighthouses in the park. This one is on North Island. Photo – Isaac Hatch/DBCA

Lighthouses and aids to navigation

There are two lighthouses in the park, one on North Island and one at Wreck Point at the southern end of Pelsaert Island, which are managed by AMSA. Prior to the creation of the park, land containing these lighthouses were leased to AMSA by way of a lease issued by DPLH and management was via a Memorandum of Understanding between DPIRD and AMSA. Upon expiration of the lease, the land will become reserves gazetted under section 5(1)(h) of the CALM Act and managed under new CALM Act leases issued to AMSA, who will continue to be responsible for their maintenance and public liability risk.

In addition, Department of Transport (DoT) manages numerous Aids to Navigation at the Abrolhos, under the *Marine Navigational Aids Act 1973*. Most of these are in the FHPA, but there are 13 lights and beacons located on various islands within the park. DoT access these to undertake upgrades or maintenance.

Digital and telecommunications

The Abrolhos Islands are located more than 60km offshore and have limited digital and telecommunications coverage. Currently, communication between the Abrolhos and the mainland is limited to:

- marginal 3G/4G mobile reception,
- class license point-to-point and fixed wireless internet services provided to individual Body Corporate members through a Geraldton-based internet service provider and
- satellite internet services to individual Body Corporate members.

Communication between islands is also limited.

A guyed 40m communications tower on Rat Island is managed and maintained by Department of Fire and Emergency Services (DFES) and is used for emergency services communication

The department and DPIRD acknowledge the lack of adequate communication between islands and between the Abrolhos and the mainland and the constraints this creates for visitors, the commercial fishing and aquaculture industries and during emergency situations. The installation of small cell mobile phone towers will improve digital and telecommunications coverage at the Abrolhos in the short-term and emerging technologies are being investigated for broader coverage in the longer term. The department will collaborate with DPIRD and other relevant agencies and stakeholders to assess options for improving digital and telecommunications coverage at the Abrolhos and develop infrastructure where appropriate.

Rat Island supports large colonies of breeding seabirds every year between August and April. A significant number of bird-strikes and mortality occurs on the island when birds fly into the guy wires and the narrow mast of the existing communications tower. The department is part of a multi-agency, digital and telecommunications working group for the Abrolhos Islands considering existing and future communications infrastructure design, cost, maintenance requirements, the potential benefits to visitors, Bodies Corporate members, and other park users, and impacts on natural and cultural heritage values, especially seabirds.

Other utilities and services

The Bureau of Meteorology (BoM) maintains and manages an automatic weather station on North Island under a Master License issued by the department (these apply to weather stations across department-managed estate).

There is no broadscale power generation and distribution infrastructure in the park or across the Abrolhos Islands. Body Corporate members who occupy camps in Reserve 20253 generate their own power using solar/battery systems and generators. The department will establish similar systems at the proposed operations base on East Wallabi Island.

The provision of utilities and services in the park should, where feasible, be located within the footprints of existing utility and services infrastructure.

Management objective: To minimise the impacts of utilities on values of the park.

Management strategies

1. Ensure that appropriate departmental lease arrangements are in place for the provision of utilities and services in the park and that the operation and maintenance of these are in accordance with lease conditions or any relevant memoranda of understanding, including the responsible management of environmental issues (particularly minimizing impacts on nesting birds, the introduction and spread of introduced species, and visitor risk).
2. Liaise with relevant agencies about the maintenance and management of infrastructure for utilities and services.
3. Recommend that any new utilities and services be co-located with existing infrastructure, where practical.
4. In consultation with DFES, DPIRD and other relevant agencies, consider alternative options for the guyed tower on Rat Island and remove and replace if required.
5. In collaboration with DPIRD, investigate options to improve digital and telecommunication coverage across the Abrolhos, considering user needs, visual impact, and amenity.

22. Water resource use

Freshwater seeps and ponds are present on several islands in the park. Outside of the park, Body Corporate members use rainwater tanks to collect and supply water for their camps. Most of these are located within Reserve 20253, although there is one instance where a tank is marginally located in the park on North Island. The department will liaise with relevant Body Corporate members about relocating this back into Reserve 20253 or establishing a relevant CALM Act lease if appropriate (see *Utilities and services*). Body Corporate members will need to ensure their own water supply to camps and the use of water from freshwater seeps and ponds in the park will not be permitted.

Management objective: To minimise the impacts of water resource use on the values of the park.

Management strategy

1. Water extraction and use of freshwater seeps and ponds in the park as a water source will not be permitted.

23. Mineral and petroleum exploration and development

Mineral and petroleum exploration, extraction, and rehabilitation activities are regulated by other government agencies under legislation such as the Environmental Protection Act, *Mining Act 1978* (Mining Act), and state agreements. Petroleum (which includes oil, gas, and geothermal energy) exploration and production on state land and onshore waters is authorised under the *Petroleum and Geothermal Energy Resources Act 1967* (Petroleum Act). The Department of Mines, Industry Regulation and Safety (DMIRS) is the State's lead agency for related assessment and approvals under the Mining Act and the Petroleum Act and is a decision-making authority for non-state agreement projects under these Acts. Projects of state significance may be administered by the Department of Jobs, Tourism, Science and Innovation under project specific agreement acts.

Exploration and development proposals that may cause significant impact on key biodiversity values should be referred to the EPA for environmental impact assessment under the Environmental Protection Act. Applications to explore or mine within parks vested in the Conservation and Parks Commission may also be referred to the Minister for Environment as required under environmental, mining and petroleum legislation. Exploration actions that may have a significant impact on matters of national environmental significance may also require approval under the EPBC Act.

Petroleum exploration wells were established in the waters around the park and on Gun Island during the late 1960s and 1970s and one more recently in 2015. Oil and gas were found in these wells but not in commercially viable quantities. Currently, there are no petroleum or mineral exploration permits covering the park.

An oil well on Gun Island was drilled in 1968 and subsequently abandoned dry. Photo – Isaac Hatch/DBCA

Basic raw materials

Limestone, rock, sand, and coral rubble has been used for building construction in camps on Reserve 20253 and, in the past, has been sourced from areas now within the park. Moving basic raw material within and between islands is a biosecurity issue as there is a risk of transferring weeds and pest animals between islands. In addition, materials cannot be removed from archaeological sites protected under the MA Act. Where possible, basic raw materials for construction of park facilities will be sourced

from outside the park. Removal of basic raw material from the park will require authority under the CALM Regulations. There is also the potential for weeds and pest animals to be introduced to the Abrolhos Islands with material brought in from the mainland. Consequently, strict hygiene conditions will apply to departmental staff or contractors if there is a need to bring material in from the mainland or move it between islands (See *Biosecurity*). Any disturbed areas in the park where basic raw material has been removed should be rehabilitated where possible (see *Ecosystem rehabilitation*).

Management objective: To minimise the impacts of mineral and petroleum exploration and development, including basic raw material extraction on the values of the park

Management strategy

1. Refer or recommend the referral of exploration or development proposals, that may impact significantly on the values of the park, to the EPA for consideration under the Environmental Protection Act.
2. Preferentially source basic raw materials from outside the park and ensure material sourced from the mainland is free of weeds, pest animals and diseases so these are not introduced to the park.
3. Ensure that any basic raw materials extracted within the park are authorised under the CALM Regulations.

RESEARCH AND MONITORING

Research and monitoring strategic objective

Enhance understanding of the values of the park, in collaboration with research partners, to guide, adapt and improve management.

Research

Research and monitoring are essential components of management and are required to successfully implement this plan. Research leads to improved knowledge and a better understanding of the values of the planning area. Well-designed research and effective monitoring are an essential component of adaptive management.

Over the past 100 years, a large amount of research has been carried out at the Abrolhos. To date, research carried out on the values of the park has included:

- the formation and geology of the Abrolhos carbonate platforms
- over 30 years of research into seabirds and shorebirds of the Abrolhos Islands, their population dynamics, breeding, and other aspects of their ecology
- surveys to determine the presence and patterns of particular fauna species, such as the Abrolhos painted button-quail, and groups such as reptiles
- mapping of vegetation communities of the Abrolhos Islands

DBCA staff surveying the pavement limestone and sand dune vegetation community at East Wallabi Island. Photo – Beth Chapple/DBCA

- over 50 years of maritime archaeological survey and research of several internationally significant shipwrecks
- cultural heritage research associated with the guano mining industry and
- social research investigating patterns and impacts of visitor and other human usage.

There are still many gaps in knowledge and understanding of the park. Through the implementation of this plan, the department will collaborate with other agencies, universities, and other research organisations to address these gaps, with a focus on those with the highest priority for research. Research that is strategic and informs and improves management of the park will be prioritised. Currently gaps in knowledge where further research is required includes (but is not limited to):

- Abundance, dispersal and taxonomy of Abrolhos painted button-quail and impacts of predation by and competition with the house mouse.
- Breeding seabirds (lesser noddy and brown noddy) and burrowing seabirds.
- Assessing the health of mangroves at seabird breeding sites.
- Identification of efficient techniques for monitoring the impacts of visitation, climate change and other threats on other conservation significant fauna.
- Developing surveillance and monitoring techniques for identifying introductions of high-risk weeds and pest animals.

Monitoring

Long-term monitoring should inform adaptive management and performance assessment against the objectives of the management plan (see *Performance assessment*). Monitoring should also include measurement of pressures so that the condition of the value can be linked to impacts from natural or human influences. Linking cause-effect relationships is a key requirement of effective monitoring and is needed for evidence-based adaptive management. If there are declines in key values then knowing why (natural variation, climate change or local human pressures) will assist in determining whether a management response will be effective in mitigating the impact.

Research and monitoring are important components in making informed decisions to achieve best practice environmental management and in determining the success of this plan. With multiple land managers in the area, this will require integration, coordination and information sharing between the department, other government agencies, research organisations and other relevant stakeholders. Other organisations may be able to help in the facilitation of this data sharing and research communication between the department and other stakeholders.

Management objective:

To increase knowledge and understanding of park values and management issues to inform and improve management.

Management strategies

1. In collaboration with DBCA Biodiversity and Conservation Science, other government agencies, research organisations and stakeholders, develop and implement a research and monitoring plan that:
   - provides for the implementation of research priorities
   - standardises data collection methods and mapping to help with identifying trends
   - specifies outcome-based evaluation methods
   - uses appropriate control sites and communicates the outcomes of high priority research projects to other government agencies, organisations and stakeholders.

2. Work with other agencies, universities, and research organisations, to facilitate greater sharing of information about the park and to relevant centralised databases or data platforms where appropriate.
3. Develop partnerships and programs with universities other external researchers and research organisations to encourage research projects that fill priority knowledge gaps.

Key performance indicator		
Performance measure	**Target**	**Reporting**
Research and monitoring plan	Research and monitoring plan is prepared and implemented.	After 5 years

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GLOSSARY

Term, acronym, or abbreviation	Definition or term in full
Abrolhos Islands	Houtman Abrolhos Islands (all the islands comprising both Houtman Abrolhos Islands National Park and Class A reserve 20253)
Abrolhos	Houtman Abrolhos (lands and State waters)
Body Corporate or Bodies Corporate	Abrolhos Islands Bodies Corporate which is comprise of four Body Corporate group. Throughout the plan, Body Corporate members are also referred to.
Biodiversity Conservation Act	*Biodiversity Conservation Act 2016*
CALM Act	*Conservation and Land Management Act 1984*
CoGG	City of Greater Geraldton
The department	Department of Biodiversity, Conservation and Attractions
DPIRD	Department of Primary Industries and Regional Development
EPBC Act	*Commonwealth Environment Protection and Biodiversity Conservation Act 1999*
FHPA	Fish Habitat Protection Area
FRM Act	*Fish Resources Management Act 1994*
MA Act	*Maritime Archaeology Act 1973*
Mid West Region	Mid West Region of Western Australian as defined in the *Regional Development Commissions Act 1993*
Midwest Region	Department of Biodiversity, Conservation and Attractions Midwest Region
MWDC	Mid West Development Commission
The plan/this plan	Houtman Abrolhos Islands National Park draft management plan 2021
The park	Houtman Abrolhos Islands National Park
The reserve	Class A reserve 20253, vested in the Minister for Fisheries
Tourism WA	Tourism Western Australia
UCH Act	Commonwealth *Underwater Cultural Heritage Act 2018*
WA Museum	Western Australian Museum

APPENDICES

Appendix 1. Names and areas of islands in the park

Island Group	Island sub-group	Island Name	Previous name/s	Area (ha)[17]
Wallabi		Akerstrom	Mangrove	1.161
Wallabi		Barge Rock		0.13
Wallabi		Beacon	Batavia's Graveyard, Goss Monument	3.488[18]
Wallabi		Dakin		0.7
Wallabi		Dick	Dicks, Goss	2.997
Wallabi		East Wallabi		324.199[19]
Wallabi		Eastern		2.253
Wallabi		Far		0.156
Wallabi		First Sister	Lagoon, Three Sisters	0.313
Wallabi		Hall		0.034
Wallabi		Long	Seal	9.683
Wallabi		Marinula		0.2
Wallabi		North Island		0.204
Wallabi		North Island		169.572
Wallabi		Oystercatcher		4.745
Wallabi		Pelican		0.299
Wallabi		Plover		0.263
Wallabi		Saville-Kent		0.371
Wallabi		Seagull		7.416
Wallabi		Seal		0.825
Wallabi		Second Sister	Three Sisters	0.006
Wallabi		Shag Rock		0.112
Wallabi		'Shag Rock' (west of North Island)		0.0211
Wallabi		Tattler		0.717
Wallabi		Third Sister	Three Sisters	0.095
Wallabi		Traitors		0.065
Wallabi		Turnstone		1.282
Wallabi		Unnamed 1		0.004

[17] The area of the park is accurate as of December 2018 based on the Cadastral Boundary Data derived from the Spatial Cadastral Database and data provided to Landgate during the park creation process. Landgate provides an updated version of the State cadastre every quarter, so there may be very slight differences between the December 2018 park boundary and area and the most recent version. As the boundary of the park is at high water mark (defined as, "*ordinary high water mark at spring tides*" under the *Land Administration Act 1997*), it is likely that there will be small discrepancies between the boundary shown in this management plan and the most recent version of the State cadastre. Any significant discrepancies detected over the life of the plan will be reported to and discussed with Landgate, to refine the park boundary.

[18] Beacon Island comprises three land parcels: the island itself, the curtilage over the water which accommodates the jetty and the intertidal area between high and low water marks, adjacent to the jetty curtilage.

[19] East Wallabi Islands comprises three land parcels: the island itself, the curtilage over the water which accommodates the jetty and the intertidal area between high and low water marks, adjacent to the jetty curtilage.

Island Group	Island sub-group	Island Name	Previous name/s	Area (ha)[17]
Wallabi		Unnamed 2		0.084
Wallabi		Unnamed 3		0.043
Wallabi		Unnamed 4		0.083
Wallabi		Unnamed 5		0.006
Wallabi		Unnamed 6		0.002
Wallabi		Unnamed 7		0.001
Wallabi		Unnamed 8		0.007
Wallabi		Unnamed 9		0.036
Wallabi		Unnamed 10		0.035
Wallabi		Unnamed 11		0.077
Wallabi		Unnamed 12		0.003
Wallabi		Unnamed 13		0.001
Wallabi		Unnamed 14		0.007
Wallabi		Unnamed 15		0.003
Wallabi		Unnamed 16		0.002
Wallabi		Unnamed 17		0.037
Wallabi		Unnamed 18		0.01
Wallabi		Unnamed 19		0.0001
Wallabi		Unnamed 20		0.028
Wallabi		Unnamed 21		0.0001
Wallabi		Unnamed 22		0.012
Wallabi		Unnamed 23		0.003
Wallabi		Unnamed 24		0.008
Wallabi		Unnamed 25		0.015
Wallabi		Unnamed 26		0.027
Wallabi		Unnamed 27		0.012
Wallabi		Unnamed 28		0.008
Wallabi		Unnamed 110		0.013
Wallabi		Wann	Small Islet	0.072
Wallabi		West Wallabi		616.904
Easter		Alexander		12.604
Easter	Eastern	Bynoe		3.202
Easter		Campbell		9.565
Easter		Crake	Beacon, Dingville, Stick	0.174
Easter		Disappearing		0.08
Easter		Dry	Beacon, Dingville, Stick	1.38
Easter		Gibson		0.17
Easter		Gilbert		2.162
Easter	Eastern	Helms		1.284
Easter	Eastern	Joe Smith		0.25
Easter		Keru		4.111
Easter	Eastern	Leo Island		22.062
Easter	Eastern	Little North		3.694
Easter		Little Roma		0.081
Easter		Morley		11.191
Easter		Rat		55.029
Easter		Sandy		1.374

Island Group	Island sub-group	Island Name	Previous name/s	Area (ha)[17]
Easter		Serventy		12.999
Easter		Shearwater		0.239
Easter	Eastern	Stokes	White	4.248
Easter		Suomi		19.758
Easter	Eastern	Tapani		0.755
Easter	Eastern	unnamed 29		0.108
Easter	Eastern	unnamed 30		1.928
Easter	Eastern	unnamed 31		0.06
Easter	Eastern	Unnamed 32		0.068
Easter	Eastern	Unnamed 33		0.014
Easter	Eastern	Unnamed 34		0.024
Easter	Eastern	unnamed 35		0.02
Easter	Eastern	Unnamed 36		0.023
Easter	Eastern	Unnamed 37		0.106
Easter	Eastern	unnamed 38		0.008
Easter	Eastern	unnamed 39		0.052
Easter	Eastern	unnamed 40		0.005
Easter	Eastern	Unnamed 41		0.043
Easter	Eastern	unnamed 42		0.009
Easter	Eastern	unnamed 43		0.252
Easter	Eastern	unnamed 44		0.055
Easter	Eastern	unnamed 45		0.033
Easter	Eastern	unnamed 46		0.028
Easter	Eastern	unnamed 47		0.118
Easter	Eastern	unnamed 48		0.335
Easter	Eastern	unnamed 49		0.294
Easter		Unnamed 50		0.064
Easter		Unnamed 51		0.058
Easter		Unnamed 52		0.053
Easter		Unnamed 53		0.018
Easter		Unnamed 54		0.0003
Easter		Unnamed 55		0.168
Easter		Unnamed 56		0.376
Easter		Unnamed 57		0.004
Easter		Unnamed 58		0.012
Easter		Unnamed 59		0.061
Easter		Unnamed 60		0.152
Easter		Unnamed 61		0.004
Easter		Unnamed 62		0.002
Easter		Unnamed 63		0.257
Easter		Unnamed 64		0.067
Easter		Unnamed 65		0.006
Easter		Unnamed 66		0.053
Easter		Unnamed 67		0.542
Easter		Unnamed 68		0.418
Easter		Unnamed 69		0.002
Easter		Unnamed 70		0.003

Island Group	Island sub-group	Island Name	Previous name/s	Area (ha)[17]
Easter		Unnamed 71		0.006
Easter		Unnamed 72		0.004
Easter		Unnamed 73		0.0003
Easter		Unnamed 74		0.02
Easter		Unnamed 75		0.005
Easter	Eastern	Unnamed 76		0.015
Easter	Eastern	Unnamed 77		0.004
Easter		Unnamed 78		0.002
Easter		Unnamed 79		0.013
Easter		White Bank		0.319
Easter	Eastern	White Island		6.901
Easter		Wooded		18.709
Pelsaert	Numbered	1 Island		1.702
Pelsaert	Numbered	2 Island		0.285
Pelsaert	Numbered	3 Island		1.574
Pelsaert	Numbered	7 Island		0.424
Pelsaert	Numbered	8 Island		0.548
Pelsaert	Mangrove	Arthur		0.56
Pelsaert	Mangrove	Burton	Mistakenly called Coronation on older maps	1.389
Pelsaert	Mangrove	Davis Island	4	1.843
Pelsaert	Mangrove	Diver		0.234
Pelsaert	Mangrove	Gaze		0.649
Pelsaert	Mangrove	Gregory		0.856
Pelsaert		Gun		18.341
Pelsaert		Hummock Island		3.091
Pelsaert	Mangrove	Iris Refuge		0.095
Pelsaert	Mangrove	Jon Jim		0.373
Pelsaert	Mangrove	Lagoon		0.567
Pelsaert	Mangrove	Middle		21.44
Pelsaert	Mangrove	Murray		4.145
Pelsaert	Mangrove	Newman		4.928
Pelsaert	Mangrove	Pelsaert		146.134
Pelsaert	Mangrove	Pelsaert Lighthouse		0.096
Pelsaert		Sandy	Graveyard, Disappearing	0.168
Pelsaert	Numbered	Sid Liddon	6	0.837
Pelsaert	Mangrove	Square		0.72
Pelsaert	Mangrove	Stick	Jubilee	2.271
Pelsaert	Numbered	Sweet Island	5	2.065
Pelsaert	Mangrove	Travia		0.295
Pelsaert	The Coral Patches	Unnamed 80		0.043
Pelsaert	The Coral Patches	Unnamed 81		0.036
Pelsaert	The Coral Patches	Unnamed 82		0.012

Island Group	Island sub-group	Island Name	Previous name/s	Area (ha)[17]
Pelsaert	The Coral Patches	Unnamed 83		0.009
Pelsaert	The Coral Patches	Unnamed 84		0.117
Pelsaert	The Coral Patches	Unnamed 85		0.356
Pelsaert	The Coral Patches	Unnamed 86		0.018
Pelsaert	The Coral Patches	Unnamed 87		0.013
Pelsaert	Mangrove	Unnamed 88		0.009
Pelsaert	Mangrove	Unnamed 89		0.013
Pelsaert	Mangrove	Unnamed 90		0.02
Pelsaert	Mangrove	Unnamed 91		0.006
Pelsaert	Mangrove	Unnamed 92		0.008
Pelsaert	Mangrove	Unnamed 93		0.005
Pelsaert	Mangrove	Unnamed 94		0.002
Pelsaert	Mangrove	Unnamed 95		0.016
Pelsaert	Mangrove	Unnamed 96		0.151
Pelsaert	Mangrove	Unnamed 97		0.065
Pelsaert	Mangrove	Unnamed 98		0.22
Pelsaert	Mangrove	Unnamed 99		0.019
Pelsaert	Mangrove	Unnamed 100		0.014
Pelsaert	Mangrove	Unnamed 101		0.005
Pelsaert	Mangrove	Unnamed 102		0.067
Pelsaert	Mangrove	Unnamed 103		0.039
Pelsaert	Mangrove	Unnamed 104		0.042
Pelsaert	Mangrove	Unnamed 105		0.053
Pelsaert	Mangrove	Unnamed 106		0.004
Pelsaert	Mangrove	Unnamed 107		0.02
Pelsaert	Mangrove	Unnamed 108		0.119
Pelsaert	Numbered	Unnamed 109	Mangrove	0.056
Total		189 islands		1564.3509

Appendix 2. Value rich islands and their management

Island Group	Island[20]	Values	Management approach
Wallabi	North*	• Significant vegetation communities • Abrolhos painted button-quail	• Defined pedestrian access (boardwalk and/or walk trail). • Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines and interpretation products and experiences. • Consideration of tourism developments only where there are minimal impacts to the natural and cultural heritage values, in particular value-rich islands or where impacts can be mitigated.
	West Wallabi*	• Significant vegetation communities • Abrolhos painted button-quail • Seabird nesting • Migratory shorebirds • Tammar wallaby • Carpet python • Maritime heritage (National heritage listed)	• Defined pedestrian access (boardwalk and/or walk trail). • Seasonal restricted visitor access to seabird nesting areas during breeding season. • Implement biosecurity protocols. • Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines and interpretation products and experiences. • Consideration of tourism developments only where there are minimal impacts to the natural and cultural heritage values, in particular value-rich islands or where impacts can be mitigated.
Wallabi (cont')	East Wallabi*	• Significant vegetation communities • Abrolhos painted button-quail	• Defined pedestrian access (boardwalk, beach or walk trail). • Implement biosecurity protocols.

[20] Islands marked with * (and highlighted in green) are value rich and have important visitor use values. The broad strategies presented throughout the plan to mimimise the impacts of visitation to the values of these islands are outlined under *Management approach*.

Island Group	Island[20]	Values	Management approach
		• Seabird nesting • Migratory shorebirds • Tammar wallaby • Maritime heritage (National heritage listed)	• Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines and interpretation products and experiences. • Medium infrastructure development (shade shelters and toilets at Turtle Bay, shelter, and toilets at airstrip and DBCA operations base).
	Beacon*	• Maritime heritage (National heritage listed)	• Defined pedestrian access (boardwalk, beach or walk trail). • Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines and interpretation products and experiences. • Monitor visitor numbers and impacts and consider changes to management if damage to maritime heritage values occur.
	Long*	• Maritime heritage (National heritage listed)	• Defined pedestrian access (boardwalk, beach or walk trail). • Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines and interpretation products and experiences.
	Dick	• Seabird nesting	• Visitor access not promoted over the life of the plan. • Seasonal restricted access to seabird nesting areas during breeding season.
Easter	Wooded*	• Seabird nesting • Sea lion pupping	• Seasonal restricted visitor access to seabird nesting and sea lion pupping areas during breeding season.

Island Group	Island[20]	Values	Management approach
		• Mangroves	• Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines and interpretation products and experiences. • Limited infrastructure development.
	Morley*	• Seabird nesting • Sea lion pupping • Mangroves	• Defined pedestrian access (boardwalk, beach or walk trail). • Seasonal restricted visitor access to seabird nesting and sea lion pupping areas during breeding season. • Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines and interpretation products and experiences.
	Leo*	• Significant vegetation communities • Seabird nesting • Sea lion pupping • Mangroves	• Defined pedestrian access (boardwalk, beach or walk trail). • Seasonal restricted visitor access to seabird nesting and sea lion pupping areas during breeding season. • Implement biosecurity protocols. • Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines and interpretation products and experiences. • Consideration of tourism developments only where there are minimal impacts to the natural and cultural heritage values, in particular value-rich islands or where impacts can be mitigated.

Island Group	Island[20]	Values	Management approach
	White Bank*	• Sea lion pupping	• Seasonal restricted visitor access to sea lion pupping areas during breeding season. • Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines and interpretation products and experiences.
	Little North	• Seabird nesting	• Visitor access not promoted over the life of the plan. • Seasonal restricted visitor access to seabird nesting during breeding season.
	Gilbert	• Sea lion pupping	• Visitor access not promoted over the life of the plan. • Seasonal restricted visitor access to sea lion pupping areas during breeding season.
	Alexander	• Sea lion pupping • Mangroves	• Visitor access not promoted over the life of the plan. • Seasonal restricted visitor access to sea lion pupping areas during breeding season.
	Serventy	• Sea lion pupping • Mangroves	• Visitor access not promoted over the life of the plan. • Seasonal restricted visitor access to sea lion pupping areas during breeding season.
	Campbell	• Seabird nesting • Sea lion pupping • Mangroves	• Visitor access not promoted over the life of the plan. • Seasonal restricted visitor access to seabird nesting and sea lion pupping areas during breeding season.
	Suomi	• Seabird nesting • Sea lion pupping • Mangroves	• Visitor access not promoted over the life of the plan. • Seasonal restricted visitor access to seabird nesting and sea lion pupping areas during breeding season.
	Keru	• Sea lion pupping • Mangroves	• Visitor access not promoted over the life of the plan.

Island Group	Island[20]	Values	Management approach
			• Seasonal restricted visitor access to sea lion pupping areas during breeding season.
	Stokes	• Sea lion pupping	• Visitor access not promoted over the life of the plan. • Seasonal restricted visitor access to sea lion pupping areas during breeding season.
	Helms	• Sea lion pupping	• Visitor access not promoted over the life of the plan. • Seasonal restricted visitor access to sea lion pupping areas during breeding season.
	Bynoe	• Sea lion pupping	• Visitor access not promoted over the life of the plan. • Seasonal restricted visitor access to sea lion pupping areas during breeding season.
	White	• Seabird nesting • Sea lion pupping	• Visitor access not promoted over the life of the plan. • Seasonal restricted visitor access to seabird nesting and sea lion pupping areas during breeding season.
Pelsaert	Pelsaert*	• Seabird nesting • Migratory shorebirds • Mangroves	• Defined pedestrian access (boardwalk, beach or walk trail). • Seasonal restricted visitor access to seabird nesting areas during breeding season. • Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines and interpretation products and experiences. • Camping at northern end only.
	Gun*	• Seabird nesting • Sea lion pupping • Maritime heritage (National heritage listed)	• Defined pedestrian access (boardwalk, beach or walk trail). • Seasonal restricted visitor access to seabird nesting and sea lion pupping areas during breeding season.

Island Group	Island[20]	Values	Management approach
			• Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines and interpretation products and experiences. • Monitor visitor numbers and impacts and consider changes to management if damage to maritime heritage values occur.
	Murray	• Seabird nesting • Maritime heritage (National heritage listed)	• Visitor access not promoted over the life of the plan. • Seasonal restricted visitor access to seabird nesting during breeding season.
	Middle	• Seabird nesting • Maritime heritage (National heritage listed)	• Visitor access not promoted over the life of the plan. • Seasonal restricted visitor access to seabird nesting during breeding season.
	Stick	• Sea lion pupping	• Visitor access not promoted over the life of the plan. • Seasonal restricted visitor access to sea lion pupping areas during breeding season.
	Square	• Sea lion pupping	• Visitor access not promoted over the life of the plan. • Seasonal restricted visitor access to sea lion pupping areas during breeding season.

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