GOVERNMENT OF WESTERN AUSTRALIA

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SECURING 5 MILLION HECTARES OVER 5 YEARS

Houtman Abrolhos Islands National Park

management plan 97

2022

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 maintaining the unique Abrolhos habitats and 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 Mid West Region of Western Australia. The area covered by the *Houtman Abrolhos Islands National Park management plan 2022* (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, the surrounding waters and coral reef of the *Houtman Abrolhos* (the Abrolhos). Despite their low-lying and partly 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 the cultural heritage values
- managing the visitor use and community values
- managing resource use
- 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 (DBCA, 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 Commonwealth and State 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*).

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

[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.

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. The Tammar wallaby (*Notamacropus eugenii derbianus*) is 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.

The management plan identifies priority islands for management where particularly important natural and cultural heritage values exist and where visitation is high. The prescribed management direction for these islands will ensure the protection of these values, especially in relation to visitor access and improving visitor awareness of their importance.

Managing cultural heritage values

The park contains significant cultural heritage values, being the location of several shipwreck survivor camps associated with internationally significant shipwrecks, including 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 historic sites and values, including the Batavia National Heritage Listed sites, and interpreting these for visitors. This plan outlines strategies to ensure that the department meets its obligations associated with the protection of these significant cultural heritage values. The plan identifies islands in the park 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.

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

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 overall visitation is low because the park is only accessible via recreational boat, charter flight or commercial tour (either on a boat or aircraft). Visitation is highly seasonal in nature, peaking between February and May. 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, recreational fishing, diving, snorkelling, and surfing). The focus of visitor management in the park will be to enhance these experiences, and to minimise the impacts of visitation on the natural and cultural values.

As well as protecting and enhancing the islands' natural and cultural heritage values, a key Government intent in the creation of the park is the encouragement of investment in tourism development and opportunities at the Abrolhos. 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 nature-based 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, Mid West Development Commission (MWDC) and Tourism Western Australia (Tourism WA) will be essential to ensure seamless planning and management of tourism at the Abrolhos, regardless of tenure.

The department also recognises that the creation of the national park, the provision of visitor facilities and the opportunities for tourism development represents a shift in use for the Abrolhos Islands. As a result of these changes, visitation to the park and the Abrolhos more broadly is likely to increase. Whilst the seasonal nature of visitation is likely to continue, increases to visitor numbers outside of the peak periods is also likely, at times when seabirds are breeding and particularly vulnerable to human disturbance. Some of the priority islands for management represent these critical locations that are important habitat for breeding seabirds yet are also islands where visitor use is a focus, thus increasing the risk of disturbance. Therefore, this plan outlines a range of approaches to managing these conflicting uses and values to ensure the protection of these natural values, including through visitor education and interpretation, seasonal access restrictions, biosecurity management, the appropriate design and location of visitor facilities and nature-based tourism developments that considers impacts to natural and cultural heritage values and adaptive management.

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 future development of appropriate visitor infrastructure at North, West Wallabi, Rat, Leo, Morley, Wooded, Pelsaert and Gun islands. Visitor facilities will aim to enhance visitor experiences and, where required, be developed to protect natural and cultural values from the impacts of visitation. 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. Until then, visitation to these islands will not be encouraged or promoted over the life of the plan.

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.

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1. Planning area

This plan covers all 184 unoccupied islands and parts of five occupied islands of the park[2], comprising 189 islands and 1564 hectares, vested in the Conservation and Parks Commission for the purpose of "national park" (see *Appendix 1 – Names and areas of islands in the park, 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[3] 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 *16. Visitor access – boat access*).

Other islands of the Abrolhos, not covered by this plan, are a Class A reserve[4] (Abrolhos Reserve), 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 the Abrolhos Reserve is leased and occupied by commercial rock lobster fishers and aquaculture operators. The Abrolhos Reserve 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 Abrolhos Reserve: 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 the Abrolhos Reserve 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 *Conservation and Land Management Act 1984* (CALM Act) for the purpose of "lighthouse" (see *21. 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, recreation and tourism 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.

[2] Reserve 53379
[3] The department will be responsible for the management of the public jetties in the park, under licence from Department of Transport (DoT) to ensure safety and maintenance standards and that there is no interference with navigation.
[4] Reserve 20253

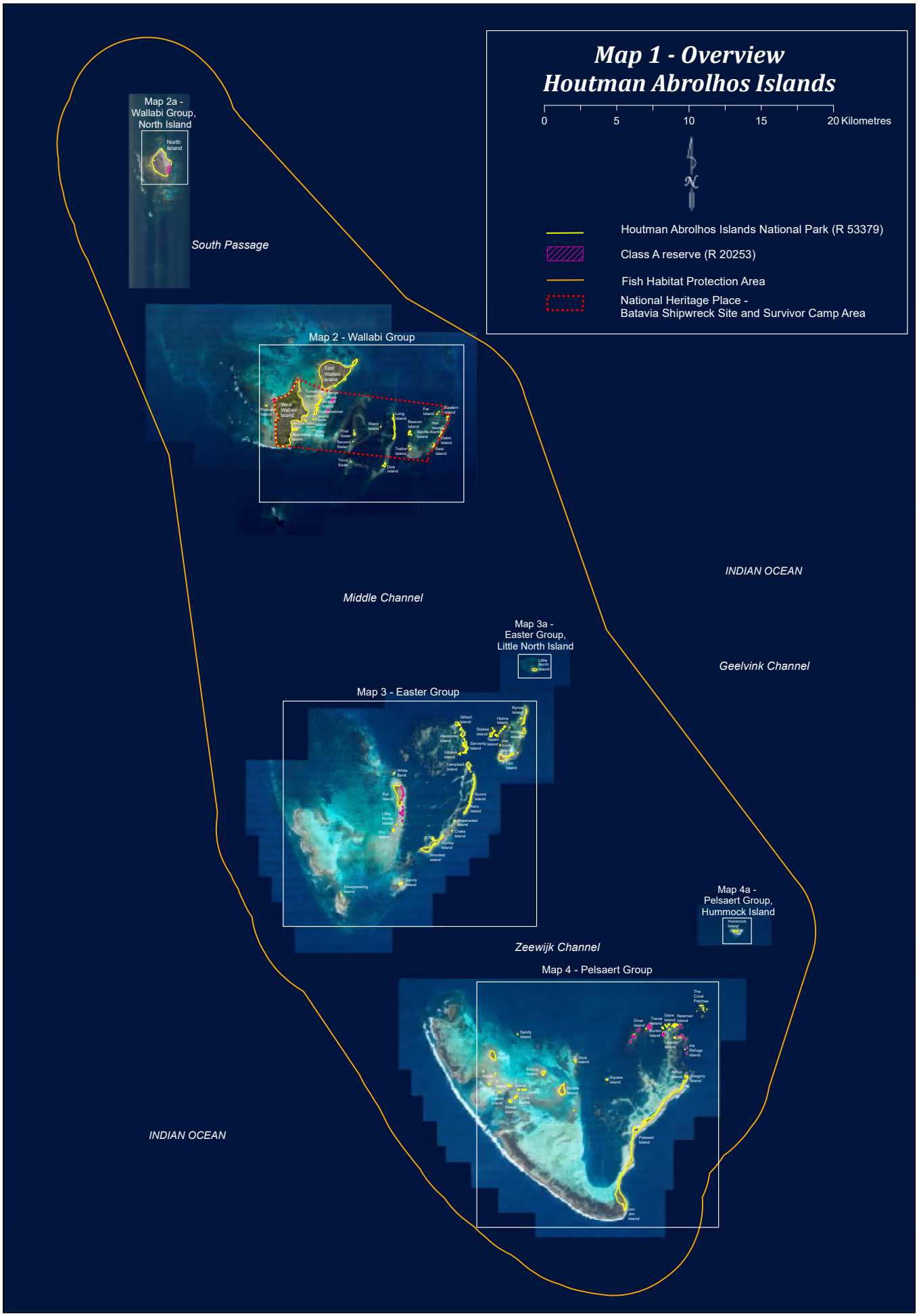
Table 1. Summary of key values, issues, and opportunities

Values	Management issues	Opportunities
Natural		
• Nationally and internationally significant populations of seabirds. • Only nesting site for endangered Australian lesser noddy. • Habitat for migratory shorebirds. • Important area for Australian sea lion haulout and breeding. • Endemic animals including the Abrolhos painted button-quail, Houtman Abrolhos spiny-tailed skink and Abrolhos dwarf bearded dragon. • 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 nesting, shorebird roosting and feeding 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 a greater management presence and framework to enhance protection to threatened seabirds, shorebirds and marine raptors. • In collaboration with DPIRD, introduce biosecurity management across the park and Abrolhos Reserve to minimise the risk of the introduction and spread of weeds and pest animals across the Abrolhos Islands. • Research and monitoring of the values to increase understanding and 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,	• Impacts on maritime archaeological sites from human disturbance. • Providing visitor access to cultural heritage without impacting these values.	• Further research associated with maritime archaeological sites. • Potential for new discoveries of Aboriginal, maritime and other cultural heritage. • 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.

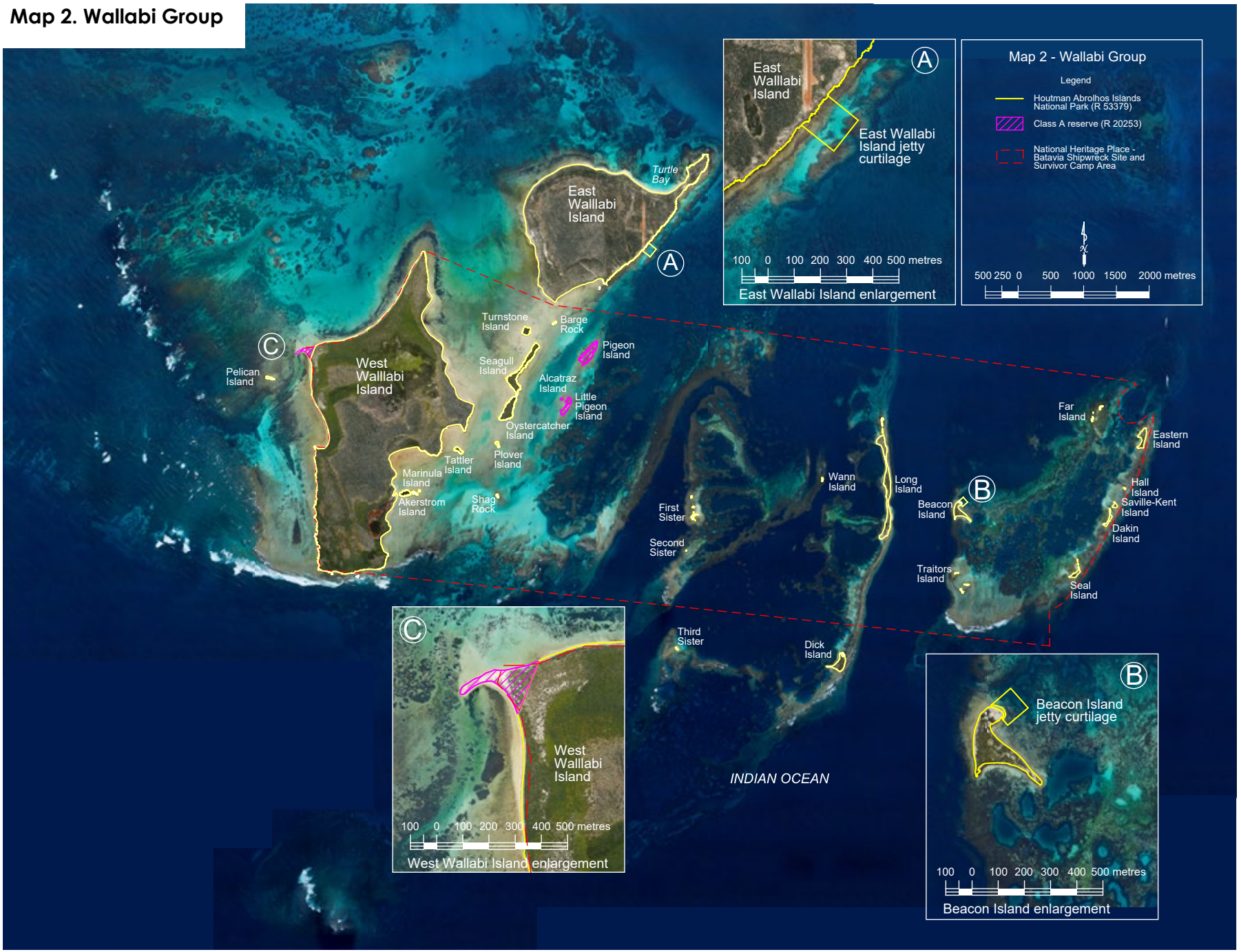
Values	Management issues	Opportunities
contributing to the unique identity and sense of place of the Abrolhos.		• Tourism and commercial opportunities associated with cultural heritage values. • Provide and manage visitor access to protect values.
Visitor use and community		
• Visitors are attracted to the park's remoteness, natural and cultural heritage values, and unique sense of place. • A range of cultural and nature-based visitor experiences. • 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 seabirds 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 that considers protection of natural and cultural heritage values. • 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, Mid West, 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.

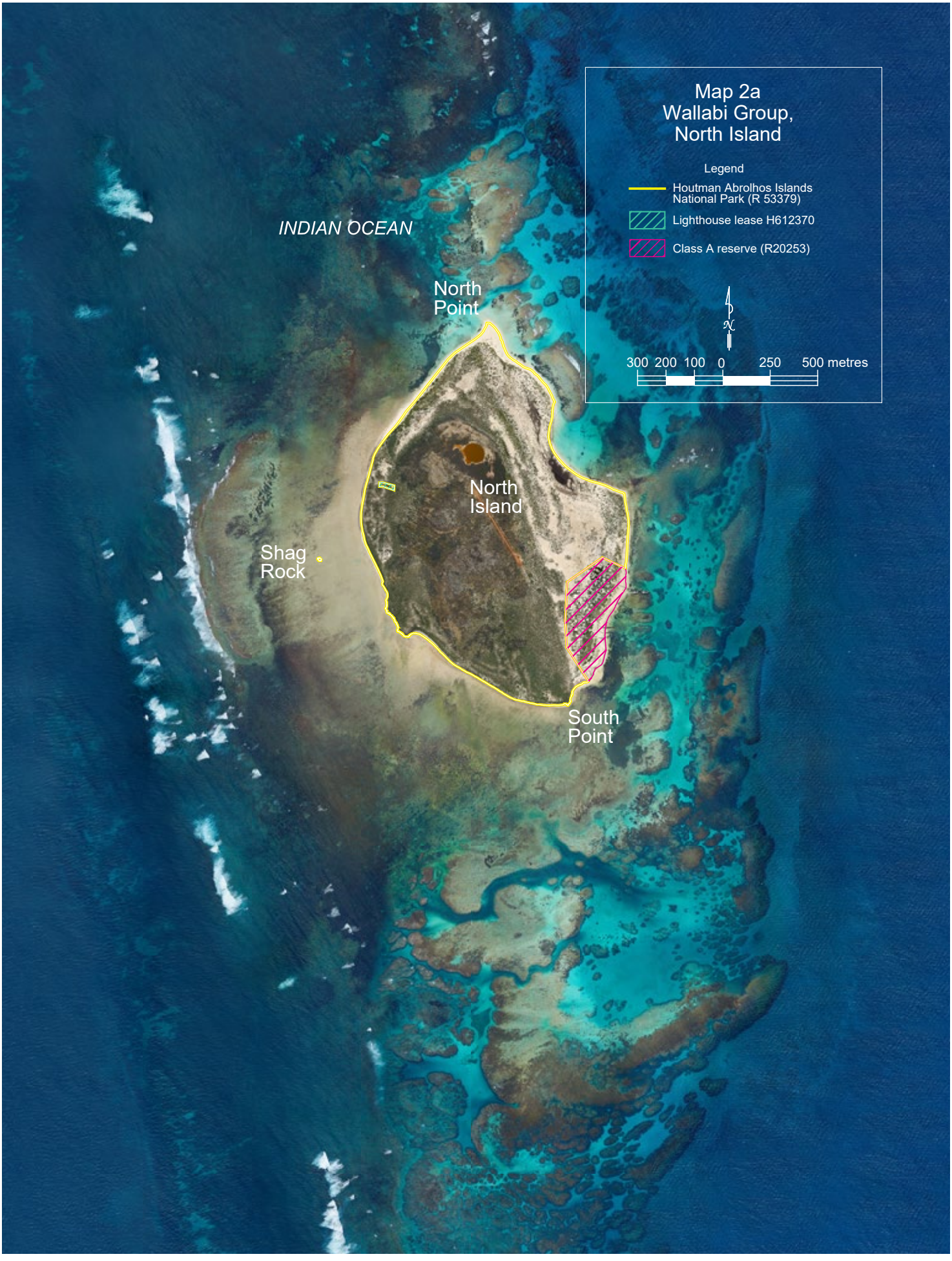
Map 1. Houtman Abrolhos Islands National Park overview



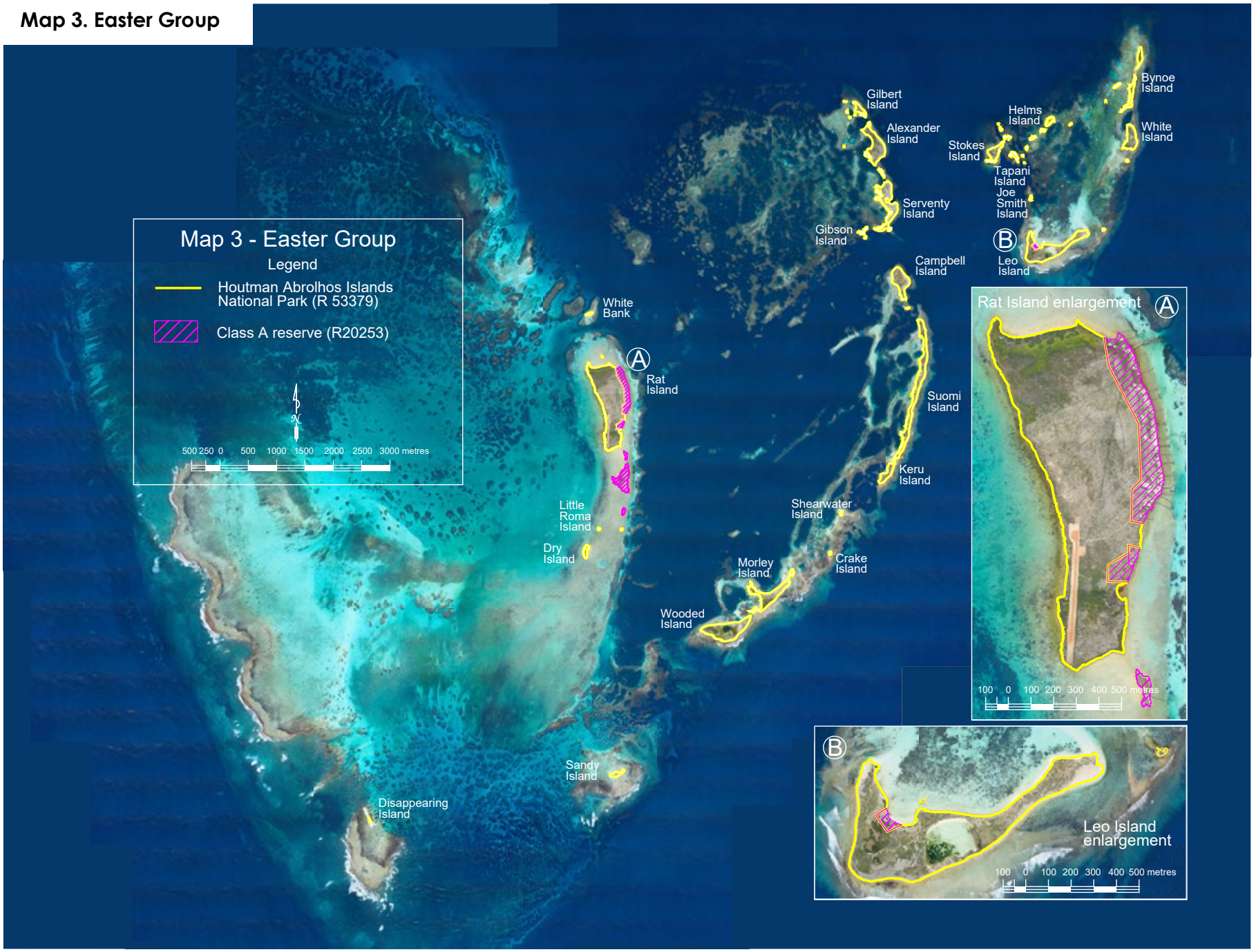
Map 2. Wallabi Group



Map 2a. Wallabi Group, North Island



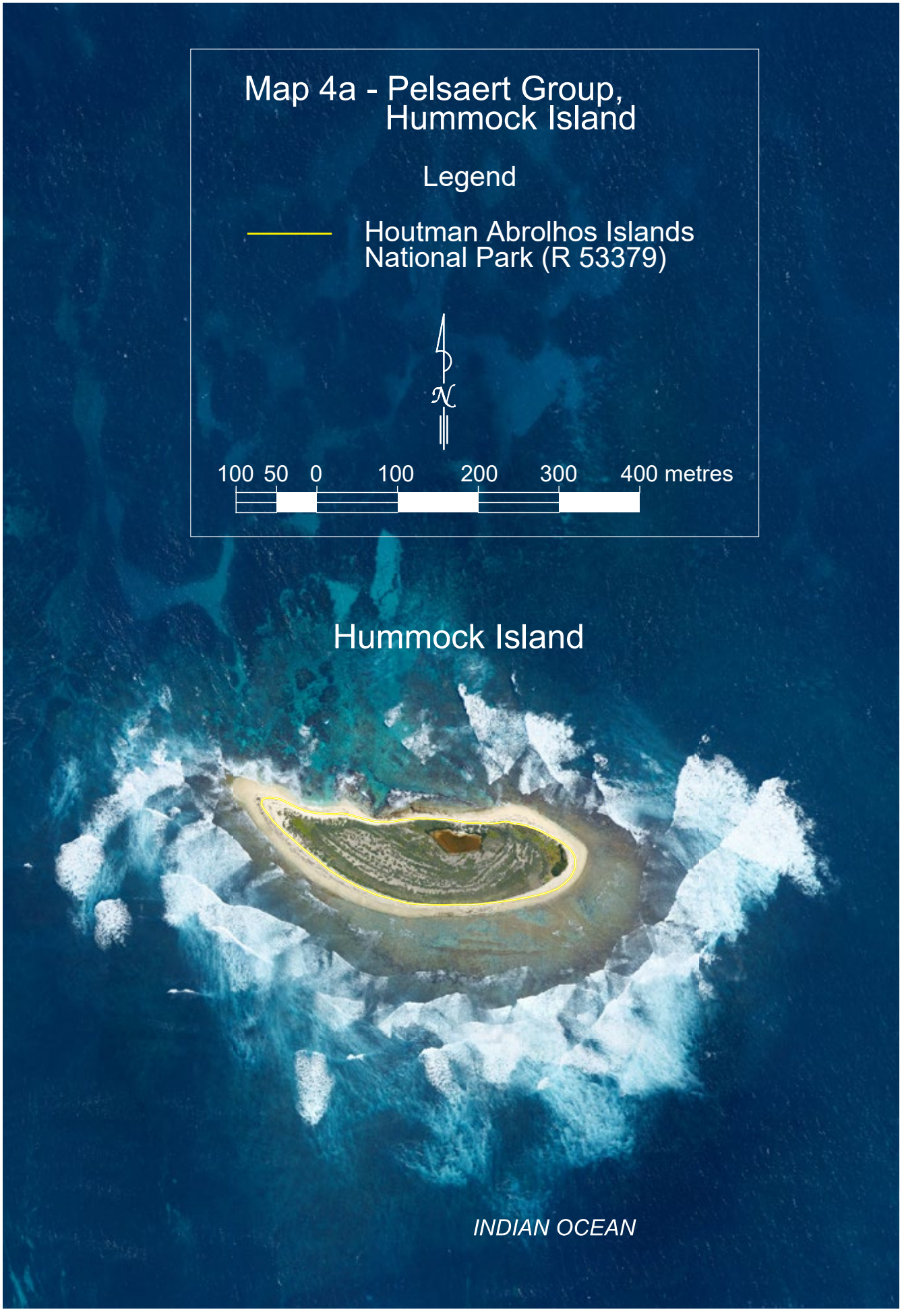
Map 3. Easter Group



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[5] 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 Region office in Geraldton is responsible for the 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. A team of operational and ranger staff carry out day-to-day management and operations in the park and are responsible for:

- managing issues outlined in this management plan, (for example, weed and pest animal control, threatened fauna management and scientific research)
- visitor use site planning, design, construction and maintenance
- liaising with visitors and park users and providing education about park values, and appropriate behaviour
- collaborating with other government agencies with responsibilities at the Abrolhos, park neighbours, other stakeholders and the public
- enforcement and compliance activities.

Operational and ranger staff also use a dedicated boat to service the park, conduct patrols and carry out management activities across the islands. An operations base to accommodate staff and rangers is located on East Wallabi Island.

[5] 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

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 Abrolhos Reserve, most of which is currently under lease agreements with Abrolhos Islands Bodies Corporate (Bodies Corporate). DPIRD manages commercial fishing and aquaculture, marine tourism, and moorings, and administers the lease arrangements with the commercial fishing and aquaculture industries. DPIRD and the 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, Abrolhos Reserve and the FHPA. These include:

- management of marine and terrestrial fauna and terrestrial flora, terrestrial habitats, coastal use, and seascapes
- conservation of maritime heritage
- shared infrastructure such as operational bases and camps, communications infrastructure, jetties, and airstrips
- management of 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
- 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 enhances maritime cultural heritage values and minimises impacts to them.

The park is in the City of Greater Geraldton and various government by-laws and local planning schemes apply. The Local Government Authority has responsibility in administering requirements of the *Building Act 2011* and *Building Regulations 2012*, emergency management coordination and response and plays a role in tourism development and promotion of the Abrolhos.

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

While this plan is one of a suite of management plans that apply to the Abrolhos (see *3. Management context – Planning framework*), the natural, cultural heritage, recreation and tourism 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.

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, Abrolhos Reserve and the FHPA and discusses five key management themes including:

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

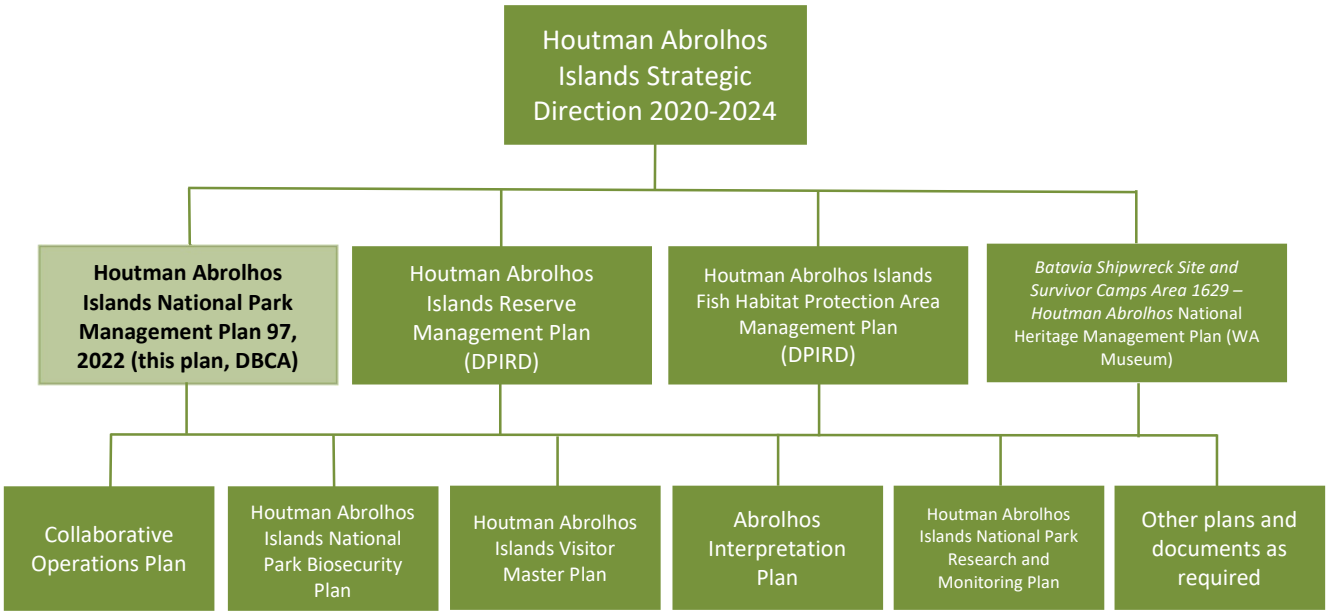


Figure 1: Abrolhos planning framework

The Strategic Direction was prepared jointly by DBCA, DPIRD, MWDC, WA Museum 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 for the National Heritage Listed area). This plan provides a broad framework to guide management of the park over the long term, until it is reviewed or replaced by another plan (see *3. Management context – Term of the plan*). Therefore objectives, strategies and detail in the plan are general, to ensure adequate flexibility over its lifetime, during implementation. Greater detail is outlined in operational plans (some examples of

which are shown in Figure 1), which are reviewed more regularly. These sit underneath the management plan. Operational plans will be developed, in consultation with stakeholders, where relevant.

Abrolhos Islands Bodies Corporate

Outside the park, most of the adjacent Abrolhos Reserve 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 the Abrolhos Reserve 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 *20. 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 the Abrolhos Reserve. Leaseholders and others accessing the Abrolhos Reserve for Body Corporate business use the three airstrips and the East Wallabi Island public jetty, located in the park (See *16. Visitor access*). The department supports this continued access. However, a 'user pays' approach will be adopted through the application of aircraft landing fees (see *16. Visitor access – Air access*).

Term of the plan

This plan will guide the management of the park for 10 years or 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, Abrolhos Reserve, 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. Priority islands for management

Generally, Western Australian islands support very high biodiversity conservation values. A unique subset of mainland biodiversity is found on Western Australia's islands, including threatened species that have become extinct or declined on the mainland and species that vary genetically from mainland populations. Islands provide habitat generally unaffected by introduced predators (foxes, cats and rats) and other threatening processes that impact on mainland flora and fauna, (such as grazing, altered fire

regimes, pests and diseases, urban development, mining and pollution) and act as ideal breeding locations for turtles, sea lions and seabirds (Conservation Commission of Western Australia, 2009). These trends are reflected at the Abrolhos Islands and, although much of the archipelago's landscape is disturbed (resulting from its history of guano mining, petroleum exploration, visitor activities, commercial fishing, weed infestations and impacts from pest animals), it also supports several unique threated and endemic species, has a lack of introduced predators (except for the house mouse), and provides breeding habitat for sea lions and a large range of seabirds.

The range of natural and cultural heritage values of islands within the park are outlined in *Appendix 2 – Islands in the park and their values*). The values identified include:

- fauna listed as threatened or migratory under the Biodiversity Conservation Act or are considered priority species by the department
- significant vegetation communities identified in literature that either support fauna listed under the Biodiversity Conservation Act, are rare, relictual, endemic or particularly diverse or are especially sensitive to disturbance (Harvey et al., 2001) or
- maritime cultural heritage associated with the *Batavia* National Heritage listed sites and
- cultural heritage associated with the guano industry.

Abbott and Wills (2016) suggest that the high biodiversity values and the unique assemblages of conservation significant and other flora and fauna of Western Australian islands are the result of a range of factors, including island area, distance from the mainland, the absence of competitor species, geographic location (climatic conditions and geomorphological features), history (geomorphological and human), productivity (soil nutrients), disturbance and presence of breeding seabirds and mammals. It is likely that these combinations of factors have influenced the presence of the unique natural values of the islands within the park. It is also likely that the unequal influence of these factors impacting on different islands within the park has resulted in the natural values being unevenly distributed across all islands in the park. Particular islands support a greater abundance and diversity of flora, fauna and ecological communities, compared with other islands. These more biodiverse islands tend to be larger (for the most part, greater than 10 hectares) and support a range of vegetation types and habitats, which, in turn, supports a larger diversity of fauna species. Some of these islands are also important as certain significant species are only found on a handful of them. For example, the endangered Australian lesser noddy only nests on Pelsaert, Wooded and Morley islands (see *7. Biological environment – Native animals – Native animals of conservation significance – Seabirds, shorebirds and marine raptors*) and the Abrolhos painted button-quail is only found on East and West Wallabi islands and thought to be extinct from North Island (see *7. Biological environment – Native animals – Native animals of conservation significance – Abrolhos painted button-quail*). Islands that support a greater number of natural and cultural heritage values include North, West Wallabi, East Wallabi, Beacon, Long, Eastern, Dakin, Seal, Wooded, Morley, Leo, White Bank, Alexander, Bynoe, Campbell, Gilbert, Helms, Keru, Rat, Serventy, Stokes, Suomi, Pelsaert, Gun, Burton, Middle, Murray, Newman, Stick and Sweet islands.

Likewise, visitation is unevenly distributed across all islands in the park. Historically, some islands are popular for visitors whereas others have little to no visitation at all. Ease of access is one of the key reasons for this. Islands which attract more visitors have good access such as airstrips, jetties, moorings or passages through fringing reef and shorelines which allow for safe boat landing and tethering in a wide range of weather conditions. In addition, people tend to visit islands with attractive and interesting locations such as sandy beaches, sheltered bays or cultural heritage features. Opportunities for walking, exploring, wildlife viewing or participation in water-based activities also

draw visitors to certain islands. Islands with higher levels of visitation include North, West Wallabi, East Wallabi, Beacon, Wooded, Morley, Leo, Gun and Pelsaert islands.

Islands that attract visitors also tend to have more natural and cultural heritage values (see *Appendix 2 – Islands in the park and their values*). Therefore, to protect these values from the impacts of visitation over the life of the plan, 11 islands have been identified as a priority for management. These are:

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

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

Over the life of the plan, visitation and demand for visitor opportunities on these islands is likely to increase. Therefore, management of visitor use will be focused on these 11 islands that are popular for visitors and support sensitive natural and cultural heritage values.

As outlined in *Appendix 2 – Islands in the park and their values*, the suite of values found on different islands across the park varies. No two islands support the same range or abundance of values. Therefore, the development of a zoning scheme, which applies generic management to groups of islands dependent on their classification, was considered too general to adequately manage the varied distribution of values on different islands. Instead, specific management strategies for each of the 11 islands have been developed to ensure that impacts from visitors and visitor activities to the natural and cultural heritage values on each of these islands are minimised (see *Appendix 3 – Priority islands for management*). Examples of these include:

- Defining appropriate pedestrian access (for example, boardwalks, beach or walk trails).
- Implementing biosecurity protocols.
- Educating visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines, codes of conduct and interpretation products and experiences.
- Planning, design, development and management of visitor infrastructure to consider and minimise visitor impacts to sensitive natural and cultural heritage values.
- Implementing a detailed assessment process for proposed tourism development and camping areas, with greater scrutiny for islands with significant natural and cultural heritage values. Following this assessment, considering tourism development and camping areas only where there are minimal impacts to the natural and cultural heritage values, or where impacts can be mitigated.
- Seasonal visitor access restrictions to seabird nesting and sea lion pupping areas during breeding seasons.
- Monitoring visitor numbers and impacts to sensitive values (such as breeding seabirds and sea lions and maritime heritage values) consider changes to management if impacts to these values occur.

Detail relating to the specific management of individual islands is outlined throughout the plan. Additional information is also outlined in *16. Visitor access – visitor access restrictions*.

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[6]) 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. Establishing what levels of change are acceptable and what are the indicators and thresholds (or trigger points) for making a change to management, based on impacts, will be an important part of this process.

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
- help with securing future funding for sustaining action.

As a newly created national park, the description of baseline (or benchmark) 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. In some instances, KPIs are based on long-term monitoring of values that is already occurring. For those KPIs which do not have an established monitoring program in place to determine effective management of these values, appropriate monitoring will be determined at the commencement of plan implementation.

The consideration of the cumulative impacts of activities and management on selected values are also incorporated into KPIs. For values where the accumulation of impacts is likely to be important, more regular reporting requirements are incorporated. This will ensure that impacts are detected sooner, and management can be adjusted accordingly.

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

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 *3. Management context – 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. Outcomes of this assessment process and reports are publicly available on the Conservation and Parks Commission website. 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.

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 20th 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. The Department of Fisheries (2003) provides a detailed inventory of the natural values of the Abrolhos Islands.

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 11 priority islands for management (see *Appendix 2 – Islands in the park and their values*), 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.

Strategic objective for natural values

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 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 sides of islands 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). DoT measures variations in sea level using tide gauges at different locations around the Western Australian coast and a mean sea level rise of 1.54mm per year has been recorded at Fremantle since 1897 (Pattiaratchi and Eliot, 2005).

MP Rogers & Associates (2018) completed a coastal inundation and erosion assessment and hazard mapping process for 30 islands in the Northern Agricultural Region, which included 20 islands in the park (and two islands in the Abrolhos Reserve). The assessment found that there is risk of significant erosion and inundation of islands in the park over the next 100 years due to a combination of erosion (from storm surge) and sea level rise. Small sandy islands with eastern aspects, such as Tattler, Keru, Beacon, Long and Stick islands, are likely to be vulnerable to complete erosion by 2118.

The Indian Ocean and Western Australian offshore islands are also impacted by the El Niño Southern Oscillation (ENSO) weather pattern, which causes changes in sea surface temperatures over time. ENSO weather patterns have three different phases. In temperate locations, sea surface temperatures fall during La Nina conditions, are normal during neutral conditions and are warmer than normal during El Niño conditions. These changes to sea surface temperatures have severe impacts on the upwelling of ocean nutrients (Chambers et al. 2009). In addition, increases in ocean water temperatures result in the degradation of coral reefs through coral bleaching and coral death, which in turn affect depositional and erosional forces acting on shorelines and compound the impacts of inundation and storm surge. A marine heatwave in the summer of 2010/11 saw water temperatures of along the Western Australian coast rise between 2 and 5°C and resulted in the first recorded coral bleaching event at the Abrolhos (Thomas 2016). Two studies reported averages of 12 percent and 22 percent of corals bleached across a range of locations at the Abrolhos and an average of 11.3 percent declines in coral cover (Moore at al. 2012, Depczynski et al. 2013). Most islands in the Houtman Abrolhos are protected by coral reefs, which minimises island erosion by reducing wave impact. Therefore, reef degradation will reduce that protection and increase erosion to islands. Ocean acidification, caused by the increased uptake of CO_2 from the atmosphere, also causes coral bleaching. Although this process 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. The impacts of El Niño conditions on ocean nutrients and sea surface temperatures can also result in breeding failures in seabird populations, given their reliance on fish as a food source. ENSO weather patterns can impact on the seabird breeding populations in the park, resulting in considerable variability in breeding success from year to year (Chambers et al. 2009, Surman et al. 2012, Dunlop et al. 2012, Surman and Nicholson, 2009a and Surman and Nicholson, 2009c).

Ocean current modelling suggests that climate change will result in a weakened Leeuwin Current (Pattiaratchi and Buchan, 1991 and Sun et al. 2012). This may also 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 from

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.

The Western Australian Planning Commission *Statement of Planning Policy No. 2.6: State Coastal Planning Policy* provides guidance for new development in the consideration of changes to mean sea level change and requirements for coastal setback. The City of Greater Geraldton prepared a coastal hazard and risk assessment report in 2019 (Baird Australia Pty Ltd 2019), although the Abrolhos Islands were not included. Given the vulnerability of the islands in the park to inundation associated with sea level rise and erosion, the consideration of coastal setback and the application of this policy will be of critical importance in planning for the construction of new visitor facilities and tourism development within the park (see *18. Commercial operations and tourism*).

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) and Collins et al. (1997).

Geology

All islands in the Abrolhos archipelago comprise coral reef limestone, which lie on carbonate platforms, formed during the last interglacial period between 116,000 and 129,000 years ago (Teichert 1946). 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 11,000-12,000 years ago, at the end of this glacial period, melting ice caused sea levels to rise, cutting the island groups 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).

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

Surrounding 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.

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 separation) 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 comprise 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 comprising 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 contained guano prior to being mined. 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 comprise 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 *7. Biological environment – Native animals – Native animals of conservation significance*). Visitor activity can also impact on coral shingle. The collection of rock and other material for building construction and the excavation of shell grit from Long Island for use in cement production, occurred prior to the creation of the park.

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 restoration of these islands back to their original state is not possible. However, rehabilitation and soil stabilisation works may be possible or required as part of future management.

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 environmental 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 *13. 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 in the park 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, and 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 islands 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)[7] 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.

[7] 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).

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

- 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.

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 *8. Biosecurity – Weeds*), clearing, landfill, trampling in areas used by visitors (see *Managing the visitor use and community values*) and grazing by tammar wallabies (see *7. Biological environment – 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.

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

Plants of conservation significance

Of the native plant species of conservation significance in the park, there are five priority[8] 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*).

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.

Native animals of conservation significance

Native animals of conservation significance recorded in the park include:

- 13 species listed as 'threatened'[9] 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*)
  - four endangered bird species – red knot (*Calidris canutus*), lesser sand plover (*Charadrius mongolus*), Australian lesser noddy, and Abrolhos painted button-quail and
  - five 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*) and flesh-footed shearwater (*Ardenna carneipes*),
- 26 bird species listed as 'migratory' under the Biodiversity Conservation Act, with many of these listed under the China–Australia Migratory Bird Agreement (CAMBA), Japan–Australia Migratory Bird Agreement (JAMBA) and the Republic of Korea–Australia Migratory Bird Agreement (ROKAMBA).

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

[9] 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.

- 12 species listed as 'threatened' under the EPBC Act (four critically endangered, four endangered and four vulnerable).
- 33 bird species listed as 'migratory' under the EPBC Act
- five 'priority 4' species.

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 had been drafted (Commonwealth of Australia 2019). 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).

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

The park provides important habitat for the conservation-significant Australian sea lion, Abrolhos painted button-quail, and a variety of seabirds and migratory and resident shorebirds. The 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 (Gales et al. 1992). Sea lions use all three island groups for haulout, with significant activity occurring on East Wallabi, West Wallabi, Long, Beacon, Seal, Dick, Rat, Wooded, Morley, Gun, Middle, Pelsaert and Third Sister islands. Sea lion breeding mainly occurs in the Easter and Pelsaert island groups, with pups recorded on Wooded, Morley, Leo, Alexander, Bynoe, Campbell, Gibson, Gilbert, Helms, Keru, Rat, Sandy, Serventy, Stokes, Suomi, White, Pelsaert, Gun, Stick and Square islands and White Bank (Campbell 2005). Sea lions with young have also been recorded on Dakin, Eastern and Seal islands in the Wallabi Group (I. Asmussen pers. comm. 24 July 2021).

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 sea lion meat, commercial sealing activity and culling by whaling crews between the 17th and 20th centuries, the decline of mangroves, which are used by mothers and sea lion 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. Female sea lions return to the same site every breeding season, so recruitment from outside of the

Abrolhos is almost non-existent. The department conducts sea lion surveys by counting pup numbers during pupping seasons.

Sea lions are vulnerable to human disturbance (Orsini et al. 2006, Osterrieder et al. 2017). Unmanaged 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 *16. Visitor access – Visitor access restrictions*).

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 believed to be 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 (Department of Biodiversity, Conservation and Attractions, 2018a). 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 (Geyle et al. 2018).

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 tammar wallaby 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, tammar wallaby grazing and recovery following the removal of tammar wallabies and an associated reduction in grazing pressure.

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 *8. Biosecurity – Pest animals*). The house mouse competes with button-quail for food and likely preys on eggs and chicks when present in high numbers. 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 *9. Fire*). Similarly, sea level rise associated with climate change may result in the loss of button-quail habitat.

Seabirds, shorebirds and marine raptors

The Abrolhos Islands support a diverse range of bird species that inhabit the full suite of island habitats. These include seabirds[10], shorebirds[11], waterbirds[12], raptors[13] 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.

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

[11] 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). These include sandpipers, turnstones, sanderlings, knots, stints, plovers, stilts, pranticoles, oystercatchers, godwits, curlews, whimbrels, avocets, tattlers, greenshanks, lapwings and egrets. At the Abrolhos Islands, some are resident, and some are migratory.

[12] 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.

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

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, Asmussen, 2006 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) and this has contributed to its identification as a Key Biodiversity Area[14] (KBA) (Reaney and Maurer 2018). 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. Many seabird and shorebird species move between different coastal locations in Western Australia (and the rest of Australia and the world). Therefore, seabird and shorebird populations at the Abrolhos are also affected by impacts to these populations when they are located elsewhere. All Australian lesser noddies, 80 percent of common 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-bellied sea eagle (*Haliaeetus leucogaster)* and osprey *(Pandion cristatus)* 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. For the most, they do not migrate out of the Midwest coast of Western Australia during the non-breeding winter period to forage (although lesser noddies have been recorded roosting on Bernier Island over 400km to the north of the park, C. Simms pers. comm. 18 March 2022).

The park supports notable populations of other seabird species. 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 breed in the park during the autumn and spring. West Wallabi and Leo islands support significant populations of Caspian terns. 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).

[14] 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.

The Abrolhos Islands are the core area for the migratory meta-population of Australian fairy terns that breeds on the west and south coasts of Western Australia. Over 4000 fairy terns winter in the northern Abrolhos around West Wallabi and North islands (possibly 70-80 percent of the world population). About 700 pairs breed within the Houtman Abrolhos in spring and summer with the beaches around West Wallabi Island being the most regularly used area for nesting colonies. The sandy beaches around West Wallabi Island may be considered critical habitat for this species between September and February and the airstrips on Rat and North islands are important roost sites during the autumn and winter (N. Dunlop, pers. comm, 18 June 2021).

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

Surman and Nicholson (2007 and 2009) surveyed 192 of the Abrolhos Islands (within the park and Abrolhos Reserve) and recorded seabirds breeding on 148 of these. From these data, Pelsaert and West Wallabi islands are the most important within the Abrolhos, with 28 and 26 species respectively recorded using these two islands for breeding. Other important seabird breeding islands, based on the number of species of breeding seabirds and the total number of individuals, include, Gun, Murray and Middle islands in the Pelsaert Group and Morley, Wooded, Leo, Suomi, Bynoe, Campbell and Little North islands in the Easter Group. Dick Island in the Wallabi Group is also important for seabird breeding. Seabird species such as lesser noddies, common 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.

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. Some species did not re-establish on other islands whereas other species (such as the sooty tern) were able to relocate to other islands (see *8. 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. Nesting lesser noddies and wedge-tailed shearwaters are particularly vulnerable to disturbance by visitors. 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, impacting mangroves and 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, sea level rise, storms and impacts from pied cormorants and lesser noddies themselves.
- Changing sea surface temperatures. Reduced breeding and increased reproductive failure of tropical pelagic seabirds has occurred at the Abrolhos Islands during strong El Niño – Southern Oscillation (ENSO) events which impacts sea surface temperatures around the Abrolhos Islands (Chambers et al. 2009) (see *6. Physical environment - Climate and climate change*). Species impacted include wedge-tailed shearwaters, sooty terns, common 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, although the potential for a major oil spill poses a small risk, there is a greater risk of smaller, more frequent oil spills (see *10. Waste disposal, contamination, and pollution*).

As a result of these impacts, populations of seabirds and shorebirds worldwide have experienced significant declines since the 1950s. Paleczny et al. (2015) suggest that global populations of monitored seabirds (representing about 19percent of the total global seabird population) have declined overall by 69.7percent between 1950 and 1910. With many of these impacts affecting populations in the park, seabirds at the Abrolhos are vulnerable and at risk of decline. Seabird and shorebird population declines will also be compounded by climate change impacts (see *6. Physical environment – climate and climate change*) given the vulnerability of islands in the park to inundation due to sea level rise, storm surge and erosion (A Bishop 2021 pers. comm. 23 July 2021).

Migratory birds also use islands in the park with 31 and 44 species listed under the Biodiversity Conservation Act and the EPBC Act respectively recorded here. Many of these species are also listed under international migratory bird agreements (CAMBA, JAMBA and ROKAMBA, see *7. Biological environment – Native animals – Native animals of conservation significance*). Migratory shorebirds travel up to 13,000km from their breeding grounds in the northern hemisphere to the Abrolhos Islands during their non-breeding seasons. Birdlife Australia (2020) reported a reasonable diversity of shorebirds at the Abrolhos but notes it is not a site that is nationally or internationally significant for shorebirds, with only ruddy turnstones recorded in significant numbers. Surman and Nicholson (2009b) recorded 16 species of migratory shorebirds, 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 annually in varying numbers to rest and feed between August and April. Important habitats include salt lakes and tidal ponds, beaches, and tidal flats. Key foraging habitat for these migratory species is often within intertidal areas (between high water and low water marks) which is outside the park and part of the Abrolhos Reserve, managed by DPIRD. Collaborating with DPIRD in relation to the management of this habitat will be important. 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).

The park provides habitat for breeding pairs of marine raptors (the migratory osprey and white-bellied sea-eagle) and active nests are found on many islands, especially larger ones such as West Wallabi, East Wallabi and Pelsaert islands.

Over the life of the plan, monitoring of seabird populations will be important in continuing to add to the long-term research knowledge and understanding about several significant seabird species that occur in the park. Through monitoring, trends in species richness and abundance[15] can be tracked and any impacts from visitor use and other human activities in the park measured. Changes can then be made to management in response, as required.

Further work is required to design and implement an appropriate seabird monitoring program for the Abrolhos Islands to measure the condition of, and pressures upon, seabird communities, to support management. A research and monitoring plan will be developed over the life of this plan, in consultation with research scientists, other agencies and relevant stakeholders (see *Research and Monitoring*). It is likely that the key seabird species that will be the focus for monitoring will be those that are particularly significant and/or vulnerable to disturbance from human activities, especially during breeding seasons and where there are breeding populations within or adjacent to visitor sites and facilities. Measures will be focussed on damage to seabird nesting habitat, nests, eggs or fledglings. So, for example, in relation to the lesser noddy populations that only occur on Pelsaert, Morley and Wooded islands, this plan proposes visitor access restrictions to these islands (and others) during seabird breeding seasons. Low level, controlled visitation to the lesser noddy populations on Morley and Wooded islands during seasonal closures and permanent visitor access restrictions to the lesser noddy habitat on Pelsaert Island will be considered (see *16. Visitor access – Visitor access restrictions*). A monitoring program to compare lesser noddy populations and their associated mangrove habitat on these islands, under these different visitor management regimes will be developed to highlight any impacts to this species from visitation. Likewise, the measurement of damage to burrows in burrowing seabird habitat (for example, wedge-tailed shearwaters) on islands with no visitor use, compared with islands where visitation occurs will give an indication of the impact

[15] Species richness is the number of different species that occur in a particular area and abundance is the relative abundances of individuals within each species. Together these two figures measure species diversity (Hamilton, 2005).

of visitors on burrow nesting species and their habitat. Similarly, monitoring the breeding success of ground nesting species (such as terns) on islands used by visitors, compared with islands with no visitation, may also highlight the impacts of visitor use on these species. Changes to the management of visitor use may then be required where monitoring demonstrates there are impacts to nesting seabirds from visitor activities. It will also be important to determine what levels of decline for certain species are acceptable (for example, limits of acceptable change) and what levels of decline are unacceptable and triggering changes to management. As part of this process, determining the thresholds (or trigger point) for making a change to management approaches, based on impacts will also be important.

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 departmental conservation planning, policies, guidelines, recovery and other plans.
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 lion, seabirds, button-quail).
4. Build capacity to respond to emergencies.

Ecological communities

5. Map areas covered by mangroves in the park and monitor changes in extent over the life of the plan with a focus on islands where visitor access and facilities are provided.

Australian sea lion

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

Abrolhos painted button-quail

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

Seabirds, shorebirds and marine raptors

10. Map locations of key seabird, shorebird and marine raptor habitat in the park and monitor their abundance, diversity and breeding success to establish baseline data and trends, with a focus on islands where visitor access and facilities are provided.
11. Determine limits of acceptable change for key seabird species, their breeding success and relevant indicators and thresholds to inform monitoring and management responses.
12. Monitor populations of increaser species in the park (for example, silver gulls) and implement control measures if numbers are impacting on seabird breeding success.
13. Collaborate with DPIRD in the protection and management of seabird, shorebird and marine raptor habitat within the park and the Abrolhos Reserve, especially adjacent intertidal areas of all islands within the park.

Key performance indicators		
Performance measure	**Target**	**Reporting**
Extent of area covered by mangroves.	The area in the park covered by mangroves does not decline because of human activities 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 visitor sites in the park over the life of the plan.	Annually
Knowledge of temperate coastal saltmarsh threatened ecological community is adequate to guide management.	Threatened ecological community boundaries and condition in the park are mapped, and major threats identified.	End 2024
Australian sea lion breeding success.	Australian sea lion pup counts, in the park, during breeding seasons do not decline over the life of the plan.	Every 2 years
Persistence of the Abrolhos painted button-quail on East and West Wallabi islands.	The population size of Abrolhos painted button-quail in the park on East and West Wallabi islands remains stable or does not significantly decrease 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
Seabird, shorebird and marine raptor richness and abundance.	No loss of seabird, shorebird and/or marine raptor diversity and abundance because of human activities in the park over the life of the plan.	Every 5 years
Seabird breeding and/or nesting activity.	No loss of seabird breeding and/or nesting activity recorded because of human activities in the park over the life of the plan.	Every 5 years
Disturbance to seabird nesting habitat because of human activities.	No significant disturbance or damage to seabird nesting habitat, nests, eggs, or fledglings recorded because of human activities in the park over the life of the plan.	Annually
Seabird breeding success.	No decline in the breeding success of key seabird species beyond the limits of acceptable change due to human activities or increaser species in the park 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 worldwide 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 Wallabi, 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, 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 and the risks associated with the introduction of weeds and pest animals and the need to adhere to biosecurity protocols.

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 of Western Australia 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 Abrolhos Reserve 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 the 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 Abrolhos Reserve 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 visitor use, commercial operations and management 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 common sow-thistle (*Sonchus oleraceus*), corn spurry (*Spergula arvensis*) and nettle-leaved goosefoot (*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 percent 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 birds' plumage or be eaten by birds 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 and Agricultural Management Act 2007* (BAM Act)[16] and subject to management. African boxthorn

[16] 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.

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.

(*Lycium ferocissimum*), common prickly pear and Athel pine (*Tamarix aphylla*) are Weeds of National Significance (WONS)[17] 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 the Abrolhos Reserve). 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 seven years).

[17] 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	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*	High	Rat Island		Monitoring and eradication
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	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	Declared pest species in WA and a Weed of National Significance.	Eradication.
Timothy	*Phleum pratense*	Unknown	Gun Island		Control and containment to prevent spread to other islands.
Buckshorn plantain	*Plantago coronopus*	Unknown	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	Seeds are wind-distributed.	Control and containment to prevent spread to other islands.
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.	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 main pest animal species identified in the park is the house mouse (*Mus musculus*), predominantly found on North Island but also recorded on Beacon Island and anecdotally reported on others such as Gun Island, the numbered islands and other islands in the Pelsaert Group. In breeding seabird populations generally, when the house mouse is the only introduced rodent, they can predate on seabird eggs and chicks, in the absence of any competition for prey. (Department of Biodiversity, Conservation and Attractions 2018b). Further surveys are required to determine their distribution and impact and locations where eradication is possible. The house mouse has been eradicated in the park from Rat Island and from Little Rat and Bushby islands in the Abrolhos Reserve. When there are population outbreaks on other islands, control efforts may need to be expanded, 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 percent 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 also affect 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).

Rat Island was surveyed and named by Lieutenant John Lort Stokes on the HMS *Beagle* in April 1840 after he observed what he thought was an infestation of black rats (although these were more likely to be bush rats [N. Dunlop pers. comm, 18 June 2021]). Rats were thought to be first introduced by crew of visiting sailing ships or shipwreck survivors and later by guano miners (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 feral cats. Baiting eradicated rats from Rat Island and several other islands by 1991 and the last feral cat died in 2000. Following this, seabirds and land birds recolonised (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 Rat, Leo Wooded, Morley and Pelsaert islands but have since been eradicated or no longer occur.

Cockroaches are found around camps in the Abrolhos Reserve and the introduced white garden snail (*Theba pisana*) has been found on larger islands.

The focus of pest animal management in the park will be on preventing the introduction of pest animals to the park, primarily mice, but also 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, methods for control and the need to monitor, contain or eradicate weeds and pest animals
- outlines a monitoring program to map the location and extent of existing and new high priority weed and pest animal populations
- allows for adaptive management.

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

Management strategies

1. In collaboration with DPIRD and other key stakeholders, prepare and implement a biosecurity plan for the Abrolhos Islands (covering the park and Abrolhos Reserve) that:
   - provides a risk assessment for the potential pathways for weeds and pest animals to be introduced to and spread within the park and Abrolhos Reserve 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.

   and weed and pest animal control plans for the Abrolhos Islands (covering the park and Abrolhos Reserve) 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
   - allows for adaptive management.

2. Develop and implement an education program for visitors, tourism operators, Body Corporate members and other park users about the importance of biosecurity for the protection of important natural and cultural heritage values in the park and the risks associated with weed and pest animal introductions.

Key performance indicators

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 in the park.	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 in the park 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 70 years ago, vegetation has been slow to recover, resulting in dune blowouts. East Wallabi, West Wallabi and North islands are likely to be the most susceptible to fire, due to their larger area and denser 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. The best tool in managing the risk of bushfire in the park is through prevention. 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. Once designated camping areas are established in the park, campers will be encouraged to bring their own enclosed flame gas cookers (see *17. Visitor activities – Camping*).

Management objective: Minimise the impacts of bushfire on life, property, and key values in the park.
Management strategies 1. Prohibit visitors from lighting fires in the park. 2. Provide information to park 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 in the park, where necessary.

10. Waste disposal and pollution

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

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

Light pollution

Given its remote location, the park is naturally dark at night and unaffected by light pollution from nearby urban areas. Although people may not visit the park specifically for its dark night sky, the absence of artificial light within the park is one of its intrinsic values. Light pollution can have a range of impacts on wildlife, including disorientating 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 routes). 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 2020).

The Commonwealth Department of Environment and Energy produced *National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds* (Commonwealth of Australia, 2020). The department will apply these guidelines in relation to the planning, design and

construction of visitor facilities and sites to ensure the installation and use of appropriate lighting at any camping sites, tourism developments and by commercial tour operators in the park (see *15. Visitor use planning – Visitor master planning*). Information will also be provided to visitors about the appropriate use of lighting and impacts on seabirds.

Rubbish, marine and toilet waste

Visitors to the park sometimes leave rubbish and toilet waste (see *17. Visitor activities*), impacting on the aesthetic of camping and day-use sites. Low levels of waste from commercial 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.

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

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 and volunteers have conducted regular clean-ups of islands in the Abrolhos Reserve and the park.

Toilets will be provided at day-use sites on East Wallabi Island (see *17. Visitor activities – Day use*). Toilets may also be provided at camping sites once the park has been assessed to determine appropriate locations for camping (see *17. Visitor activities – Camping*). DPIRD, City of Greater Geraldton and Department of Health have prepared guidelines for the installation and use of appropriate septic tanks for the Abrolhos Islands. Any toilet facilities within the park will comply with these guidelines.

Marine pollution and oil spills

Boating activities (both recreational and commercial) in the waters surrounding the Abrolhos Islands can result in pollutants from ship spills, anti-fouling paints (used on hulls) and bilge pumping, washing up onto beaches and islands in the park. A major shipping lane is located to the west of the Houtman Abrolhos. In 2017, DoT 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. However, this assessment also noted that smaller spills are likely to occur more regularly and that responders need to be prepared to deal with both regular small spills and rarer larger spills (Navigatus Consulting 2018). DoT is responsible for coordinating responses to marine oil pollution incidents and DBCA staff participate in training programs and exercises.

Management of waste and pollution in the park will be through consultation with the commercial 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. In collaboration with DPIRD, liaise with the local commercial fishing and aquaculture industry and other park users about appropriate waste management and pollution mitigation practices.
2. Educate park visitors about appropriate rubbish and waste disposal, and use of lights and the impacts of these on the natural and cultural heritage values.
3. Ensure that septic and wastewater systems associated with visitor facilities within the park comply with relevant guidelines and untreated waste is not discharged into the terrestrial or marine environments.
4. Ensure that planning, design and construction of visitor facilities in the park gives consideration to the impacts of pollution (including lighting) and waste management and comply with relevant guidelines where appropriate.

11. Ecosystem rehabilitation

The Abrolhos Islands are a dynamic environment and the park is impacted by a range of natural disturbances such as storms and cyclones. The park is also highly disturbed from past and present human usage, such as historic guano mining, petroleum exploration, visitor activities, commercial fishing, 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 resulting from human activities in 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 weeds and disease. Rehabilitation on islands in the park can be difficult because of the variable rainfall and exposure to strong, salt-laden winds. 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 2013-17, 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 of the park 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 in the park.

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 artefacts 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 associated 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 NHL site in accordance with the *Batavia Shipwrecks site and survivor camps 1629, Houtman Abrolhos Islands, Western Australia. Batavia National Heritage Listing – Heritage Management Plan 2017-2022* (Batavia NHL 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 shipwrecks 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 are provided to minimise damage or loss to known cultural heritage sites and materials
- contemporary and innovative interpretation methods tell the stories associated with *Batavia* and *Zeewijk* and other historical events.

Strategic objective for cultural heritage values

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 *13. Maritime cultural heritage*). The artefact is an Eocene fossiliferous chert flake most likely older than 6000BP (Marwick 2002).

This artefact is the only discovered 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 creation 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. Should this occur, the department will consult further with WA Museum and local Aboriginal people about the protection and interpretation of these values and providing opportunities for Aboriginal people to connect with country in the park.

At the time of writing, the park is not subject to any native title claim or determination. The Yamatji Nation Native Title Determination extends offshore from the mainland but does not incorporate the Abrolhos 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. The site is managed by the WA Museum through the Batavia NHL Management Plan (in draft at the time of writing) (Anderson 2020) (see *3. Management context – Planning framework*).

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

Once finalised, the Batavia NHL Management Plan will provide the management framework for the protection of the Batavia National Heritage Listed sites.

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

The UCH Act automatically protects all shipwrecks, and their associated artefacts, 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. There are almost 50 undiscovered historic wrecks in the vicinity of the Abrolhos. With the rolling protection date of 75 years for the *Underwater Cultural Heritage Act 2018*, this number will increase. Some islands in the Wallabi Group support evidence that survivors stayed on islands which have not been attributed to known wrecks. When a ship was wrecked at the Abrolhos, all effort would have been made to get to land.

The MA Act automatically protects all pre-1900 historic shipwrecks, artefacts, 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:

- Beacon Island – archaeological features relating to *Batavia* shipwreck, survivor camp, shipwreck and massacre victims, graves; *Hadda* (1877) shipwreck survivor camp and a cairn.
- 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 Jakarta, Indonesia).
- 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* (Heritage Act). 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, under the Heritage Act, to protect these sites, including the referral of development proposals to the Heritage Council for advice.

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 (now Jakarta, Indonesia), *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 Batavia 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.

Ceramic sherds from *Zeewijk* survivor camp site (1727) found on Gun Island during excavations undertaken by WA Museum and University of Western Australia. Photo – Patrick Baker/WA Museum

In the park, significant sites associated with *Zeewijk* include Gun Island (survivor camp artefacts 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 artefacts from the *Zeewijk* survivor camp (Paterson et al. 2019).

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).

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 conclusively 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 activity. 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.

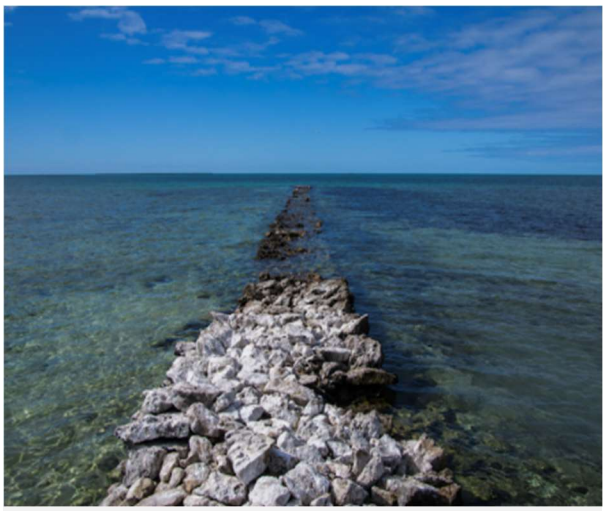
Likely increases in visitation to the park will lead to increases in instances of visitors and park staff discovering new cultural heritage sites and artefacts. The department will report any new discoveries made by park staff and visitors to WA Museum and information will be developed and provided to visitors to encourage this reporting.

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 19th 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.



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.

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. 2020). It is also possible that guano mining may have disturbed evidence of Aboriginal occupation and cultural heritage sites and artefacts associated with historic shipwrecks, making it more difficult to identify archaeologically significant locations (Department of Planning, Lands and Heritage, pers. comm, 26 July 2021). 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, sea lions, 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 20th 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 in accordance with relevant legislation.

Management strategies

1. Control access to, protect, maintain and monitor known or identifiable cultural heritage in the park 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, DPLH, Abrolhos fishing community, research institutions and stakeholders to identify, research, document, interpret, and monitor impacts to known sites of cultural heritage or historical significance.
3. Report discoveries of new cultural heritage sites and/or artefacts in the park to the WA Museum and provide information to visitors to encourage the reporting of new cultural heritage by visitors to the department or WA Museum.
4. Consult with relevant Aboriginal people or groups and WA Museum following any future discoveries of Aboriginal cultural heritage or connection to country within the park.
5. Consider the cultural heritage values of the commercial 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 in the park.	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 aircraft 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 commercial fishing and aquaculture community. Visitor activities include swimming, fishing, diving, 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 planning and preparing prior to visiting with adequate food, water and supplies, walking on firm ground, 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, avoiding wildlife disturbance and being considerate of other visitors.

The development of visitor infrastructure, interpretation and appropriate access is initially focussed 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, 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 management 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. Until then, visitation to these islands will not be encouraged or promoted over the life of the plan.

This plan outlines a range of strategies to manage visitation to ensure the protection of the park's significant natural and cultural heritage values, including through visitor education and interpretation, seasonal access restrictions, biosecurity management, the appropriate design and location of visitor facilities and tourism developments that considers impacts to natural and cultural heritage values and adaptive management.

Strategic objective for visitor use and community values

To provide high-quality visitor experiences, facilities and nature-based 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 *14. 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, Abrolhos Islands Consultative Committee 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 10 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 compared with other national parks in the Midwest[18]. 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 percent of charter aircraft passengers were tourists and 75 percent non-tourists (commuting fishers or their families). There are also visitors who access the park in private aircraft or privately chartered aircraft (some without authority), however the exact numbers per year are unknown.

Visitors in small recreational boats also make up a significant proportion of visitation to the FHPA. Many boat visitors access the FHPA for recreational fishing, with the waters surrounding the park providing excellent fishing opportunities. Diving and snorkelling are also popular activities in the FHPA. 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. Most boats visited islands in the park 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.

Visitors also access the Abrolhos with fishing charter and marine tourism operators for recreational fishing, diving and snorkelling within the FHPA.

Visitation to the Abrolhos is also highly seasonal. DPIRD's registration records show most vessels are 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. Being highly seasonal and weather-dependent, large numbers of visitors are attracted to popular islands locations in the park when weather conditions are favourable.

[18] By comparison, Nambung National Park recorded 492,000 visits, Kalbarri National Park recorded 391,300 visits and Monkey Mia Reserve recorded 99,000 visits in 2017–18.

As part of the DPIRD notification and registration process, recreational boat visitors, charter boat and marine tourism operators 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. In consultation with stakeholders, this process considered existing visitor use, developed direction for current and future visitor use across the three island groups, and outlined a framework for nature-based 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. The visitor master planning process will be finalised early in the life of this 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, visual amenity and sense of place. Site planning and visitor infrastructure design will aim to ensure that facilities are sensitive to the impacts on natural and cultural values and complement the environment and the existing structures. Where relevant, appropriate building approvals from the City of Greater Geraldton may be required to ensure new visitor facilities comply with relevant building regulations and other legislation.

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 remaining 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 variable. 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 visitors must be self-sufficient.
- Weather conditions that can change very quickly, and extreme weather events are possible (winter storms).
- Diseases and injury associated with wildlife encounters.

- 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 *21. Utilities and services – Digital and telecommunications*).
- Marine-related risks including environment (risk of drowning in strong currents and swells and bites and stings from marine life).
- 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 (LEMC) for the City of Greater Geraldton, in which the Abrolhos Islands are included. Coordinated by the City of Greater Geraldton, these outline policies, procedures, strategies and priorities for emergency management in the park and the roles and responsibilities of those involved. 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. 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.

The safety of boat users within the FHPA is the responsibility of DoT. Although boating activities occur outside of the park, there are 13 lights and beacons located on various islands within the park that provide navigation assistance to boat users in the FHPA (see *21. Utilities and services – Lighthouses and aids to navigation*). The department will consult with DoT regarding the location, operation and maintenance of these aids to navigation.

The Abrolhos is serviced by two volunteer Marine Rescue Western Australia groups based in Geraldton and Kalbarri. These groups work closely with the Western Australian Police Service to perform sea search and rescue operations.

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 and 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 partner 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 visitors' 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).

Visitor information, education and interpretation will be crucial in encouraging appropriate visitor behaviour within the park and fostering an appreciation and respect for its values. The provision of

information will be through a variety of mediums and formats (brochures, information guides, codes of conduct, online and digital information, face-to-face communication with park staff and on-site interpretation).

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 WA* 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 experiences 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. In consultation with relevant stakeholders, plan, design and construct visitor infrastructure and facilities that provide high-quality visitor experiences, that maintains the remoteness, character, and sense of place of the Abrolhos and minimises impacts to the natural and cultural heritage values in the park.
2. Plan and implement programs to collect data and information about visitor numbers, activities and satisfaction within the park.
3. Manage park visitor numbers, especially to areas with sensitive natural and cultural values through strategies such as site design, education, marketing, and access restrictions (see *16. Visitor Access*).
4. Undertake regular visitor risk assessments to identify risks associated with visitor activities in the park and manage these according to departmental policy and other legislative requirements.
5. Communicate with visitors and the community and collaborate with relevant stakeholders about visitor safety in the park.
6. Fulfil the department's role under the City of Greater Geraldton Local Emergency Management Committee's local emergency management arrangements.
7. Collaborate with DPIRD, WA Museum and other 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 of the park
   - highlights visitor safety and appropriate behaviour to minimise visitor impacts on the natural and cultural heritage values of the park
   - describes important management messages (such as biosecurity protocols and 'leave no trace' principles)
   - facilitates exceptional contemporary storytelling
   - is delivered to suit a wide range of visitors and park users across a variety of platforms.
8. Maintain partnerships with key stakeholders to strengthen the delivery of experiences and information outside of the park.

Key performance indicators		
Performance measure	**Target**	**Reporting**
Visitor safety	The number of serious incidents[19] per 100,000 visits to the park remains stable or decreases.	Annually
Visitor education and interpretation program	The visitor education and interpretation program is developed and implemented.	Every 5 years

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 that are accessible by vehicle.

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 possible extension would meet RFDS requirements).

Most flights to the park are provided by two aircraft charter companies based in Geraldton and occasionally by another charter company in Kalbarri. Most aircraft passengers (an average of 75 percent) are commercial fishers or people providing support to the commercial fishing and aquaculture

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

[19] Serious incidents are those requiring medical treatment.

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. Private aircraft and privately chartered aircraft also use the airstrips within the park (see *15. Visitor use planning – Visitor numbers and trends*).

Visitors have also accessed the Abrolhos Islands by private and charter helicopters in the past, although no charter companies currently use helicopters to bring visitors to the park. There are several helicopter landing pads adjacent to lighthouses and in the Abrolhos Reserve, adjacent to the park.

Charter and private 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.

Drone use within the park must comply with CASA regulations as well as the CALM Act, CALM Regulations, Biodiversity Conservation Act, Biodiversity Conservation Regulations 2018 (Biodiversity Conservation Regulations) and the *Bush Fires Act 1954* to ensure that use does not interfere with other aircraft, does not disturb other visitors or wildlife, is not permitted to be operated above people, and does not interfere with emergency or other park operations. Visitor information about drone use in the park will be developed and distributed over the life of the plan.

Impacts to seabirds from all types of aircraft are well documented, especially in relation to noise impacts during breeding, nesting, and fledgling periods. Birds respond by increasing scanning, alertness, 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. The Great Barrier Reef Marine Park Authority (1997) developed guidelines for managing visitation to seabird breeding islands and these include management measures for reducing impacts from aircraft disturbance. Some examples of strategies include not flying below 1500 feet in altitude or 1000m in latitude, helicopters not landing on islands during periods of seabird nesting, helicopter landings only occuring between sunrise and sunset where burrow-nesting birds occur and helicopters only landing on the edge of islands, Similar guidelines to minimise aircraft impacts to seabirds, shorebirds and raptors will be developed in consultation with charter flight operators and seabird researchers and experts. The department will also ensure that works associated with airstrip maintenance will not impact on seabird or sea lion habitat.

Boat access

Boat access, boating and other visitor activities within the FHPA are managed by DPIRD and, together with the management of moorings and anchorages, are outlined in the *Houtman Abrolhos Islands Fish Habitat Protection Area Management Plan* (DPIRD 2022b).

Private boats account for an average of 75 percent of boat traffic into the FHPA for recreational fishing, diving and snorkelling opportunities (although the proportion of visitors to the FHPA, on private 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. Moorings provide the initial entry points for boat access to the park and the locations of these influence which islands are accessed by boat visitors. Therefore, their location also influences where visitor use and activities become concentrated during busy periods. DPIRD approval is required for the construction of new moorings in the FHPA. 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 cultural heritage 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.

East Wallabi Island jetty. To improve visitor access to the park, this has been replaced by a new jetty, allowing vessels up to 20m (65ft) in length to access the island. Photo – Tourism WA.

New jetties were constructed at East Wallabi and Beacon islands in early 2022 to allow safer access for fishers, commercial tour operators and visitors. Vessels up to 20m (65 feet) in length can access the East Wallabi Island jetty and smaller vessels, up to 7m (22 feet) in length can use the Beacon Island jetty. The construction of public jetties at other islands in the park may be considered over the life of the plan.

Several lights and beacons managed by DoT are located on various islands within the park, providing navigation assistance to boat users in the FHPA (see *15. Visitor use planning – Visitor safety* and *21. Utilities and services – Lighthouses and aids to navigation*).

Outside of the park, camps and jetties within the Abrolhos Reserve that are occupied by commercial rock lobster fishers and aquaculture operators, are private property and not accessible to park visitors. Access to these areas is only by invitation of the relevant Body Corporate members. The management

of existing jetties and proposed new jetties within the Abrolhos Reserve are managed by DPIRD and are outlined in the *Houtman Abrolhos Islands Reserve Management Plan* (DPIRD 2022a).

Pedestrian access

Once visitors arrive at an island within the park, 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 nearby lookout. Over time, worn pathways have been created by pedestrian access on some other islands.

Uncontrolled pedestrian access presents a threat to several fauna and some cultural heritage values in the park. Visitors to the park can trample seabird nests and burrows and impact on their breeding success (see *7. Biological environment – Native animals of conservation significance – Native animals and habitats – Seabirds, shorebirds and marine raptors*). Australian sea lions are vulnerable to disturbance by visitors, especially during breeding season, when pups are present (see *7. Biological environment – Native animals of conservation significance – Native animals and habitats – Australian sea lions*). Approach distances are managed in accordance with the Biodiversity Conservation Regulations. Mangrove communities are also vulnerable to trampling by visitors, which can change the suitability for nesting lesser noddies 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, where required, on East Wallabi, Beacon, Leo, Morley, Pelsaert and Gun islands 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 boardwalks and walk trails may be considered on other islands over the life of the plan if required to protect sensitive plants and animals and/or for visitor safety and amenity.

DPIRD proposes the construction of a new public jetty within the Abrolhos Reserve on Rat Island (see *Houtman Abrolhos Islands Reserve Management Plan* [DPIRD, 2022a]). Associated with this, a walk trail between the existing airstrip and the proposed jetty will be required for pedestrian access between the park and reserve. Walk trails to enable public access between the park and the Abrolhos Reserve may also be considered on North, West Wallabi, Leo and Newman islands. DBCA will collaborate with DPIRD regarding pedestrian access on islands which contain both park and the Abrolhos Reserve to maintain the privacy of camp residents within the Abrolhos Reserve and to minimise impacts to natural and cultural heritage values.

Vehicle access

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

If used off access tracks, ATVs can impact significantly on natural values, particularly on nesting seabirds and on cultural heritage values. 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 the Abrolhos Reserve.

Visitor access restrictions

As outlined in *4. Priority islands for management* and *Appendix 2 – Islands in the park and their values*, 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, Morley, Wooded, White Bank, Pelsaert and Gun islands and for parts of West Wallabi and Leo islands within the park due to their importance for sea lion pupping and seabird breeding. Typically, most seabirds that breed in the park have eggs and chicks between September and February, with the exception being wedge-tailed shearwater chicks which do not fledge until May (Surman 1998, C Surman, pers. comm. 20 July 2021). Therefore, it is likely that visitor access closures to all or parts of these islands will be considered at these times. For the most part, these closures will fall outside of the peak periods for visitation (between March and May). The Australian sea lion, however, breeds at different times each year (see *7. Biological environment – Native animals and habitats – Native animals of conservation significance – Australian sea lion)*. During years where breeding periods for sea birds and sea lions do not overlap, separate seasonal visitor access restrictions associated with each species may be applied.

Lesser noddies only breed and nest in mangrove habitat on Morley, Wooded and Pelsaert islands (see *7. Biological environment – Native animals of conservation significance – Seabirds, shorebirds and marine raptors)*. Birdwatchers and visitors with an interest in wildlife and photography are keen to visit important seabird islands during breeding seasons, especially the lesser noddy and common noddy populations on these three islands. This also represents an additional visitor experience within the park. Seabirds can become habituated to the regular and predictable presence of visitors, who access breeding populations under strict guidelines (Great Barrier Reef Marine Park Authority, 1997). Asmussen (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. This activity will be enabled by providing several visitor access options to the nesting lesser noddy populations occupying the mangrove habitat on these three islands. These could include:

- Morley Island – development of appropriate visitor facilities (for example boardwalks, bird hides and visitor information and interpretation to outline appropriate behaviour) to enable visitor and commercial tour operator access (operating under relevant licence conditions) to nesting lesser noddy populations
- Wooded Island – seasonal visitor access restrictions with an opportunity for commercial tour operator access (operating under relevant licence conditions)
- Pelsaert Island – permanently closed to all visitor and commercial tour operator access.

It should be noted that these restrictions will only apply to the areas used by nesting lesser noddies on these three islands, subject to the development of appropriate licence conditions, visitor infrastructure, monitoring outcomes, scientific advice, and stakeholder consultation. Should monitoring demonstrate impacts of visitation to breeding lesser noddies, the seasonal or permanent closure of the nesting lesser noddy habitat on either Morley or Wooded islands (or both) will be considered. Seasonal visitor access restrictions may still be applied to other parts of Morley, Wooded and Pelsaert islands to protect other breeding seabird species and sea lions during pupping seasons, as required.

Seabird breeding and sea lion pupping will be monitored over the life of the plan to determine the overall effectiveness of permanent and seasonal visitor access closures on these species. Over time, if impacts to breeding seabirds and sea lions on these islands increase or decrease or species on any additional islands become impacted because of visitor use, changes to these visitor access restrictions may be considered, subject to monitoring outcomes, scientific advice, and stakeholder consultation.

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

Management objective: Provide visitor access to islands within the park that enables their enjoyment of nature and culture-based opportunities and contributes towards the creation of a high-quality visitor destination whilst minimising 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 legislation, regulations and guidelines.
3. Maintain airstrips on North, East Wallabi and Rat islands according to departmental policy and Standard Operating Procedures and CASA legislation, regulations and guidelines to ensure long-term, safe and sustainable use for fixed-wing aircraft and helicopters.
4. Liaise with seabird researchers, experts and aircraft charter companies to develop guidelines 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 in the park.
6. Build and maintain public jetties at Beacon and East Wallabi islands.
7. Consider infrastructure to provide access to other islands in the park, subject to visitor demand and impacts on natural and cultural heritage values.
8. Collaborate with DPIRD and DoT to ensure that any mooring plan is complementary to park management and that the design, location and construction of new moorings, and the management of existing moorings and anchorages in the FHPA minimises impacts on the natural and cultural heritage values of the park.
9. Permit the use of 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. Collaborate with DPIRD in the consideration of providing pedestrian access between the park and Abrolhos Reserve on islands with both tenures.
12. Consider implementing permanent and/or seasonal visitor access restrictions, within the park, for all or parts of Morley, Wooded, Pelsaert, Gun, West Wallabi and Leo islands, and White Bank and other islands with values sensitive to impacts from visitor use, as required, subject to monitoring outcomes, scientific advice and stakeholder consultation.

13. Consider providing visitor access to a limited number of seabird breeding colonies in the park during breeding seasons, subject to appropriate commercial operator licence conditions, monitoring outcomes, scientific advice and stakeholder consultation.
14. Provide information to park visitors about access to and within the park, and neighbouring 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. These include swimming, fishing, diving, snorkelling, surfing, wind/kite surfing, walking, bird watching and other nature appreciation.

The development of visitor facilities and infrastructure for day use will be a priority on East Wallabi, and Beacon islands. The development of appropriate day-use facilities and visitor infrastructure will also be considered on North, West Wallabi, Rat, Leo, Morley, Wooded, Pelsaert and Gun islands over the life of the plan. Visitor facilities will aim to enhance visitor experiences and, where required, be developed to protect natural and cultural values from the impacts of visitation. Opportunities for day use may be considered on other islands, providing that impacts to important natural and cultural heritage values can be minimised.

Kite surfing and wind surfing is popular off Morley, Wooded Leo and Third Sister islands 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 and marine raptors. Consequently, on islands where season visitor access restrictions will apply (for example West Wallabi, Wooded, Morley, Leo, White Bank, Pelsaert and Gun islands), some beaches may be closed to kite and windsurfing during seabird breeding times (See *16. Visitor access – Visitor access restrictions*).

The Great Barrier Reef Marine Park Authority's (1997) guidelines for managing visitation to seabird breeding islands recommended a range of measures to reduce the impacts of visitors on breeding seabirds, some of which have been considered and adapted for this plan. These include:

- the establishment and designation of activity zones that limits visitor access to the least sensitive areas, for example seasonal visitor access restrictions to West Wallabi, Wooded, Morley, Leo, Pelsaert and Gun islands and White Bank)
- the construction of appropriately located platforms and bird hides to ensure suitable separation distances from breeding seabirds
- limiting overnight access to seabird breeding islands

the development of education and interpretation materials to make visitors aware of how breeding seabirds are disturbed (see *Appendix 3*3 – *Priority islands for management*).

Camping

Prior to the creation of the park, camping was not permitted on any of the Abrolhos Islands, although DPIRD staff reported low levels of unmanaged camping over many years, mainly in the Pelsaert Group, by visitors on recreational boats visiting from Geraldton. Unauthorised 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 variable, 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.

Camping can have a range of impacts on natural and cultural heritage values in the park. In addition to the general impacts of human disturbance outlined in *7. Biological environment – native animals and habitats*, impacts of camping activities on seabirds and migratory shorebirds can occur because of people spending more time and generally more unsupervised time on islands. Therefore, impacts from camping can include:

- disturbances to the sunrise departure and sunset return of burrow nesting species
- establishment of campsites in locations that block bird access between beaches and burrows
- risk of campfire escapes in seabird and shorebird colonies
- use of lights that can impact on seabird activity at night
- increased risk of trampling of burrows, eggs chicks and nests in the dark and
- greater exploration of seabird colonies increasing the risk of impacts (Great Barrier Reef Marine Park Authority 1997).

The department acknowledges that there is demand for low-impact, low-cost, remote camping in the park. However, given the sensitivity of many islands and their natural and cultural heritage values (such

as seabirds and shorebirds), further work is required to determine islands or locations that may be suitable for camping. Therefore, in consultation with key stakeholders, the department will complete a more detailed assessment of the park to determine any suitable location/s for camping where the potential impacts to the natural and cultural heritage values can be minimised.

Following this assessment, low-impact camping may be permitted at designated sites for small numbers of campers in the park, subject to:

- booking campsites online
- campers being self-sufficient, adopting 'leave no trace' principles (for example removing all toilet waste and rubbish) and adhering to biosecurity protocols
- no campfires
- the seasonal closure of campsite areas to manage natural and cultural heritage values (for example, during periods of seabird breeding and sea lion pupping)
- monitoring the impacts of camping and making changes to management based on monitoring outcomes.

No camping will be permitted in the park until this camping assessment is completed and appropriate locations are determined, designated and developed.

Visitor accommodation within the Abrolhos Reserve and floating accommodation (on boats or pontoons) within the FHPA are managed by DPIRD and outlined in the *Houtman Abrolhos Islands Reserve Management Plan* (DPIRD 2022a) and the *Houtman Abrolhos Islands Fish Habitat Protection Area Management Plan* (DPIRD 2022b) respectively.

Domestic animals

As domestic animals may impact on wildlife, they are generally not allowed in national parks, aside from designated areas. Approved assistance dogs (guide dogs) and specially trained dogs for search and rescue operations, security or educational purposes or pest 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 *16. Visitor Access – Visitor access restrictions* 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 in the park on North, West Wallabi, Rat, Leo, Morley, Wooded, Pelsaert and Gun islands, subject to consultation with key stakeholders and access restrictions as outlined in *Visitor Access – Visitor access restrictions* and are designed and constructed to minimise impacts to natural and cultural values and maintain the sense of place at the Abrolhos.
3. Provide for visitor activities in the park that are consistent with department policy and can be provided while minimising impacts to natural and cultural heritage values.
4. Provide visitor information on and define appropriate access points to islands in the park to promote safe visitor access and minimise impacts on natural and cultural values.

5. In consultation with key stakeholders, assess islands in the park to determine suitable locations for camping where impacts to natural (especially breeding seabirds, shorebirds and pupping sea lions) and cultural heritage values can be minimised. Based on this assessment, designate appropriate locations for camping and plan, develop and maintain campsites accordingly.
6. Implement a booking system for designated campsites in the park and include on the department's online booking system.
7. Develop and implement a monitoring program to determine and measure visitor impacts on natural and cultural heritage values in the park (for example, footprint/disturbance zone, or vegetation cover of camping areas, impacts to cultural heritage sites).
8. 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 and nature-based tourism

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 for Environment 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 within national parks and reserves. 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 in the park where there is no need to restrict the number of operators conducting such activities. The

department requires operators licensed for more than 12 months to achieve and maintain accreditation from one of several industry-recognised tourism or ecotourism accreditation programs. Operators also need to demonstrate a commitment to protect and promote the park's values and behave appropriately and respectfully within the park, especially at sensitive sites. Interpretive and educational materials may be provided to operators to share with tour participants and to improve operator understanding of the significant natural and cultural heritage values of the park and the importance of appropriate visitor behaviour.

Restricted E class licences are applied where there is a need to restrict the number of licences in the park or parts of the park 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 and locations as required. These conditions are reviewed regularly.

Prior to the creation of the park, the marine charter tourism industry was (and still is) a key component of commercial tourism at the Abrolhos. In 2019, 30 charter boat and tour companies were licensed with DPIRD to run tours to the Abrolhos Islands, mostly operating out of Geraldton and Perth. Most of these were charter fishing tours, operating in the FHPA, and at least six operated tours that landed on islands in the park. At the time of writing, three aircraft charter companies and two boat-based tour companies also offer single or multi-day trips to the park (See *16. 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 may consider:

- appropriate behaviour for tour guides and participants especially in relation to wildlife interactions
- impacts on the natural and cultural heritage values
- group sizes and ratio of guides to participants
- appropriate islands to access, island access points and approach distances for sea lions and seabird colonies
- appropriate use of lighting associated with overnight accommodation and
- pre-approved activities.

These standard conditions will be regularly reviewed and may change if commercial tour operator activities and visitation levels are impacting on the natural and cultural heritage values.

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. The department will consult with tourism operators if this is proposed and any such restricted E class licences will be allocated through a competitive process.

Licensing of commercial operators to conduct tours in the Abrolhos Reserve and FHPA is managed by DPIRD and outlined in the and the *Houtman Abrolhos Islands Reserve Management Plan* (DPIRD 2022a) and the *Houtman Abrolhos Islands Fish Habitat Protection Area Management Plan* (DPIRD 2022b) respectively.

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.

Park entry fees do not currently apply, but these and camping fees may be introduced in the future.

Nature-based 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 tour vessels.

At the time of writing, no formal overnight accommodation is provided for visitors in the park. The potential for nature-based tourism development at the Abrolhos 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 the Abrolhos Reserve or in the park. It is recognised that providing for overnight accommodation at the Abrolhos would significantly expand the nature-based tourism potential of the islands, allowing visitors to engage with and explore the area 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 nature-based 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. A competitive process seeking

expressions of interest from the private sector to select a proponent for an appropriate nature-based tourism development at the Abrolhos will occur over the life of the plan. 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 proposal in the park would require assessment and approvals under the CALM Act. 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*. Given the low-lying nature of the islands in the park and the risk of inundation, the Western Australian Planning Commission's *Statement of Planning Policy No. 2.6: State Coastal Planning Policy* and consideration of coastal setback requirements will be of particular importance. In addition, compliance with local government legislation and policies will also be a requirement, including building approvals.

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

- is consistent with the purpose of the park and with the management plan and meets the requirements of the CALM Act
- 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 in the park 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
- is logistically feasible in terms of the provision of power, water, and wastewater treatment
- whether the proponent had the necessary skills and experience
- 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).

Any tourism development will need to be sustainable and provide high-quality visitor experiences. 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 the presence of significant natural and cultural heritage values.

As a general principle, the department has a preference for nature-based tourism development proposals incorporating overnight accommodation to occur on islands that contain both national park and Abrolhos Reserve, as these are the areas in which the impacts of development and human habitation are already occurring. Acknowledging that some of these islands also contain significant natural and cultural heritage values, this preference will be considered within the broader context of the factors outlined above to ensure the most appropriate location is selected.

Key stakeholders may be consulted during the assessment of nature-based tourism development proposals in the park, including Tourism WA, WA Museum, DPIRD, MWDC, City of Greater Geraldton and other relevant key stakeholders.

The management of tourism operations in the Abrolhos Reserve 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.

The department will encourage and enable nature-based tourism development and opportunities within the park by:

- proposing the development of high-quality visitor facilities, information and interpretation, and enhancing opportunities for a range of visitor activities and experiences
- licensing accredited tour operators to provide visitors with additional opportunities to experience the environments, wildlife, and cultural heritage of the park and
- outlining the framework for the establishment of tourism opportunities and development in the park to be managed through commercial leases or licences.

Tourism promotion of the park and the Abrolhos more broadly and the encouragement of tourism investment is the responsibility of Tourism WA, MWDC, City of Greater Geraldton, local tourism organisations and other key tourism and development stakeholders. The City of Greater Geraldton has developed an Abrolhos Islands Tourism Policy outlining its role in tourism development and promotion of the Abrolhos as a destination. The department will collaborate with these agencies and authorities to ensure a streamlined, whole-of-government approach to tourism development and promotion of the Abrolhos.

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 nature-based tourism development delivers a high-quality experience for visitors and avoids or 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, City of Greater Geraldton, local tourism organisations and other key stakeholders, identify and progress nature-based tourism development opportunities at the Abrolhos across land tenures.
3. Conduct a competitive process to ascertain commercial interest in nature-based tourism development at the Abrolhos, assess against a range of environmental, cultural, social and economic criteria and grant authorisation for any approved proposals in collaboration with DPIRD, WA Museum, MWDC and Tourism WA.
4. Plan for, assess and manage any nature-based tourism development in the park 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 in the park according to departmental policy and ensure that operators and guides are trained with local knowledge, demonstrate a commitment to protect and promote the park's values, behave appropriately and respectfully at sensitive sites, are accredited by an industry-recognised tourism or ecotourism accreditation program (for licences greater than 12 months) and conduct operations according to departmental policy and licence/lease conditions.
7. Develop and distribute educational and interpretive materials to commercial operators about the natural and cultural heritage values of the park and appropriate visitor behaviour for sharing with tour participants.
8. Include requirements in licences and leases for operators to provide information to the department to allow assessment and monitoring of the impacts of nature-based tourism activity and compliance with conditions as required.
9. Apply conditions to licences and leases to ensure the protection of natural and cultural heritage values within the park, that accurate natural and cultural heritage information is provided to visitors, and that visitation to sensitive sites is appropriate. Review these conditions regularly based on monitoring the impacts of nature-based tourism operations on natural and cultural heritage values.
10. Apply landing fees to all charter/tour aircraft passengers, and all occupants of private aircraft, landing at airstrips in the park.
11. Monitor the impacts of nature-based tourism operations to ensure that any development maintains the sense of place and is broadly acceptable to the community.
12. Consult with key stakeholders on any commercial tourism development and consider the requirement for public comment on any 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 do 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 commercial 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 increase 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

Strategic objective for economic and resource use values

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 the Abrolhos Reserve as part of their commercial activities (see *3. Management context – Abrolhos Islands Bodies Corporate*). These activities are managed by DPIRD within the Abrolhos Reserve and the FHPA and are outlined in the *Houtman Abrolhos Islands Reserve Management Plan* (DPIRD 2022a) and the *Houtman Abrolhos Islands Fish Habitat Protection Area Management Plan* (DPIRD 2022b) respectively.

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 percent 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 the Abrolhos Reserve by commercial rock lobster fishers.

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

A range of aquaculture leases operate within the FHPA, including 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 the Easter Group and the Pelsaert Group to encourage large-scale commercial aquaculture development in the area. Although located in the FHPA, the Public Environment Review process for this development recognised a range of potential impacts of aquaculture projects within the zone on marine fauna, in particular seabirds. These included increases to food sources because of aquaculture activities, impacts from lighting, noise, vibrations and increased competition for breeding sites from an expansion of 'increaser' seabird species such as silver gulls, Pacific gulls and pied cormorants (Department of Fisheries 2016).

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 the Abrolhos Reserve. However, access to the Abrolhos Reserve 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 the Abrolhos Reserve (see *3. Management context – 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 park access for commercial fishing and aquaculture operators, 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 (including during seasonal visitor access restrictions).
2. Liaise with DPIRD to ensure commercial fishing and aquaculture activities are compatible with park values and that impacts from these activities are minimised.

21. Utilities and services

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

Australian Marine Safety Authority (AMSA) 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, 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
- 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 the Abrolhos Reserve generate their own power using solar/battery systems and generators.

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 existing utilities and services and the design and construction of new ones are in accordance with lease conditions or any relevant memoranda of understanding, including the responsible management of environmental issues (particularly minimising impacts on nesting seabirds, 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 with alternative infrastructure 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

There are limited water resources in the park. Freshwater seeps and ponds are present on several islands in the park. Outside of the park, Bodies Corporate members use rainwater tanks to collect and supply water for their camps.

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 and development 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 the Abrolhos Reserve 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 park 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 *8. Biosecurity*). Any disturbed areas in the park where basic raw material has been removed should be rehabilitated where possible (see *11. 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 or to the Commonwealth Department of Agriculture, Water and the Environment for assessment under the EPBC 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 done in accordance with the CALM Regulations.

RESEARCH AND MONITORING

Strategic objective for research and monitoring

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

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

- the recovery of Rat Island following eradication of rats, mice and cats
- 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.

Research into the values of the Abrolhos has been carried out by a range of agencies, organisations, educational institutions and research scientists and has contributed towards the large research knowledge base that currently exists. State government departments have implemented and funded research into the natural and cultural heritage values of the Abrolhos and long-term research projects (particularly associated with seabirds) have been carried out by privately funded research scientists, non-government organisations and conservation groups. Universities and other educational institutions have also played a role in improving understanding about the biodiversity and cultural heritage of the Abrolhos. All have contributed significantly towards increasing research knowledge about the Abrolhos.

The extensive research undertaken at the Abrolhos and its importance as a long-term research site is also recognised as an important value. There are many opportunities for future research and the potential to build on this already extensive knowledge base. The department will work with external researchers and research organisations to encourage future research projects at the Abrolhos that further add to this legacy of knowledge about its natural and cultural heritage values.

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. Current 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
- seabird (especially lesser noddy, common noddy, fairy terns and wedge-tailed shearwaters) and migratory shorebird abundance and diversity and seabird breeding
- 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
- impacts of disturbance from human activities (especially visitor use) on natural and cultural heritage values, with a focus on seabirds, migratory shorebirds, marine raptors, breeding sea lions and important cultural heritage values.

Monitoring

Long-term monitoring should inform adaptive management and performance assessment against the objectives of the management plan (see *5. 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 the cause (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. Collaboration with external research organisations, research scientists and experts may also be required in the development and implementation of research and monitoring programs, particularly those associated with measuring KPIs. Other organisations may be able to help in the facilitation of data sharing and research communication between the department and other stakeholders.

The department will develop and implement a research and monitoring plan, in consultation with research scientists, other government agencies and relevant stakeholders, over the life of this plan. This will provide greater detail about future research priorities, proposed monitoring programs (including what species will be monitored and how, where and what monitoring data will be collected), communication of research findings, collaboration with external research organisations and research scientists and how future management of the park will be based on information collected in research and monitoring programs.

Management objective:

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

Management strategies

1. In collaboration with other government agencies, research organisations, research scientists, 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
   - communicates the outcomes of high priority research projects to other government agencies, organisations, research scientists and stakeholders.
2. Work with other agencies, universities, research scientists 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, 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 for the park is prepared and implemented.	After 1 year and then every 5 years thereafter

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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 Abrolhos Reserve)
Abrolhos	Houtman Abrolhos (islands and State waters)
Body Corporate or Bodies Corporate	Abrolhos Islands Bodies Corporate which is comprised of four Body Corporate groups. 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, DBCA	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 management plan 97 2022
The park	Houtman Abrolhos Islands National Park
The Abrolhos 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)[20]
Wallabi		Akerstrom	Mangrove	1.161
Wallabi		Barge Rock		0.13
Wallabi		Beacon	Batavia's Graveyard, Goss Monument	3.488[21]
Wallabi		Dakin		0.7
Wallabi		Dick	Dicks, Goss	2.997
Wallabi		East Wallabi		324.199[22]
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
Wallabi		Unnamed 2		0.084
Wallabi		Unnamed 3		0.043

[20] 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.

[21] 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.

[22] 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)[20]
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
Easter		Serventy		12.999
Easter		Shearwater		0.239

Island Group	Island sub-group	Island Name	Previous name/s	Area (ha)[20]
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
Easter		Unnamed 71		0.006
Easter		Unnamed 72		0.004

Island Group	Island sub-group	Island Name	Previous name/s	Area (ha)[20]
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
Pelsaert	The Coral Patches	Unnamed 83		0.009

Island Group	Island sub-group	Island Name	Previous name/s	Area (ha)[20]
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. Islands in the park and their values

The table below summarises significant natural and cultural heritage values of islands in the park (Department of Fisheries 2003, Surman and Nicholson 2009b, A Burbidge pers. com., 9 November 2021). Fauna species included here are those listed as threatened or migratory under the Biodiversity Conservation Act or are considered priority species by the department. Significant vegetation communities are those identified by Harvey et al, 2001.

Island Group	Island	Significant natural and cultural heritage values
Wallabi	Akerstrom	• Significant vegetation communities (mangroves) • Seabirds (bridled tern) • Migratory shorebirds (grey-tailed tattler, common greenshank, red-necked stint, curlew sandpiper)
Wallabi	Beacon	• Maritime heritage (*Batavia* National Heritage Listed area) • Seabird nesting (little shearwater, bridled tern, roseate tern, Caspian tern, crested tern, fairy tern) • Migratory shorebirds (ruddy turnstone) • Marine raptors
Wallabi	Dakin	• Sea lion pupping • Seabird nesting (bridled tern) • Migratory shorebirds (ruddy turnstone) • Maritime heritage (*Batavia* National Heritage Listed area)
Wallabi	Dick	• Seabird nesting (bridled tern, Caspian tern, fairy tern, roseate tern) • Marine raptors • Maritime heritage (recommended to be included in *Batavia* National Heritage Listed area)
Wallabi	East Wallabi	• Significant vegetation communities (flora rich pavement limestone, dunes and consolidated dunes, *Eucalyptus oraria* community) • Abrolhos painted button-quail • Seabird nesting (Caspian tern, fairy tern, roseate tern) • Migratory shorebirds (greater sand plover, bar-tailed godwit, ruddy turnstone, sanderling, red-necked stint), • Marine raptors • Tammar wallaby • Abrolhos spiny-tailed skink and Abrolhos bearded dragon • Maritime heritage (recommended to be included in *Batavia* National Heritage Listed area)
Wallabi	Eastern	• Sea lion pupping • Seabird nesting (bridled tern) • Migratory shorebirds (grey-tailed tattler, ruddy turnstone) • Marine raptors • Maritime heritage (*Batavia* National Heritage Listed area)

Island Group	Island	Significant natural and cultural heritage values
Wallabi	Far	• Maritime heritage (*Batavia* National Heritage Listed area) • Seabird nesting (roseate tern) • Marine raptors
Wallabi	First Sister	• Seabird nesting (bridled tern) • Marine raptors
Wallabi	Hall	• Maritime heritage (*Batavia* National Heritage Listed area)
Wallabi	Long	• Sea birds (bridled tern, Caspian tern, crested tern, fairy tern roseate tern, wedge-tailed shearwater) • Migratory shorebirds (common greenshank, grey-tailed tattler, ruddy turnstone, bar-tailed godwit, sanderling, whimbrel) • Marine raptors • Maritime heritage (*Batavia* National Heritage Listed area)
Wallabi	Marinula	• Seabird nesting (bridled tern, roseate tern) • Migratory shorebirds (common greenshank)
Wallabi	North	• Significant vegetation communities (flora rich pavement limestone, dunes and consolidated dunes, salt lake and saltbush flats) • Abrolhos painted button-quail • Seabird breeding (Caspian tern, crested tern, fairy tern, roseate tern) • Marine raptors
Wallabi	Oystercatcher	• Significant vegetation communities (mangroves) • Migratory shorebirds (common greenshank)
Wallabi	Pelican	• Seabird nesting (bridled tern)
Wallabi	Saville-Kent	• Seabird nesting (bridled tern, roseate tern) • Marine raptors • Maritime heritage (*Batavia* National Heritage Listed area)
Wallabi	Seagull	• Significant vegetation communities (mangroves) • Migratory shorebirds (ruddy turnstone, red-necked stint)
Wallabi	Seal	• Sea lion pupping • Seabird nesting (bridled tern, Caspian tern, roseate tern) • Migratory shorebirds (ruddy turnstone) • Marine raptors • Maritime heritage (*Batavia* National Heritage Listed area)
Wallabi	Second Sister	• Seabird nesting (crested tern, roseate tern) • Marine raptors

Island Group	Island	Significant natural and cultural heritage values
Wallabi	Shag Rock	• Seabird nesting (bridled tern) • Marine raptors
Wallabi	Tattler	• Significant vegetation communities (mangroves) • Abrolhos spiny-tailed skink • Seabird nesting (bridled tern)
Wallabi	Third Sister	• Seabird nesting (crested tern, fairy tern, roseate tern) • Marine raptors • Sea lion breeding
Wallabi	Traitors	• Seabird nesting (bridled tern, Caspian tern, crested tern, roseate tern) • Marine raptors • Maritime heritage (*Batavia* National Heritage Listed area)
Wallabi	Turnstone	• Significant vegetation communities (mangroves) • Seabird nesting (Caspian tern) • Migratory shorebirds (grey-tailed tattler, ruddy turnstone, red-necked stint)
Wallabi	Wann	• Seabird nesting (bridled tern, crested tern) • Marine raptors
Wallabi	West Wallabi	• Significant vegetation communities (mangroves, *Atriplex cinerea* dwarf shrubland, flora rich pavement limestone, dunes and consolidated dunes, salt lake and saltbush flats) • Abrolhos painted button-quail • Seabird nesting (Caspian tern, crested tern, fairy tern, roseate tern, wedge-tailed shearwaters) • Migratory shorebirds (grey plover, greater sand plover, bar-tailed godwit, grey-tailed tattler, common greenshank, ruddy turnstone, sanderling, red-necked stint, curlew sandpiper) • Marine raptors • Tammar wallaby • Abrolhos spiny-tailed skink and Abrolhos bearded dragon • Maritime heritage (*Batavia* National Heritage Listed area) • Cultural heritage associated with guano industry
Easter	Alexander	• Significant vegetation communities (mangroves) • Sea lion pupping • Seabird nesting (bridled tern, Caspian tern, fairy tern, wedge-tailed shearwater) • Migratory shorebirds (ruddy turnstone) • Marine raptors
Easter	Bynoe	• Sea lion pupping • Seabird breeding (bridled tern, crested tern, fairy tern, roseate tern)

Island Group	Island	Significant natural and cultural heritage values
		• Migratory shorebirds (bar-tailed godwit, grey-tailed tattler, common greenshank, ruddy turnstone) • Marine raptors
Easter	Campbell	• Significant vegetation communities (mangroves) • Seabird nesting (bridled tern, fairy tern, roseate tern), • Migratory shorebirds (greater sand plover, bar-tailed godwit, ruddy turnstone, red-necked stint) • Marine raptors • Sea lion pupping
Easter	Crake	• Sea lion pupping • Seabird nesting (bridled tern, crested tern)
Easter	Disappearing	• Migratory shorebirds (ruddy turnstone, sanderling)
Easter	Dry Island	• Seabird breeding (bridled tern) • Migratory shorebirds (greater sand plover, ruddy turnstone)
Easter	Gibson	• Sea lion pupping • Seabird breeding (bridled tern, crested tern, fairy tern, roseate tern)
Easter	Gilbert	• Sea lion pupping • Seabird nesting (bridled tern, fairy tern, Caspian tern, crested tern, roseate tern) • Migratory shorebird (whimbrel, ruddy turnstone) • Marine raptors
Easter	Helms	• Sea lion pupping • Seabird nesting (bridled tern, crested tern, fairy tern, roseate tern) • Migratory shorebirds (ruddy turnstone) • Marine raptors
Easter	Joe Smith	• Seabird breeding (roseate tern, bridled tern, Caspian tern) • Marine raptors
Easter	Keru	• Significant vegetation communities (mangroves) • Sea lion pupping • Seabird breeding (bridled tern, crested tern, Caspian tern, fairy tern, roseate tern) • Migratory shorebirds (grey plover, ruddy turnstone) • Marine raptors
Easter	Leo	• Significant vegetation communities (mangroves and *Tecticornia halocnemoides* subsp. *tenuis*) • Sea lion pupping

Island Group	Island	Significant natural and cultural heritage values
		• Seabird nesting (bridled tern, crested tern, Caspian tern, fairy tern, roseate tern, wedge-tailed shearwater) • Migratory shorebirds (bar-tailed godwit, curlew sandpipers, greater sand plover, whimbrel, grey-tailed tattler, common greenshank, ruddy turnstone). • Marine raptors
Easter	Little North	• Seabird nesting (bridled tern, fairy tern, roseate tern) • Migratory shorebirds (ruddy turnstone) • Marine raptors
Easter	Little Roma	• Seabird nesting (bridled tern)
Easter	Morley	• Significant vegetation communities (mangroves) • Sea lion pupping • Seabird nesting (lesser noddy, bridled tern, Caspian tern, crested tern, fairy tern, roseate tern). • Migratory shorebirds (greater sand plover, common greenshank, ruddy turnstone, grey plover, bar-tailed godwit, grey-tailed tattler, ruddy turnstone)
Easter	Rat	• Seabird nesting (bridled tern, Caspian tern, fairy tern, wedge-tailed shearwater) • Migratory shorebirds (greater sand plover, whimbrel, grey-tailed tattler, common greenshank, ruddy turnstone, sanderling, red-necked stint) • Marine raptors • Sea lion pupping • Cultural heritage associated with guano industry
Easter	Sandy	• Seabird nesting (roseate tern, fairy tern) • Sea lion pupping
Easter	Serventy	• Significant vegetation communities (mangroves) • Sea lion pupping • Seabird nesting (bridled tern, Caspian tern, fairy tern, roseate tern) • Migratory shorebirds (ruddy turnstone) • Marine raptors
Easter	Shearwater	• Seabird nesting (bridled tern, crested tern, roseate tern) • Migratory shorebirds (ruddy turnstone) • Marine raptors
Easter	Stokes	• Significant vegetation communities (mangroves) • Sea lion pupping • Seabird nesting (bridled tern, crested tern, fairy tern, roseate tern)

Island Group	Island	Significant natural and cultural heritage values
		• Migratory shorebirds (grey-tailed tattler, ruddy turnstone, red-necked stint) • Marine raptors
Easter	Suomi	• Significant vegetation communities (mangroves) • Sea lion pupping • Seabird nesting (bridled tern, sooty tern) • Migratory shorebirds (bar-tailed godwit, grey-tailed tattler, ruddy turnstone) • Marine raptors
Easter	Tapani	• Seabird nesting (bridled tern, Caspian tern, fairy tern) • Migratory shorebirds (ruddy turnstone) • Marine raptors
Easter	White	• Sea lion pupping
Easter	White Bank	• Sea lion pupping • Seabird nesting (wedge-tailed shearwater, sooty tern, Caspian tern, crested tern, fairy tern, roseate tern, bridled tern) • Marine raptors
Easter	Wooded	• Significant vegetation communities (mangroves) • Sea lion pupping • Seabird nesting (lesser noddy, bridled tern, Caspian tern, crested tern, fairy tern, roseate tern) • Migratory shorebirds (ruddy turnstone, red-necked stint) • Marine raptors
Pelsaert	Arthur	• Seabird nesting (bridled tern, fairy tern) • Marine raptors
Pelsaert	Burton	• Significant vegetation communities (mangroves) • Seabird nesting (bridled tern, fairy tern) • Migratory shorebirds (ruddy turnstone) • Marine raptors
Pelsaert	Davis	• Seabird breeding (wedge-tailed shearwater, bridled tern) • Cultural heritage associated with guano industry
Pelsaert	Diver	• Seabird nesting (bridled tern)
Pelsaert	Eight	• Seabird nesting (bridled tern, Caspian tern) • Migratory shorebirds (ruddy turnstone) • Cultural heritage associated with guano industry
Pelsaert	Gaze	• Seabird nesting (bridled tern)

Island Group	Island	Significant natural and cultural heritage values
		• Migratory shorebirds (ruddy turnstone) • Marine raptors
Pelsaert	Gregory	• Seabird nesting (bridled tern, fairy tern, roseate tern, wedge-tailed shearwater) • Marine raptors
Pelsaert	Gun	• Sea lion pupping • Seabird nesting (bridled tern, Caspian tern, crested tern, fairy tern, roseate tern, wedge-tailed shearwater) • Migratory shorebirds (ruddy turnstone, grey-tailed tattler, greater sand plover, ruddy turnstone, red-necked stint). • Marine raptors • Maritime heritage (*Zeewijk*) • Cultural heritage associated with guano industry
Pelsaert	Hummock	• Seabird nesting (fairy tern) • Marine raptors • Maritime heritage (*Zeewijk*)
Pelsaert	Iris Refuge	• Seabird nesting (bridled tern)
Pelsaert	Jon Jim	• Seabird nesting (roseate tern), • Marine raptors
Pelsaert	Lagoon	• Seabird nesting (bridled tern, fairy tern, Caspian tern) • Migratory shorebirds (ruddy turnstone) • Marine raptors
Pelsaert	Middle	• Significant vegetation communities (pavement limestone) • Seabird nesting (wedge-tailed shearwater) • Migratory shorebirds (grey-tailed tattler, ruddy turnstone, red-necked stint) • Marine raptors • Maritime heritage (*Zeewijk*)
Pelsaert	Murray	• Seabird nesting (wedge-tailed shearwater, Caspian tern, fairy tern) • Migratory shorebirds (Greater sand plover, grey-tailed tattler, ruddy turnstone) • Marine raptors • Maritime heritage (*Zeewijk*)
Pelsaert	Newman	• Significant vegetation communities (mangroves) • Seabird nesting (bridled tern, Caspian tern, crested tern, fairy tern, roseate tern) • Migratory shorebirds (whimbrel, ruddy turnstone) • Marine raptors

Island Group	Island	Significant natural and cultural heritage values
Pelsaert	One	• Seabird nesting (bridled tern, Caspian tern, wedge-tailed shearwater) • Marine raptors • Cultural heritage associated with guano industry
Pelsaert	Pelsaert	• Significant vegetation communities *(Atriplex cinerea* dwarf shrubland, mangroves) • Sea lion pupping • Seabird nesting (lesser noddy, wedge-tailed shearwater, bridled tern, Caspian tern, crested tern, fairy tern, roseate tern) • Migratory shorebirds (grey plover, bar-tailed godwit, grey-tailed tattler, common greenshank, ruddy turnstone, great knot, red-necked stint) • Marine raptors • Maritime cultural heritage (*Zeewijk* and non-Dutch shipwrecks) • Cultural heritage associated with guano industry
Pelsaert	Seven	• Seabird nesting (bridled tern, Caspian tern) • Migratory shorebirds (ruddy turnstone) • Marine raptors
Pelsaert	Sid Lidden	• Seabird nesting (Caspian tern, crested tern)
Pelsaert	Six	• Seabird nesting (bridled tern, crested tern, Caspian tern) • Marine raptors
Pelsaert	Square	• Sea lion pupping • Seabird breeding (bridled tern, Caspian tern, crested tern, fairy tern, roseate tern) • Marine raptors
Pelsaert	Stick	• Sea lion pupping • Seabird breeding (bridled tern, Caspian tern, crested tern, fairy tern). • Migratory shorebirds (ruddy turnstone) • Marine raptors • Abrolhos Spiny tailed skink
Pelsaert	Sweet	• Seabird breeding (wedge-tailed shearwater, bridled tern, Caspian tern, crested tern, roseate tern) • Migratory shorebirds (ruddy turnstone) • Marine raptors • Cultural heritage associated with guano industry
Pelsaert	The Coral Patches	• Seabird nesting (bridled tern, crested tern, fairy tern, roseate tern) • Migratory shorebirds (ruddy turnstone) • Marine raptors

Island Group	Island	Significant natural and cultural heritage values
Pelsaert	Three	• Seabird nesting (bridled tern, Caspian tern) • Marine raptors • Cultural heritage associated with guano industry
Pelsaert	Travia	• Seabird nesting (bridled tern) • Migratory shorebirds (ruddy turnstone)
Pelsaert	Two	• Seabird nesting (bridled tern, wedge-tailed shearwater) • Migratory shorebirds (ruddy turnstone)

Appendix 3. Priority islands for management

Island Group	Island	Significant natural and cultural heritage values	Proposed management to minimise visitor impacts to significant values
Wallabi	North	• Significant vegetation communities (flora rich pavement limestone, dunes and consolidated dunes, salt lake and saltbush flats) • Abrolhos painted button-quail • Seabird breeding (Caspian tern, crested tern, fairy tern, roseate tern) • Marine raptors	• Define appropriate pedestrian access (boardwalk, beach or walk trail). • Define appropriate locations for boat landing • Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines and interpretation products and experiences. • Implement a detailed assessment process for proposed nature-based tourism development and camping areas, with greater scrutiny for islands with significant natural and cultural heritage values. Following this assessment, consider nature-based tourism development and camping areas only where there are minimal impacts to the natural and cultural heritage values, or where impacts can be mitigated. • Implement biosecurity protocols.
Wallabi	West Wallabi	• Significant vegetation communities (mangroves, *Atriplex cinerea* dwarf shrubland, flora rich pavement limestone, dunes and consolidated dunes, salt lake and saltbush flats) • Abrolhos painted button-quail • Seabird nesting (Caspian tern, crested tern, fairy tern, roseate tern, wedge-tailed shearwaters)	• Define appropriate pedestrian access (boardwalk, beach or walk trail). • Define appropriate locations for boat landing. • Seasonal visitor access restrictions to seabird nesting areas during breeding seasons. • Monitor Abrolhos painted button-quail populations and consider changes to management if impacts from visitor use occur.

Island Group	Island	Significant natural and cultural heritage values	Proposed management to minimise visitor impacts to significant values
		• Migratory shorebirds (grey plover, greater sand plover, bar-tailed godwit, grey-tailed tattler, common greenshank, ruddy turnstone, sanderling, red-necked stint, curlew sandpiper, • Marine raptors • Tammar wallaby • Abrolhos spiny-tailed skink and Abrolhos bearded dragon • Maritime cultural heritage (*Batavia* National Heritage Listed area) • Cultural heritage associated with guano industry	• Monitor maritime cultural heritage (*Batavia* National Heritage Listed area) and consider changes to management if impacts from visitor use occur. • 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. • Implement a detailed assessment process for proposed nature-based tourism development and camping areas, with greater scrutiny for islands with significant natural and cultural heritage values. Following this assessment, consider nature-based tourism development and camping areas only where there are minimal impacts to the natural and cultural heritage values, or where impacts can be mitigated.
Wallabi	East Wallabi	• Significant vegetation communities (flora rich pavement limestone, dunes and consolidated dunes, *Eucalyptus oraria* community) • Abrolhos painted button-quail • Seabird nesting (Caspian tern, fairy tern, roseate tern) • Migratory shorebirds (greater sand plover, bar-tailed godwit, ruddy turnstone, sanderling, red-necked stint, • Marine raptors • Tammar wallaby • Abrolhos spiny-tailed skink and Abrolhos bearded dragon	• Define appropriate pedestrian access (boardwalk, beach or walk trail). • 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. • Plan, design, develop and manage visitor infrastructure (new jetty, shade shelters, toilets, DBCA operations base) to consider and minimise visitor impacts to sensitive natural and cultural heritage values. • Implement a detailed assessment process for proposed nature-based tourism development and camping areas,

Island Group	Island	Significant natural and cultural heritage values	Proposed management to minimise visitor impacts to significant values
			with greater scrutiny for islands with significant natural and cultural heritage values. Following this assessment, consider nature-based tourism development and camping areas only where there are minimal impacts to the natural and cultural heritage values, or where impacts can be mitigated.
Wallabi	Beacon	• Maritime heritage (*Batavia* National Heritage Listed area) • Seabird nesting (little shearwater, bridled tern, roseate tern, Caspian tern, crested tern, fairy tern) • Migratory shorebirds (ruddy turnstone) • Marine raptors	• Define appropriate pedestrian access (boardwalk, beach or walk trail). • Plan, design, develop and manage visitor infrastructure visitor infrastructure (new jetty and interpretation) to consider and minimise visitor impacts to sensitive natural and cultural heritage values. • Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines, codes of conduct and interpretation products and experiences. • Monitor maritime cultural heritage (*Batavia* National Heritage Listed area) and consider changes to management if impacts from visitor use occur. • Implement biosecurity protocols
Easter	Wooded	• Significant vegetation communities (mangroves) • Sea lion pupping • Seabird nesting (lesser noddy, bridled tern, Caspian tern, crested tern, fairy tern, roseate tern) • Migratory shorebirds (ruddy turnstone, red-necked stint) • Marine raptors	• Define appropriate pedestrian access (boardwalk, beach or walk trail). • Seasonal visitor access restrictions to seabird nesting and sea lion pupping areas during breeding seasons. • Monitor key seabird, shorebird and marine raptor populations and seabird breeding success and consider changes to management if impacts from visitor use occur.

Island Group	Island	Significant natural and cultural heritage values	Proposed management to minimise visitor impacts to significant values
			• Monitor sea lion pupping and consider changes to management if impacts from visitor use occur. • Commercial tour operator access considered during periods of seasonal restricted visitor access with appropriate licence conditions. • Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines, codes of conduct and interpretation products and experiences. • Implementing biosecurity protocols
Easter	Morley	• Significant vegetation communities (mangroves) • Sea lion pupping • Seabird nesting (Lesser noddy, bridled tern, Caspian tern, crested tern, fairy tern, roseate tern). • Migratory shorebirds (greater sand plover, common greenshank, ruddy turnstone, grey plover, bar-tailed godwit, grey-tailed tattler, ruddy turnstone)	• Define appropriate pedestrian access (boardwalk, beach or walk trail). • Define appropriate locations for boat landing • Seasonal visitor access restrictions to seabird nesting and sea lion pupping areas during breeding seasons. • Monitor key seabird, shorebird and marine raptor populations and seabird breeding success and consider changes to management if impacts from visitor use occur. • Commercial tour operator access considered during periods of seasonal visitor access closure with appropriate licence conditions. • Implementing biosecurity protocols • Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines, codes of conduct and interpretation products and experiences. • Monitor sea lion pupping and consider changes to management if impacts from visitor use occur.

Island Group	Island	Significant natural and cultural heritage values	Proposed management to minimise visitor impacts to significant values
Easter	Leo	• Significant vegetation communities (mangroves and *Tecticornia halocnemoides* subsp. *tenuis*) • Sea lion pupping • Seabird nesting (bridled tern, crested tern, Caspian tern, fairy tern, roseate tern, wedge-tailed shearwater) • Migratory shorebirds (bar-tailed godwit, curlew sandpipers, greater sand plover, whimbrel, grey-tailed tattler, common greenshank, ruddy turnstone). • Marine raptors	• Define appropriate pedestrian access (boardwalk, beach or walk trail). • Define appropriate locations for boat landing • Seasonal visitor access restrictions to seabird nesting and sea lion pupping areas during breeding seasons. • Monitor key seabird, shorebird and marine raptor populations and seabird breeding success and consider changes to management if impacts from visitor use occur. • Monitor sea lion pupping and consider changes to management if impacts from visitor use occur. • Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines, codes of conduct and interpretation products and experiences.
Easter	Rat	• Seabird nesting (bridled tern, Caspian tern, fairy tern, wedge-tailed shearwater) • Migratory shorebirds (greater sand plover, whimbrel, grey-tailed tattler, common greenshank, ruddy turnstone, sanderling, red-necked stint) • Marine raptors • Sea lion pupping • Cultural heritage associated with guano industry	• Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines, codes of conduct and interpretation products and experiences. • Define appropriate pedestrian access (boardwalk, beach or walk trail). • Minor infrastructure development (shelter, airstrip). • Implement a detailed assessment process for proposed nature-based tourism development and camping areas, with greater scrutiny for islands with significant natural and cultural heritage values. Following this assessment, consider nature-based tourism development and camping areas only where there are minimal impacts to the natural

Island Group	Island	Significant natural and cultural heritage values	Proposed management to minimise visitor impacts to significant values
			and cultural heritage values, or where impacts can be mitigated.
Easter	White Bank	• Sea lion pupping • Seabird nesting (shearwaters and sooty tern, Caspian tern, crested tern, fairy tern, roseate tern) • Seabird breeding (bridled tern, crested tern, roseate tern, fairy tern) • Marine raptors	• Visitor access not promoted over the life of the plan. • Seasonal visitor access restrictions to seabird nesting and sea lion pupping areas during breeding seasons. • Monitor key seabird, shorebird and marine raptor populations and seabird breeding success and consider changes to management if impacts from visitor use occur. • Monitor sea lion pupping and consider changes to management if impacts from visitor use occur.
Pelsaert	Pelsaert	• Significant vegetation communities *(Atriplex cinerea* dwarf shrubland, mangroves) • Sea lion pupping • Seabird nesting (lesser noddy, wedge-tailed shearwater, bridled tern, Caspian tern, crested tern, fairy tern, roseate tern) • Migratory shorebirds (grey plover, bar-tailed godwit, grey-tailed tattler, common greenshank, ruddy turnstone, great knot, red-necked stint, • Marine raptors • Maritime cultural heritage (*Zeewijk* and non-Dutch shipwrecks) • Cultural heritage associated with guano industry	• Define appropriate pedestrian access (boardwalk, beach or walk trail). • Define appropriate locations for boat landing • Permanently visitor access restrictions to area containing habitat used by nesting lesser noddies on Pelsaert Island. • Seasonal and/or permanent visitor access restrictions to other seabird nesting areas during breeding seasons and seasonal visitor access restrictions to sea lion pupping areas during breeding seasons. • Monitor key seabird, shorebird and marine raptor populations and seabird breeding success and consider changes to management if impacts from visitor use occur. • Monitor sea lion pupping and consider changes to management if impacts from visitor use occur.

Island Group	Island	Significant natural and cultural heritage values	Proposed management to minimise visitor impacts to significant values
			• Monitor maritime cultural heritage (*Zeewijk*) and consider changes to management if impacts from visitor use occur. • Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines, codes of conduct and interpretation products and experiences. • Implement biosecurity protocols
Pelsaert	Gun	• Sea lion pupping • Seabird nesting (bridled tern, Caspian tern, crested tern, fairy tern, roseate tern and wedge-tailed shearwater) • Migratory shorebirds (ruddy turnstone, grey-tailed tattler, greater sand plover, ruddy turnstone, red-necked stint). • Marine raptors • Maritime heritage (*Zeewijk*) • Cultural heritage associated with guano industry	• Define appropriate pedestrian access (boardwalk, beach or walk trail). • Define appropriate locations for boat landing • Seasonal visitor access restrictions to seabird nesting and sea lion pupping areas during breeding seasons. • Educate visitors on sensitive values, access, and appropriate behaviour via pre-visit information, commercial tour operator guidelines, codes of conduct and interpretation products and experiences. • Implement biosecurity protocols • Monitor sea lion pupping and consider changes to management if impacts from visitor use occur. • Monitor maritime cultural heritage (*Zeewijk*) and consider changes to management if impacts from visitor use occur.