LANDSCOPE EXPEDITIONS
Working at the Frontier of Discovery

Expedition briefing

Main: historic ruins on Alexander Island. Insets: (from left) expedition members observing common noddys (*Anous stolidus*) on Pelsaert Island; Australian sea lions (*Neophoca cinerea*); crested terns (*Sterna bergii*) nesting on Wooded Island; the research vessel *Odyssey* (Photos – Kevin Coate/DEC).

Seabirds and Shipwrecks

Exploring the Houtman Abrolhos Archipelago

Abrolhos Islands, Western Australia,
11 – 18 December 2007

Leaders:

Kevin Coate	Naturalist and ornithologist, Perth
Ron Johnstone	Curator of Ornithology, Western Australian Museum, Perth

This expedition is offered by *LANDSCOPE*, the Department of Environment and Conservation's (DEC's) quarterly magazine devoted to wildlife, conservation and environmental issues in Western Australia. It is run in association with UWA Extension, The University of Western Australia.

LANDSCOPE Expeditions - Working at the Frontier of Discovery

ACT NOW FOR THE FUTURE

Department of Environment and Conservation
Our environment, our future

in association with

UWA Extension,
The University of Western Australia.

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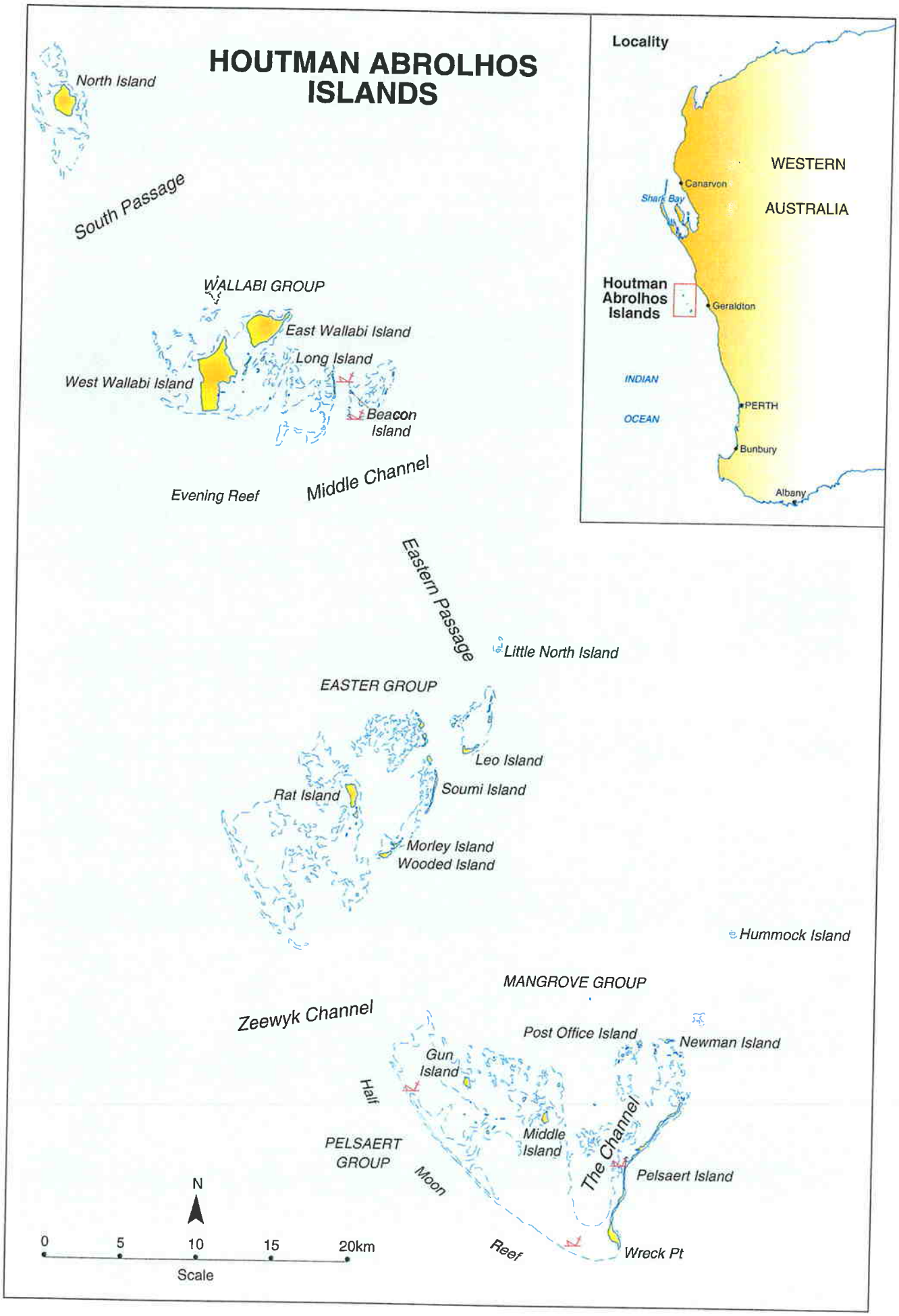
HOUTMAN ABROLHOS ISLANDS
North Island
South Passage
WALLABI GROUP
East Wallabi Island
Long Island
West Wallabi Island
Beacon Island
Evening Reef
Middle Channel
Eastern Passage
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Zeewyk Channel
Post Office Island
Newman Island
Gun Island
Half
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Pelsaert Island
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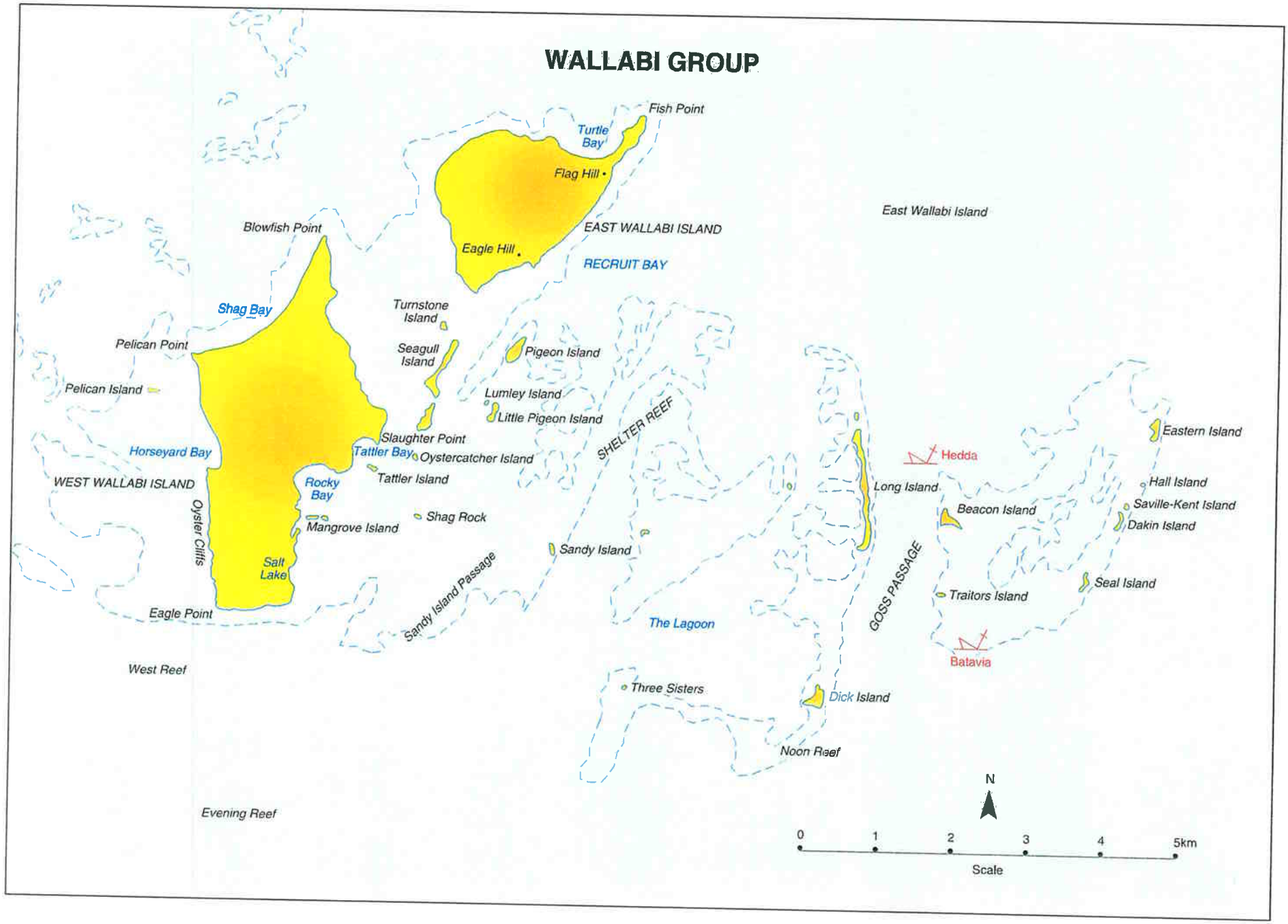
Locality
WESTERN AUSTRALIA
Canarvon
Shark Bay
Houtman Abrolhos Islands
Geraldton
INDIAN OCEAN
PERTH
Bunbury
Albany


WALLABI GROUP
Fish Point
Turtle Bay
Flag Hill
East Wallabi Island
EAST WALLABI ISLAND
Blowfish Point
Eagle Hill
RECRUIT BAY
Shag Bay
Turnstone Island
Pelican Point
Seagull Island
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Pelican Island
Lumley Island
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SHELTER REEF
Slaughter Point
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Horseyard Bay
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WEST WALLABI ISLAND
Rocky Bay
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Long Island
Hall Island
Beacon Island
Saville-Kent Island
Oyster Cliffs
Mangrove Island
Shag Rock
Dakin Island
Salt Lake
Sandy Island
GOSS PASSAGE
Seal Island
Sandy Island Passage
Traitors Island
Eagle Point
The Lagoon
Batavia
West Reef
Three Sisters
Dick Island
Noon Reef
N
Evening Reef
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2
3
4
5km
Scale


EASTER GROUP
Middle Channel
Little North Island
Bynoe Island
Heims island
White Island
Gilbert Island
Alexander Island
Stokes Island
EASTERN ISLANDS
Eastern Passage
Joe Smith Island
Good Friday Bay
Seventy Island
Gibson Island
Leo Island
Rowland Passage
Cambell Island
White Bank
Suomi Island
RAT ISLAND
Bushby Island
Little Rat Island
Wooded Island Passage
Roma Island
Little Roma ISland
Keru Island
Dry Island
Crake Island
Morley Island
Wooded Island
Graveyard Island
Disappearing Island
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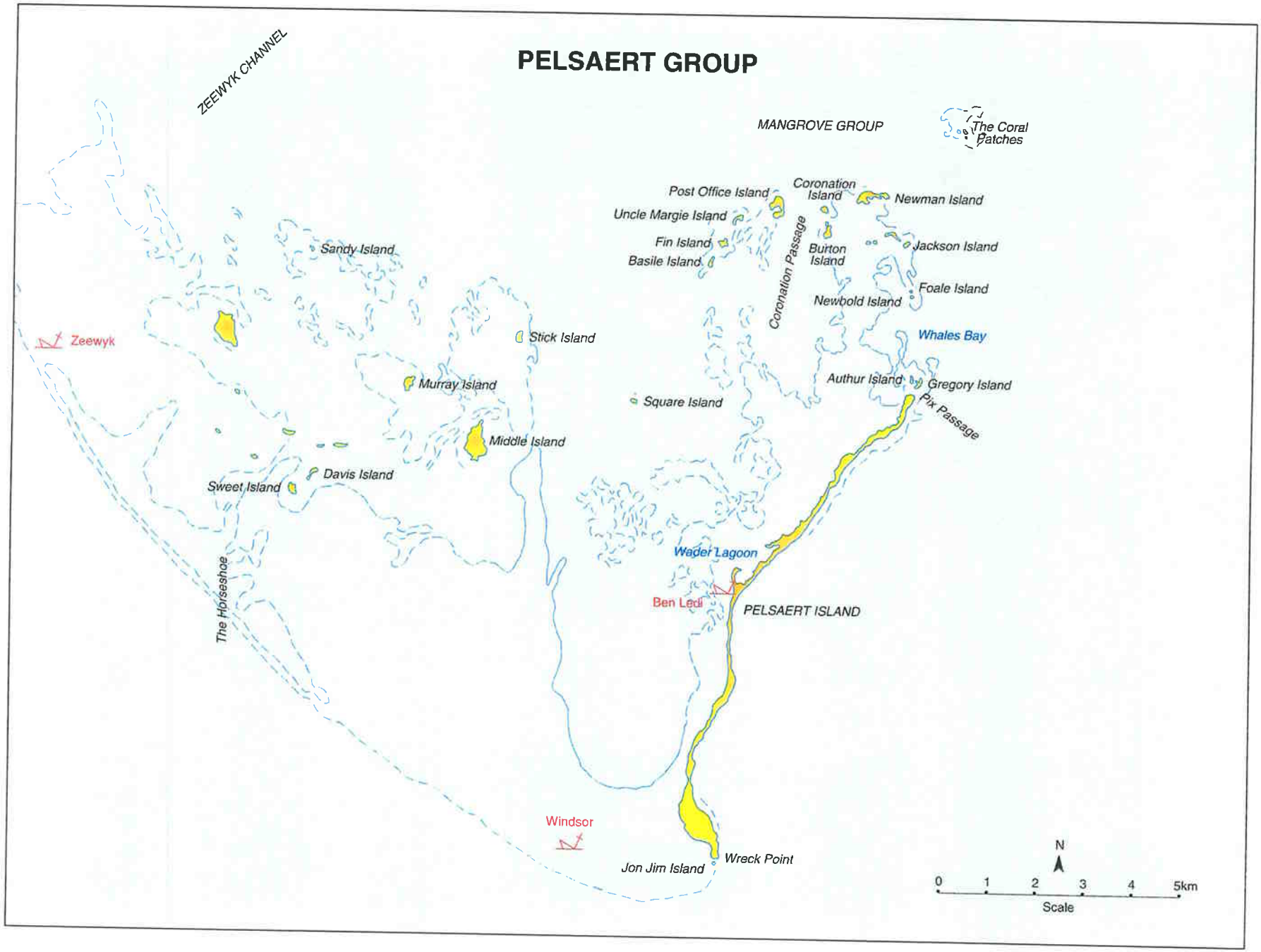
PELSAERT GROUP
ZEEWYK CHANNEL
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The Coral Patches
Post Office Island
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Murray Island
Square Island
Middle Island
Davis Island
Sweet Island
The Horseshoe
Wadei Lagoon
Ben Ledi
PELSAERT ISLAND
Windsor
Jon Jim Island
Wreck Point
N
0 1 2 3 4 5km
Scale

RESEARCH LOCATION

The Houtman Abrolhos Islands are located in the Indian Ocean about 60 km offshore from the City of Geraldton on the Western Australian coast. They consist of four island groups extending over 80 km from north to south. In all, there are 122 islands. The geology of islands in the Abrolhos indicates that those defined as belonging to the 'Central Platform' type, such as the Wallabi, Rat and Gun Islands, consists of Cretaceous and Tertiary limestones, siltstones and marls of mainland landforms and these have been isolated by rising sea levels for the past 8 000 to 10 000 years. In contrast the newly created adjacent islands, such as Long, Suomi and Pelsaert, consist of coral rubble of more recent origin.

The islands are situated at the edge of the continental shelf, providing easy access to both littoral and oceanic waters. They are surrounded by the most southerly coral reefs in the Indian Ocean. Because the coral reefs of the Abrolhos are high latitude (south of 28°S) they have a mixture of tropical and temperate components. The maintenance of the coral communities has been suggested to be due to the existence of the southerly flowing Leeuwin Current which bathes the reefs in warm water between March and September each year. The islands and surrounding waters support the most productive and valuable rock lobster fishery in Australia.

The Houtman Abrolhos Islands are Crown reserves vested in the Minister for Fisheries as 'A' Class Reserve No 20253 for the Purposes of Conservation of Flora and Fauna, Tourism and for Purposes Associated with the Fishing Industry. The islands generate a baseline for the purposes of the 200-mile Australian Economic Zone, which in turn generates a three-mile territorial sea. The State Territorial Waters around the Abrolhos are a Fish Habitat Protection Area (FHPA) established under the Fish Resources Management Act (1994) and vested in the Minister for Fisheries. The FHPA includes a system of four small Reef Observation Areas where all extractive use is prohibited except rock lobster fishing. Some additional fisheries management restrictions apply within the FHPA including a prohibition on commercial wetlining within the lagoons. At present the land areas of the Abrolhos are not zoned to manage threats to specific values or to allocate space to incompatible activities.

In 1996 the Minister for Fisheries established an Abrolhos Islands Management Advisory Committee (AIMAC) under Section 42 of the FRMA 1994. AIMAC provides advice on the management of the islands and the FHPA area and provides a reference group for the development and review of management plans.

The Abrolhos Islands are the site of a number of historic shipwrecks including the Dutch ships *Batavia* and *Zeewyk*. The *Batavia* shipwreck and subsequent mutiny is one of the bloodiest episodes in Australia's history and is of considerable public interest.

PROJECT BACKGROUND

The Houtman Abrolhos archipelago supports the largest (in terms of population sizes) and most species-rich assemblage of seabirds in the Indian Ocean. The mixture of species is also unique as the breeding islands are shared by subtropical (cool water) and tropical species, and littoral and oceanic foragers. The terrestrial flora and fauna include a number of species that are endemic to the islands.

Pelsaert Island is renowned as one of the most important seabird breeding islands in Australia. It is 12 kilometres long and varies between 0.5 kilometre to less than 50 metres in width. Like most of the islands in the Abrolhos it is only a few metres above sea level and composed of coral boulders, shingle, limestone and sand. It is vegetated with *Nitraria*, *Atriplex* and samphire (*Halosarcia* spp.). The white mangrove (*Avicennia marina*) forms dense low thickets around salt lakes. Pelsaert Island and the adjacent Half-Moon Reef have been the scene of numerous shipwrecks.

The remains of the *Windsor* can still be seen on the reef. Bottle-nosed dolphin are common here and will most likely accompany the boat to shore. Pelsaert Island was so named by Wickham and Stokes during an admiralty survey in 1840, mistakenly attributing wreckage found there to that of the *Batavia*.

Gun Island is where the Dutch ship *Zeewyk* was wrecked on Half-Moon Reef in 1727. Survivors struggled ashore and built a boat named the *Sloepie* to sail to the Indies.

Rat Island in the Easter Group was once claimed to be the greatest breeding ground in the world for tropical seabirds. In 1889 it was estimated that in the 300 acres common noddy rookery alone, there was in excess of 1,400,000 birds. Now there are none. Rats, guano mining and cats are thought to have caused their decline. The island was extensively mined for guano during the 19th and into the early 20th century. We will view the heaps of coral slabs that lie where diggers stacked them, and see where the karst topography typical of hard consolidated limestone has been exposed by the Asian labourers employed there during that time. Being a base for seasonal crayfishermen, there are many fishermen's shacks and jetties on the island. Please do not interfere with anything near these buildings. There will be a briefing before going ashore outlining procedure and where you may go on the island.

Morley and/or Wooded Island have safe overnight anchorages. There are usually sea lions present and there are interesting corals for snorkelling. On these islands (separated by a narrow channel which dries out sufficiently to walk across), there are stands of the white mangrove (*Avicennia marina*). Both islands are important breeding grounds for the lesser noddy, white-faced storm petrel and little shearwater.

Serventy Island and Alexander Island, both named after well known naturalists, are surrounded by interesting corals and fish. Usually a number of sea lions are lying on the beach.

The Wallabi Group is the site of the wreck of the *Batavia*. If the weather is sufficiently calm, we hope to visit the *Batavia* wreck site, where some of the cannon are still visible. We will visit Beacon Island, site of the *Batavia* mutiny, and Long Island, where the ringleaders were hung.

On West Wallabi Island visits will be made to sites connected to the mutiny, including the rock hole where the survivors found water and the forts (the first European buildings in Australia) built by Wiebbe Hayes in 1629. Wiebbe Hayes and 40 survivors of the *Batavia* spent three months on West Wallabi Island. They survived largely on seabirds and their eggs. DEC personnel have established that there are in the vicinity of 1,020,000 wedge-tailed shearwaters breeding on West Wallabi Island. The island is also of interest because of its population of tammar wallaby, carpet python and reptiles endemic to the Abrolhos.

As well as visiting many small islands to determine if they are being used by seabirds to breed on, we will also visit Pelsaert and Gun Islands in the Southern Group; Wooded, Rat and Serventy Islands in the Easter Group; Beacon, Long and West Wallabi Islands in the Wallabi Group. The itinerary will depend on weather conditions and the discretion of the leaders.

There is also a significant Australian sea lion population. Breeding has been recorded on Alexander Island, Gilbert Island, Serventy Island and Suomi Island in the Easter Group.

The Australian sea lion is the only pinniped found solely in Australian waters. Its distribution ranges from the islands of the Houtman Abrolhos (28 S: 114 E) in WA to The Pages (35 S: 138 E) in South Australia, consisting of some 3000 km of coast. The scattered offshore islands along this range support approximately 50 breeding colonies and an estimated population of 9,300-11,700 individuals. The patchiness of the distribution may be determined by the lack of suitable habitat for the establishment of breeding colonies. Historically, the range extended to include the entire south coast of Australia and the north coast of Tasmania, before the advent of commercial sealing in the 1800's. Australian sea lions prefer islands with sandy beaches and smooth rocks as breeding substrates. They are well known for their habit of straying inland, sometimes appearing several kilometres from the seashore. A mainland colony has been recorded on the Western Australian side of the bight.

THE PROJECT

The expedition will begin in Geraldton with an expedition dinner and briefing at the Batavia Motor Inne. The next morning we will board *Odyssey* and journey to the Houtman Abrolhos after a light breakfast. The crossing to the Abrolhos Islands can be rough, so be prepared with medication if you are susceptible to sea sickness. Once we reach the Abrolhos we will be in sheltered waters. We will be on board *Odyssey* for six nights.

We will begin our observations in the Wallabi group and conduct a sweep from the north to the south visiting as many islands as possible to observe and record seabird, shorebird and bushbird populations during the peak of the breeding season. Observations and recordings of migratory waders will also be undertaken to gain a more comprehensive knowledge of birds using the Abrolhos as seasonal feeding grounds.

The expedition will provide an opportunity to do a population count and record males, females, juveniles and if there are any pups present. We will record if any animals are using other islands visited during the expedition as haul out sites

Expedition members may also have the opportunity to investigate the ruins built after the wreck of the *Batavia.*

VOLUNTEER ASSIGNMENTS

Apart from the larger islands, not a great deal of information has been gathered on the movement of breeding birds to lesser islands. We intend to visit many of these smaller

islands to locate and record the incidence of breeding seabirds. Volunteers will assist with identification and assessments of the density of birds.

Australian sea lion survey – Volunteers will record and collate information on Australian Sea Lions.

Other activities may include

Assisting with wildlife photography (participants may wish to contribute high quality images suitable for use in LANDSCOPE magazine).

Field Training

In addition to orientation, there will be briefings on safety, and research procedures and objectives. There will also be informal talks, daily reviews of progress, and sharing of participants' discoveries.

With respect to natural history aspects of the expedition, participants will gain experience in the identification and gathering of data on seabirds.

Team leaders will be available to discuss aspects of their work with expedition members, and are looking forward to a shared learning experience.

Application of Results

This type of research is fundamental in documenting and monitoring the biodiversity values of WA. Importantly, reference collections made here will be lodged with the Western Australian Museum where they contribute in the broader context to our understanding of biogeography throughout WA and Australia. Specifically, bird sightings and other natural history observations will assist in providing answers on distribution and abundance of species.

Expedition Leaders

Kevin Coate, naturalist and ornithologist, has been involved in nature based tourism in WA since 1975. He has travelled extensively throughout the state and has written numerous articles, primarily on birds. He won WA Tourism's FACET Golden Guide Award in 2000 and in 2001 he was a recipient of a *Premier's Award to Legends of the Hospitality and Tourism Industry*, a one-off award which marked the start of the new millennium and the contribution of individuals to these industries during the previous 30 years.

Ron Johnstone is Curator of Ornithology at the Western Australian Museum. He has worked at the museum for over 36 years and is one of Australia's most experienced ornithologists. He has carried out extensive research, both in the field and on museum collections throughout WA, the Northern Territory and Indonesia. Ron has published over 100 scientific papers and books on Australian and Indonesian birds, the most recent of these a two volume handbook of Western Australian birds which provides scientists, naturalists and the public with a detailed summary of all birds occurring in WA, Christmas Island and the Cocos Keeling Islands. He was also a co -author on a monograph dealing with birds of the Houtman Abrolhos.

Expedition Report and Reunion

A copy of the expedition diary will be provided soon after the conclusion of the expedition, and this will be followed in due course by the Expedition Report.

Due to the timing of this expedition, participants will be invited to the 2008 reunion to be held in Perth in late 2008. An invitation will be issued with details of the venue and other arrangements approximately one month prior to the evening. The reunion provides an opportunity to catch up with old friends, see other participants' photographs and records of their trips, and review the results of the *LANDSCOPE* Expeditions program.

FIELD LOGISTICS

RENDEZVOUS

Volunteers will meet at 1800 hours on Tuesday 11th December 2007 at the Batavia Motor Inne, 54 Fitzgerald Street, Geraldton (Tel: 08 9921 3500, Fax: 08 9964 1061). There will be an expedition briefing at 1830 hours at the Batavia Motor Inne, where you will meet fellow expeditioners and your leaders. This will be followed by an expedition dinner at 1900 hours at the same venue. We will stay overnight at the Batavia Motor Inne.

ITINERARY

Tue	11 Dec	**Group arrives in Geraldton**	
		1800	Rendezvous Batavia Motor Inne
		1830	Briefing at Batavia Motor Inne
		1900	Expedition dinner at Batavia Motor Inne
			Overnight at Batavia Motor Inne
Wed	12 Dec	0600	**The group will gather at 0600 hours at the Batavia Motor Inne and transport will be arranged to the wharf.**
			PASSAGE TO THE ISLANDS CAN BE ROUGH. IF YOU ARE PRONE TO MOTION SICKNESS TAKE YOUR MEDICATION BEFORE BOARDING THE CHARTER VESSEL.
		0700	**Board the *Odyssey* and depart Geraldton Harbour.** Enjoy a light breakfast on board. Voyage to the Abrolhos Islands arriving approximately 1100 hours at the northern **Wallabi Group**. Examine historical sites and early buildings. Commence Bird observations.
Thu	13 Dec		**Wallabi Group** Visit numerous islands including Long Is. (proposed resort); If time permits, inspect camp of *Batavia* survivors and where mutineers were hung.
Fri	14 Dec		**Easter Group** The Easter Group is the main set of islands for Australian sea lion breeding at the Abrolhos.
Sat	15 Dec		**Easter Group**
Sun	16 Dec		**Pelsaert Group**
Mon	17 Dec		**Pelsaert Group**
Tue	18 Dec		**Pelsaert Group** Return to **Geraldton** mid afternoon. End of Expedition.

DAILY SCHEDULE

Activities will commence at first light to take advantage of the best observing time during the day. Breakfast will be served during the morning.

First light	Wake up, rise and commence activities
	Breakfast
	Continue day's activities
1200	Lunch (variable)
1630	End of day's activities
1800	Dinner
1900	'Show and Tell' and Briefing for next day.

This itinerary is provisional and may be varied at the discretion of the expeditions leaders and/or the charter boat operator and is dependent on weather conditions.

TEAM DEVELOPMENT

LANDSCOPE Expeditions are research-oriented, nature-based experiences; working as a team is an important part of the overall experience. Team spirit will be enhanced and developed by having all meals together, sharing in preparation and clean-up, and reporting on the night's activities and results. Working and living together on a vessel in an offshore location will also enhance team spirit.

ACCOMMODATION

The first night of the expedition will be at the Batavia Motor Inne in Geraldton where we will meet and have a short briefing before dinner. After departure from Geraldton for the Abrolhos Islands, accommodation will be on board the *Odyssey* research vessel (see Advance Preparation). For details of your charter vessel, please see page 20 of this document.

FOOD AND DRINKS

All meals from dinner on day one to lunch on day eight will be covered by your contribution. If any special diets are needed you must advise *LANDSCOPE* Expeditions administration as soon as possible to ascertain if they can be accommodated; please advise Cheryl Tonts by telephone (08 9334 0319), fax (08 9334 0498), or email (cheryl.tonts@dec.wa.gov.au).

Once aboard the *Odyssey*, you will be provided with all meals and drinks (except alcoholic beverages - there are bar facilities or BYO). Tea and coffee will be available when the waters are calm. You may also wish to bring a small stash of lollies, snacks or 'trail mix' to take ashore with you.

PHYSICAL CONDITION

The expedition will not demand an elite level of fitness. However, some level of physical fitness is required to conduct ornithological fieldwork. The islands can become windy and

there is little shelter available. A lightweight windproof jacket is recommended. There will be as much walking, exploring and searching as you want, so ensure that you have comfortable, solid boots. You will also need protective booties for wading ashore (see clothing and footwear). You will maximise your enjoyment of the activities by ensuring a reasonable level of fitness in the weeks leading up to the commencement of the expedition.

Environmental Conditions

Terrain

Most of the islands in the Abrolhos are only a few metres above sea level and composed of coral boulders, shingle, limestone and sand. Access to shore will be by means of tenders provided by the operator. There maybe some walking through thick, knee high, coastal scrub so boots and gaiters are recommended when on land.

Climate

The weather pattern at the Abrolhos Islands in December is similar to that of Geraldton. The average daily temperature in Geraldton in December is 27.5°C but can be well over 40°C. The average minimum temperature at this time of year is 17°C, but can drop as low as 10°C. Dominant wind direction in summer is normally from the south, averaging 25 kph. Calm conditions are rare and occur mainly from April through until September. Thunderstorm events are common in summer and, although rare, the area has been subject to tropical cyclones.

Safety and Health

Your safety, health and comfort are of paramount importance.

Sunburn: Is possibly the greatest medical problem that arises. You must guard against it. Loose-fitting, long-sleeved shirts, full-brimmed hats, sunglasses, sunscreen lotion, and lip-block are all essential.

Dehydration: Is a significant issue in the high temperatures generally experienced, even during the evenings. It is vital to always ensure you drink plenty of water. You must keep water bottles (minimum of 2 litres) with you in your daypack. **This is essential.**

Safety Mates and Safety Tags: To improve volunteer safety in the field, expeditioners will be assigned a 'safety mate' for the duration of the expedition. At all times, you should know where your 'safety mate' is. If you cannot locate your mate and are concerned as to their whereabouts, please advise a leader. This system is designed to improve safety in the field and at sea. Leaders will explain the 'safety mates' and 'safety tag' protocol on Day 1.

Swimming and Snorkelling: Any swimming and snorkelling activities will be at the discretion of the expedition staff and charter boat crew. We advise that there are inherent risks associated with swimming and snorkelling that are beyond the control of expedition leaders and charter boat crew. **Whilst all care will be taken, if you choose to participate in snorkelling and swimming activities, you do so entirely at your own risk.**

Snakes: For safety reasons, volunteers are not to handle snakes. Only non-venomous snakes are recorded from the Houtman Abrolhos Islands, however, all snakes encountered in

the wild should be considered dangerous. Carpet pythons may be encountered on West Wallabi Island.

Clothing and footwear: Walking will be an essential part of the expedition and it is therefore imperative your footwear is comfortable. For island walking you will need proper walking boots that give ankle protection. Gaiters are also useful in keeping the sand out. Reef walkers are an essential item for this expedition (divers' ankle length neoprene booties) are useful for wading ashore and exploring the reefs and shallows. Ensure that they have a thick sole and ankle protection. These can be purchased from dive shops.

Insect pests: Sandflies can occur in coastal regions—repellents and creams are advised if you are particularly susceptible to insect bites. Your doctor can prescribe any necessary antihistamines. *Please familiarise yourself with the enclosed brochures from the Health Department of Western Australia.*

Medications: Check that you have any required prescriptions filled beforehand. If you think you may need antihistamines for possible allergic reactions, see your doctor and obtain appropriate medication. You will also need to be prepared for the possibility of being sea sick (though this is unlikely in the sheltered waters of the islands) and will need to bring appropriate remedies.

Personal hygiene: Peter G's liquid soap is a good soap to use in hard water. Medicated soaps such as gamophen, or sandalwood, which is natural to the bush, are also good choices. Baby wipes can be used for cleaning hands when ashore, and disposed of when back on board.

Wilderness survival: Please familiarise yourself with the enclosed Wilderness Survival Card and carry it in your day pack. Carry your water bottle and a whistle when ashore.

First Aid Kit: The *Odyssey* carries an extensive first aid kit. Minor cuts and scratches should be attended to promptly in the warm salt-water environment of the islands to avoid the infection. Please ask one of the crew.

Avian Influenza: Wild birds in Australia pose a negligible avian influenza risk to humans at the present time, however, all birds, particularly water fowl (ducks, geese, swans) are potential carriers of the disease. As there may be some contact with water fowl on expeditions, volunteers are advised that they are not permitted to handle birds, especially those who appear sick or injured. For further information please refer to the following website on Avian Influenza.

http://www.health.gov.au/internet/wcms/publishing.nsf/content/health-avian_influenza-index.htm

FIELD COMMUNICATIONS

The charter vessel is equipped with a range of marine radio equipment for general communication and emergency situations. Mobile phones do not work from the Abrolhos Islands.

LANDSCOPE Expeditions administration also has facilities to contact DEC's office in Geraldton, but only in an emergency. Telephone LANDSCOPE Expeditions on (08) 9334 0561 or (08) 9334 0401.

ADVANCE PREPARATION

FIELD SUPPLIES

Once we board the *Odyssey*, it is not possible to run to the local deli if you have forgotten anything. **Check each item carefully**. Don't forget to bring your camera. Binoculars and field guides will also be handy. You may wish to include a large, sturdy plastic garbage bag with ties to protect your bag in transit. Bed linen is provided on board *Odyssey* and at The Batavia Motor Inne so sleeping bags or doonas and pillows are ***not*** required.

CHECK LIST

- ❑ Sturdy, comfortable, worn-in walking boots with firm soles and ankle support.
- ❑ Thick walking socks.
- ❑ Reef walkers with thick soles and ankle protection.
- ❑ Footwear for the boat (Loafers or sandals).
- ❑ Underwear.
- ❑ Long trousers, loose and tough.
- ❑ Shorts.
- ❑ T-shirts.
- ❑ Cool, long-sleeved and loose-fitting shirts.
- ❑ Casual clothes for around Geraldton, and travelling.
- ❑ Wet weather gear, spray jacket or raincoat.
- ❑ Jumper/polar-fleece, warm jacket.
- ❑ Woollen beanie or balaclava to wear at night.
- ❑ Thermal underwear or tracksuit if you feel the cold.
- ❑ Volunteer hat and sunglasses.
- ❑ Two x 1 litre, or 2 litre leak-proof water bottle.
- ❑ Bathers and fishing gear.
- ❑ Handkerchiefs or tissues.
- ❑ Toiletries.
- ❑ Whistle for emergencies
- ❑ Beach towel.
- ❑ Insect repellent and sunscreen.
- ❑ Personal first aid including two pressure bandages (plus motion sickness remedy, eg, Kwells, acupressure wrist-bands).
- ❑ Prescription medicine and spectacles.
- ❑ Small, light daypack to carry camera, water bottle, snacks, whistle etc.
- ❑ Head torch + spare batteries (Petzl with halogen globe recommended – optional).
- ❑ Small robust torch plus batteries, and spare globe.
- ❑ Camera and spare batteries. Plenty of film if required.
- ❑ Binoculars.
- ❑ Notebook and pen.
- ❑ Chux wipes, or Wet Ones.
- ❑ Pocket knife.
- ❑ Lots of enthusiasm and smiles.

LANDSCOPE Expeditions supply a canvas bag and luggage tags for your gear, a DEC Volunteer's full-brimmed hat, a stubby holder, and a thermal mug.

YOUR CHARTER VESSEL

You will be accommodated aboard *Odyssey,* launched in February 2005. Facilities and specifications of *Odyssey* include:

Specifications: Built by Western Boat Builders and launched in 2005, *Odyssey* is a 24 m twin hull catamaran with a beam of 8 m, drawing 1.8 m. The vessel is purpose-built for research, charter and sightseeing in west coast conditions and is exceptionally stable. Powered by two of the most advanced 600hp Mercedes diesel engines, she has a range of 3000 nautical miles (~5500kms) from 16000 litres of fuel. She is surveyed for up to 25 passengers in open waters. *Odyssey* can produce 200 litres of fresh water per hour via it's on board desalination plant and can store up to 1600 litres.

Accommodation: The vessel's main saloon/galley area is air-conditioned and there is an outdoor "al fresco" style eating area as well. There are four bathrooms with toilets and full sized showers on board, close to the cabins. Cabins are twin share or double (that can be turned into twin share if required). All cabins have personal climate control air conditioning, 240 volt power, a bar fridge and storage cupboards. Cabins are located on the middle and lower decks, and the main saloon/galley and presentation area on the upper deck. There are laundry facilities available if required. Bed linen is provided in all cabins.

Facilities: Dual silenced 40kVA generators provide 3 phase and single phase power. The *Odyssey* carries a compliment of the latest navigational equipment, radios, satellite communications, data facilities and a full DVD entertainment system. Facilities are provided for burning photos to CD's or DVDs, full digital and audio visual presentation equipment for corporate functions and a library of informative and fictional books. There are three spacious viewing decks and large areas for the preparation of equipment and conducting data analysis. The boat has been thoughtfully designed for the comfort and enjoyment of seniors.

Tenders: *Odyssey* has a two surveyed tenders. A 5 metre excursion vessel fitted with a 50 hp motor as well as a 4.2 m inflatable dinghy with a 15 hp motor.

Food and drink: Once aboard the *Odyssey*, you will be provided with all meals and drinks (except alcoholic beverages - there are bar facilities or BYO). Tea and coffee will be available when the waters are calm.

Emergency procedure: Life jackets are located in the dining room. The vessel is fitted with an automatic life raft, which is located on the roof of the vessel. The vessel carries an extensive first aid kit. The crew will conduct a briefing and familiarisation when everyone is on board on day one of the expedition, and will advise the location of life jackets and life rafts, and outline emergency procedures.

Fishing: You will need to bring your own gear. There is plenty of room in the iceboxes for your fish, but bring some labelled bags.

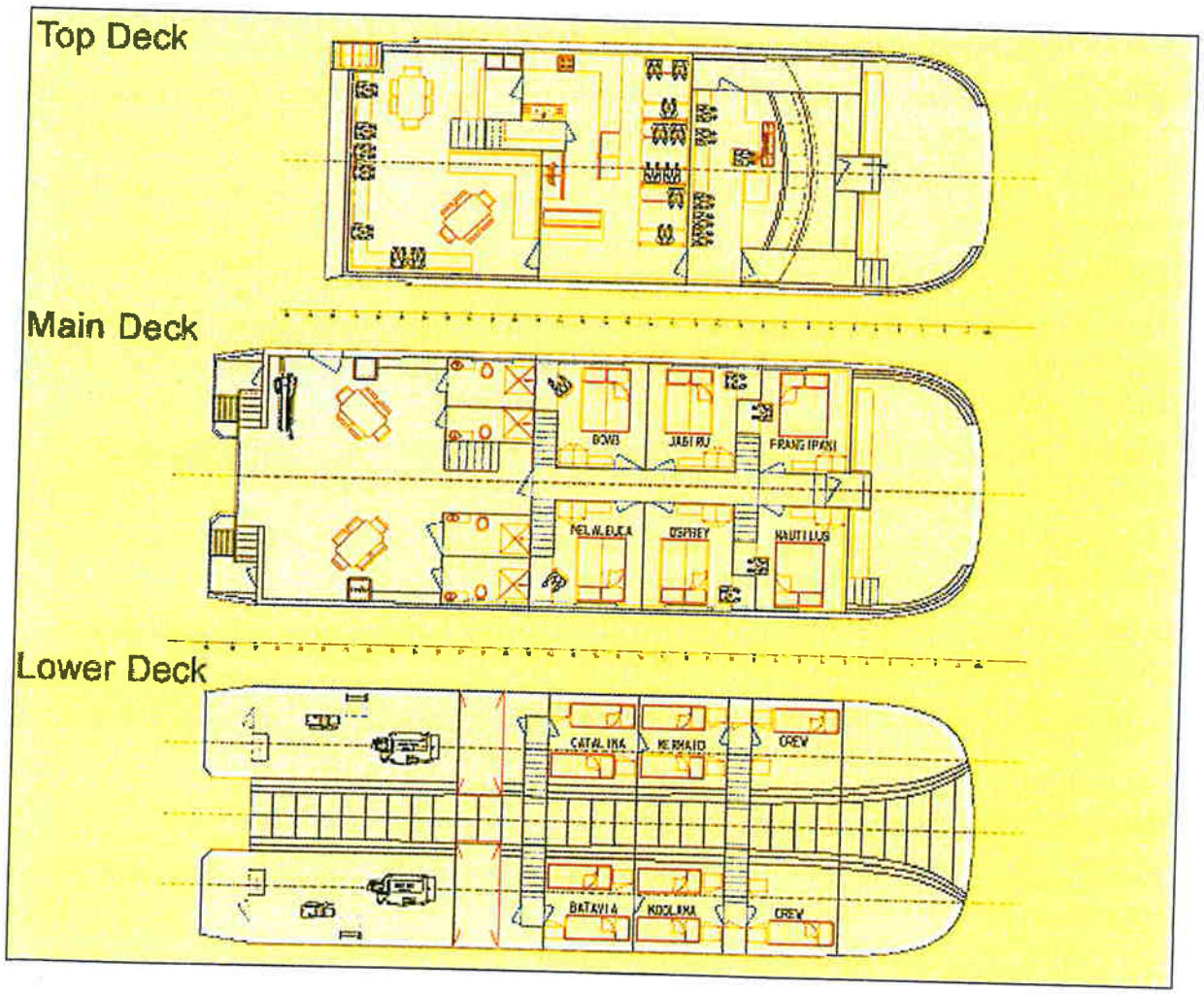
Leaving the boat: Your safety is our biggest responsibility. A system of "Safety Mates" and "Safety Tags" will be explained and adhered to. Please observe the following guidelines:

1 Do not enter the water or swim until the skipper or one of the crew gives you the "all clear". They will generally give you a quick briefing as to what to expect in that area.

2 You will be checked in when you return to the boat, and counted before the boat leaves an area. **Do not return to the water after you have been counted as being on board.**

General: The crew of the *Odyssey* will discuss rubbish disposal, access to food and drink and tea-making facilities, and where you should stow wet gear, towels, bathers, and fishing gear. Please assist the crew by following their instructions precisely.

***Odyssey* layout**



REFERENCES

Allen, G. (1997) *Marine Fishes of Tropical Australia and South-East Asia.* Western Australian Museum, Perth, Australia.

Bonner, N. (1994) *Seals and Sea Lion of the World.* Blandford, London, UK.

Cawardine, M. (1995) *Whales, Dolphins and Porpoises – The visual guide to all the world's cetaceans.* Dorling Kindersley, London, UK.

Edwards, Hugh (1966) *Islands of Angry Ghosts.* Angus & Robertson, Sydney, Australia.

Edwards, Hugh (1970) *The Wreck on the Half-Moon Reef.* Rigby, Adelaide, Australia.

EPA (1987) *Coral Reefs of Western Australia.* Environmental Protection Authority, Perth, Australia.

France, V., Mitchell, L. and Right, A. (1998) *Abrolhos Islands Conversations*, Fremantle Arts Centre Press, Fremantle, Australia.

Fuller, P.J. and Burbidge, A.A.(1992) Seabird Islands No 215—Pelsaert Island, Houtman Abrolhos, Western Australia. *Corella* 16(2)

Fuller, P.J., Burbidge, A.A., and Owens, R. (1994) Breeding Seabirds of the Houtman Abrolhos. *Corella* 18, 97-113.

Green, G.A. (1970) *Fifth Abrolhos Expedition 1970.* Aquinas College, Manning, Australia.

How, R.A., Pearson, D.J., Desmond, A. and Maryan, B. (2004) Reappraisal of the Reptiles on the Islands of the Houtman Abrolhos, Western Australia. *The Western Australian Naturalist*, Vol. 24, (3) 172-178.

Hutchins, B. and Swainston, R. (1986) *Sea Fishes of Southern Australia.* Swainston Publishing, Perth, Australia.

Johnstone, R.E. and Coate, K.H. (1992) Seabird Islands No 216—Wooded Island, Easter Group, Houtman Abrolhos, Western Australia. *Corella* 16(5) 155-159.

Johnstone, R.E. (1992) Seabird Islands No 217—Morley Island, Easter Group, Houtman Abrolhos, Western Australia. *Corella* 16(5) 160-162.

Leys, Simon. (2007) *The Wreck of the Batavia.* Thunder Mouth Press, New York, U.S.A.

Miskelly, A. (2002) *Sea Urchins of Australia and the Indo-Pacific.* Capricornia Publications, Sydney, Australia.

Pizzey and Knight (1997) *Field Guide to the Birds of Australia,* Angus & Robertson, Sydney, Australia.

Storr, G.M., Johnstone, R.E., and Griffin, P. (1986) *Birds of the Houtman Abrolhos, Western Australia.* Records of the Western Australian Museum. Supplement No 24, Perth, Australia.

Wells, Fred E., and Bryce, Clayton W. (1986) *Seashells of Western Australia,* Western Australian Museum, Perth, Australia.

Wells, Fred E., and Bryce, Clayton W. (2000) *Sea Slugs of Western Australia.* Western Australian Museum, Perth, Australia.

LANDSCOPE MAGAZINE

The following LANDSCOPE magazine articles in chronological order of publication are relevant to the Abrolhos Islands.

Burbidge, A. & Fuller, P. 'A Million Seabirds' *Landscope*, Autumn 1991.

Stoddart, Dr. J. 'Abrolhos – Diver Down'. *Landscope* Autumn 1991.

WEB SITES AND ONLINE REFERENCES

www.naturebase.net	Department of Environment and Conservation Website
http://www.odysseyexpeditions.com.au	*Odyssey* website.
http://www.fish.wa.gov.au/docs/pub/AbrolhosVisiting/index.php?0502	Department of Fisheries site information on the Abrolhos islands
http://www.environment.gov.au/heritage/national/sites/batavia.html	Department of Environment and Heritage site on the wreck of the batavia
http://members.iinet.net.au/~bill/batavia.html	Information on the wreck of the Batavia

NOTES

APPENDIX

LANDSCOPE **Expeditions** 2007

Lend your body to research...

LANDSCOPE Expeditions are non-profit, self-supported study and research projects. Since their inception in 1992, the expeditions have been offered by the Department of Environment and Conservation (DEC) publication *LANDSCOPE*, a quarterly magazine devoted to wildlife, conservation and environmental issues in Western Australia. The expeditions are offered in association with UWA Extension, a department of The University of Western Australia (UWA).

DEC is responsible for the management and sustainable use of Western Australia's 25 million hectares of national parks, conservation parks, marine parks, State forests and timber reserves, nature reserves and marine nature reserves. It is also responsible for conserving the State's rich diversity of plants and animals.

UWA Extension has been operating as a public outreach arm of UWA since 1913. It is a Centre for Continuing Education and promotes community awareness in a variety of ways, including educational travel.

Scientists and regional staff identify the research projects and lead the expeditions. DEC and UWA administer the expeditions. The private sector and local communities are contracted to provide logistical support.

LANDSCOPE Expeditions answer the need for research to protect the environment, while they respond to the demand for first class interpretation by scientists and specialists. They provide paying volunteers with an opportunity to work alongside scientists and promote wider cooperation in addressing conservation and land management challenges in Western Australia. Anyone can be involved subject to fitness. You must be 13 years of age or over to be registered as a conservation volunteer.

You can visit and gain an understanding of remote places and natural ecosystems. You can take part in important wildlife recovery programs. You can have the satisfaction of knowing you have contributed to our knowledge of threatened environments and endangered species. Unique photo opportunities and close encounters with unusual animals are a bonus.

Participants are not the only beneficiaries. The community also profits from the enriched lives of its members, and from the benefits that flow on from research findings and outcomes. Future generations benefit from the natural and cultural resources that volunteers help to identify and conserve. And, on a global scale, *LANDSCOPE* Expeditions help to perpetuate cultural and biological diversity.

Appendix 1: *LANDSCOPE* Expeditions background information

LANDSCOPE Expeditions

Distant places, close encounters... of the scientific kind

Western Australia covers almost a third of the Australian continent, stretching from the tropical Kimberley to temperate areas of the south coast. Of Australia's 80 recognised natural biogeographic regions, no fewer than 26 occur in Western Australia – more than in any other State. These biogeographic regions are defined principally by landform, soils and vegetation types. They range from the monsoon forests (rainforests) and savannas of the northern Kimberley through the diverse desert regions and the mulgas and mallees of arid inland Western Australia to the tall karri forests of the south-west. Coastlines cover a similar diversity of environments from the extensive coral reefs, mudflats and mangroves of the tropical Kimberley through the shallow sandy embayments of the west coast to the granite promontories and islands in the ocean off Albany and Esperance to the south.

These extensive land and seascapes provide a magnificent natural setting for a vast array of plant and animal species. However, such a diverse and extensive State poses a formidable hurdle for scientists in determining the first among many questions that are essential to effective research and conservation: what occurs where? A major emphasis of the scientific research undertaken by *LANDSCOPE* Expeditions is directed toward answering this intriguing and pivotal question.

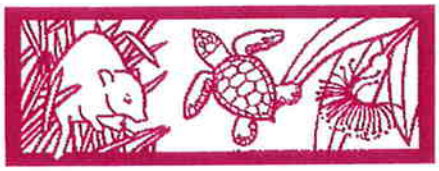
In the sparsely populated western third of the continent, the distribution of most plant and animal species is very poorly known and many *LANDSCOPE* Expeditions are focused on trying to improve scientists' understanding of species' distributional patterns. Detailed records and prudent collections are made of many species, using the most scientifically acceptable methods and techniques, so that biologists from many institutions can carry out more detailed studies. Such documentation and collection has the dual purpose of helping to define the distribution of many botanical and zoological species as well as facilitating research by State herbaria and museums on the level of variation within species. Studies of specimens and records of species from a wide geographic area are often the precursors to the description of species new to science.

Western Australia's conservation reserve system plays a pivotal role in conserving the State's rich biodiversity, but this reserve system is not comprehensive, adequate or representative. Many land surface types and their associated wildlife are not represented in reserves, or are very poorly represented. This pattern was documented in the 1995 Interim Biogeographic Regionalisation for Australia (IBRA) Report, which demonstrated that many of Australia's major bioregions are poorly served by the existing conservation reserve system. Bioregions provide a framework for identifying gaps in the reserve system. Conservation reserves should protect representative samples of each bioregion. *LANDSCOPE* Expeditions help identify which areas should be included to protect and enhance the State's biodiversity.

LANDSCOPE Expeditions encourage the public to travel with us to distant places for close encounters of the scientific kind.

You are a vital partner. Join us and be part of a scientific team – record observations, collect, prepare and help identify specimens.

Many conservation goals are difficult to achieve by scientists working alone – your support can make the difference.



LANDSCOPE Expeditions

You can make a difference

When you travel with *LANDSCOPE* Expeditions, you help in a variety of ways:

FUNDING

You and your financial contribution make the research possible. This alone is a significant factor in making the expedition a success.

SCIENTIFIC DISCOVERY

You can help by collecting key information. Although some interpretations will be made in the field, much of the synthesis takes place back in the laboratory, where final identifications and analyses are made and results prepared for publication. You will discover that fieldwork can be repetitive and time-consuming because it has to be done in a systematic way. Outcomes are not always obvious at first – but there's always the chance of that surprise discovery.

Extra pairs of hands and eyes are of great benefit in helping to achieve goals, as fieldwork is very intensive. Leaders will dedicate most of their time to fieldwork, but will provide instruction in techniques as opportunity permits.

You may be asked to collect plant specimens and make animal sightings to increase our knowledge of the distribution of species.

However, with plants, only representative specimens will be kept. Do not be disappointed if some are discarded, as redundancy is often part of the scientific process. With bird observations, it is the collective experience that confirms the sighting and produces advances in our knowledge.

YOU DON'T NEED TO BE A SCIENTIST

Anyone can be of help – be assured that your assistance will make a contribution to nature conservation in Western Australia.

Remember scientists and leaders have spent many years developing their level of expertise –
they welcome your questions and are there to guide you.

Your point of view or personal expertise may help in unexpected ways. Please feel free to share your ideas.

Expect to return home with a broader understanding of the natural world, the role of scientific methods, the value of nature conservation and the rewards of knowing you have contributed to pioneering studies in remote areas. *LANDSCOPE* Expeditions aims to whet your appetite for nature, give you a taste of scientific discovery, and provide an experience that may not otherwise be a part of your life.

IT'S NOT ALL SCIENCE

Many elements combine to make an expedition successful, not just the scientific activities. An affinity for team work, a flexible approach and a willingness to help in whatever way you can help to create the best results for nature conservation.

A MILLION SEABIRDS

BY ANDREW BURBIDGE AND PHIL FULLER

Pelsaert Island, in the Houtman Abrolhos off Geraldton, has more species of breeding seabirds - and more individual seabirds - than any other island in Western Australia. Andrew Burbidge and Phil Fuller go there regularly to monitor this amazing avian spectacle.

The Houtman Abrolhos lie roughly 50-70 kilometres off the Western Australian coast near Geraldton. They are windswept, waterless places. They appear bleak, barren and inhospitable, at least to humans. Seabirds, however, find them very attractive and they support many nesting species, including tropical species not usually found so far south. The warm, off-shore, southerly-flowing Leeuwin Current leads to sea temperatures being markedly higher around the Abrolhos than inshore, explaining how an archipelago with a Mediterranean climate supports a predominantly tropical seabird fauna.

The islands were first sighted by the Dutch navigator Frederik Houtman in 1619. The name Houtman Abrolhos is probably derived from combining the names of the discoverer and a group of shoals off Brazil; the Portuguese word *abrolhos* is applied to 'spiked obstructions' - a fitting phrase for the coral reefs that lie in ambush just beneath the waves.

Interestingly, the Pelsaert Group in the southern Abrolhos was named in error. Pelsaert, the southernmost island of the group, was so called by the explorer J. Lort Stokes, who visited the Abrolhos in HMS *Beagle* in April 1840. He named the island after Francois Pelsaert, commander of the *Batavia*, which was wrecked in the Abrolhos in June 1629. The *Batavia* actually met its end on Morning Reef in the Wallabi Group, but for many years it was thought to have been wrecked in the southern part of the Abrolhos. In 1840 Stokes noted the beams

of a large vessel near Wreck Point, the southern tip of Pelsaert Island; as the same wreck was reported by the crew of the *Zeewijk*, itself wrecked on nearby Half Moon Reef in 1727, Stokes mistakenly presumed the beams to be the remains of the *Batavia*. The identity of the ship they belonged to is not known: the mysterious wreck has not been rediscovered.

Pelsaert Island is 12 km long but is very narrow (between 20 and 500 metres wide), and has an area of about 120 ha. Most of the island consists of coral boulders and shingle thrown up by the ocean waves. In some areas, notably at the southern end, there are accumulations of white sand, with a few low dunes. Low, undercut limestone cliffs are found near the southern tip and along the western and eastern shores and patches of mangroves are found in sheltered places. These different habitats meet the nesting requirements of a wide variety of seabird species.

COUNTING COLONIES

The first person to write of Pelsaert's seabirds was John Gilbert, who worked for the famous naturalist John Gould. He visited the island in 1843. Since then, many noted ornithologists (including Prince Philip, Duke of Edinburgh, in 1963) have visited Pelsaert to see the birds.

We travel to Pelsaert on a patrol boat by courtesy of the Fisheries Department, or on a lobster boat kindly provided by John and Beth Fitzhardinge, and we camp in the ruins left behind by guano miners (see box). Our camp is away from the major seabird colonies to avoid disturbing them, but is often invaded by the large king skinks that live on the island.

We have been visiting Pelsaert regularly since 1977. Since 1986 we have been counting or estimating the numbers of all breeding species. A few species, such as the bridled tern, have nests that are very hard to find and accurate counts are not possible - in these cases we have to make an educated guess. Every nest in small, dense seabird colonies of up to a few hundred pairs, such as those of crested, roseate and fairy terns, can be counted without too much difficulty.

However, some species are so abundant that we have to make statistically valid estimates, based on sampling. In the case of shearwaters, sooty terns and common noddies we use a procedure developed by CALM scientist David Ward, which he has named the 'triangular tessellation method'. This involves picking sample points scattered throughout a colony, finding the three nests that circumscribe a triangle around the point and measuring the length of the sides of that triangle. We then punch the figures into a hand-held computer, which calculates the area of the triangle and

Previous page: Crested terns rise from their nests on a patch of sandy soil on Pelsaert.
Photo - Michael Morcombe

Ruined guano-loading jetty, a relic of mining during World War II.
Photo - Bert Wells ◄

Common noddies are found in most tropical oceans but nest only on islands.
Photo - Andrew Burbidge ►

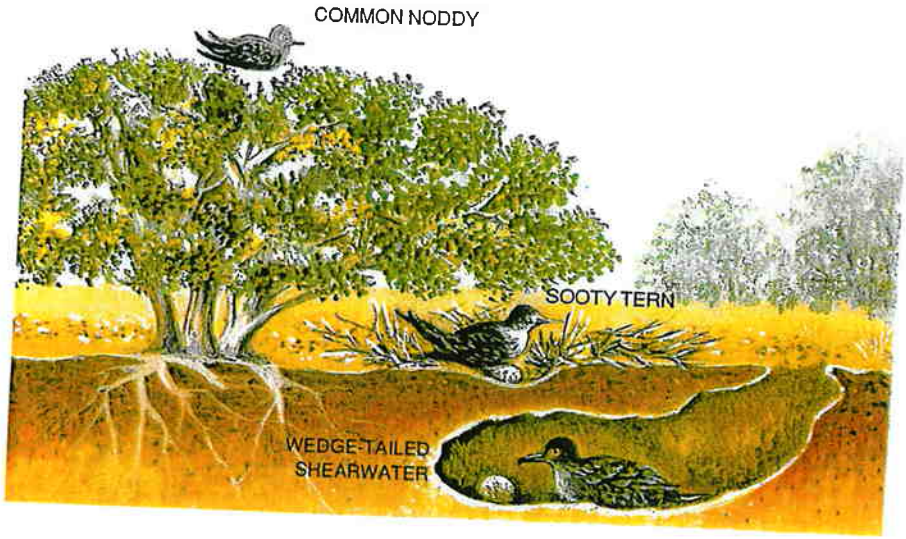
A young osprey, almost ready to fly, rears up to try and frighten an intruder.
Photo - Andrew Burbidge ►►

On the mainland, fairy terns nest on beaches, but on Pelsaert they nest among coral rocks.
Photo - Bert Wells ►►►

from it the number of nests per hectare. The area of the colony is worked out by plotting its boundaries onto an air photograph of known scale. Because of fluctuating densities, many samples are needed to get a good estimate.

Lesser noddy numbers can not be estimated using this method, because their nests occur in three dimensions and one nest may be immediately over another. Instead, we use a different sampling method involving counting every nest in many sample 'quadrats' - measured areas of 20 square metres. This is no fun since it involves crawling through muddy, dense and tangled mangrove thickets with bird droppings raining from above! The seabirds on Pelsaert are very tame and if we are careful when we walk (or crawl) though the colonies our movements have no effect on them.

Why bother to count the nests? The aim is to detect any long-term fluctuations in numbers. Concern has been expressed that there could be negative effects on seabird numbers in the future, for example from excessive catches of the small fish (such as pilchards) that they feed on - in the eastern Pacific Ocean seabird numbers have crashed following the collapse of the pilchard population there from over-fishing - or perhaps from the effects of a rise in sea level. Another concern is that the world-wide reduction in tuna numbers, also caused by over-fishing, might affect seabirds because tuna may herd shoals of pilchards and other small fish to the surface when they are feeding. Along our coast it is common to see seabirds feeding on schools of fish brought to the surface by tuna and other predators.



CHOICE OF THE FAMILY HOME

Eighteen species of seabird nest on Pelsaert Island and a further one on an adjacent islet (see box). With a total of over 400 000 nests during an average summer, well over a million birds would be resident, either building nests, incubating eggs, feeding young, being fed by their parents or just feeding themselves from the adjacent ocean.

Each seabird species has different requirements for a nest site. On Pelsaert, crested terns nest on sand in the open while roseate and fairy terns lay their eggs on small stones among coral rock. Bridled terns like a roof over their heads and lay under overhanging cliffs, low mangrove trees or even under a large slab of coral. (On some Abrolhos islands they nest under lobster fishermen's huts.) Ospreys build large structures of sticks (which also include plastic and other flotsam); the same nest can be used by generations of birds and grow to over 1.8 metres tall. Sea-eagles build low stick nests or sometimes use an old osprey nest. Shearwaters dig burrows. Noddies like a room with a view - common noddies often place their nests on low shrubs while lesser noddies always build on mangrove branches.

Four species are particularly abundant on Pelsaert Island: the wedge-tailed shearwater, sooty tern, common noddy and lesser noddy. The first three of these

In suitable places, common noddy nests are at pecking-distance from each other.
Photo - Andrew Burbidge ◄▲

Bridled terns (top), also seen around islands near Perth, have a white forehead extending behind the eye.
Photo - Jiri Lochman ▲▲

Sooty terns (below) are oceanic species not usually seen near the mainland.
Photo - Andrew Burbidge ▲

have huge overlapping nesting colonies at the southern end of the island. Wedge-tailed shearwaters nest in deep burrows in sandy soil, sooty terns nest on sand under low shrubs and common noddies nest on shrubs or on bare ground. Because of these different nest site requirements some areas have three layers of birds - underground, on the surface and in shrubs.

Wedge-tailed shearwaters (shearwaters are often called mutton-birds) are commonly seen at sea all along the west coast of WA. They nest on many islands from Perth's Carnac and Rottnest northwards, but Pelsaert has easily the largest nesting colony in the State. On Pelsaert shearwater burrows riddle the ground wherever the soil is deep enough. During the breeding season, which lasts from August to April, birds arrive at their burrows at late dusk and stay all night; only incubating birds stay in the burrows during daylight.

Our campsite on Pelsaert is surrounded by burrows, so we are relegated to camping on very shallow, stony soil and have to attach our tent ropes to boulders rather than to tent pegs. Wedge-tailed shearwaters are a very vocal species. However, even their constant wailing and groaning calls cannot keep us awake after a hard day's work!

Sooty terns are found in all tropical oceans of the world. On Pelsaert 'sooties' are the most abundant species. In late October 1990 the colony covered an area of 16.1 ha; however, colony size varies from year to year. The single egg is laid in a scrape in bare sand under shrubs. Egg-laying commences in October and may continue until late November; runners (young chicks that have left the nest) are present until February or March.

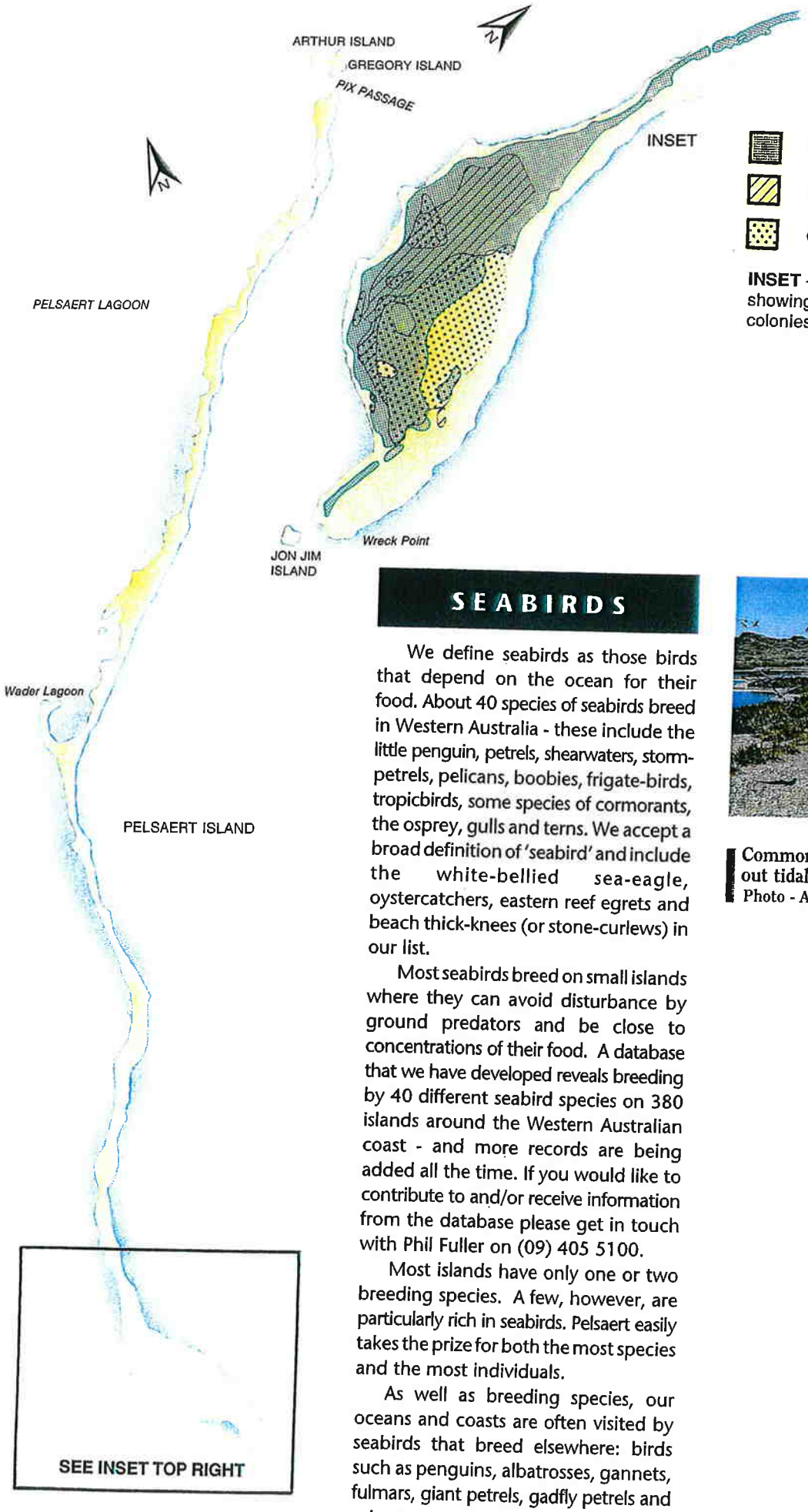
Small colonies of sooty terns are found on five other islands in the Abrolhos. Elsewhere in the eastern Indian Ocean sooties also nest on Bedout Island off the Pilbara and on East Island, Ashmore Reef, an Australian External Territory near Indonesia.

HOMES OF TWIGS AND SEAWEED

Also abundant on Pelsaert are noddies - dark-coloured terns that are seldom seen near land. The common noddy is found in most tropical oceans. Nests are built from twigs and seaweed, some being decorated with small shells and pieces of coral. Some are placed on soil with little or no added material; most are on low shrubs. After the breeding season (August to April) common noddies completely desert the Abrolhos and apparently move north to the tropics, where flocks may be seen hundreds of kilometres from land. At sea, huge flocks of common noddies can sometimes be mistaken for smoke!

The Pelsaert colony is by far the largest in Western Australia. Elsewhere in the Abrolhos there is only a small colony on Wooded Island, and there are only two other colonies in the State: on Bedout Island off the mouth of the De Grey River in the Pilbara, and on the Lacepede Islands to the north of Broome. There was once a very large colony on Rat Island, further north in the Abrolhos, estimated in 1889 to contain more than a million birds. This colony had disappeared by the late 1930s, probably destroyed by a combination of guano mining, cats and rats.

The fourth abundant species is the lesser noddy. We estimated 30 000 occupied or recently used nests in December 1986, and in December 1989 another survey revealed about 54 000 nests. The nests, which are large for a seabird, are built from seaweed, copiously cemented with white excreta, and are located on the branches of white mangroves (*Avicennia marina*). Two large colonies were noted by Stokes in 1840 and by other visitors up to 1899. In 1907 C.G. Gibson found these to be abandoned, possibly because of disturbance by guano miners, with thriving colonies in place on Wooded and Morley Islands, in Easter Group, 35 km to the north of Pelsaert. The Pelsaert colonies were still abandoned in 1913. However, by 1936 lesser noddies had re-established on Pelsaert and were flourishing, and a similar situation was reported by later visitors up to 1954.



INSET - Southern end of Pelsaert Island showing location of seabird breeding colonies, December 1989.

SEABIRDS

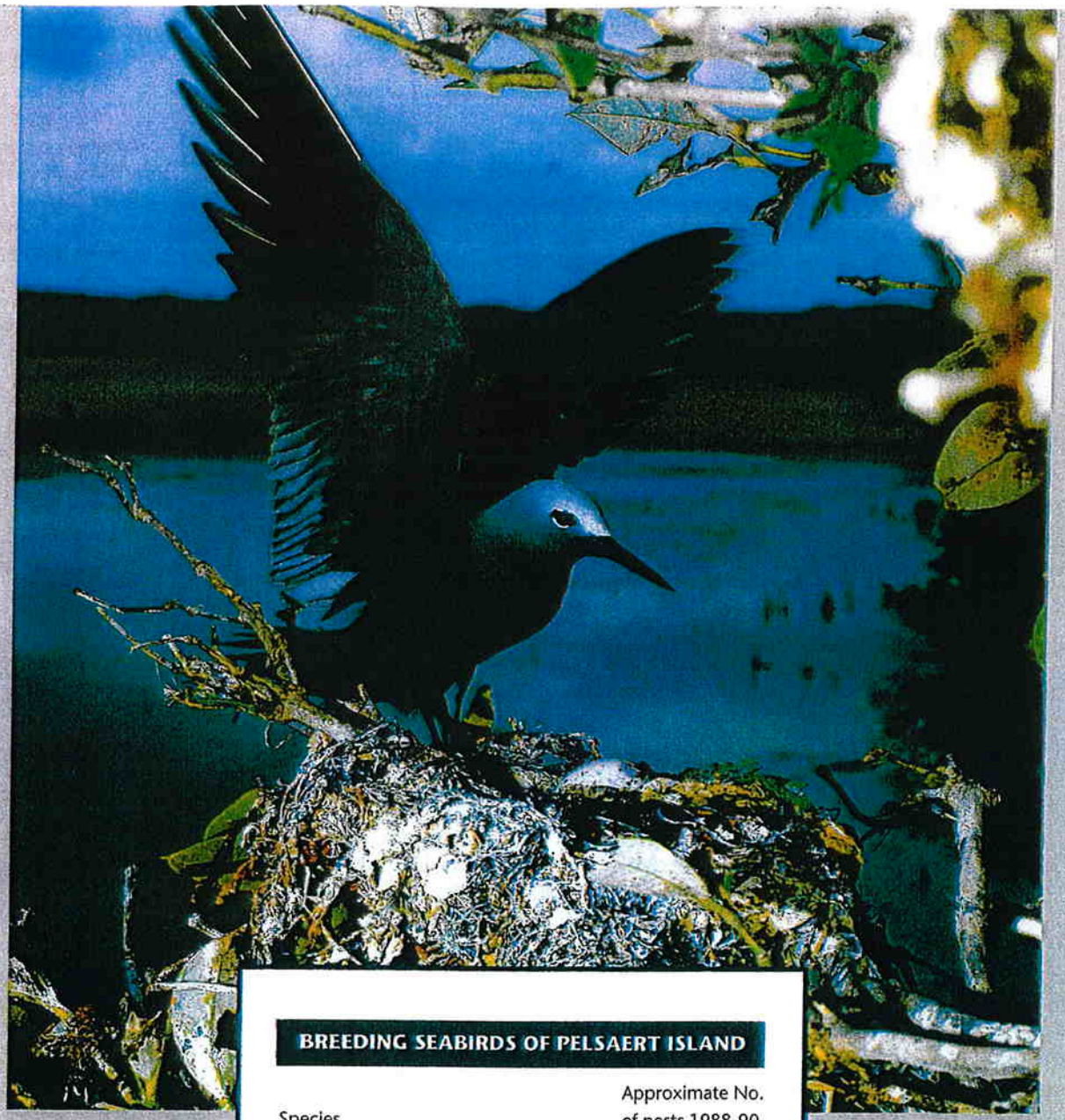
We define seabirds as those birds that depend on the ocean for their food. About 40 species of seabirds breed in Western Australia - these include the little penguin, petrels, shearwaters, storm-petrels, pelicans, boobies, frigate-birds, tropicbirds, some species of cormorants, the osprey, gulls and terns. We accept a broad definition of 'seabird' and include the white-bellied sea-eagle, oystercatchers, eastern reef egrets and beach thick-knees (or stone-curlews) in our list.

Most seabirds breed on small islands where they can avoid disturbance by ground predators and be close to concentrations of their food. A database that we have developed reveals breeding by 40 different seabird species on 380 islands around the Western Australian coast - and more records are being added all the time. If you would like to contribute to and/or receive information from the database please get in touch with Phil Fuller on (09) 405 5100.

Most islands have only one or two breeding species. A few, however, are particularly rich in seabirds. Pelsaert easily takes the prize for both the most species and the most individuals.

As well as breeding species, our oceans and coasts are often visited by seabirds that breed elsewhere: birds such as penguins, albatrosses, gannets, fulmars, giant petrels, gadfly petrels and prions.

Common noddies nest among mined-out tidal claypans.
Photo - Andrew Burbidge



BREEDING SEABIRDS OF PELSAERT ISLAND

Species	Approximate No. of nests 1988-90
wedge-tailed shearwater *(Puffinus pacificus)*	50 000
little shearwater *(Puffinus assimilis)*	35
white-faced storm-petrel *(Pelagodroma marina)*	250
red-tailed tropicbird *(Phaethon rubricauda)*	1
eastern reef egret *(Egretta sacra)*	5
osprey *(Pandion haliaetus)*	7
white-bellied sea-eagle *(Haliaeetus leucogaster)*	3
pied oystercatcher *(Haematopus longirostris)*	10
silver gull *(Larus novaehollandiae)*	100
pacific gull *(Larus pacificus)*	15
caspian tern *(Hydroprogne caspia)*	15
roseate tern *(Sterna dougallii)*	700
sooty tern *(Sterna fuscata)*	223 000
bridled tern *(Sterna anaethetus)*	300
fairy tern *(Sterna nereis)*	200
crested tern *(Sterna bergii)*	400
common noddy *(Anous stolidus)*	115 000
lesser noddy *(Anous tenuirostris)*	54 000

Lesser noddies build massive nests of seaweed and perch them on mangrove branches.
Photo - Michael Morcombe ◀

A wedge-tailed shearwater at the entrance to its nest burrow.
Photo - Jiri Lochman ▲

Since then additional areas of mangroves have been colonised, some being abandoned again later.

The Wooded and Morley Islands colonies still exist. Numbers there, however, are now much lower than on Pelsaert; in August 1977 Ron Johnstone of the Western Australian Museum estimated about 8 700 nests on Wooded and 2 585 on Morley, while in December 1989 we estimated 6 875 on Wooded and 16 375 on Morley. Lesser noddies are found only in the Indian Ocean. Another sub-species breeds on several islands in the western Indian Ocean to the north of Madagascar.

Unlike the common noddy, the lesser noddy remains in the vicinity of the breeding colonies all year round and continues to roost in the mangroves at night. The lesser noddy is a vulnerable species in Australia. Its population fluctuates but may be under 100 000 birds, with only two breeding places 35 km apart (see *LANDSCOPE*, Autumn 1989).

THE FUTURE

Counts have shown that both noddy species have increased in number over the past few years. The reasons for this are unknown, and until regular censuses are conducted we will not be able to tell atypical changes in abundance from those which happen normally. We plan to conduct regular censuses of lesser noddies and other Pelsaert seabirds to enable important baseline data to be accumulated.

Pelsaert Island is of enormous nature conservation value and needs continued protection and management. It is especially important that the small patches of mangroves, on which the lesser noddy depends for its nest sites, are not damaged. The introduction of predators such as cats, rats or even rabbits could be catastrophic.

Andrew Burbidge, Director of Research, and Phillip Fuller, Senior Technical Officer, are both based at CALM's Wildlife Research Centre at Woodvale, telephone (09) 405 5100.

GUANO MINING

The early settlers found Australian soils to be deficient in nutrients, and fertiliser was in great demand. The guano (bird droppings) accumulations on the Abrolhos were discovered during the survey by HMS *Beagle* in 1840, and exploitation began in 1844 when the cutter *Waterwitch* brought a load of Pelsaert guano to Fremantle. Fishing schooners continued to bring small supplies for the local market, but it was not until after John Forrest made a survey of the guano resources of the Abrolhos in 1879 that steps were taken for regular production. This was begun in 1885 by the firm of Broadhurst and McNeil, then by J. & W. Bateman, and later by F.C. Broadhurst alone. He ceased operations in 1904 when the State prohibited the export of guano, but the lease was taken over by Fallowfield & Co., who continued production for the local market until 1915.

During this period 56 900 tonnes of guano was known to have been produced from the Abrolhos. Many islands were mined but the proportion that came from Pelsaert Island is not known. Some islands in the Abrolhos were greatly affected by mining, which removed all the soil and left them looking like a 'moonscape'. The destruction of the enormous seabird colonies on Rat Island in the Easter Group is thought to have been partially due to guano mining.

In 1943 the industry was revived on Pelsaert by the British Phosphate Commissioners because of urgent war needs, and 10 900 tonnes were taken up to 1945. Although some parts of Pelsaert were mined out to the bedrock, much of it was unsuited to mining and the damage was, fortunately, much less than on some other islands. The buildings left on Pelsaert by the miners were used as a tourist resort from 1946 to 1953, and when this enterprise collapsed the huts were removed to other islands by lobster fishermen.