LANDSCOPE EXPEDITIONS
Working at the Frontier of Discovery

Expedition briefing

Expeditioners observing birds on the Abrolhos.
Inserts – Lesser Noddy on nest and an Australian Sealion pup. Photos by Kevin Coate.

Houtman Abrolhos Archipelago – a Voyage of Discovery

Abrolhos Islands, via Geraldton, Western Australia

26 February – 2 March

Leaders:

Doug Coughran	Senior Wildlife Officer (Marine Wildlife) Nature Protection Branch, CALM, Perth
Kevin Coate	Naturalist and Ornithologist, Perth

This expedition is offered by *LANDSCOPE*, a 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

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

artment of Conservation and Land Management *in association with* UWA Extension, The University of Western Australia.

ANDSCOPE Expeditions 2005

PAM09019

Houtman Abrolhos Archipelago – a Voyage of Discovery

February 26 – March 2, 2005

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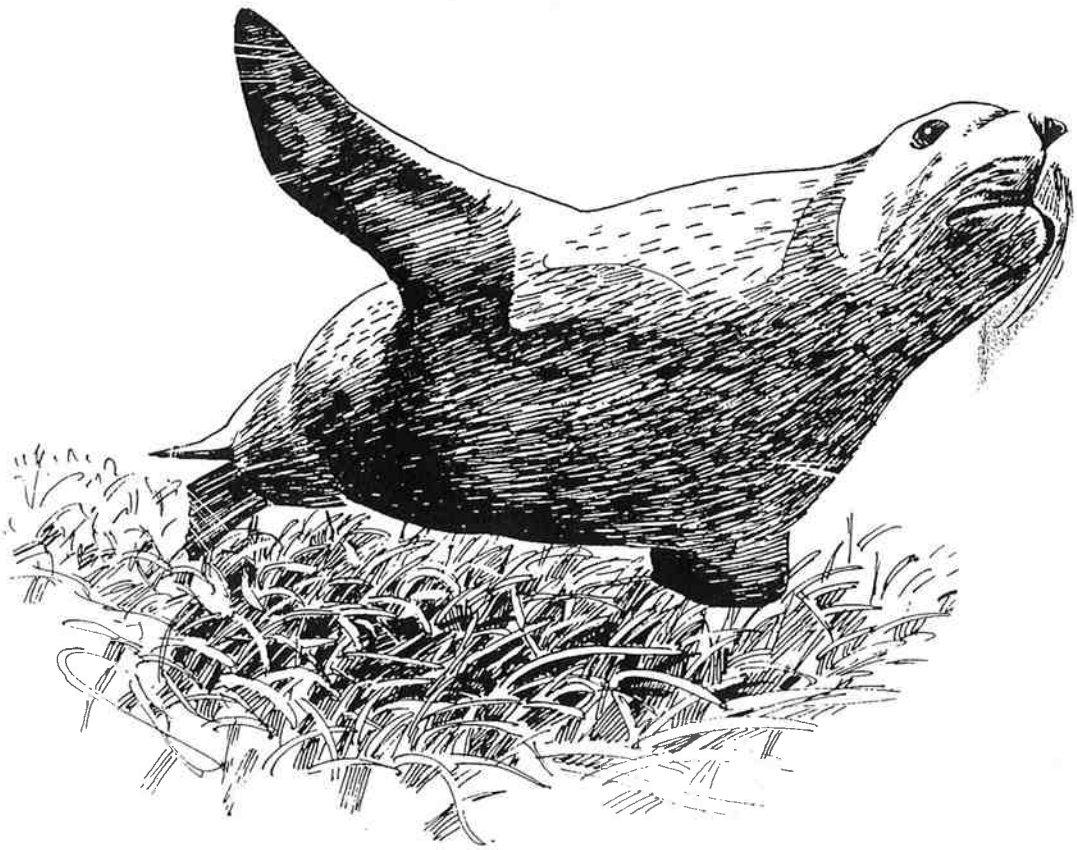
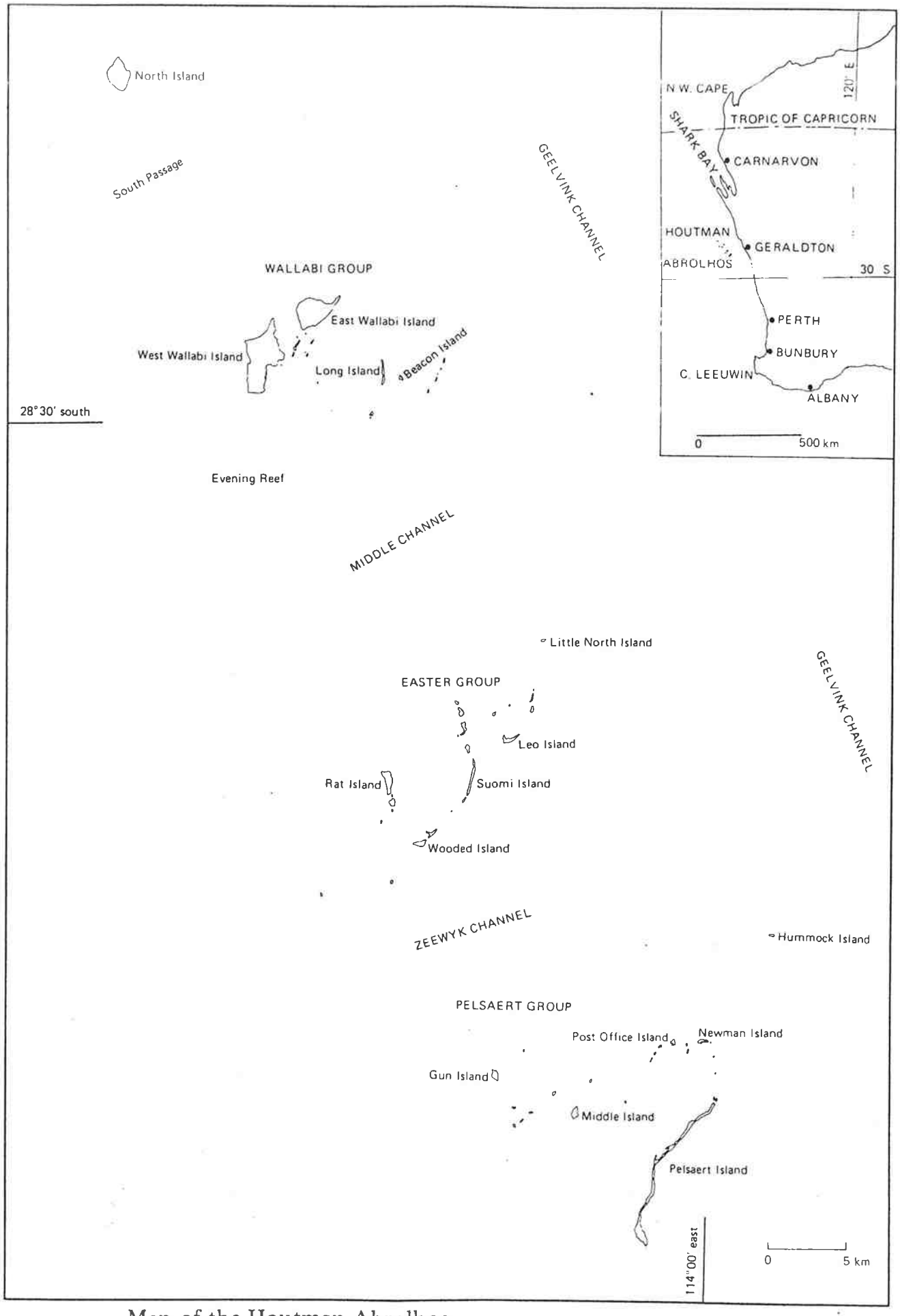
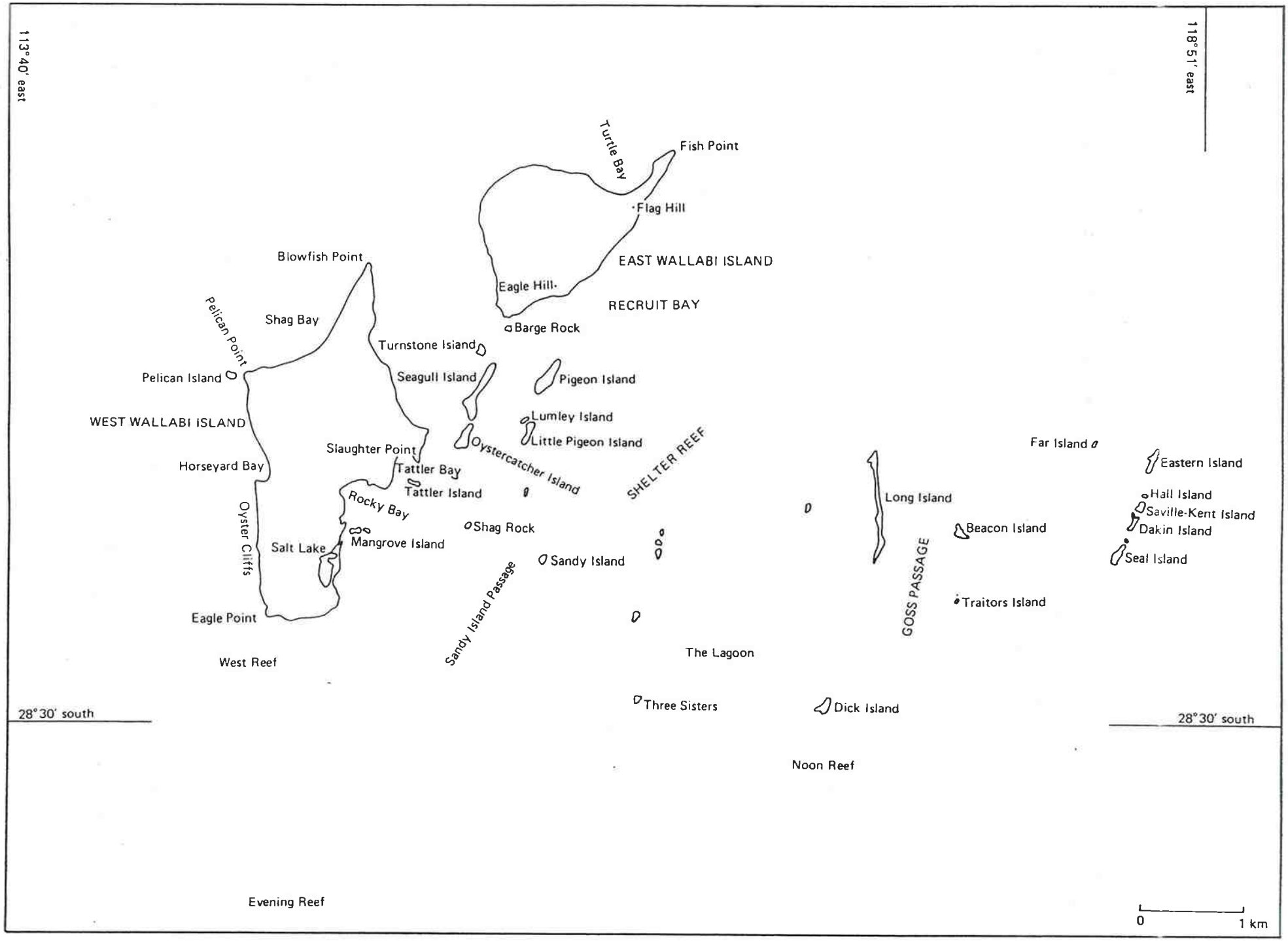


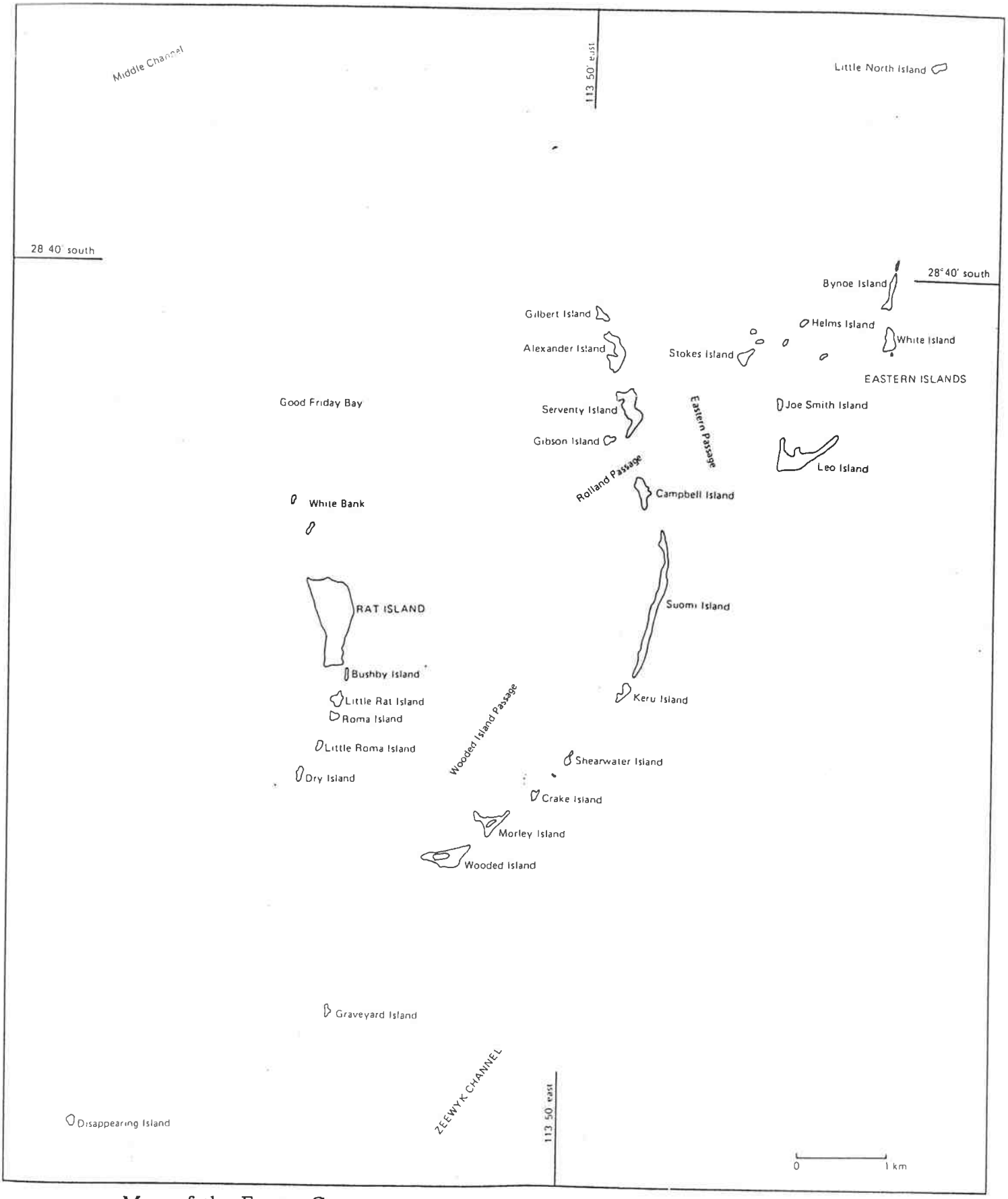
RESEARCH PROJECT



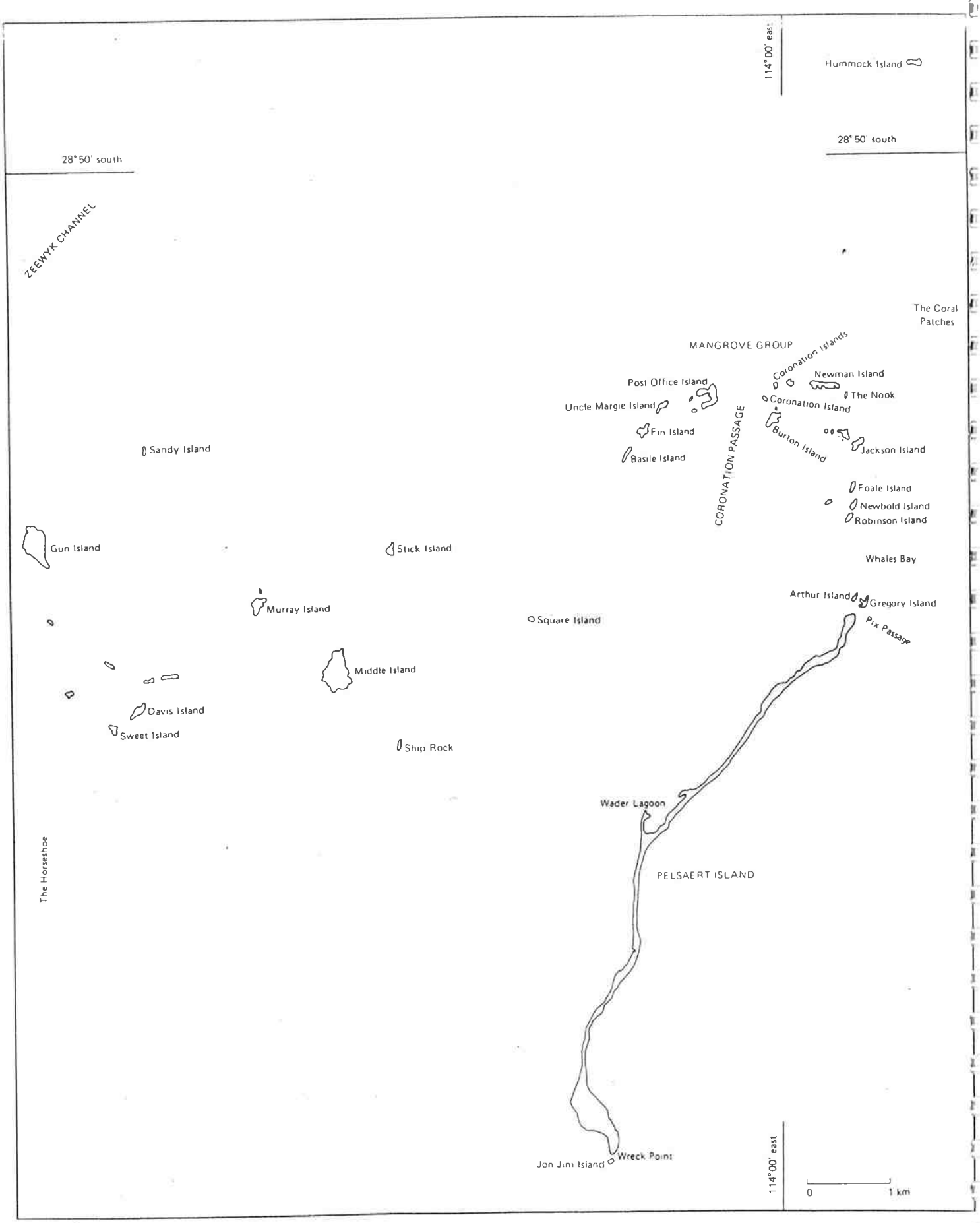
Map of the Houtman Abrolhos.



Map of the Wallabi Group.



Map of the Easter Group.



Map of the Pelsaert Group.

THE PROJECT

The expedition is centred around a four day visit to the Houtman Abrolhos Islands, west of Geraldton. The three-and-a-half-hour passage across can sometimes be rough. Ensure you have a supply of seasickness remedies. Once at the Abrolhos Islands you will be in sheltered waters.

Popular recreational pursuits at the Abrolhos Islands are fishing, diving and wildlife appreciation of the seabirds and sea-lions.

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 Houtman Abrolhos Islands are located about 60km offshore from the City of Geraldton. They consist of four island groups extending over 80km 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 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.

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.

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 Western Australia 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 (Gales et al. 1994). 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.

As well as visiting many small islands to record vegetation and whether 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.

Pelsaert Island is renowned as one of the most important sea bird 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. On no account must anyone interfere with anything near these buildings and there will be a briefing before going ashore, on procedure and where you may go on the island.

Morley and/or Wooded Island have safe overnight anchorages. There are usually sea lions there and interesting corals for snorkelling over. 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.

Wallabi Group. 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. CALM 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.

There will be opportunities to snorkel at various sites. Participants should bring their own snorkelling equipment.

We expect to return to Geraldton between 5 pm and 6 pm on the final day.

VOLUNTEER ASSIGNMENTS

- Birdwatching: 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 with volunteers to locate and record the incidence of breeding seabirds.
- The 1999 LANDSCOPE Expedition assisted in a survey of the vegetation of the smaller islands. Further botanical collecting may be conducted.
- Australian sea lion survey: This 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.

Other activities may include:

- Assisting with wildlife photography (participants may wish to contribute high quality images suitable for use in LANDSCOPE magazine).
- Compilation of data at the end of the day; write up notes; and contribute to the trip diary.

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 sea birds, particularly the lesser noddy and roseate and fairy terns and shorebirds.

You will receive instruction in how to identify male, female and juvenile members of the Australian sea lion family and be shown how to complete a seal/sea lion sighting information log. You will also be instructed in how to complete a cetacean (whales, dolphins and porpoises) data record and a turtle field report. For your safety, you will learn appropriate behaviour in the presence of sea lions and how to recognise their basic behaviours, including warning behaviours.

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

Bird sightings and other natural history observations will assist in providing answers on distribution and abundance of species. Any plant specimens collected will supplement the ongoing flora and vegetation survey of the islands published in 2001. Census data on Australian sea lion populations at the Abrolhos will be used by CALM and copies will be provided to the Mid-West region and members of the research community.

EXPEDITION LEADERS

Kevin Coate is a naturalist and ornithologist who has been involved in nature based tourism in Western Australia since 1975. He has travelled extensively throughout the State and internationally and has written numerous articles on the areas he has visited as well as a number of papers, primarily on birds. He has been guiding groups to the Abrolhos Islands since 1986 to view wildlife and the historical

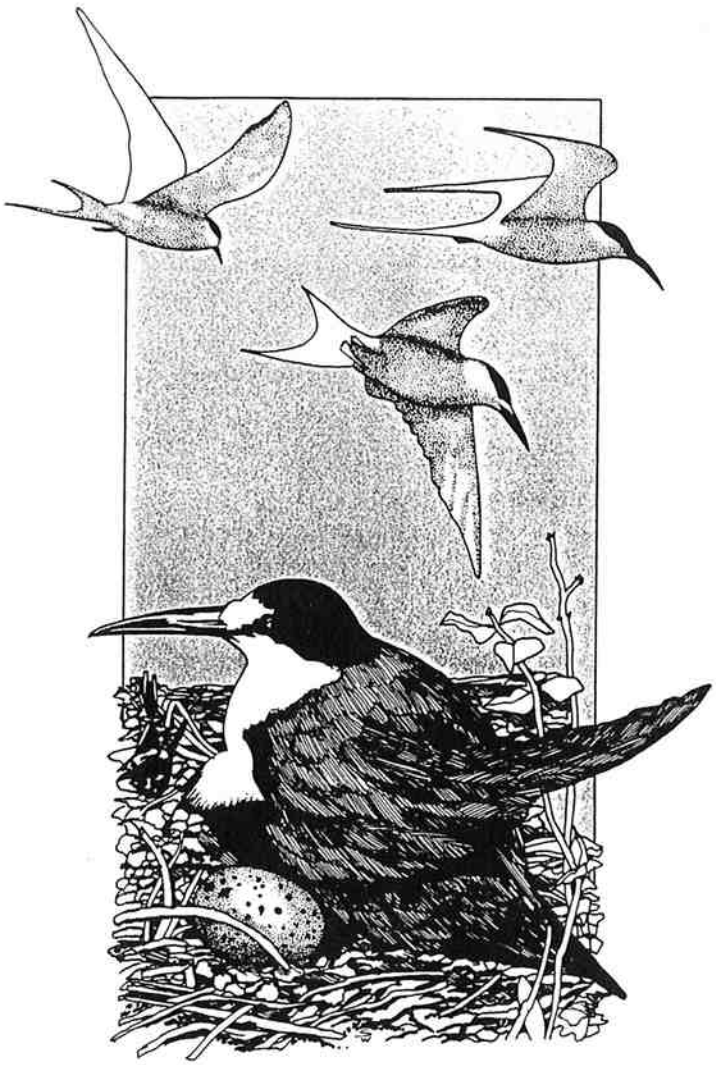
sites associated with early maritime encounters. Kevin has recently returned from leading a tour to the Galapagos Islands and Amazon rainforest. In 2000, he was the winner of Western Australian Tourism's FACET Golden Guide Award, and in 2001 he was a recipient of a "Premier's Award to Legends of the Hospitality and Tourism Industry", a one-off award which marked the start of the new millenium and the contribution of individuals to these industries over the previous thirty years.

Doug Coughran is a Senior Wildlife Officer with the Western Australian Department of Conservation and Land Management's Nature Protection Branch (Marine Wildlife), Perth. Doug has 25 years' experience in the management of marine mammal issues, contributing to ongoing research on pinniped and cetaceans. Doug takes the lead role as Incident Controller at most whale and dolphin strandings in Western Australia. He is the team leader of the State's large whale disentanglement team, responsible for the ongoing training and the management of occupational health and safety of the team. He has assisted the Australian Federal Government Conservation Agency with the development of a national approach to managing large whale disentanglement operations for all of the State Conservation Agencies (Victoria, New South Wales, Queensland, South Australia and Tasmania), providing advice and assistance and fulfilling the role of principal trainer. Doug currently contributes to the State's humpback whale photo identification catalogue, managed by the Western Australian Museum. He has direct involvement in the management, liaison and compliance of the growing commercial whale watching industry in Western Australia, off Perth in particular, and involvement with numerous other marine wildlife eco-tourism activities. These include the seasonal whale shark tourism activities operating within the Ningaloo Marine Park. Doug's academic background is in applied science and environmental management. He was awarded a Churchill Fellowship in 2004 to visit Provincetown in the USA to work with the Center for Coastal Studies large whale disentanglement network. He focussed on techniques, procedures, protocols and tools used in the disentanglement of large whales in fishing gear and steps that can be taken to prevent this problem. He is particularly interested in the critically endangered northern right whale, as Australia has the recovering population of the southern right whale with a very similar difficult demeanour to its northern cousin. On this expedition Doug's principal research focus will be the Australian sea lion.

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.

A reunion for all 2005 expeditions will be held on Saturday December 3rd 2005 in Perth. 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 6pm on Saturday 26th February 2005 at the Batavia Motor Inne, 54 Fitzgerald Street, Geraldton (Tel: 08 9921 3500, Fax: 08 9964 1061). There will be an expedition briefing at 6.30 pm at the Batavia Motor Inne, where you will meet fellow expeditioners and your leaders. This will be followed by an expedition dinner at 7.00 pm at the same venue. We will overnight at the Batavia Motor Inne.

ITINERARY

Sat	Feb 26		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.
Sun	Feb 27	0600	The group will gather at 6.00 a.m. at the Batavia 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*, enjoy a light breakfast aboard and voyage to the Abrolhos Islands arriving approximately 11.00 a.m. Visit Wallabi Group and examine historical sites and early building, mammals (tammars) and reptiles. In the afternoon visit Beacon Island. Overnight Beacon Island.
Mon	Feb 28		Beacon Is. Snorkel over wreck of *Batavia* if conditions are suitable. Long Is. (proposed resort; Inspect camp of *Batavia* survivors and where mutineers were hung.) Travel to the Easter Group p.m. The Easter Group is the main set of islands for Australian sea lion breeding at the Abrolhos. Wooded or Rat Island. Birds (lesser noddies). Overnight Wooded Island.
Tue	Mar 1		Pelsaert Group. Gun Island.
Wed	Mar 2		Pelsaert Group. Post Office Island. Return to Geraldton. End of Expedition.

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.

DAILY SCHEDULE

0600 - 0630	Wake up and rise
0700	Breakfast
0800	Begin day's activities
1200	Lunch (variable)
1630	End of day's activities
1800	Dinner
1900	"Show and Tell" and Briefing for next day.

The Daily Schedule may be varied due to operational requirements.

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 participating in activities, surveys and sharing of results. Working and living together on a vessel in an offshore location will also enhance team spirit.

ACCOMMODATION

The accommodation in Geraldton will be twin share rooms in a motel. Once we depart Geraldton for the Abrolhos Islands, accommodation will be on board the *Odyssey* (See Advance Preparation).

FOOD AND DRINKS

All meals will be covered by your contribution. In Geraldton, dinner, bed and breakfast will be at the Batavia Motor Inne. On board the *Odyssey*, meals will be provided by the tour operator. You may be required to assist with preparation on a rotational basis. If any special diets are needed you should contact LANDSCOPE Expeditions as soon as possible to see if they can be accommodated.

Any drinks other than tea or coffee would be at your expense. If you have a favourite alcoholic beverage you will need to bring a supply. You may also wish to bring a small stash of lollies, snacks or "trail mix" to your liking.

PHYSICAL CONDITION

You need to be in reasonable physical condition. If you are over 60 you may wish to obtain a doctor's certificate of fitness. There will be a range of activities to suit differing levels of fitness.

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.

Climate

The weather pattern at the Abrolhos Islands is similar to weather recorded at Geraldton Port. Mean daily temperatures in February/March range from 30.0° C maximum to 18.0 ° C minimum. Dominant wind direction in summer is from SE-SW with 76% of wind speeds exceeding 11 knots and 44% exceeding 17 knots. Calm conditions are rare during summer and the area has been subject to tropical cyclones in summer months.

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.

Motion Sickness If you are prone to seasickness it is recommended that you take appropriate medication/measures before boarding the vessel.

Dehydration can be 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 (for about 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 your first day aboard *Odyssey*.

Snakes: For safety reasons, volunteers are not to handle snakes. Only non-venomous snakes are recorded from the Abrolhos. 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 boots (divers' ankle length neoprene booties) are useful for wading ashore and exploring the reefs and shallows.

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. It is unlikely that these types of insect will be encountered on the Abrolhos. *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 and will need to bring appropriate remedies.

Personal hygiene: Peter G's liquid soap is a good soap to use in hard or salt 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.

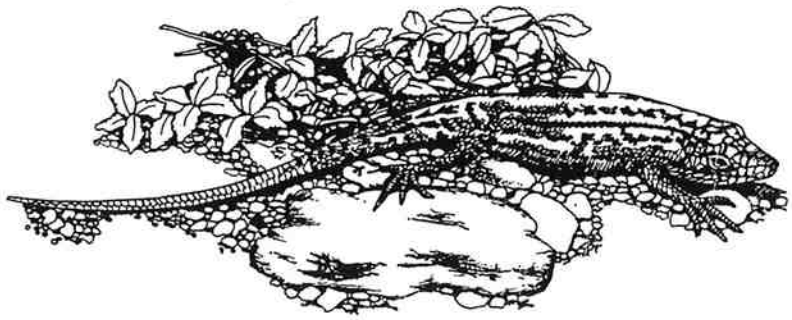
Wilderness survival: Please familiarise yourself with the enclosed Wilderness Survival Card and carry it in your day pack. Carry your water bottle and a whistle when ashore.

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 onset of infection. Please ask one of the crew.

FIELD COMMUNICATIONS

The charter vessel is equipped with a range of marine radio frequencies.

LANDSCOPE Expeditions also has facilities to contact CALM's office in Geraldton, but only in an emergency. Telephone LANDSCOPE Expeditions on or (08) 9334 0319 or (08) 9334 0401. Outside office hours, contact Kevin Kenneally on (08) 9334 0561.



ADVANCE PREPARATION

FIELD SUPPLIES

Once we board *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 and plenty of film or memory storage for digital images. Binoculars and field guides will be useful. You may wish to include a large, sturdy plastic garbage bag with ties to protect your bag in transit. Bedding is provided at the Batavia Inne but you will need to bring your own sleeping bag or doona, and pillow for use aboard *Odyssey*.

CHECK LIST

- ❑ Sturdy, comfortable, worn-in walking boots with firm soles and ankle support.
- ❑ Thick walking socks.
- ❑ Reef boots.
- ❑ 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.
- ❑ Small shade-umbrella (NOT beach umbrella) for personal use ashore.
- ❑ Bathers, snorkelling equipment, and fishing gear.
- ❑ Handkerchiefs, or tissues.
- ❑ Toiletries.
- ❑ Beach towel.
- ❑ Bedding/linen for aboard *Odyssey* – doona or sleeping bag. Pillow.
- ❑ 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, film, water bottle, snacks, etc.
- ❑ Head torch + spare batteries (Petzl with halogen globe recommended – optional).
- ❑ Small robust torch plus batteries, and spare globe.
- ❑ Camera and film (bring PLENTY of film).
- ❑ 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 CALM Volunteer's full-brimmed hat, a stubby holder, and a thermal mug.

The expedition will carry a comprehensive first aid kit.

YOUR CHARTER VESSEL

You will be accommodated aboard the *Odyssey,* launched in 2001. Facilities and specifications of the *Odyssey* include:

Specifications: Built by Seaquest Boat Builders and launched in 2001, *Odyssey* is a 16.0 m charter vessel with a beam of 5.0 m and draws 1.8 m. She is purpose-built for research, charter and sightseeing in west coast conditions, and is powered by a 1000 Hp Mercedes diesel engine, with a cruising speed of 18 knots. She is surveyed for up to 12 for overnight charters. She carries 5000 litres of fuel and 400 litres of fresh water, with a desalinator to ensure continuous supply.

Accommodation: The vessel's main saloon/galley area is air-conditioned. There are two showers and toilets at the aft of the vessel. The water in the basin and shower is drinking quality. There are 3 sleeping areas below deck and 2 enclosed rooms on the main deck. Cabins below deck have their own wardrobes and storage cabinets for stowing your personal gear. Passengers will be limited to 10 plus two leaders to ensure maximum comfort while aboard.

Facilities: A 16 kVA Isuzu diesel generator ensures adequate supplies of hot water for showers. The vessel is also equipped with a desalinator and a 9-cf/m-dive compressor. She carries a complement of the latest navigational equipment and radios, together with a full entertainment system, including TV, and DVD, VCR and CD players.

Food and drink: There are soft drinks in the icebox and there is usually a kettle on in the galley. You may help yourself to a hot drink whenever the vessel is in calm water. You will need to provide your own alcoholic beverages. You may like to bring some trail mix or similar snack food.

Emergency procedure: Life jackets are kept under the dinette lounge. The vessel is fitted with life rafts. These can be manually released by the crew or will deploy automatically at 3 – 4 m. The vessel carries an extensive first aid kit.

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.**
3. Snorkelling: Your leaders will prepare a dive plan, and our duty of care requires that all snorkelling must be under supervision and according to the plan. You can bring your own, or use some provided by *Odyssey*.

General: The crew will conduct a briefing and familiarisation when everyone is on board, and will advise the location of life jackets and life rafts, and outline emergency procedures. They will also 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.

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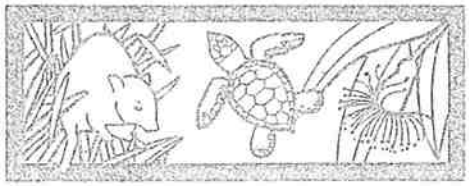
❑ *The expedition will carry some reference books.*

NOTES

LANDSCOPE Expeditions



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 Conservation and Land Management (CALM) 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.

CALM 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 The University of Western Australia since 1913. It is a Centre for Continuing Education and promotes community awareness in a variety of ways, including educational travel.

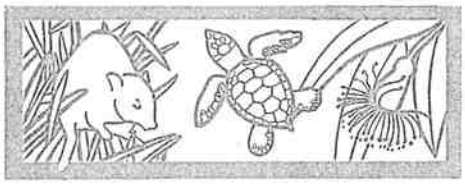
Scientists and regional staff identify the research projects and lead the expeditions. CALM and UWA administer the expeditions. The private sector and local communities are contracted to provide logistical support.

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.

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 west of Albany. The coastline alone is nearly 13 000 kilometres long. 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 Warren Region in 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.

Checking pit traps at Lake Mason. Photo – Kevin Kenneally

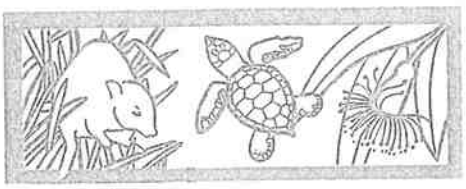
These extensive land and seascapes provide a magnificent natural setting for a vast array of plant and animal species. In this huge natural laboratory, scientists can pursue their research interests. However, such a diverse and extensive State also poses a formidable hurdle for scientists in determining 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.

The conservation reserve system in Western Australia 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. While some land systems may have been well represented within reserves, others remain completely unrepresented. 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 field work can be repetitive and time consuming as 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 field work is very intensive. Leaders will maximise time spent on fieldwork, but will provide instruction in techniques as time 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.

Establishing vegetation quadrats at Lake Mason. Photo – Kevin Kenneally

- 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 Wallahi 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.

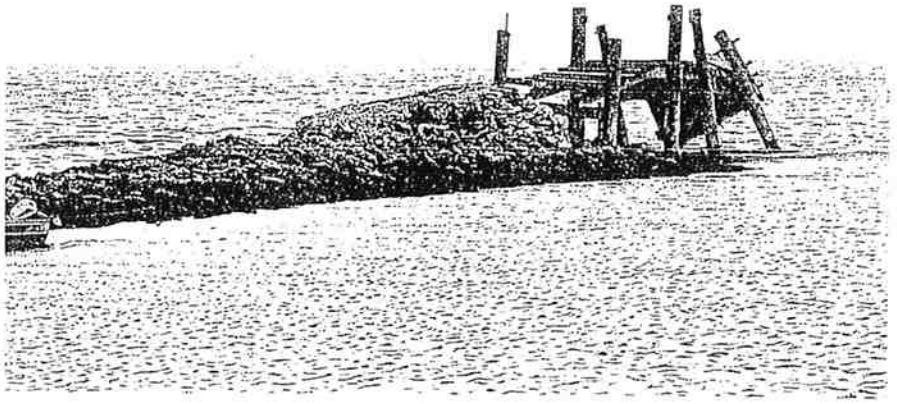
COUNTING COLONIES

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 the 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 ▸

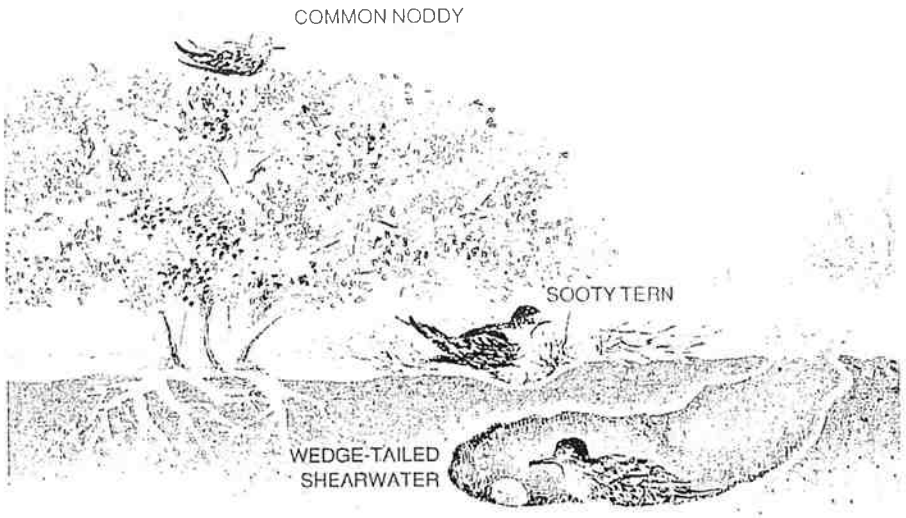
A young osprey, almost ready to fly, rears up to try and frighten an intruder.
Photo - Andrew Burbidge ▸▸

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

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

SEABIRDS

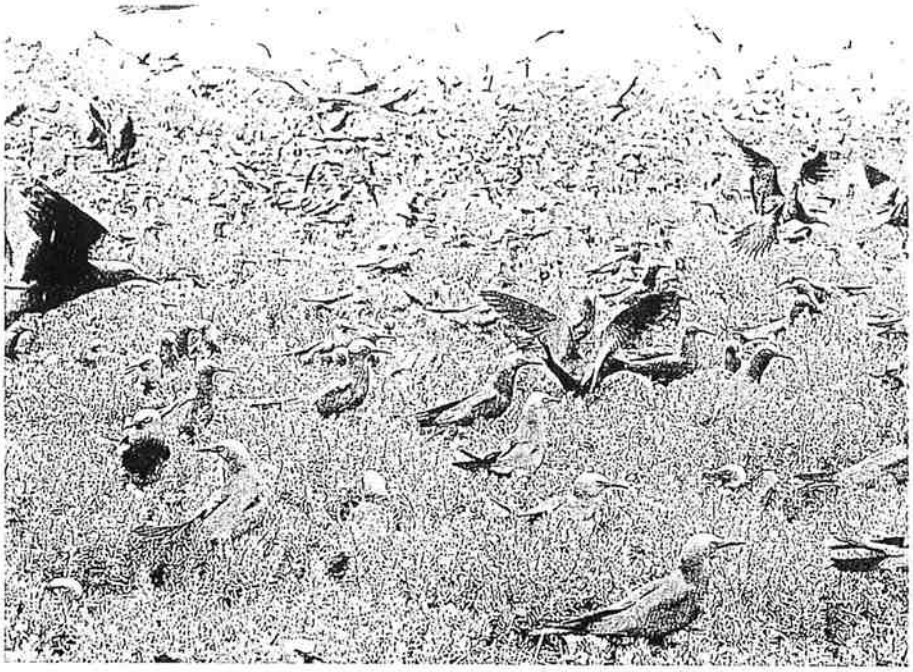
We define seabirds as those birds that depend on the ocean for their food. About 40 species of seabirds breed in Western Australia - these include the little penguin, petrels, shearwaters, storm-petrels, pelicans, boobies, frigate-birds, tropicbirds, some species of cormorants, the osprey, gulls and 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.

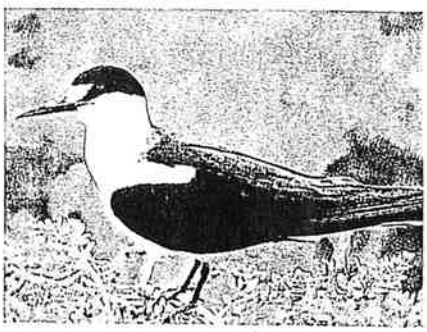
Most seabirds breed on small islands where they can avoid disturbance by ground predators and be close to concentrations of their food. A database that we have developed reveals breeding by 40 different seabird species on 380 islands around the Western Australian coast - and more records are being added 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





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.

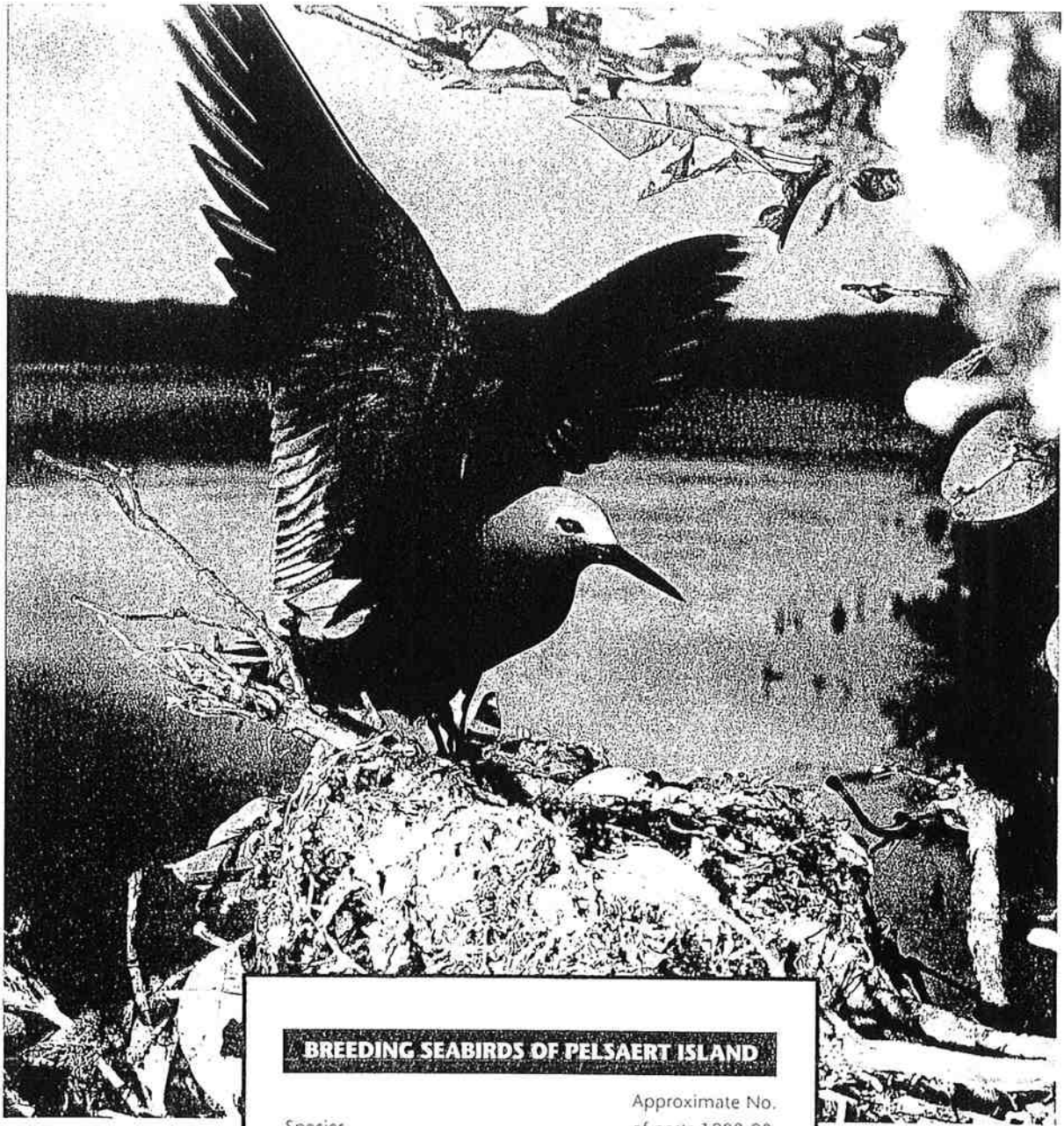
Small colonies of sooty terns are found on five other islands in the Abrolhos. Elsewhere in the eastern Indian Ocean sooties also nest on Bedout Island off the Pilbara and on East Island, Ashmore Reef, an Australian External Territory near Indonesia.

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!

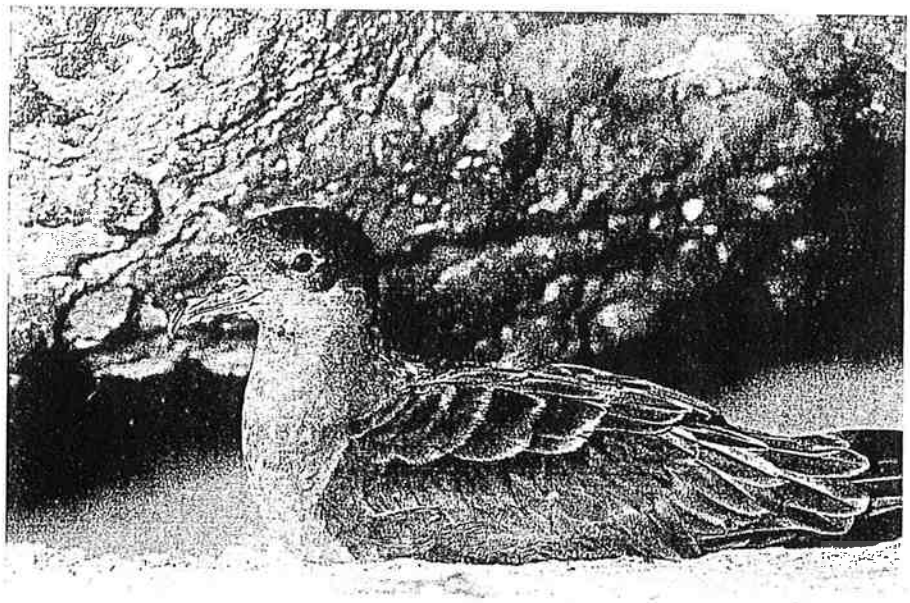
The Pelsaert colony is by far the largest in Western Australia. Elsewhere in the Abrolhos there is only a small colony on Wooded Island, and there are only two other colonies in the State: on Bedout Island off the mouth of the De Grey River in the Pilbara, and on the Lacepede Islands to the north of 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.



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.

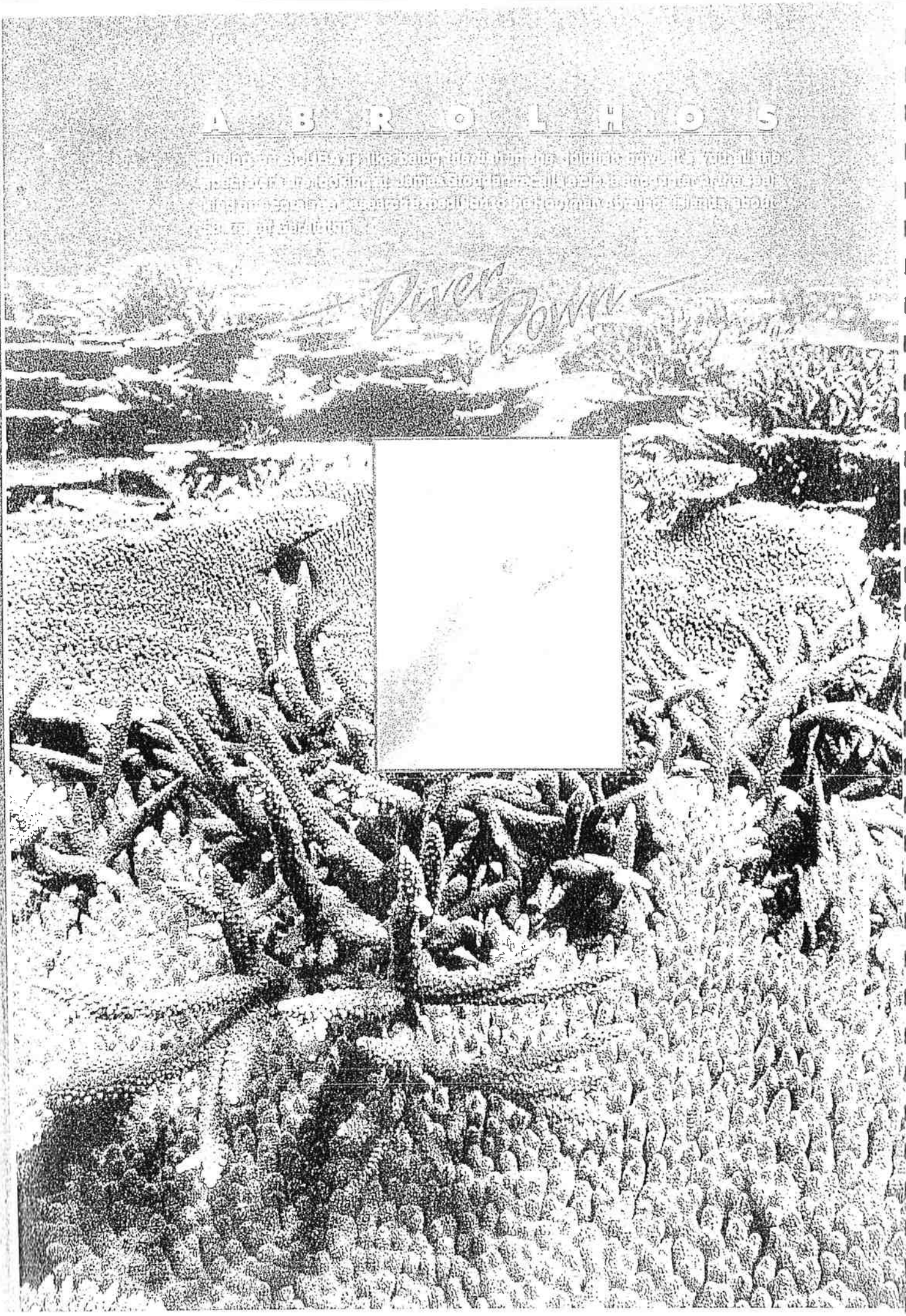
GUANO MINING

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.

ABROLHOS

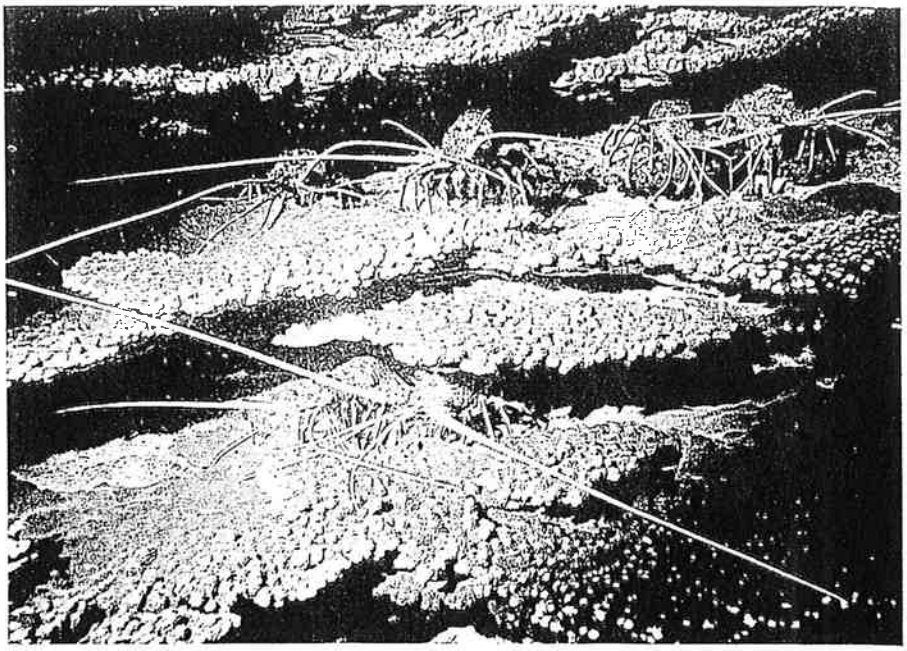


The Abrolhos Islands are largely undisturbed by humans for almost nine months of the year, but between mid-March and the end of June they are scenes of frantic activity as the lucrative rock-lobster fishing industry swings into gear.

Surrounding the islands lies a rich blend of tropical and temperate ecosystems (see *LANDSCOPE*, Spring 1990). The waters around each of the four island groups are essentially coral reef ecosystems: systems not usually noted for their ability to sustain fisheries. Yet the Abrolhos reefs are extremely productive for lobsters, yielding more than 1 100 tonnes in 1986 - worth an estimated $15 million. This productivity seems to result from an interaction between coral and macroalgal (seaweed) communities which may be unique to the Abrolhos.

Managing the fragile balance of this relationship requires constant vigilance for early warnings of impending change. That's the reason for my visit to the Easter group of islands with researchers from the Department of Conservation and Land Management (CALM): we wish to establish sites for monitoring the health of these reefs.

Normally, the summer face of the Abrolhos is anything but the benign millpond people associate with coral reefs.



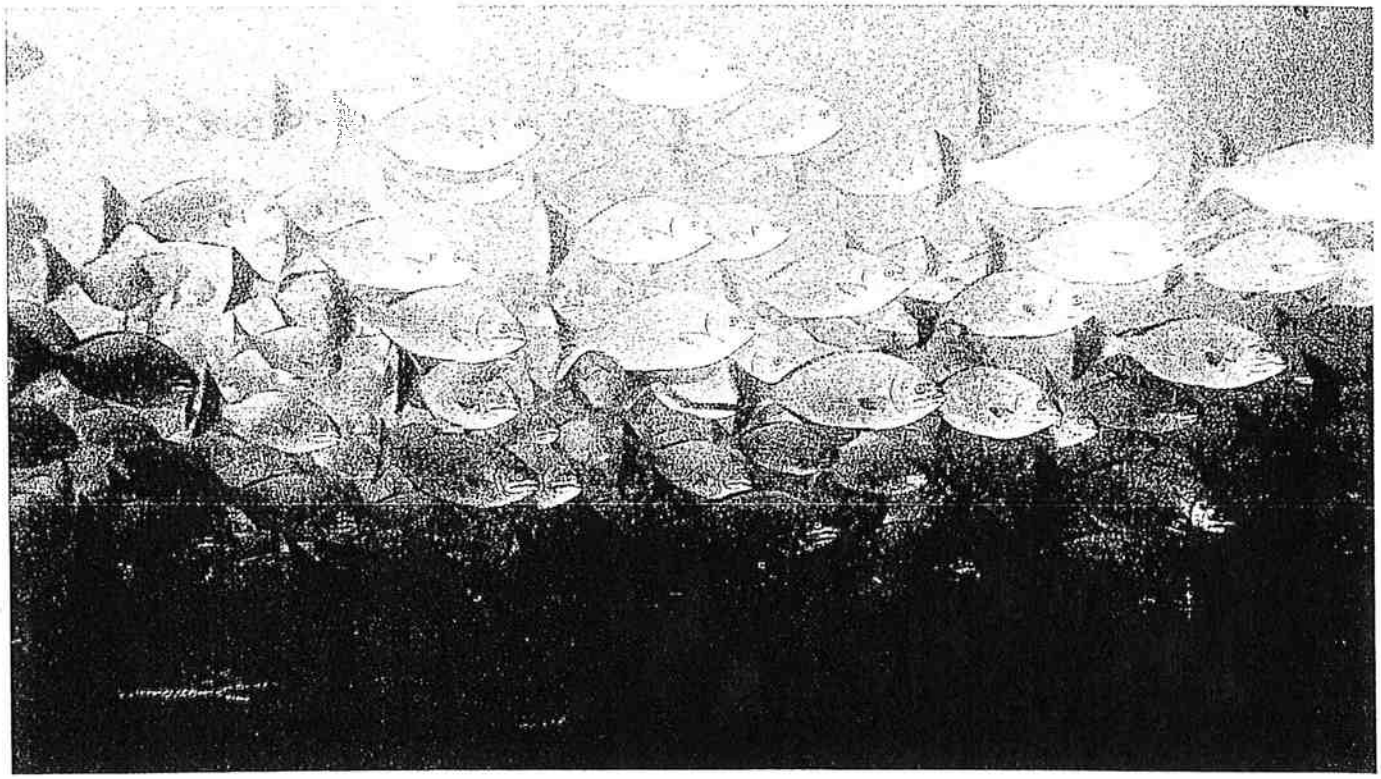
More than 80 per cent of winds blow between the south-west and south-east, almost half at over 17 knots. But on this trip the weather is calm; as our small 'tinny' sets out from one of Rat Island's many ramshackle wooden jetties, the sea is barely ruffled.

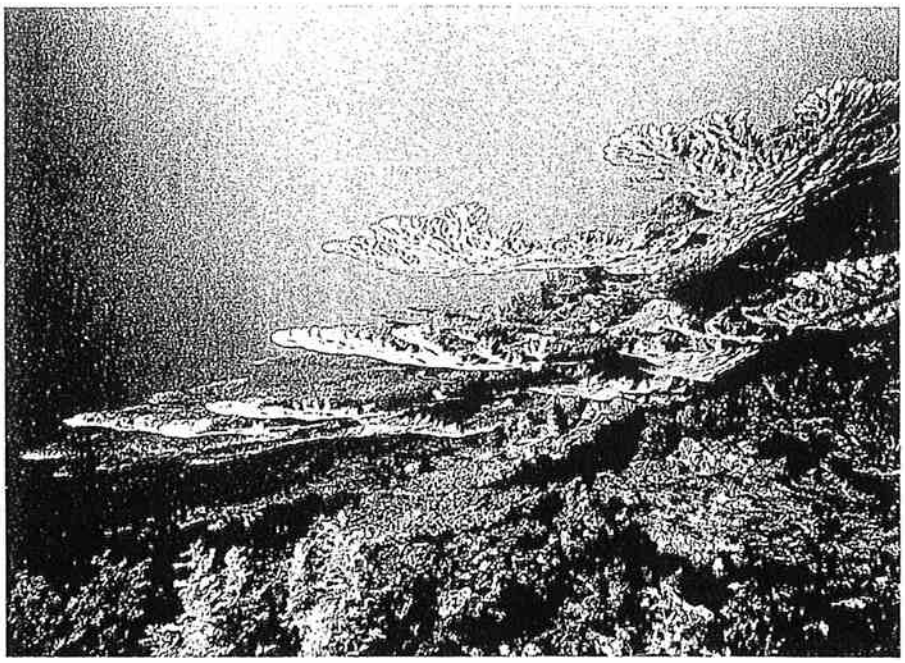
Passing the low stone jetty at the northern limit of the channel fringing the lee side of the island, we note a resident family of ospreys converting the roofs of empty huts into dining tables for their young with fish caught that morning. The ospreys are long-time island residents and co-exist well with the fishing

Western rock-lobsters clustered together in crevices of table corals.
Photo - Robert Garvey ▲

Large schools of herbivorous fish typical of the Abrolhos are rarely seen elsewhere in coral reefs.
Photo - Robert Garvey ▼

Opposite page: Corals.
Photo - Gerhardt Sauracker
Australian sea lion.
Photo - Jiri Lochman ◄





Well-developed plate corals at the top of a reef slope.
Photo - Gerhardt Saueracker / Lochman Transparencies ◄

Small coral cay. Its surrounding reef flat drops to a rich coral slope.
Photo - Robert Goodale ▼

community, which goes to great pains to ensure that the birds' nesting sites are not disturbed.

North of Rat Island, a small sand cay, barely substantial enough to include a central covering of low green plants, is the beginning of the White Banks area, which stretches north-west into an expanse of shallow patch-reefs known as Kakka Flats - a 'kakka' being the term given to a lobster below the legal minimum size.

It's the lush coral gardens on the eastern slopes of the reefs of White Banks that attract us. As a rule, the presence of macroalgae sounds the death knell for coral reefs. Both need adequate amounts of sunlight to survive, and normally corals, which are unable to compete with the tremendous growth rate of macroalgae, lose out. Extensive coral reefs usually occupy areas too nutrient-poor for algal growth.

In the Abrolhos, the macroalgal communities - largely dominated by fleshy kelps such as *Ecklonia radiata* - are best developed on the western slopes of the atolls. Oceanic swells and wind-driven currents drive the detritus, which algal beds shed constantly, into the coral-dominated lagoons where it provides the basis for a chain which is ultimately consumed by the rock-lobsters.

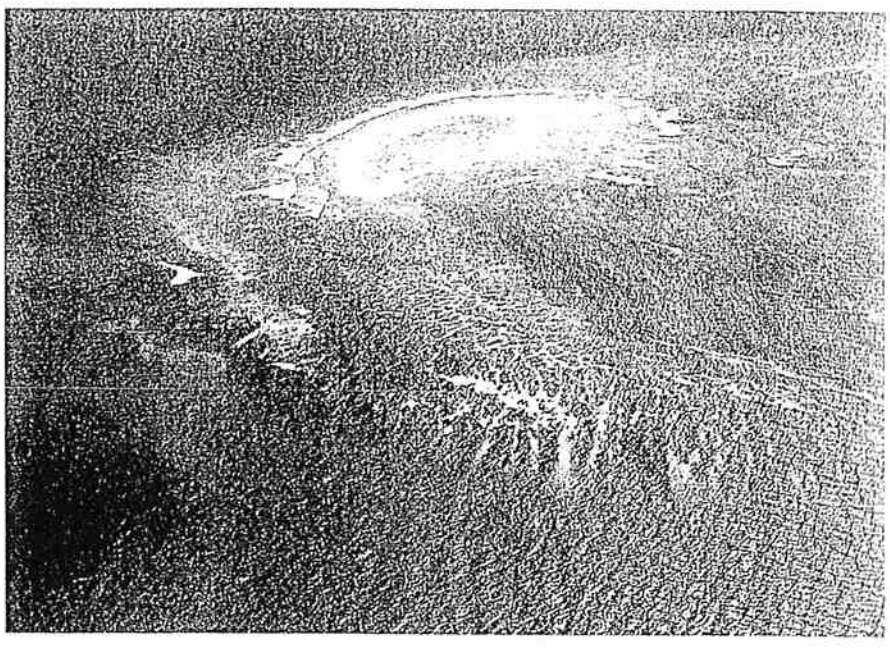
En route to our dive site, our attention is diverted by a number of dark shapes sprawled over the small rubble-strewn beach surrounding the cay - they turn out to be Australian sea lions (*Neophoca cinerea*), another temperate invader of these coral isles. John Mokrzycki, a photographer from *The West Australian*, is keen to get a closer look at the two bulls and two cows basking in the sun. Annoyingly for him, the tide is too low to allow the boat to approach close enough to the cay, and the fringing coral reefs are too fragile to support the passage of a cameraman with a very expensive land camera, so we abandon the attempt and continue to our dive site some hundreds of metres away.

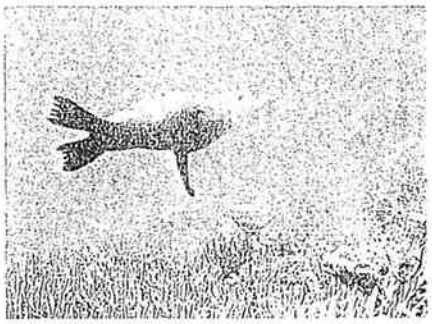
GETTING DOWN TO BUSINESS

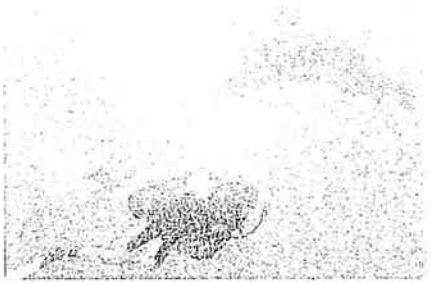
Coral reefs are renowned for their sudden steep 'drop-offs', and the Abrolhos are no exception. The greens, grey-browns and yellows of the staghorn and plate corals bounding the upper few metres of the White Banks reefs plunge steeply into a blue-green distance, where they finally reach a sandy floor at about 18 m depth.

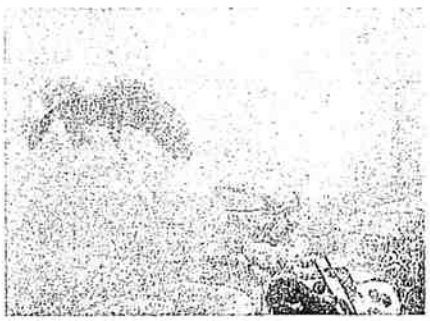
Kim Nardi, CALM's operations officer from Geraldton, and I lay out the 20 m tape measure we use to record the abundance and type of organisms which make up the reef's living cover, while Mokrzycki, partnered by work experience student Veronica Campagna, floats around us taking photographs.

Within minutes, my world has narrowed to a blue-tinged sphere about 50 cm in radius from my diving mask. As I record the changes in reef cover onto a slate of waterproof paper and listen to the rhythmic sounds of my air regulator, the office where these notations will be









An inquisitive seal circles the diver and comes in to take a nip at his flippers.
Photos - James Stoddart ▲

Though the species is occasionally seen at Shark Bay, the Australian sea lion is at the northernmost limit of its distribution in the Abrolhos Islands.
Photo - Eva Boogaard / Lochman Transparencies ▶▲

entered onto a computer and become part of an overall statistical picture seems remote.

After 15 minutes and about half-way along the tape, Mokrzycki brings me back to the real world with a tap on the head. It takes several seconds before I realise his gestures are not to set up a posed photo, but to make me look over my shoulder. It appears that while our attempt to observe the sea lions was unsuccessful, they have had no such difficulty in returning the interest - one is watching me intently while resting less than half a metre from my right shoulder.

Five metres down in the clear waters at the edge of the drop-off, the two sea lion cows circle us. They are curious about everything: the slates, the tape, the divers' fins, mouthpieces that release clouds of bubbles, and especially the cameras and their flashes.

After their initial curiosity begins to wane, the sea lions test their acrobatics, flying line-astern between divers, or coming to abrupt stops a centimetre or two from a diver's faceplate. Their graceful actions inspire mimicry, but mere humans cannot compare with these acrobats.

Finding us lacking in their manoeuvring ability, and rapidly losing interest in our equipment, the sea lions begin to invent games of their own. Worryingly, these games seem to involve a good deal of nipping behaviour from jaws which resemble those of a giant labrador; Australian sea lion cows weigh 80-90 kg, with bulls growing to more than 250 kg. Veronica's long floating hair is a favourite target, as are camera flashes.

As the games become more vigorous, I'm reminded of the damage to human flesh that sea lion mothers guarding calves on offshore islands further south can give, and decide to call an end to the games. On our retreat to shallower water where the top of the reef is exposed, one seal takes particular delight in worrying Kim's large fins. Veronica returns to the boat and the rest of us sit around the top of the reef with our cameras well out of the water.

Faced with such a sulky response, the sea lions soon lose interest in us and disappear to find more tractable companions. Left to our own devices, we resume our laborious passage along the tape with only an occasional sideways glance. But the sea lions do not return. We carry on, half-wishing they would, until we finish our minute recordings, retrieve the tape measure and return to our base at Rat Island.

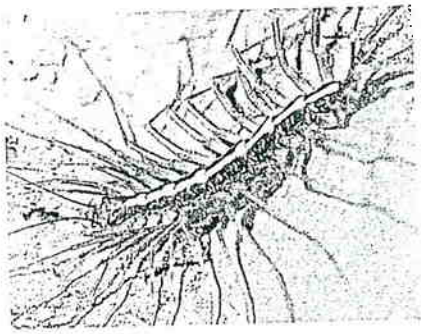
The data we have collected will provide a useful snapshot of the reef's state when incorporated into numerical models, but will retain little of the pleasure we had collecting it. ⊡

Dr James Stoddart, formerly with CALM's Research Division, is a senior ecologist with Kinhill Engineers. He can be contacted on (09) 362 5900.

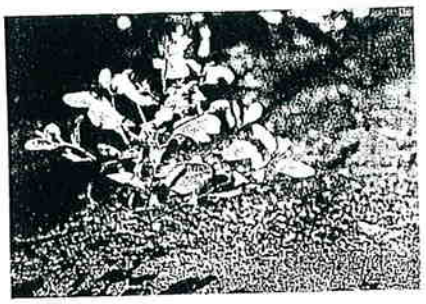
LANDSCOPE

VOLUME SIX NO. 3 - AUTUMN EDITION 1991

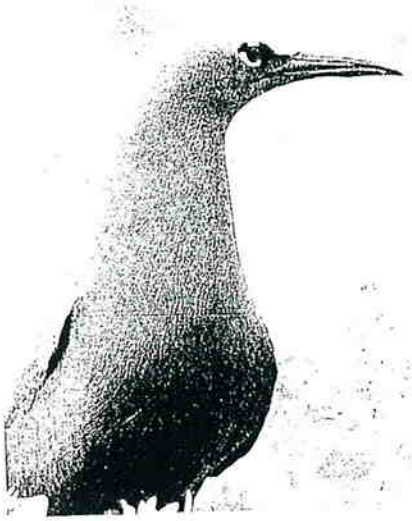
*Visitors from around Australia are discovering what those who live nearby already know - D'Entrecasteaux...*C'est Magnifique. *Turn to page 10.*



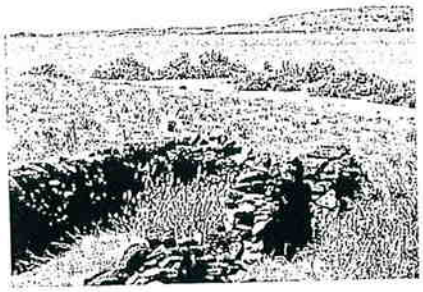
There's more to invertebrates than slugs, maggots and spiders. Turn to page 28 to find out just why invertebrates are so important.



What has happened to Fitzgerald River National Park since the 1989 wildfire? See page 34.



Seabirds nest on Pelsaert Island in the Houtman Abrolhos by the million. See page 17.



Explore the Dampier Archipelago, a group of rocky islands with a violent past and a wealth of wildlife. Turn to page 48.

FEATURES

REGULARS

COVER

Invertebrates play an important role in the ecosystem of WA's jarrah forest. Earthworms, termites and ants fragment leaf litter and mix organic matter. Some soil and litter invertebrates stimulate plant growth. Soil insects such as larval beetles feed on roots, stimulating the plants' growth rate. Our cover illustration is Philippa Nikulinsky's impression of this process at work in the jarrah forest.

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Australian Policy on Whales

Whales have been hunted for over a thousand years. Early hunting methods were primitive. With the development of harpoon guns, explosive harpoons and steam-driven whaling boats, large-scale commercial whaling caused stocks of several species to decline.

Whaling was the first major primary industry of Australia. Numerous coastal whaling stations were established. As whale numbers diminished, legislation was enacted to protect the endangered species. Until their protection in 1935, more than 15,000 southern right whales were taken off Australia; some 40,000 humpback whales were taken before their worldwide protection in 1965. Sperm whales were heavily exploited during the 19th century, and between 1952 and 1978 some 16,000 were taken off Australia.

The slow moving southern right whale, which was reduced to near extinction by the mid nineteenth century, is now showing signs of recovery. In recent years some have appeared off the southern Australian coast where they rear their calves before heading south to the nutrient rich Antarctic waters.

Commercial whaling in Australia ceased in 1978 when the Cheynes Beach Whaling Company in Western Australia closed down.

Following a detailed inquiry into whales and whaling chaired by Sir Sydney Frost, the Australian Parliament passed the Whale Protection Act (1980) which prohibits people from killing, capturing, injuring or interfering with whales, dolphins and porpoises in Australian waters. This also prohibits such actions by Australians anywhere in the world.

The Australian Government banned the importation of all whale products and goods containing whale products from January 1981.

Whale Strandings

Many whales have stranded on Australian beaches, either singly or in groups. Strandings are not fully understood, but contributing factors can include sickness, confusing echo location signals or a desire to stay with sick members of the pod.

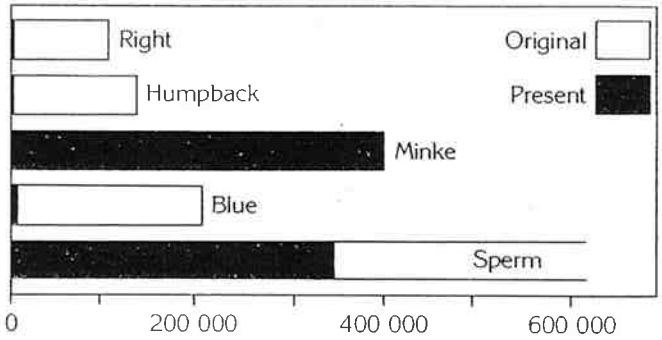
Following extensive consultation with government and non-government bodies, the Australian National Parks and Wildlife Service has published a national contingency plan for cetacean strandings which sets out basic objectives and guidelines for whale rescue.

International Policy on Whales

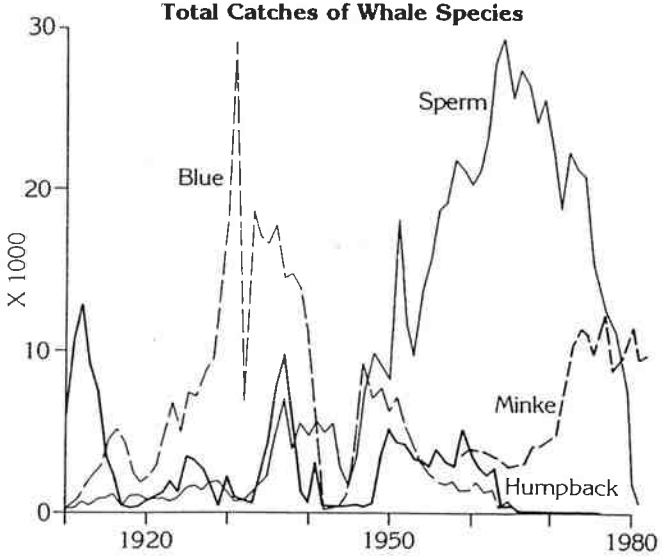
The International Whaling Commission (IWC) was established under the 1946 International Convention for the Regulation of Whaling 'to provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry'.

At the IWC Australia has co-operated with other nations and non-government organisations in promoting a moratorium on all commercial whaling after 1985. All members of the IWC have agreed to abide by the IWC decision.

Southern Hemisphere Whale Population Estimates



Total Catches of Whale Species



Further Reading:

Project Jonah Education Kit. From Project Jonah Inc., 39 George St, Sydney. NSW 2000

A Sea Guide to Marine mammals by Richard Ellis. American Cetacean Society. 1982.

Sea Guide to Whales of the World by Lyall Watson. Hutchinson Press. 1982.

Whales and Whaling. Report of the Independent Inquiry conducted by the Hon. Sir Sydney Frost. AGPS. 1978.

Whales and Dolphins of New Zealand and Australia by Alan N. Baker. Victoria University Press. 1983.

Whales and Whale-Watching in Australia by Mark Tucker. Australian National Parks and Wildlife Service. 1989.

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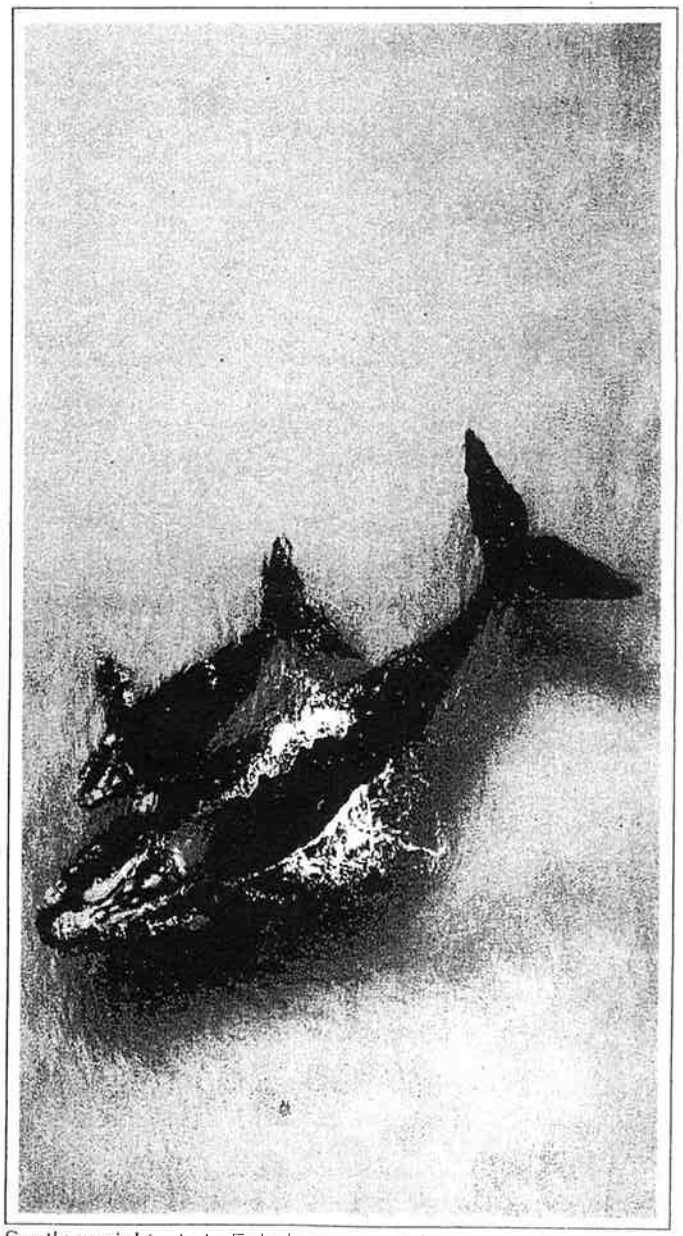
WHALES
IN AUSTRALIAN WATERS

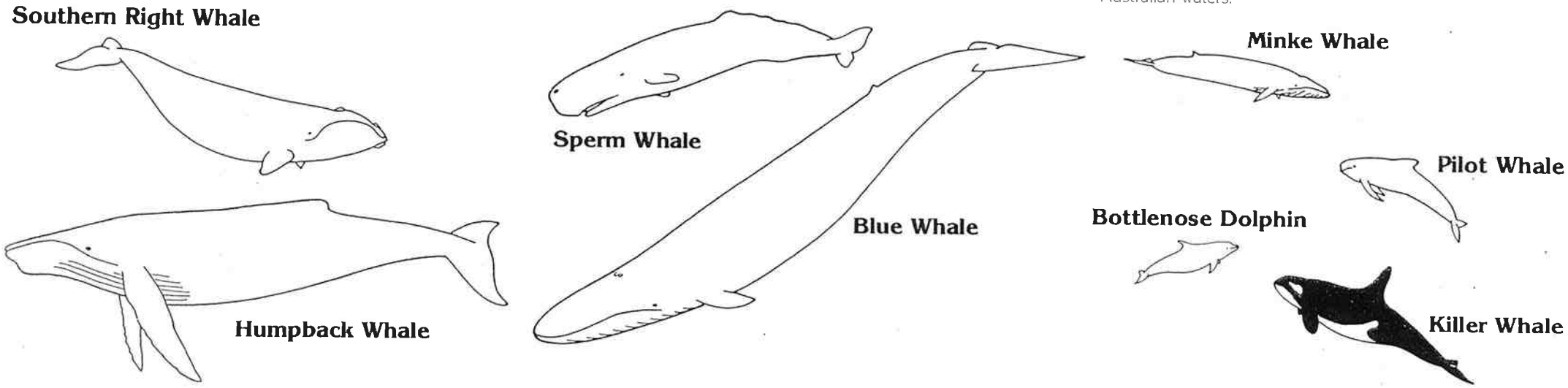


Southern right whale *Eubalaena australis*
Photo: Durant Hembree

Cetaceans (whales, porpoises and dolphins) are warm blooded, air breathing marine mammals which give birth to live young. About eighty species of Cetacea exist today, from relatively small porpoises to giant blue whales 30m long. They are found in all the world's oceans.

Cetacea are all carnivorous. Filter feeders (Mysticeti) filter plankton through plates of baleen hanging from the mouth roof. They may gulp at their food and squeeze the water out, or swim with open mouths until enough food accumulates on the baleen. Most baleen whales have throat grooves which expand when feeding. Toothed whales (Odontoceti) generally feed on fish and squid and catch their food in various ways. The killer whale is the only true flesh eater, feeding on penguins, seals, sea lions and other cetaceans as well as fish and squid.

About 40 species of cetaceans live in or migrate through Australian waters.



The following are some of the species which may be seen in Australian waters:

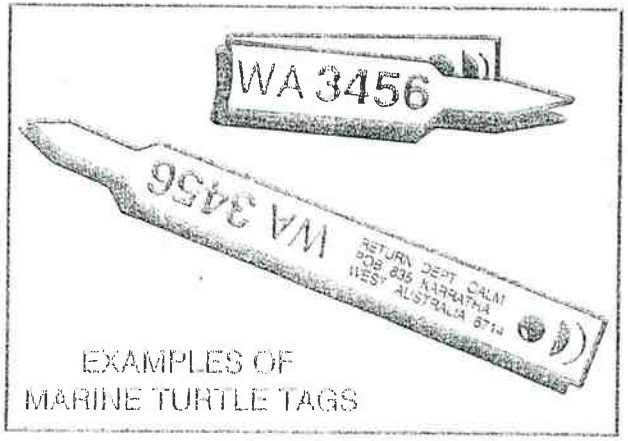
Name	Distinguishing Features	Max. Length and Weight	Main Diet	Additional Information
Southern Right Whale *Eubalaena australis*	Wartlike collosites on the head. Broad back. No dorsal fin.	18m 96t	Krill	Called the right whale because it swam slowly, floated when dead and produced a large quantity of oil.
Humpback Whale *Megaptera novaeangliae*	Long flippers and lumpy dorsal fin.	16m 48t	Krill	Famous for their singing and acrobatics. Protected since 1965.
Sperm Whale *Physeter macrocephalus*	Long blunt head and single blow hole.	20m 38t	Squid	Largest brain of any creature (10kg). Dives to over 1 km and can stay down for 90 minutes.
Blue Whale *Balaenoptera musculus*	Short flippers and long streamlined body.	30m 178t	Krill	Largest creature to ever live. Populations were drastically reduced by whaling. Present stocks may be less than 10,000.
Minke Whale *Balaenoptera acutorostrata*	Flat head. Fin appears simultaneously with blow.	10m 9t	Krill	The smallest rorqual (whale with throat grooves). Migrates to Antarctic waters in summer to feed.
Long-finned Pilot Whale *Globicephala melaena*	Strongly curved, long based fin. Broad round forehead. Grey saddle patch.	8m 4t	Squid	Distinct populations exist in both hemispheres. Can produce an amazing variety of sounds.
Bottlenose Dolphin *Tursiops truncatus*	Tall curved dorsal fin. Short, easily distinguished beak.	4m 0.4t	Fish	Found in all warm and temperate oceans, usually within 800km of land.
Killer Whale *Orcinus orca*	Tall erect fin in the male. Striking black and white markings.	10m 7t	Fish, Squid, Penguins, Seals, Dolphins	Widely distributed. Enormous appetites (about 50kg a day). Travel in social units (pods) of 2-40.

Marine Turtle Tagging

A long term study of marine turtles nesting on the north and north-west coasts of Western Australia is now underway.

The Department of Conservation and Land Management are tagging adult turtles using titanium metal tags attached to the trailing edge of one or both of the turtles fore-flippers.

Tags will be similar to those used previously in other parts of Australia, but will be identified by a sequence of numbers prefixed by the letters "WA" followed by four or more numbers, e.g. WA 3456. The reverse of the tag will carry the return address.



EXAMPLES OF
MARINE TURTLE TAGS

Should you come across one of our tagged turtles, please record the number on the tag(s), along with the information such as date, time, place and circumstances and forward to the above address. If the turtle is alive please leave the tag(s) on when you release it.Tags can be removed from dead turtles and forwarded with your information.If you find turtles carrying different tags, it would be appreciated by that tagging agency if a similar reporting procedure is followed. CALM would also appreciate advice of your find.

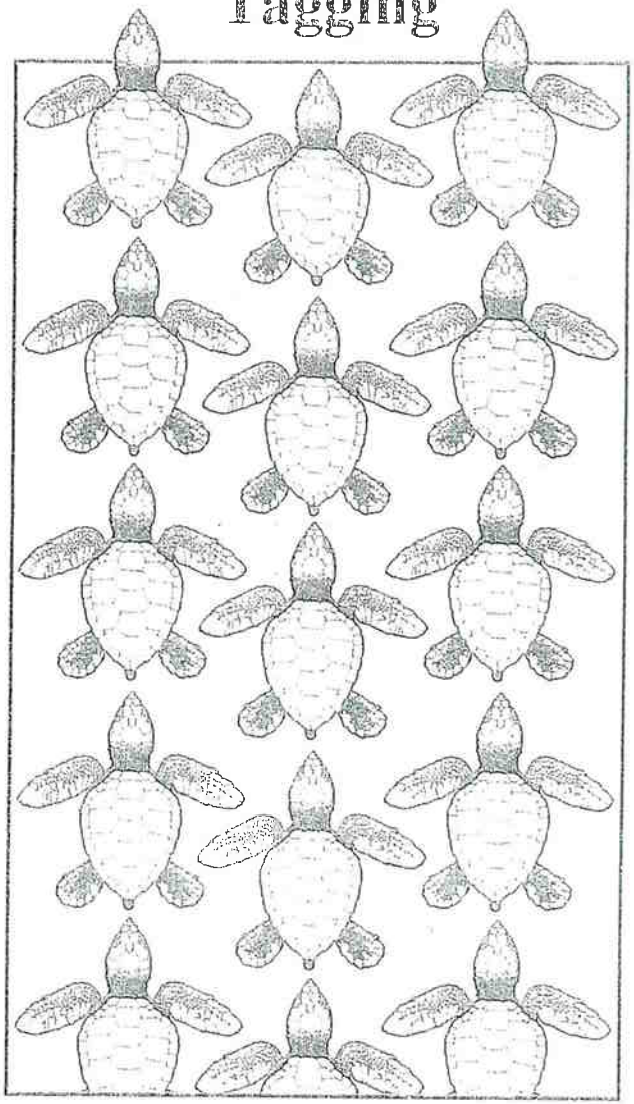
If you require further details,you could send photographs similar to the diagrams in the Marine Turtle Guide to one of the addresses below or telephone the Karratha Regional Office on (091) 86 8288, or the Woodvale Wildlife Research Centre on (09) 405 5100.

The Department of Conservation and Land Management greatly appreciates your interest, help and co-operation in the project.

Department of Conservation and Land Management

PILBARA REGIONAL OFFICE
SGIO Building,Welcome Road
KARRATHA 6714
P.O. Box 835
Telephone (091) 86 8288

Marine Turtle Identification & Tagging



Department of Conservation & Land Management

Marine Turtle Identification

The four species of marine turtles most commonly found in the waters off the north-west coast of Western Australia are the Green (Chelonia mydas), Flatback (Chelonia depressa), Loggerhead (Caretta caretta) and Hawksbill (Eretmochelys imbricata).

These turtles can be identified by the shape and markings on the shell (or carapace) and by markings on the head.

They can also be identified by the tracks the adult female makes on the beach when she comes ashore to lay her eggs.