Department of Fisheries

Fish for the future

EXPLORING THE HOUTMAN ABROLHOS ISLANDS

This booklet is designed to assist you in exploring and appreciating the Houtman Abrolhos Islands. It provides a general overview on the attributes of the Abrolhos that make it so unique.

A place rich in ecological, historical, economic and cultural significance for Western Australia.

Somewhere worthy of careful, ongoing management for the benefit of present and future generations.

Prepare to embark on a journey of discovery.

Apart from being an introduction to the Abrolhos, the booklet also provides background and context for the various management plans and strategies developed and implemented to sustainably manage these Islands and their surrounding waters. For further information on the Abrolhos and its management arrangements, visit the Department of Fisheries website at **www.fish.wa.gov.au** or contact:

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Published by Department of Fisheries, Perth, Western Australia.
Fisheries Occasional Publication No. 105, June 2012.
ISSN: 0819 - 4327 ISBN: 978-1-921845-34-5

Front cover photos:
Top – Burnett and Basile Islands, Southern Group. Photo © by Karl Monaghan, 335 Production Studio, www.outbackpix.com
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Top – Jade Plottke
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The Houtman Abrolhos Islands

Introduction

> *"Deeming ourselves to be in an open sea, we unexpectedly came upon a low-lying coast, a level, broken country with reefs all round it. We saw no high land or mainland, so that this shoal is very dangerous to ships that wish to touch at this coast."*
>
> **Frederik de Houtman, 1619**

When Frederik de Houtman and his crew of the *Verenigde Oostindische Compagnie* (VOC - United Dutch East India Company) ship *Dordrecht* encountered a collection of islands and reefs off the Western Australian coast in June 1619, they charted them with a warning to other navigators of *Abrolhos*. In modern day Portuguese, "*Abro olhos*" translates to *open eyes*.

Today, the Houtman Abrolhos Islands are still a place to keep your eyes open.

The Abrolhos supports a diverse and unique range of marine and terrestrial flora and fauna. Abrolhos waters contain important historical shipwrecks, with the remnants of survivors' camps on the islands themselves.

The Abrolhos is a complex of islands and reefs at the edge of the continental shelf in Western Australia between latitudes 28°15'S and 29°00'S – over 100 km from north to south. Situated approximately 60 km offshore from the Mid-West coast and Geraldton, separated from the mainland by the Geelvink Channel, the Abrolhos comprises three major island groups:

- Wallabi-North Island Group;
- Easter Group; and
- Pelsaert (or Southern) Group.

These island groups are separated by the Middle and Zeewijk Channels, which are around 40 metres deep.

Photo: Department of Fisheries

Jackson Island looking south toward Pelsaert Island in the Pelsaert Group.

The Abrolhos, including the adjoining State territorial waters, was declared a Fish Habitat Protection Area (FHPA) in 1999 for:

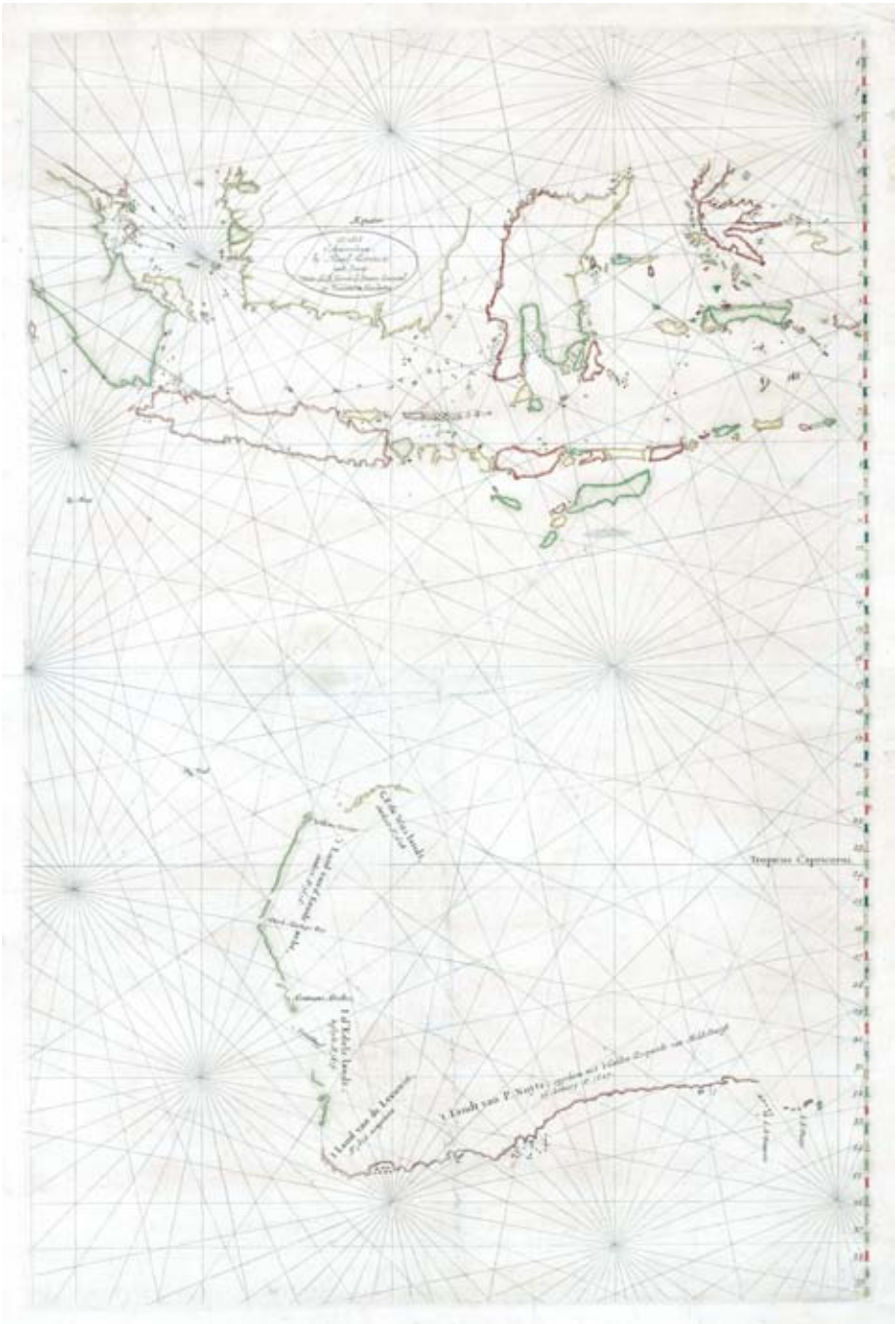
- *the conservation and protection of fish, fish breeding areas, fish fossils or the aquatic eco-system;*
- *the culture and propagation of fish and experimental purposes related to that culture and propagation; or*
- *the management of fish and activities relating to the appreciation or observation of fish.*

An A Class Reserve since 1929, the Houtman Abrolhos Nature Reserve is 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."

> *"The space between the Abrolhos and the mainland bears the name of Geelvink Channel, after Vlamingh's ship, the first that ever passed through."*
>
> **John Lort Stokes, 1846**

Jetties and camps at the Abrolhos.



First map showing Houtman's Abrolhos drawn in 1632, by Hessel Gerritsz for the United Dutch East India Company.

History

"One should stay clear of this shoal, for it lies most treacherously for ships that want to call in at this land."

Frederik de Houtman

Frederik de Houtman

Despite de Houtman's advice, many vessels have visited the Abrolhos. Some visited by accident, as shipping traffic driven off-course or through navigational errors. Some visited intentionally, for guano mining, fishing, tourism or defence, and some met their ends at the Abrolhos.

More than 60 vessels have been documented as lost at the Abrolhos, starting with the *Batavia* in 1629. The total number of vessels which met a watery grave in Abrolhos waters may never be known.

The United Dutch East India Company

The United Dutch East India Company (VOC) was formed in the Netherlands in 1602 to send wooden sailing ships from the Netherlands to Asia to buy silks and spices and sell them in Europe. In order to get there, the ships sailed down around the Cape of Good Hope (in modern day South Africa), before using the prevailing winds to carry them east across the Indian Ocean and then north to the East Indies (modern day Indonesia). Some of the ships ventured too far east and encountered the Western Australian coast, sometimes fatally.

Batavia

"It is strange to note how indifferent the old navigators and castaways of the Batavia seem to have been to the peculiarities of their place of enforced settlement. The horror of the massacre and continual fighting, and the excitement of the trial, probably account for this."

Western Mail, 1897

The *Batavia* was a VOC vessel on its way from the Cape of Good Hope to Batavia (modern day Jakarta). On 4 June 1629, the *Batavia* hit Morning Reef in the Wallabi Group. The majority of its 316 passengers and crew made it ashore to some of the small islands on the eastern side of the Wallabi Group.

The commander, Francisco Pelsaert, and the skipper, Ariaen Jacobsz, together with some passengers and crew (48 in all) sailed away in search of water in one of the ship's longboats. When this search proved fruitless, they set sail for Batavia. In an amazing feat of navigation and sailing at the time, this boat travelled over 2,000 km to reach Batavia in 30 days.

Governor General Coen in Batavia dispatched Pelsaert seven days later in the *jacht Sardam* to effect a rescue of the survivors and salvage the cargo aboard the *Batavia*.

When Pelsaert returned to the Abrolhos in the *Sardam*, he found that the *Batavia*'s under-merchant, Jeronimus Cornelisz, who had been left in charge, had recruited a small band of men, who then brutally murdered 125 of their fellow survivors. Some of the victims were buried on what is now Beacon Island.

This number might have been greater except for the efforts of Wiebbe Hayes, a soldier who was sent with a group of others to East and West Wallabi Islands in search of food and water. Hayes' group constructed a small shelter on West Wallabi Island, the first European structure on Australian soil. Traces of this structure still remain on West Wallabi Island.

Anchor, hull and cannon from the *Batavia*.

Pelsaert and the crew of the *Sardam* salvaged as much of the *Batavia*'s cargo as they could and administered justice under the Dutch law of the time. This didn't involve a trial in the modern sense, with lawyers and witnesses. Eight of the murderers (who Pelsaert considered to be the worst) were interrogated whilst being subject to torture. Dutch law at the time required a man to confess his crimes in order to be subject to the death penalty and these eight all confessed.

Seven of the self-confessed murderers, including Cornelisz, were executed in the Abrolhos, whilst two murderers were marooned on the mainland. A further 14 lesser offenders, who had been flogged, keelhauled and dropped from the yard arm on the voyage home, were taken to Batavia in the *Sardam* to face justice there.

In the end, after it was all over, out of the 316 people aboard the *Batavia*, only 116 survived.

The wreck of the *Batavia* was discovered in 1963 and extensive archaeological surveys and excavations have since been conducted, both in the water and on land. Most of the artefacts have been removed and conserved by the Western Australian Museum. These artefacts are on display at museums in Geraldton and Fremantle.

Salvaged part of *Batavia* on display at WA Museum.

Zeewijk

> *"At dawn we saw 10 to 12 islands, which we thought to be the Islands of Frederik Houtman. We saw a reef, which runs around the back of us as far as one could see."*
>
> **Officers of the *Zeewijk*, 1727**

The *Zeewijk* was also a VOC vessel sailing from the Cape of Good Hope to Batavia. The *Zeewijk* hit Half Moon Reef in the Pelsaert Group on 9 June 1727. Many of the crew established a camp on nearby Gun Island.

The *Zeewijk* did not break up immediately and goods, including the treasure chests, were transferred to Gun Island, when it became obvious to the crew that the ship could never be floated from its position locked into the reef. A rescue group of 11 of the survivors and the First Mate set off for Batavia in the ship's longboat on the 10 July, but were never heard of again.

Using materials salvaged from their stricken ship, the crew of the *Zeewijk* constructed the first ocean-going vessel built in Australia, the 20 m long *Sloepie*. On the 26 March 1728, the remaining 88 survivors from the original 212 crew set sail for Batavia in the *Sloepie*. Only 82 of them survived to reach Batavia on 30 April 1728.

> *"Thursday 30th October: Today we decided to construct a vessel with which everybody could go to Batavia, as there seemed to be no other solution for us."*
>
> **Officers of the *Zeewijk*, 1727**

Photo: Department of Fisheries © Shannon Conway

Zeewijk cannon.

Guano Mining

"The island is fronted by a line of low overhanging cliffs of limestone. Upon these rests a layer of a kind of soil, in some places eighteen inches deep, in others four feet, in which the seabirds burrow, and which, from what I have since seen of the much sought after guano, I believe to contain some of the valuable substance. In some of the islands forming Houtman's Abrolhos which we subsequently examined, I found similar signs of the presence of this manure, which I think worthy of being made the subject of inquiry."

John Lort Stokes, 1846

Guano mining at the Abrolhos, 1907.

When the Abrolhos were surveyed in 1840 by Commander John Wickham and Lieutenant John Lort Stokes in HMS *Beagle*, their report identified guano resources on the islands. John Forrest was sent to the Abrolhos to investigate these guano deposits in 1879 in what he referred to as "the dirty little cargo boat called the *Moonlight*". Guano is a natural fertiliser, predominantly made up of bird droppings, which was highly sought after in Europe and the United States at the time.

Anthony Curtis arranged for the first commercial shipment of guano to leave the Abrolhos in 1844. The commercial guano industry at the Abrolhos was developed by the Pelsart Fishing Company from 1847, mining guano at a number of islands. Guano continued to be mined at the Abrolhos by several successive companies until 1946. The remnants of buildings, jetties and tramways used for guano mining are still visible on Rat Island, Gun Island, Pelsaert Island and Pigeon Island.

At least five guano ships ran afoul of the reefs and sand bars in the Abrolhos, including the German barque *Hadda* in 1877.

Photo: Courtesy of Geraldton Regional Library – Donated by Neville Thompson

Guano mining at the Abrolhos in the 1890s.

Fishing

"The Abrolhos may be considered as a place of refreshment, inasmuch as fish, of an excellent quality may be taken with hook and line in any quantity."

Captain John Wickham, 1840

Wickham's account of the marine life in Abrolhos waters inspired the fishing industry in the 1840s – an industry which still exists today.

Rat Island in 1983.

William Saville-Kent, the Commissioner of Fisheries, was deputed by the Western Australian Government in 1897 to examine the Abrolhos for the establishment of profitable fisheries. He was very impressed by the marine resources at the Abrolhos and devoted a large portion of his book, *The Naturalist in Australia*, to the wildlife both on the islands and in the surrounding waters.

William Saville-Kent

Photo: Pat Baker © WA Museum

Photo: Courtesy of Geraldton Regional Library – Donated by Bill Newbold

From left to right: Denis “Fiddle” Hancock, Ray Page, Bill Newbold and Colin Hancock, on Basile Island in 1950.

Photo: Courtesy of Geraldton Regional Library – Donated by Tracy Budd

Gerald Jennings with his catch, Rat Island in the 1950s.

Initially, fishers at the Abrolhos targeted finfish, whales, seals and sea cucumbers. Recreational fishing helped to support the guano and tourism industries at the islands, providing both a food source and a source of additional income.

The western rock lobster industry started to develop in the 1920s, increasing during and after World War II, as a result of a decision by the Defence Foodstuffs Administration in 1941 to supply canned lobster to canteens for the armed forces. Some of the first fishers' camps on the islands were constructed around this time and parts of these original camps still remain today, on the islands currently inhabited by commercial rock lobster fishers for part of the year.

Many of the smaller vessels which ran afoul of the Abrolhos were fishing boats, including the *Columbia* in 1929, off Rat Island. One man from the *Columbia* drowned, trying to swim to shore with a rope. His name was Giuseppe Benvenuto and his grave stone can still be seen on Rat Island.

Photos: Courtesy of Geraldton Regional Library – Donated by Tracy Budd

(left): Bob Jennings with his rock lobster catch at Rat Island in the 1950s. (right): Fixing rock lobster pots on Rat Island in the 1950s.

Tourism and Recreation

> *"The Islands have many attractions, besides the good fishing and oyster beds. Those of us who made the trip for the first time were very delighted, and we earnestly hope that it will be possible at no distant date to make arrangements for our residents to spend a holiday at this charming place."*
>
> **S.J. Hayward, Director of the State Tourist Bureau, in *The West Australian*, 1 July 1929**

The Abrolhos were considered ideal for tourism and recreation in the first half of the twentieth century.

Utilising the buildings constructed by the British Phosphate Commission for their guano mining operations during World War II, a fishing and tourist resort was established on Pelsaert Island. This resort was not particularly successful, due to the lack of fresh water supplies.

The majority of the resort has been demolished, though the construction materials can be seen forming parts of fishing shacks on other islands in the Pelsaert Group.


ABROLHOS ISLANDS TOURIST AND FISHING CAMP
FOR SALE

From The *West Australian* newspaper, 1952.

Photo: Courtesy of Geraldton Regional Library – Donated by Neville Thompson

Abrolhos tourists on Pelsaert Island in the 1890s.

Defence

> *"11/9/42: At the request of Commanding Officer 2nd Infantry Brigade, who were attacking the Abrolhos Islands at 0500 hours, six Anson aircraft of No. 69 Squadron took off at 0551 hours arriving at East Wallabi Island at 0630 hours, where Army was to be contacted. The attacking force in six luggers were not in sight and did not arrive until approximately 0930 hours. The luggers were unable to effect landing at East Wallabi Island, one lugger going aground, the other five being temporarily weather bound."*
>
> **Norman Brearley, *Operations Record Book of No.4 Service Flying Training School,* Geraldton, 1942**

In 1942, during World War II, the Royal Australian Air Force (RAAF) established No. 1 Spotting WT Post on East Wallabi Island near Turtle Bay, including the first air strip on East Wallabi Island. This was manned constantly by staff and cadets from the No. 4 Service Flying Training School at Geraldton until March 1943.

East and West Wallabi Islands were also used for training exercises during World War II.

Operations and training exercises on East Wallabi Island, 1942.

Conservation

> *"On these islands, there are large numbers of creatures of miraculous form."*
>
> **Francisco Pelsaert, Commander of the *Batavia***

The islands of the Abrolhos are low-lying, with a maximum height of 14 metres above sea level, and have an unusual geology, as they are only around 125,000 years old.

The warm marine waters and mild climate with low rainfall make the Abrolhos a pleasant place to visit, despite its isolation from the mainland.

The combination of temperate and tropical species, both in the water and on the islands, is unique at the Abrolhos. This unique blend fosters unusual ecological interactions. In addition, the small tidal ponds that occur on many islands are important structures, which are rare on other offshore islands in the south-west of Australia.

The terrestrial flora includes a number of communities that are of special conservation interest. Virtually all the islands of the Abrolhos archipelago have sea bird nesting and breeding areas, and populations of some species are of national and international significance.

Geology

> *"One of the islets was formed of large flat pieces of dead coral, resembling a fan, strewed over a limestone foundation one foot above the level of the sea, in the greatest possible confusion. In walking over them they yielded a metallic sound."*
>
> **John Lort Stokes, 1846**

The Houtman Abrolhos Islands are very flat, with an elevation above sea level of three to five metres on most islands. Flag Hill, above Turtle Bay on East Wallabi Island, is the highest point in the Abrolhos, at 14 metres above sea level.

Bridled tern on the coral shingle on Uncle Margie Island.

The three main island groups are located on separate limestone platforms up to 36 m thick with deep channels between these. North Island, which is the northernmost island at the Abrolhos, is on the same carbonate platform as the Wallabi Group. Each platform has a fringing reef system, with a windward reef on the southern and western sides and a leeward reef on the eastern side. These reefs are separated by a central shallow lagoon. The majority of the islands in the Abrolhos have formed within the central lagoons or on the eastern (leeward) reefs.

The Abrolhos are formed of solid limestone under a layer of sand, cemented coral rubble and coral shingle. The limestone is the remnants of coral reef which formed at least 125,000 years ago, during a period of high sea level. Coral shingle and sand has been deposited on the limestone during storms and cyclones. The islands continue to change shape and form today, through the same processes of erosion and deposition during storms and cyclones. Walking on the coral shingle makes a tinkling sound, like walking through small pieces of metal or glass.

At the peak of the last glacial period (approximately 18,000 years ago), the sea level was about 130 m lower than it is today, so it was possible to walk, hop or slither across where the Geelvink Channel is today to the Abrolhos Islands, such as East and West Wallabi Islands. At the end of the last glacial period, the ice started to melt and sea levels rose. Around 6,000 years ago, sea levels reached the current level, marooning terrestrial wildlife on the Abrolhos.

Water

"I could trace the long line of white breakers rolling in on the other side in solemn grandeur, contrasting strongly in their foaming turbulence with the placid waters within the protection of the reef and island. The surface of the lagoon was diversified by blue and grey patches, showing the alternations of shoal and deep water."

John Lort Stokes, 1846

Waves breaking on a submerged reef.

Marine Waters

Abrolhos waters have a history of higher nutrient levels than coastal waters at Geraldton. There are a number of theories for this, including nutrient upwelling (a phenomenon where dense, cooler and nutrient-rich water is driven from the depths toward the sea surface, replacing warmer, nutrient-poor surface water) and seagrass detritus. During autumn and winter storms, seagrass is torn from the reef substrate. This seagrass detritus accumulates in the relatively calm water in the lagoon areas and releases nutrients as it decays. The higher nutrient levels in Abrolhos waters help to support the diverse marine life found at the Abrolhos.

Abrolhos tides alternate between diurnal and semi-diurnal (two tide cycles per day), though they are predominantly diurnal (one high tide and one low tide per day). The daily tidal range is low - about 0.7 metres between high and low tides. Whilst wave heights can average about two metres in the open ocean near the Abrolhos, within the island groups they are lower, dampened by the shallow reefs and islands.

The Leeuwin Current runs along the Western Australia coast and brings warm tropical water to higher latitude reefs like those at the Abrolhos. Between the islands, ocean currents are highly variable.

The Leeuwin Current maintains warmer water temperatures at the Abrolhos than in coastal waters near Geraldton. Sea surface temperatures are noticeably stable at the Abrolhos, with the monthly mean of 20°C in September and a maximum of 27.3°C in March.

Fresh Water

> *"We found a kind of cavern, about 15 feet deep, with a sloping entrance, in which was some slightly brackish water, that in percolating through the roof had formed a number of stalactites."*
>
> **John Lort Stokes, 1846**

There is limited fresh water available on the islands. The only source of fresh water is from rainfall, which is less than 300 mm per year.

Winter storm approaching Turtle Bay.

There are freshwater wells on East and West Wallabi Islands, Rat Island and Middle Island, where rainwater drains and percolates into small, shallow limestone caverns on these islands.

Climate

> *"The gale commenced in earnest, continuing with great violence, accompanied by heavy squalls of rain. During this time the whole aspect of the scene changed; immense dark banks of clouds rested on the contracted horizon; the coral islands by which we were surrounded loomed indistinctly through the driving mist..."*
>
> **John Lort Stokes, 1846**

The Abrolhos are subject to strong winds for most of the year, with calm conditions mostly in autumn and early winter. The prevailing winds are from a southerly direction and these are strongest in summer.

There is a weather station on North Island which has been recording temperature and rainfall data since 2000. Based on the data collected at this station to date, the Abrolhos Islands receive an average annual rainfall of 272 mm, with the majority of this occurring in April to September. In summer, the mean temperature varies from 21 to 27°C, and in winter between 16 and 22°C.

Cyclones

The Abrolhos are occasionally subject to cyclone activity during the cyclone season from December to May, with more than half the recorded cyclones occurring between March and May. Since 1915, on average, a cyclone passes through coastal waters within 400 km of North Island approximately every 2.5 years.

Under the Sea

Seagrass Communities

> *"I was particularly impressed by the very definite border-like plan of growth upon each side of the river-like channels which circulate through the Pelsaert Island Lagoon. In the regularity of their development and blended tints, they vied, on colossal lines, with the artificially laid out flowers of a well-appointed garden."*
>
> **William Saville-Kent, *The Naturalist in Australia*, 1897**

Photo: Pat Baker © WA Museum

Marine algae at the Abrolhos.

Photo: Pat Baker © WA Museum

Ecklonia, a brown marine algae found at the Abrolhos.

Seagrasses are marine flowering plants that generally grow in shallow coastal areas, protected from ocean swells. In contrast to the marine fauna, which has a strong tropical component, the seagrasses in Abrolhos waters are predominately cooler water species.

In total, 10 seagrass species have been recorded at the Abrolhos ranging from small, delicate species to larger, more robust types that grow in large meadows. Small paddle-weeds grow in protected lagoon areas or deep waters between the islands, such as Goss Passage.

The larger species may be found growing on reef as well as in sandy areas. *Thalassodendron pachyrhizum*, which is encountered growing on the exposed reef crest area, has been recorded at a number of the island groups.

There are also two species of wire-weed (*Amphibolis* species), endemic to southern Australia, found at the Abrolhos. The most abundant seagrass is *Amphibolis antarctica*, while *Amphibolis griffithii* appears to be restricted to bays such as Turtle Bay in the Wallabi Group.

The larger ribbon-weeds (*Posidonia* species) grow in sheltered bays and lagoons where the sand cover is deeper and more stable (e.g. Turtle Bay, the Gap, East Wallabi Island, the lagoon on the west side of West Wallabi Islands and around North Island).

Protection of the diverse seagrass communities in reef areas and sheltered bays at the Abrolhos is necessary for the maintenance and functioning of these productive waters. Seagrasses are not only a key benthic primary producer but also provide habitat for a diverse and abundant community of algae and small invertebrates, like juvenile western rock lobsters. Additionally, seagrasses reduce water movement and stabilise the sea floor.

Seagrass can be torn from the reef substrate during storms and this accumulates in the calm lagoon areas of the Abrolhos. As this seagrass detritus decays, it provides nutrients to support the marine ecosystem at the Abrolhos.

Posidonia, a ribbon-weed found at the Abrolhos.

Photo: Department of Fisheries @ Shannon Conway

Acropora coral reefs at the Abrolhos.

Coral Communities

> *"As we threaded our way among the patches of coral, the view from the masthead of the submarine forests through the still pellucid water was very striking. The dark blue of the deep portions of the lagoon contrasted beautifully with the various patches of light colours interspersed."*
>
> **John Lort Stokes, 1846**

The Abrolhos are high-latitude coral reefs – some of the southernmost coral reefs in the Indian Ocean. They have a unique assemblage of tropical and temperate fish, corals, algae and other invertebrates.

The coral fauna of the Abrolhos is diverse for a high-latitude reef system, with 211 species of corals discovered so far. All but two of the coral species are tropical.

The greatest diversity and density of corals is found on the reef slopes, shallow reef perimeters and lagoon patch reefs in the more sheltered northern and eastern sides of each of the three limestone platforms that support the island groups. The growth of at least two species of coral abundant at the Abrolhos has been found to be significantly slower than at several locations in the tropics.

The coral reefs occur in the same area as lush growths of temperate marine algae, or seagrass, which are more characteristic of the south coast of WA.

Marine Invertebrates

> *"Of the zoological groups which bear testimony to the essentially tropical character of a large portion of the marine fauna of Houtman's Abrolhos, we find that some of the most remarkable evidence is yielded by that group of the Echinodermata Holothuridae, which comprises Sea-Cucumbers or Trepang and Beche-de-Mer."*
>
> **William Saville-Kent, *The Naturalist in Australia,* 1897**

Marine invertebrates present at the Abrolhos include:

- Crustaceans
- Molluscs
- Echinoderms
- Sponges
- Cnidarians (other than hard corals)

There are 492 mollusc species and 172 echinoderm species which have been identified at the Abrolhos.

Some of the species which are important for the fishing industry are western rock lobster, saucer scallops, octopus and species that produce specimen shells.

In all these groups of marine invertebrates, there is a complex assemblage of tropical species living in close association with temperate species and

Photo: Jade Plottke

Crab on the stone jetty, Rat Island.

species endemic to WA. There are a higher proportion of tropical species in most groups, but the majority of hydroid (members of the invertebrate order *Hydroida*) and sponge species are usually found in temperate, rather than tropical, waters.

Southern Saucer Scallop

Southern saucer scallops (*Amusium balloti*) are short-lived, benthic, filter-feeding bivalve molluscs which reside on sandy bottoms. The southern saucer scallop can grow to 13 cm in length and live up to three years. They are subject to great natural fluctuations in reproductive success from year-to-year and grow to maturity within a year.

Southern saucer scallops spawn at the Abrolhos between August and March. The scallops feed on organic material which they filter from the water and are, in turn, eaten by pink snapper, turtles, crabs, octopus and humans.

Western rock lobster.

Western Rock Lobster

The western rock lobster (*Panuliris cygnus*) can live up to 30 years and weigh more than 5 kg. Rock lobster larvae are called phyllosoma and these are found up to 1,500 km offshore where they remain for between nine and 11 months. After this, they metamorphose into a puerulus phase, which looks just like an adult lobster, only transparent. Puerulus are capable of swimming and make the long journey from off the continental shelf back into nearshore areas and onto the shallow reefs, where they moult into tiny red/brown rock lobsters, around 10 mm long. They remain inshore for their first three to four years of life, when towards the end of their juvenile phase they

Western rock lobster puerulus.

moult again into a white shell in November/December. These 'whites' migrate in December/January out to deeper waters, where they slowly change back into a red colour and mature into breeding adult lobsters.

Western rock lobsters feed on algae, detritus, molluscs and crustaceans. They, in turn, are food for larger fish, octopus, sea lions and humans.

Beche de Mer

Beche de mer, also known as sea cucumbers or trepang, are echinoderms. The species which are fished in Western Australian waters are predominantly species of the Class *Holothurioidae*. Historically, these were one of the first species to be fished at the Abrolhos, in the first half of the last century, but now beche de mer fishing no longer occurs within the Abrolhos Fish Habitat Protection Area.

The average life span for beche de mer is five to ten years, depending on the species.

Fish

> *"The sea abounds in fish in these parts, but very different in shape and taste from those caught on other coasts."*
>
> **Francisco Pelsaert, Commander of the *Batavia***

A total of 389 finfish species have been recorded at the Abrolhos.

The Abrolhos and their surrounding coral and limestone reef systems consist of a combination of abundant temperate macroalgae with coral reefs, supporting substantial populations of large species such as baldchin groper and coral trout.

Some of the species occurring in the Abrolhos are dependent on larvae carried southward by the Leeuwin Current from areas further north, such as Shark Bay or Ningaloo Reef. Similarly, populations of some of the species occurring at Rottnest Island are dependent on larvae generated from breeding populations at the Abrolhos.

Temperate fish species such as pink snapper and West Australian dhufish are also found in Abrolhos waters.

Coral Trout

The waters surrounding the Abrolhos have the highest abundance of coral trout (*Plectropomus leopardus)* on the west coast of WA, whilst also being the southernmost extent of their range.

Abrolhos coral trout are mature females when they are five to six years old and around 40 cm long. They change sex from female to male when they are about 10 years old and 56 cm long. They can grow up to 80 cm long and weigh as much as 9 kg. These fish are red to brown, with small blue spots all over their bodies.

Coral trout.

Photo: Department of Fisheries © Shannon Conway

Baldchin groper.

Baldchin Groper

The Abrolhos is an area of high importance for the baldchin groper (*Choerodon rubescens*), which is only found in WA waters. This species spawns in the Abrolhos. The characteristic bald chin from which they get their name is white.

Baldchin groper are mature females when they are three to four years old and around 27 cm in length. They change sex from female to male when they are about eight to 12 years old and 48 to 55 cm. They can grow to be up to 70 cm and weigh as much as 7 kg.

These fish are carnivorous, feeding on sea urchins, gastropods, bivalve molluscs and crustaceans.

Photo: Henrique Kwong © Department of Fisheries

West Australian dhufish.

West Australian Dhufish

West Australian dhufish (*Glaucosoma hebraicum*) occur on deep-water limestone reefs and in the shallower coral areas of the Abrolhos. These fish are only found in Western Australian waters, from Shark Bay to Esperance.

Dhufish reach their maximum size of 125 cm and 26 kg at about 20 years of age. They can live up to 40 years.

Adult male dhufish are often bigger than female dhufish, with an elongated filament on their dorsal fins, making it easy to tell the difference between male and female dhufish.

Dhufish have cavernous mouths, which they use to eat other fish, crustaceans and molluscs, including squid and octopus.

Pink Snapper

Pink snapper (*Pagrus auratus*) are mostly pink, with blue spots on their upper body. They can live up to 40 years, growing to over 100 cm and 10 kg. These snapper take an average of four to five years to reach maturity, when they are between 40 and 70 cm long.

They don't just live in Western Australian waters – these fish live in waters all along the southern part of Australia, from Exmouth all the way around to southern Queensland and New Zealand. Most individual snapper don't travel far from home – pink snapper tagged in Western Australian waters were usually recaptured within 20 km of their release point, though some adventurous fish were recorded more than 100 km away from where they were tagged and released.

Pink snapper eat small fish, crustaceans, worms, molluscs, jellyfish, algae and echinoderms like sea stars and sea urchins. In addition to being eaten by humans, these fish are part of the menu for both dolphins and sharks.

Pink snapper.

Samson fish.

Samson Fish

Samson fish (*Seriola hippos*) only live in the waters of southern Australia and northern New Zealand, with most of them off the shores of Western and South Australia. A big strong fish, hence being named after the biblical character Samson who was famous for his strength, these fish are around 60 cm long at only two years of age, lurking around reefs in search of their preferred foods - pilchards, yellowtail scad, red snapper, squid and cuttlefish. These fish can live for up to 32 years, growing to 175 cm and 55 kg.

Because of their reputation for strength and fighting, Samson fish are popular with recreational fishers for 'catch and release' sport fishing. Samson fish have a high chance of survival on release after being caught, if returned to the water correctly and carefully.

Over the years, people have been hand-feeding Samson fish and yellowtail kingfish at some of the commercial mooring areas at the Abrolhos. The fish have become very tame, and Samson fish are now protected in the anchorage areas of inhabited islands in the Abrolhos.

Yellowtail Kingfish

Like Samson fish, yellowtail kingfish (*Seriola lalandii*) are also protected in the anchorage areas of inhabited islands at the Abrolhos. They can live up to 21 years and grow to 190 cm and 50 kg.

Yellowtail kingfish don't just have a yellow tail – they have yellow fins and a yellow stripe running down their sides.

Photo: Henrique Kwong © Department of Fisheries

Yellowtail kingfish.

Sharks and Rays

> *"A unique sight presented itself by the appearance of a company of sharks, no less than fourteen, ranging from eight to ten or twelve feet in length, being discernible at one time from the boat's deck. Without wishing to cultivate their nearer acquaintanceship, one could not withhold admiration of the leisurely grace of their motion in the emerald clear water, and of the amazing swiftness, like the release of an arrow from a bow, with which they would abruptly dart away in pursuit of some passing fish."*
>
> **William Saville-Kent, *The Naturalist in Australia*, 1897**

More than twenty species of sharks have been identified at the Abrolhos, including Port Jackson sharks, tiger sharks, whaler sharks and wobbegongs. Abrolhos waters are considered to be an important food source for sharks, due to the resident fish populations.

Various species of rays have been recorded at the Abrolhos. These include the manta ray and the white spotted eagle ray.

Port Jackson Sharks

Port Jackson sharks (*Heterodontus portusjacksoni*) are usually found on or near the sea floor. Grey-brown with dark diagonal stripes, these sharks only grow to around 120 cm long. Port Jackson sharks lay eggs, which are left on the seabed or in rock crevices for up to 12 months to hatch.

Tiger Sharks

Tiger sharks (*Galeocerdo cuvier*) are named for the dark stripes along the backs of younger sharks, which fade as they age. They can grow to be up to 6 m long.

A female tiger shark's eggs are fertilized and hatched in her uterus. After a nine month pregnancy, she gives birth to up to 60 pups, each of which are around 50 cm long.

Tiger sharks are mainly seasonal visitors to the Abrolhos during late spring, summer and autumn, coinciding with the warm water currents and the commercial rock lobster fishing season.

Wobbegongs

Wobbegongs (species from the *Orectolobidae* family) are usually found on or near the sea floor at the Abrolhos. They can grow up to 3 m long and have elaborate patterns and colours that don't fade as they grow older.

Wobbegongs have little skin flaps or barbels around their mouths.

Tassled wobbegong (*Eucrossorhinus dasypogon*).

Photo: Carina Gemignani © Department of Fisheries

Manta ray.

Manta Rays

The eggs of a female manta ray (*Manta birostris*) are fertilised and hatch inside her uterus. She gives birth to up to two pups, which are 1.2 m wide and 45 kg at birth. Adult manta rays can grow up to 9 m wide, weighing up to 2 tonnes.

Manta rays are filter feeders, feeding mainly on zooplankton (microscopic marine life) and small fish.

Vegetation Communities

> *"Much interest attaches itself in the minds of most biological students to the contemplation of the indigenous fauna and flora of islands occupying a more or less remote distance from the mainland. Oftentimes, the terrestrial inhabitants of the divided lands may be notably distinct."*
>
> **William Saville-Kent, *The Naturalist in Australia,* 1897**

A number of vegetation communities on the Abrolhos are identified as being of conservation significance, including:

- Mangroves
- *Atriplex cinerea* dwarf shrubland
- Saltbush flats

In addition, *Eucalyptus oraria* is known to occur on East Wallabi. This is the only island south of Barrow Island and west of Albany on which this species grows.

Mangroves

> *"A few remarkable clumps of mangroves pointed out the position of some lagoons about a mile and a half from the south end of the island."*
>
> **John Lort Stokes, 1846**

Mangroves are coastal plants which live in the upper intertidal zone. A single mangrove species, the grey mangrove (*Avicennia marina*), occurs in the Abrolhos. The grey mangrove provides an important source of nutrients for marine food chains, in addition to habitat for terrestrial and marine animals, including the Australian sea lion and the lesser noddy at the Abrolhos.

Mangroves also protect the Abrolhos shoreline from storm damage and erosion. Extensive stretches of mangroves can be seen on Pelsaert Island, Wooded Island and Morley Island.

Mangroves on the edge of the lagoon on Post Office Island.

Shrubland

> *"Nor is there any vegetation beyond brushwood, and little or no grass."*
>
> **Francisco Pelsaert, Commander of the *Batavia***

The *Atriplex cinerea* dwarf shrubland occurs on sandy soils or shell grit. The deeper soils supporting the shrubland are suitable for burrowing seabirds, such as shearwaters and petrels, to use for building nests.

Saltbush Flats

Saltbush flats are present on islands such as North Island and West Wallabi Island, but do not occur extensively elsewhere at the Abrolhos.

Reptiles

> *"Rat Island - We saw numbers of a very pretty lizard with its tail covered with spines."*
>
> **John Lort Stokes 1846**

Turtles are regularly observed in the Abrolhos waters. Sea snakes are not residents in Abrolhos waters, but during strong winter storms they may be transported south to the islands from Shark Bay and further north.

There are 26 terrestrial reptile species on the islands, including the carpet python. One previously undiscovered worm lizard, *Aprasia* sp., the Houtman Abrolhos spiny tailed skink and the Abrolhos dwarf bearded dragon are endemic to the Abrolhos. All three species are found on East Wallabi, but the Houtman Abrolhos spiny tailed skink and Abrolhos dwarf bearded dragon occur on a number of other islands as well.

Houtman Abrolhos Spiny Tailed Skink

> *"Egernia stokesii was abundant on Houtman's Abrolhos, where it was basking in the sun or taking shelter underneath the scrubby bushes with which the greater portion of the islands are covered."*
>
> **William Saville Kent, *The Naturalist in Australia,* 1897**

The Houtman Abrolhos spiny tailed skink (*Egernia stokesii stokesii*) has been found on islands throughout the Abrolhos, including Murray, Middle, Tattler, Rat and East and West Wallabi Islands. These skinks are only 22 cm long and prefer limestone rocks, where they can hide under slabs and in crevices. They can inflate their body and use their spines to wedge themselves into these crevices, making it impossible to pull them out.

These lizards are different to spiny tailed skinks on the mainland by their brown to dark brown colour, with clusters of pale spines on their thick tails.

Houtman Abrolhos spiny tailed skinks often live in small colonies and their babies are born live, in small litters.

Abrolhos Dwarf Bearded Dragon

The Abrolhos dwarf bearded dragon (*Pogona minor minima*) is only found at the Abrolhos. This lizard has been found on East Wallabi and West Wallabi Islands, North Island, Rat Island, Seagull Island and Tattler Island, generally in sandy areas and limestone outcrops.

Photo: Jade Piottke

Abrolhos dwarf bearded dragon.

The Abrolhos dwarf bearded dragon grows up to 36 cm, smaller than other dwarf bearded dragons on the mainland, but with longer tails and limbs. Their name comes from the spiny 'beard' on their throat which can be inflated when the lizard feels threatened.

These lizards can modify their body colour, depending on their mood and the temperature. They also use body language, such as bobbing their heads and waving their arms, to establish dominancy over a group.

Female Abrolhos dwarf bearded dragons make shallow burrows and produce multiple clutches of eggs in spring and summer.

Carpet Python

> *"West Wallabi Island - carpet snakes are rather numerous on this island."*
>
> **John Forrest, 1879**

The carpet python (*Morelia spilota imbricata*) is found at the Abrolhos, with a large population on West Wallabi Island and a smaller population on East Wallabi Island. They feed mainly on the Tammar wallabies, but also eat birds and lizards. Like many other pythons, the carpet python strangles its food and swallows it whole.

These snakes grow to an average of two metres long, though some grow to up to four metres. The males weigh up to 1 kg. Females are much larger, weighing up to 4.5 kg.

Turtles

Turtles are regularly observed in the Abrolhos waters. Resident green turtles forage in and around the Abrolhos reefs. There has been unconfirmed speculation that green turtles breed at North Island.

Mammals

Marine mammals frequent Abrolhos waters, with a colony of Australian sea lions living and breeding at the Abrolhos. Only two species of indigenous land mammals have been recorded – the Tammar wallaby and the southern bush rat.

Photo: Jade Plottke

Juvenile and adult female Australian sea lions.

Australian Sea Lions

The Abrolhos represent the northernmost breeding population of Australian sea lions. The current population of approximately 90 is greatly reduced from historical times - when as many as 600 animals may have been resident at the Abrolhos. The population decline is most likely due to hunting, by the hungry crews of wrecked ships and whaling and sealing activities of early fishermen in the nineteenth century.

Male Australian sea lions are usually dark brown. They can grow to up to 2.5 metres in length and weigh up to 300 kg. Female sea lions are smaller and they usually have grey backs with yellow-to-cream underneath. The females can grow to more than 1.5 metres long and weigh up to 100 kg.

Australian sea lions breed approximately every 18 months, so there is no annual breeding season. The sea lions which breed in winter one year won't breed again until at least the summer of the following year, 18 months later. The sea lion pups are dark brown at birth, with a pale fawn crown until they moult at two months of age. Their juvenile coat is a similar colour to that of an adult female.

The Australian sea lions feed on fish, rock lobster, octopus and occasionally sea birds. They can dive to depths of up to 150 m in search of their prey. Often they can be seen at sandy beaches throughout the Abrolhos.

Cetaceans

> *"When we arrived in the islands of the southern group, two humpback whales – a cow and her calf – were in a reef locked lagoon. My first sight of the mother was dramatic – a huge, dark shape nearly as big as a railway locomotive and moving about the same speed. She burst into my vision with huge mouth opening and shutting, showing the rows of baleen brushes through which she strained her dinner of shrimp and plankton. With bubbles creaming off the longitudinal wrinkles on her back, she thundered past me, viewing me fleetingly with her little eye."*
>
> **Hugh Edwards, *Islands of Angry Ghosts*, 1966**

Humpback whale.

Bottlenose dolphins.

The predominant whale species seen at the Abrolhos are the humpback and southern right whales. Sightings of humpback whales are common in the Abrolhos waters between April and October each year, during their annual northward breeding migration and return journey to Antarctica. Whale bones on some of the islands, such as Post Office Island, are testament to the whaling industry that hunted these species in the nineteenth and early twentieth centuries.

Dolphin species are present all year round. The most common species is the bottlenose dolphin *(Tursiops truncatus)*, but other species found at the Abrolhos include striped *(Stenella caeruleoalba)* and common dolphins *(Delphinus delphis)*.

Tammar wallaby on East Wallabi Island.

Tammar Wallaby

"We found in these islands large numbers of a species of cats, which are very strange creatures. It has two hind-legs and it walks on these only. Its tail is very long; if it eats, it sits on its hind legs, and clutches its food with its forepaws. Their manner of generation or procreation is exceedingly strange. Below the belly the female carries a pouch and we have found that the young ones grow up in this pouch until they are able to walk. Still, they keep creeping into the pouch even when they have become very large, and the dam runs off with them, when they are hunted."

Francisco Pelsaert, Commander of the *Batavia*

The Tammar wallaby (*Macropus eugenii derbianus*) has been recorded on East Wallabi, West Wallabi and North Island (where it has been introduced from West Wallabi Island). These were the first macropods (kangaroo species) seen by Europeans – the shipwrecked crew of the *Batavia*, who called them cats, killed large numbers for food.

Tammar wallabies can weigh up to 4.6 kg. The wallabies who live on West Wallabi tend to grow larger in size than those on East Wallabi Island. Their fur is dark, grey-brown above and pale grey-buff below. They can live up to 14 years, eating grass and drinking sea water when no fresh water is available.

Female Tammars mature at nine months, while the males do not reach maturity until they are almost two years of age. Within a few hours of giving birth to one baby in late summer, female Tammars mate again and the embryo from this mating will be the baby the following year, almost a year after conception. Babies remain in their mother's pouch for around nine months, until late spring.

Southern Bush Rat

The southern bush rat (*Rattus fuscipes)* has been recorded on East Wallabi and West Wallabi. Research has shown that the population of the southern bush rat on East Wallabi has decreased markedly over the last 20 years and it is now thought to be extinct.

Birds

> *"From time immemorial, as testified by the deep guano deposits, Houtman's Abrolhos has been the home or breeding centre of countless hosts of sea-birds, which still resort thither in enormous quantities in the breeding season."*
>
> **William Saville-Kent, *The Naturalist in Australia*, 1897**

The Abrolhos is one of the most significant seabird nesting areas in the eastern Indian Ocean. Over two million birds breed on the islands and small rocky atolls in the Abrolhos. The mixture of species is unique, as subtropical and tropical species, and littoral and oceanic foragers, share the breeding islands.

Osprey.

A total of 95 bird species have been recorded as residents or visitors to the Abrolhos Islands, though only 35 species breed there. Many of the migrant species are protected by international agreements between Australia, China, the Republic of Korea and Japan.

Abrolhos Painted Button Quail

> *"North Island...was about a mile across, and nearly circular. It was surrounded by a range of hills, with a flat in the centre, covered with coarse grass, where a great many quails were...but not a single wallaby."*
>
> **John Lort Stokes, 1846**

The Abrolhos painted button quail (*Turnix varius scintillans*) is found on North Island, East Wallabi Island, West Wallabi Island, Seagull Island and Pigeon Island in the Houtman Abrolhos. This species is threatened by competition with mice and introduced Tammar wallabies on North Island.

Brush Bronzewing

> *"To these we gave the name of Pigeon Islands, the common bronze-winged pigeon being found there in great numbers."*
>
> **John Lort Stokes, 1846**

The brush bronzewing (*Phaps elegans)* is found on North Island and the islands within the Wallabi Group, as well as Rat Island. On North Island, where this species is predominantly located, they feed on the seeds of the littoral plant (*Cakile maritima*) and occasionally gather near water. On other islands, they are found in all kinds of vegetation. On the mainland, this species is in decline due to land clearing and predation from domestic and feral animals.

Australian Lesser Noddy

> *"The habit of one kind, of a sooty-black colour, generally called noddies, was quite new – that of building their nests, which are constructed of seaweed and contain only one egg, in trees."*
>
> **John Lort Stokes, 1846**

Australian lesser noddy.

The Abrolhos support the only Australian breeding population of Australian lesser noddies (*Anous tenuirostris melanops*). Lesser noddies can live for more than 20 years. Up to 100,000 of these birds currently breed every spring and summer in the Abrolhos, on three main islands - Pelsaert, Wooded and Morley Islands. The lesser noddy prefers to nest in the branches of grey mangroves.

Australian lesser noddies don't migrate, remaining near their nesting sites throughout the year. However, their idea of 'near' might be a long commute for some – Australian lesser noddies forage as much as 180 km out to sea, before returning to their island homes.

Fairy Tern

Over 1,000 fairy terns (*Sternula nereis)* have been identified breeding at the Abrolhos, with most of these on Pelsaert Island and West Wallabi Island.

Common Noddy

The Abrolhos supports 80 per cent of the Australian breeding population of the common noddy (*Anous stolidus*). Up to 250,000 common noddies breed at Pelsaert Island. These birds lay their eggs in spring, but the actual month can vary, depending on their food supply and the weather conditions existing in offshore waters.

Silver Gull

There are over 700 silver gulls (*Chroicocephalus novaehollandiae*) breeding at the Abrolhos on 25 islands in summer and autumn. Whilst they breed across these periods, there are significant differences in the size of the breeding colonies in summer and autumn. Larger numbers of gulls breed at the Abrolhos in autumn than in summer, coinciding with the presence of commercial rock lobster fishers during the fishing season.

Pacific Gull

The colony of around 300 Pacific gulls (*Larus pacificus)* at the Abrolhos represents the most significant breeding site for this species in Western Australia. The birds tend to build solitary nests, so the colony is spread across more than 60 islands.

Photo: Greg Finlay

Pacific gull.

Pacific gulls breed at the Abrolhos between August and December each year. They are larger than silver gulls and have darker wing feathers.

Wedge Tailed Shearwater

The Abrolhos are the most important breeding sites in Australia for the wedge tailed shearwater (*Ardenna pacifica*), with between 500,000 and a million of these birds breeding there every year, predominantly on West Wallabi Island. The wedge tailed shearwater breeding colonies at the Abrolhos are the largest in Australia.

These birds arrive at the Abrolhos in August, before laying a single egg in a burrow in late November to mid December. Wedge tailed shearwater chicks hatch in January and are fed by their parents until April, when the parents desert the nest. The fledglings leave the nest about two weeks after this, usually in large numbers.

Little Shearwater

The little shearwater (*Puffinus assimilis*) lays its eggs in burrows on more than 40 islands throughout the Abrolhos, with large colonies on West Wallabi Island. The Abrolhos is the northernmost breeding ground for this species.

Roseate Tern

The Abrolhos supports a large spring and autumn breeding population of more than 8,000 roseate terns (*Sterna dougallii*), a globally threatened species. These birds rotate their colony sites every few years, breeding on 19 different islands within the Abrolhos.

Roseate terns.

Photo: Chris Suman © Halfmoon Biosciences

Crested terns.

Crested Tern

Crested terns (*Sterna bergii*) nest in spring and autumn at the Abrolhos. There are only around 6,000 of these birds breeding at the Abrolhos. Like roseate terns, crested terns shift their colony locations from year to year. In recent years, crested terns have formed new colonies at Morley, Long, Bynoe, Stick and Crake Islands.

White Breasted Sea Eagle

At the Abrolhos, there are up to 50 breeding white-breasted sea eagles (*Haliaeetus leucogaster*), spread across all three island groups.

The white breasted sea eagle weighs between two and four kilograms, with females slightly larger than the males. They are predominantly white and grey, with black wing tips.

These eagles can live for up to 30 years. They breed in winter and spring, sometimes reusing the same nest. Their home range can be as large as 100 km^2.

Photo: Greg Finlay

Osprey.

When hunting prey, which can be fish, birds, reptiles, mammals or crustaceans, the white breasted sea eagle will go from a perch or a glide into a shallow dive, to snatch prey in one talon from the ground or the water surface.

Eastern Osprey

Up to 100 eastern ospreys (*Pandion cristatus*) nest at a number of sites throughout all three island groups at the Abrolhos, including nesting platforms made from converted rock lobster pots and stacked fishing equipment on jetties. Ospreys are very particular about their diet – they feed exclusively on fish.

White Faced Storm Petrel

There are around 36,000 white faced storm petrels (*Pelagodroma marina*) breeding at the Abrolhos, with the majority of these on Morley and Stick Islands.

Caspian Terns

Unlike other more social terns, Caspian terns (*Hydroprogne caspia*) are usually solitary nesters. There are less than 150 of these breeding at the Abrolhos, across 22 islands.

Bridled Terns

Bridled terns (*Onychoprion anaethetus*) breed on 90 islands throughout the Abrolhos. These birds fly north for the winter, through Indonesia to waters around the Phillippines. There are approximately 4,000 bridled terns who return to the Abrolhos around October every year to lay their eggs. Bridled terns nest on more islands in the Abrolhos than any other bird species.

Bridled tern.

Sooty Terns

Adult sooty terns (*Onychoprion fuscata*) are black above and white below. There are over 200,000 of these birds breeding at the Abrolhos in late spring. Some sooty tern colonies nest at different locations from year to year at the Abrolhos, but surveys have recorded a permanent nesting colony at Pelsaert Island.

Hutton's Shearwater

Hutton's Shearwater (*Puffinus huttoni*) rests and feeds at the Abrolhos in late spring and summer, after migrating from New Zealand where it breeds.

Introduced Species

> *"The centre island we named Rat Island, from the quantity of that vermin with which it was infested."*
>
> **John Lort Stokes, 1846**

In the nineteenth century, black rats and cats were introduced to Rat Island by miners. In 1991, black rats were successfully eradicated from Rat, Little Rat and nearby small islands. The cats on Rat Island were also eradicated soon after. The introduced house mouse has been recorded on a number of islands.

Exotic plant species which have been introduced over time to the Abrolhos include verbesina *(Verbesina encelioides*), mother of millions (*Bryophyllum delagoense*), ice plant (*Mesembryanthemum crystallinum*) Patterson's curse (*Echium plantagineum*), boxthorn (*Lycium ferocissimum*) and prickly pear cactus (*Opuntia stricta*).

These plant species all have the ability to change vegetation structure and composition on an individual island, which in turn affects terrestrial fauna, seabirds and native flora species.

More recently, in the 1970s, Tammar wallabies were introduced to North Island from the Wallabi Group. This population increased in size to the point where monitoring showed significant grazing impacts, which has reduced the habitat for the Abrolhos painted button quail.

Fishing and Aquaculture

"Fishing is good all over the Abrolhos in places selected with care, in deep water off banks or rocky ledges."

John Forrest, 1879

Commercial rock lobster fishing operations at the Abrolhos.

Rock Lobster

"Among the Crustaceans, Panuliri were exceedingly abundant and identical with the Perth and Fremantle market type."

William Saville-Kent, *The Naturalist in Australia*, 1897

Commercial Fishery

Today, the major commercial fishery at the Abrolhos is the West Coast Rock Lobster Managed Fishery (WCRLMF), which targets the western rock lobster (*Panulirus cygnus*). The WCRLMF has a long-standing commercial and economic history at the islands and with a landed value of $191 million (2008/09) is Australia's most valuable single-species commercial fishery, with around 18 per cent of the 2008/09 catch coming from Abrolhos waters.

At the Abrolhos, rock lobsters reach reproductive maturity before they reach minimum legal length. As a result, the contribution from the Abrolhos rock lobsters to the breeding output of the overall western rock lobster stock outweighs the relative proportion of the Abrolhos stock.

It has been estimated that approximately 40 to 50 per cent of the western rock lobster spawning output comes from the Abrolhos, therefore conservation of rock lobster habitat and breeding stocks is vital to the entire fishery.

Commercial rock lobster fishing camp on Nook Island, with resident white breasted sea eagle.

Recreational Fishery

In addition to the commercial rock lobster fishery, recreational fishing for western rock lobster takes place at the Abrolhos. Unlike the mainland recreational fishery, the take of rock lobsters by diving is prohibited at the Abrolhos.

Other Invertebrates

There are three invertebrate commercial fisheries other than rock lobster operating in the waters of the Abrolhos, which are:

- The Abrolhos Islands Mid-West Trawl Managed Fishery (AIMWTMF);
- The Marine Aquarium Fishery; and
- The Specimen Shell Fishery.

The Marine Aquarium and Specimen Shell Fisheries are primarily dive-based fisheries, with Remote Operated Vehicles (ROVs) used to access depths of greater than 40 m.

Photo: Department of Fisheries

Commercial scallop vessel.

Photo: Department of Fisheries

Southern saucer scallop.

Scallop Fishery

In terms of economic value, the second most important commercial fishery at the Abrolhos is the saucer scallop (*Amusium balloti*) fishery that forms the basis of the Abrolhos Islands and Mid West Trawl Managed Fishery (AIMWTMF). Scallop catches fluctuate from year to year among the WA scallop fisheries, due to environmental factors such as water temperature, the strength of the Leeuwin current and nutrient levels in the water. State-wide, the AIMWTMF is usually second in importance for its catch of scallops, behind Shark Bay.

The major area fished for scallops at the Abrolhos is the sandy sea bottom between the various island groups. These are generally commercially fished between April and July.

Finfish

"We discovered a coral bank. We called it Snapper Bank, from the immense quantity of fish which we found on it. In half an hour we caught more than we could cure, so it became necessary to stop the sport. This shows what a lucrative trade might be carried on. Any quantity of fish might be caught and cured."

John Lort Stokes, 1846

Photo: Stuart Gore © State Library of Western Australia

Army personnel and catch, 1942.

Finfish fishing is currently a popular activity at the Abrolhos. A wide array of finfish species, in particular West Australian dhufish, pink snapper, coral trout and baldchin groper, inhabit Abrolhos waters.

With an increased number of recreational boats in Western Australia and the expanding knowledge of the Abrolhos as a fishing destination, recreational fishing at the Abrolhos is increasing.

Photo: Neil Sumner

West Australian dhufish, a popular species for recreational fishing.

Photo: Michelle Hanlon © Department of Fisheries

Camp and jetty, Basile Island.

Aquaculture

> *"The character of the reefs and lagoons at the Abrolhos, combined with their short distance from the commercial port of Geraldton, render them particularly eligible for the introduction of the larger species of the Mother-of-Pearl shell (Pinctada margaritifera) on a substantial commercial basis. Horizontal screens or partitions should be added for the purpose of keeping the shells in separated layers, through which the water could freely percolate."*
>
> **William Saville-Kent, *The Naturalist in Australia,* 1897**

The first Abrolhos aquaculture licence was issued for the production of black-lip oysters (*Pinctada margaritifera*) in 1996, almost 100 years after Saville-Kent's recommendation.

The near-pristine waters of the Abrolhos are suitable for aquaculture of a variety of high-value species. Subsequent licences have predominantly been for pearl oyster species, sponges, finfish, coral and live rock.

Pearl oyster spat.

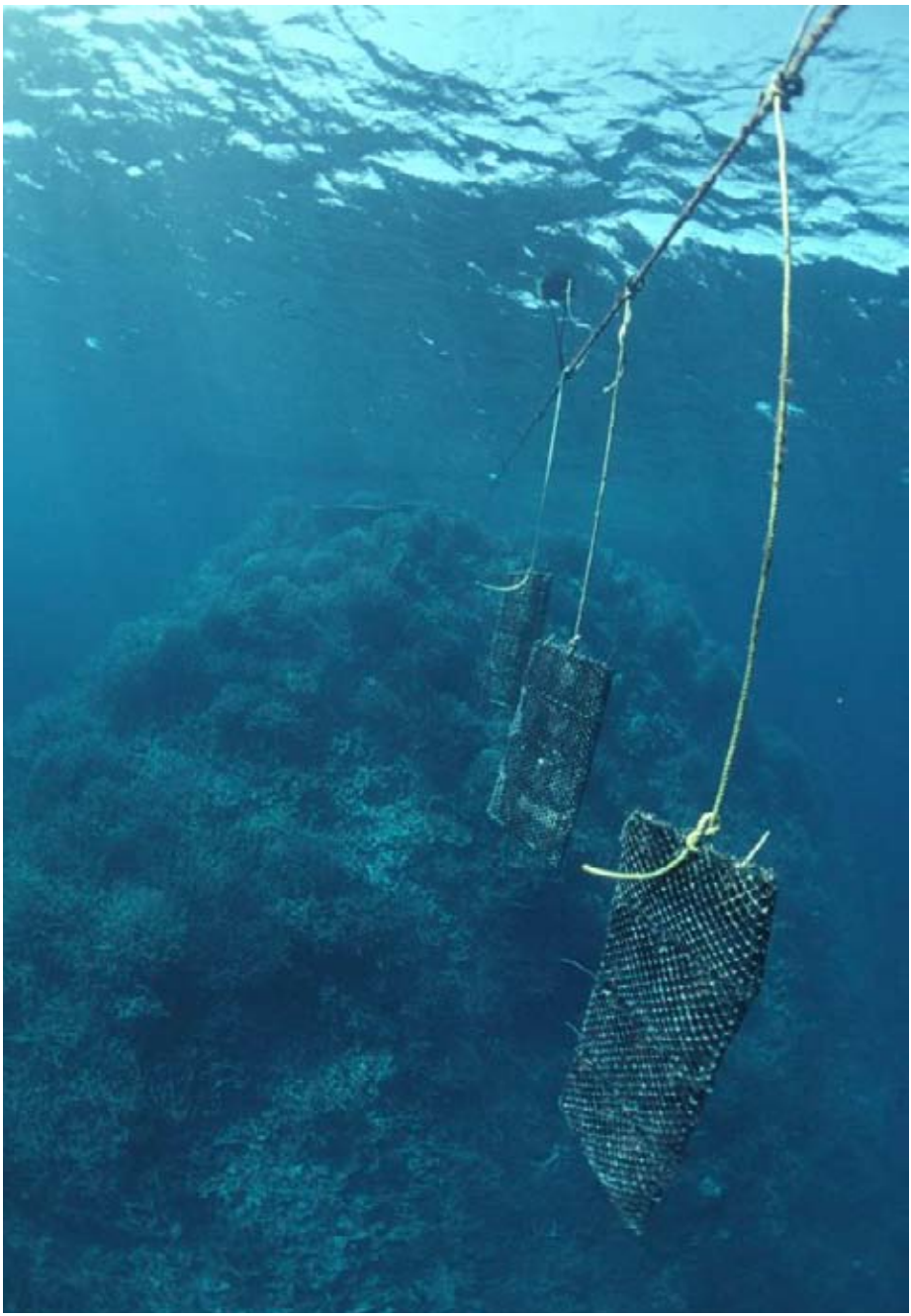


Photo: Greg Finlay © Department of Fisheries

Shell grow-out panels on an Abrolhos pearl farm.

Tourism and Recreation

"The horizon line, looking oceanwards, was, in its way, remarkable. The boundary in this direction is represented by the level, raised surface of the rocky platform, which constitutes a massive breakwater between the placid waters of the lagoon and the tumultuous billows, which break unceasingly and with a sustained roar mightier than that of Niagara, upon the precipitous edge of the outer barrier."

William Saville-Kent, *The Naturalist in Australia*, 1897

Photo: Jade Plottke

Mangrove swamps on Pelsaert Island.

Charter Industry

The only way to travel to the Abrolhos is by boat or light plane. For those without their own boat or aircraft, transport to the islands is provided by the charter industry.

Boat Charter

> *"Through the glass-clear water in the immediate foreground every coral branch was distinctly visible, the clustered corolla constituting harbours of refuge to parrot and other fishes of the most brilliant hues, which would dart to and fro across the intervening spaces as the boat approached."*
>
> William Saville-Kent, *The Naturalist in Australia*, 1897

Photos: Neil Sumner © Department of Fisheries

Fishing charter boat.

Charter operators holding a West Coast region licence are authorised to operate at the Abrolhos. The charter vessels operating at the Abrolhos operate either as fishing charter vessels or eco tourism charters for diving and snorkelling.

Over the period from 2002 to 2009, Abrolhos charter operators conducted on average around 400 tours per annum. Most tour activity took place between March and May each year. Data trends indicate that charter activity is strongly influenced by weather patterns and school and public holidays.

Photo: Neil Sumner

Photo: Department of Fisheries © Shannon Conway

Fishing and diving at the Abrolhos.

Air Charter

> *"Abrolhos Islands by air and sea, immediate bookings available, inclusive cost for all fares, meals and accommodation. 5 days £14/9/6; 12 days £18/7/ Enjoy this remarkable holiday departing Perth every Wednesday at 6 a.m. Your stay on the Island will be interesting and enjoyable."*
>
> **Advertisement in *The West Australian*, 13 November 1948**

Today, air transport to the Abrolhos is mostly by commercial charter, generally from Geraldton and Kalbarri Airports.

Over the period 2007 to 2009, 4,814 aircraft movements occurred at the islands involving 18,039 passengers. Of this number, 23 per cent undertook same day return scenic flights of the three island groups. These flights land mainly at East Wallabi Island to undertake terrestrial and marine tourism activities.

Photos: Pat Baker © WA Museum

Photo: Simon Glossop © Tourism Western Australia

Float plane in 1973 (top). Light aircraft landing at the Abrolhos (bottom).

Land and Marine Based Tourism and Recreation

"The sunset presented a very lurid appearance, and the most fantastically shaped clouds had been scattered over the red western sky. It seemed as though nature had determined to entertain us with a series of dissolving views. Headlands and mountains with cloud-capped pinnacles appeared and faded away; ships under sail floated across the sky; towers and palaces reared their forms indistinctly amid the vapour, and then vanished, like the baseless fabric of a dream."

John Lort Stokes, 1846

The Abrolhos offer a near-pristine natural environment with a diverse range of marine and terrestrial fauna and flora, as well as a rich history including shipwrecks and remnants of early colonial industries such as guano mining and commercial fishing. A broad range of available activities includes visiting historical sites, fishing, wildlife viewing, surfing, diving and snorkelling.

Photo: Ann Storrie © Department of Fisheries

Sunset clouds over Abrolhos jetties.

The Abrolhos are separated from the mainland by 60 km of ocean, but this isolation makes it a highly desirable tourist destination. Consequently, the Abrolhos presents land and marine based tourism and recreation development opportunities for both overnight accommodation and day trips. At present, overnight tourist accommodation is only permitted on marine craft, until the development of land-based tourist accommodation facilities on the islands.

Photos: Jade Plottke

Turtle Bay visitor sun shelter

Any tourism or recreation development proposal for land or sea will need to maintain the environmental and cultural values of the Abrolhos and, most importantly, minimise its footprint.

Photo: Department of Fisheries © Shannon Conway

Diving at just one of the many amazing reefs.

Dune vegetation at the Abrolhos.

Community

Public Infrastructure

Air Strips

"5/4/1942: EAST WALLABI ISLAND Aerodrome now suitable for landing aircraft."

Operations Record Book of No.4 Service Flying Training School, Geraldton, 1942

Photo: Jade Plottke

Light aircraft sitting on the airstrip at the Abrolhos

The three fixed-wing airstrips are located at Rat Island, East Wallabi Island and North Island. These assist with the logistical operations of the commercial rock lobster and aquaculture industries, the tourism industry and emergency and government statutory services.

The first airstrip on the islands was on East Wallabi Island, constructed by the RAAF in 1942. This original airstrip is no longer in use. Geraldton Air Charter constructed a new airstrip slightly east and parallel to the RAAF airstrip in 1968, which is still in use today.

Two airstrips were constructed on Rat Island in 1968 by Geraldton Air Charter and Geraldton Building Company. The original north-south airstrip is still in use today, whilst the other airstrip, which ran east-west across the northern part of the island, is used as a sports ground.

The North Island airstrip was originally constructed in 1980 by the Geraldton Fishermen's Cooperative and is still in use today.

The East Wallabi Island public airstrip is the only airstrip for public use. This airstrip has associated infrastructure, including a public jetty and two designated public toilets, constructed to accommodate island visitors.

East Wallabi airstrip (top). Saville-Kent Centre (bottom).

Research Facilities

> *"The few data chronicled concerning the remarkable interblending of a tropical and temperate marine fauna that occurs at Houtman's Abrolhos will serve to accentuate the desirability that exists for their further systematic investigation. The question of fully exploring and working out the indigenous fauna of isolated or remarkable island areas is at the present time commanding a large share of attention in scientific circles the world over."*
>
> **William Saville-Kent, *The Naturalist in Australia,* 1897**

In 2003, the Department of Fisheries constructed the Saville-Kent facility on Rat Island to support operational and research capabilities by the Department and other agencies. The facility includes accommodation, a conference room, offices, a research laboratory and office, a jetty, equipment and workshop stores, a boatshed and vessels.

On Beacon Island there are two government buildings, which were formerly used to support operational activities and maritime archaeological work on the various *Batavia* sites. A public toilet is also located on this island for visitor use. Beacon Island is on the National Heritage List due to its connection to the *Batavia* shipwreck and needs to be managed accordingly.

Tourist Facilities

On the southern end of Pelsaert Island, a boardwalk was constructed to allow members of the public to visit an important seabird rookery, while reducing the potential for damage and/or disturbance to the site.

Through National Heritage Trust funding, the Department of Fisheries installed 23 public vessel moorings to accommodate charter and privately-owned recreational vessels visiting the Abrolhos. These moorings were installed at safe anchorage areas, popular dive sites and Reef Observation Areas to facilitate visitation and access throughout the island groups, and to limit marine habitat damage by reducing the need to use anchors.

The Department of Fisheries has installed a large number of dive markers, outlining various dive trails throughout the Abrolhos. These include Turtle Bay, Morley Island and the Coral Patches dive trails.

Photo: Jade Plottke

Infrastructure at Turtle Bay.

Together with the Midwest Development Commission and the Northern Agricultural Catchment Council, the Department of Fisheries has worked to provide additional infrastructure in the form of walk trails, shade areas and toilets within the Turtle Bay area of East Wallabi for use by visitors undertaking day trips.

> *"With beautiful weather we have weighed our anchor and gone away from these disastrous Abrolhos..."*
>
> **Francisco Pelsaert, Commander of the *Batavia***

Watching the sunset from Rat Island.

Further Reading

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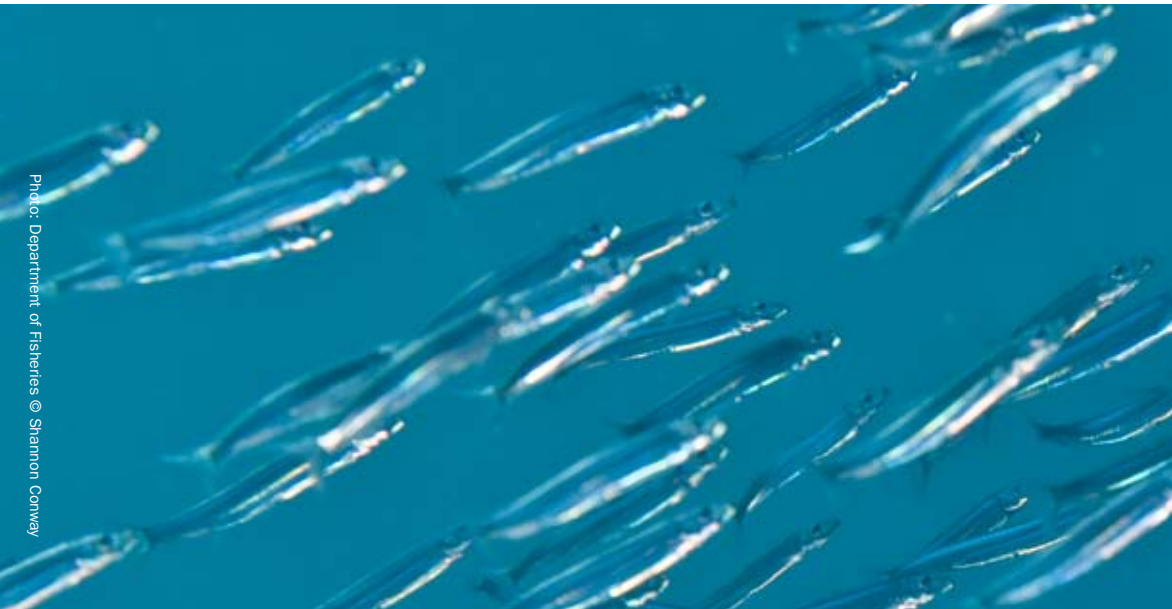

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F&FH140 JUNE2012 PB006-25