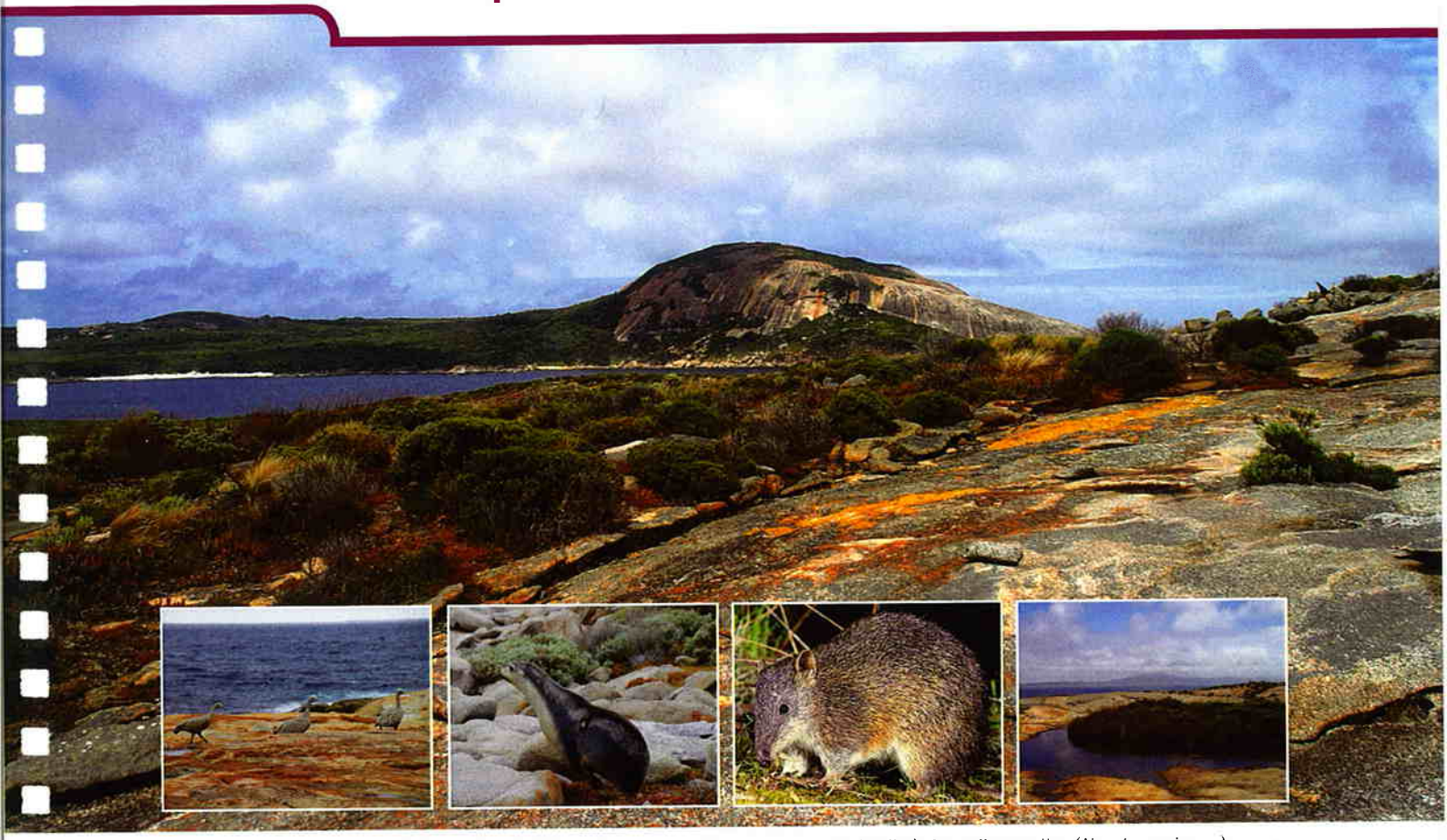
LANDSCOPE EXPEDITIONS
Working at the Frontier of Discovery

Expedition **Briefing**



(Main) Flinders Peak on Middle Island. (Insets from left) Cape Barren geese (*Cereopsis novaehollandiae*); Australian sea lion (*Neophoca cinerea*); quenda (*Isoodon obesulus*); view from the summit of Flinders Peak (photos – DEC).

Researching the Recherche

Wildlife of Southern Ocean Islands

20–27 October 2008

Leaders:

Sarah Comer	Regional Ecologist, DEC South Coast Region, Albany
Julie Patten	District Nature Conservation Coordinator, DEC South Coast Region, Esperance
Peter Collins	Fauna Conservation Officer, DEC South Coast Region, Albany
Emma Adams	Conservation Officer, Flora, DEC South Coast Region, Esperance

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. LANDSCOPE Expeditions are run in association with UWA Extension, The University of Western Australia.

LANDSCOPE Expeditions - Working at the Frontier of Discovery

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Department of Environment and Conservation
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UWA EXTENSION
THE UNIVERSITY OF WESTERN AUSTRALIA

Researching the Recherché - Wildlife of Southern Ocean Islands

20 – 27 October 2008

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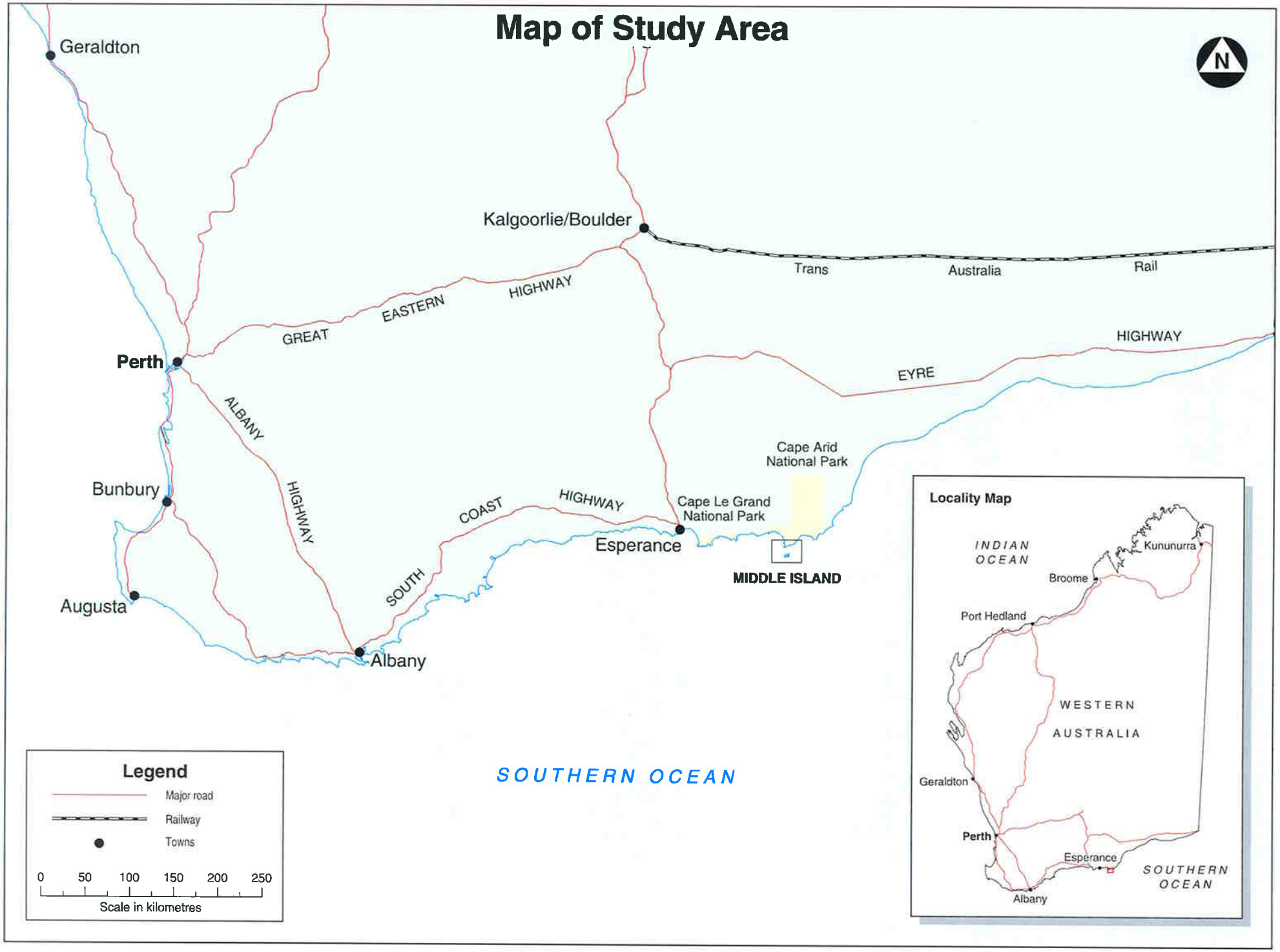
RESEARCH PROJECT

Map of Study Area




Middle Island
Mainland
N
Cape Arid
Gulch Island
Wickham Island
Goose Island
Glennie Island
Lake Hillier
Middle Island
SOUTHERN OCEAN
0 1 2 4 6 8 10
Scale in kilometres

RESEARCH LOCATION

The Recherché Archipelago Nature Reserve is made up of over 100 islands and 1200 'obstacles to shipping' (comprising of reefs, islets and rocks) totaling over 7000 ha of land area and stretching 230 km from east to west and up to 50 km offshore. The islands of the Archipelago represent the high points of the Albany-Fraser Oregon, the characteristic granite geology which dominates the southern coastline, and is now flooded by the ocean. Middle Island is situated approximately 130 km east of Esperance and 9 km south of Cape Arid National Park, the nearest mainland. Middle Island (1080 ha) is the largest island in the Recherché Archipelago.

Middle Island slopes down from high cliffs on the south coast to a long beach and low granite coastline to the north. The western end is dominated by Flinders Peak, a large granite hill 174 m high. Behind the beach is Lake Hillier, a shallow saline lake about 1 km across and very pink in colour. Salt was mined from this lake years ago and train tracks are still visible. The island is covered with forest on the granite and sandy interior slopes with very dense scrub growth on the limestone tracts. Eucalypts are the most prolific tree on the Island with large areas occupied by melaleuca woodland. The island had almost recovered from an uncontrolled wildfire lasting from Jan 10th to Feb 7th 1977 but was recently burnt by a fire in November 2006.

Middle Island is rich with fauna, with possibly the most well-known resident being the Tammar wallaby which resides in the vegetated sections of the island. A diverse suite of reptiles have been recorded on the island with the crown snake being the only snake found. Over 38 species of birds have been positively identified as resident, with breeding colonies of great-winged petrels and little penguins found on the island.

A rough track (marked with surveyors tape) leads to the top of Flinders Peak. You need to be reasonably fit and adventurous to attempt this climb. On the summit there is a cairn of rocks, the builder unknown. Many climbers who reach this peak have recorded their name and date in a register found near the cairn. From the summit there is a breathtakingly spectacular panoramic view of the island, Cape Arid and the islands to the south. The northern bays of the island provide safe anchorage and good swimming beaches. The wreck of the vessel *55 Penguin* is visible from the beach.

Historical sights found on the island indicate both indigenous and European settlement. Aboriginal activity on the island is believed to predate the current stabilisation of sea levels some 11 000 - 9 000 years ago, when the islands of the Recherché became isolated from the mainland. European history in the Recherché is reasonably well documented from the 1820's when the Afriacn American sealer, John 'Black Jack' Anderson, based himself and his band of sealers on Middle Island. A granite fireplace with a baker's oven is located south from an old hut in a direct line with Lake Hillier, which may be the remains of the Anderson settlement.

Metallic remains of horse drawn rail wagons and old lightweight rails from more recent salt mining are located on the western end of Lake Hillier. These were probably used to transport salt to the beach. About 300 m east of the fishing hut and behind the coastal dunes is a rock well 6 m deep as well as several granite fireplaces. The water from the well

is saline. There is evidence of man made water catchments on the granite outcrop south of the fishing shack made to divert and catch rain water.

Matthew Flinders and botanist Robert Brown visited Middle Island in January 1802 to collect flora material during his voyage through the Recherché Archipelago. The island boasts 232 flora species. As there are only 373 species recorded for all the islands in the Recherché Archipelago, the botanical importance of Middle Island is obvious.

Goose Island, adjacent to Middle Island and accessible by dinghy, is a major breading ground for muttonbirds. The area is inundated with burrows so tread carefully if visiting this island. Black rabbits and some crown snakes also reside on this island. Most vegetation is low but quite dense. A cairn similar to the one on Middle Island is located on a high point on the northwestern end of this island.

THE PROJECT

Middle Island has only been surveyed to a limited extent and there is still much information to be obtained regarding flora and fauna and their response to fire. Wildfires tend to occur infrequently on the islands, but when they do, they often burn much of the affected island. Fires are difficult to combat due to the remoteness and inaccessible nature of the islands. In 1972 and 1977 wildfires burnt much of Middle Island, and again in 1984 and 2005. The opportunity to document the response of vegetation following the 1970's fires was taken by researchers, with post-fire plots established in several different vegetation communities on the Island. On this expedition these plots will be revisited some 30 years since their original scoring.

Standardised monitoring of vertebrate fauna will be conducted in both burnt and unburnt vegetation on Middle Island and nearby Goose Island. Grids of Elliott and pit traps will be set through different vegetation types in several areas to detect small mammals as well as reptiles and frogs. The pit traps are also likely to provide evidence of many ground dwelling invertebrates such as various bugs and spiders. Opportunistic surveys will aim at collecting data on invertebrates living in vegetation, under bark, and other such sites. In particular we will target those invertebrates known as short range endemics, including millipedes, land snails, mygalomorph spiders and pseudoscorpions. Hair arches will be used on nearby islands to collect hairs from as yet unidentified species of rats. Dedicated bird surveys will add to the known list of birds in the area. Sea bird nesting observations and burrow observations will also be recorded.

The specific aims of the project are:

- Undertake live trapping (Elliott and pit traps) to determine the fauna species present in the area (mammals, reptiles, frogs and invertebrates)
- Conduct opportunistic surveys to gather further information on invertebrates
- Record sea and terrestrial bird observations
- Carry out botanical surveys to draw conclusions on ecosystem recovery after fire
- Collect baseline flora, fauna and invertebrate data on the poorly surveyed Goose Island

VOLUNTEER ASSIGNMENTS

Conservation Volunteers

Being a volunteer allows you to discover first hand what the Department is doing. You will be part of a force of 4000 people involved in a wide range of activities that include tree planting, trail building, interpretation and assisting with scientific projects. If you wish to be involved with future DEC Volunteer projects, please contact DEC's Community Involvement Coordinator, Margaret Buckland, on (08) 9334 0251 on your return. The Department relies very much on its volunteer work force. In 2006/2007 volunteers supplied 497 000 hours of effort. Volunteer assistance with remote area work, such as this expedition plans to carry out, is especially helpful. *LANDSCOPE* volunteers will be primarily engaged in fieldwork on Middle and Goose Island however, you will also assist with general tasks around camp. There will be some free time each day for people to follow personal interests such as painting or photography. There will be abundant photo opportunities throughout the day.

Field Tasks

Volunteers will assist with the following research activities in the field:

- Daily checking of pit and Elliott traps for small mammals, reptiles, amphibians and invertebrates.
- Identification and measurement of captured animals.
- Scoring flora plots.
- Opportunistic search/collection of invertebrates.
- Daily bird surveys.
- Identification and collection of plant specimens.
- Collecting information on seabird burrows and nests

Base Camp Tasks

- Assist in compilation of data at the end of the day.
- Confirm identification of small vertebrates.
- Plant identification.
- Summarise trapping data sheets.
- Write up notes.

Base Camp Maintenance

- Assist with general camp maintenance.
- Assist with meal preparation and clean up.

FIELD TRAINING

Upon arrival at the campsite an orientation will be held outlining the site, expedition schedule, daily timetables, camp procedures and safety protocols.

Further information sessions will cover the project and research objectives. Trapping techniques and the specific skills to identify animals and record data will be discussed and demonstrated by leaders prior to volunteers undertaking these tasks ensuring that you are well versed in the procedures required for this type of research.

APPLICATION OF RESULTS

Due to the remoteness of these islands no comprehensive survey has been undertaken. Therefore we still have much information to obtain on both flora and fauna, and the response of organisms and ecosystems to wildfire (refer to the fire in the arc articles). All findings will be reported to operational and planning staff in the local region so that this data can be incorporated into management plans for the islands.

Comparisons made between the baseline data collected in the 1970's and 2007/2008 will allow information on the ecosystem response to fire to be determined and will assist with developing fire management strategies for Middle Island.

EXPEDITION LEADERS

The leaders of this expedition have extensive experience in ecological research and management of natural ecosystems.

Sarah Comer has been working as an Ecologist in DEC's South Coast Region for the past nine years. Sarah's work is focused on threatened species recovery programs on the south coast. She is responsible for coordinating the noisy scrubbird recovery and other threatened bird recovery actions on the south coast including the western ground parrot and western bristlebird. Sarah also works on recovery programs for threatened flora, threatened ecological communities and threatened and relictual invertebrates. Sarah has a strong interest in fire ecology and is currently working on the development of fire management strategies for biodiversity conservation in reserves of the south coast.

Julie Patten is the District Nature Conservation Coordinator for the Esperance District. Julie started in Esperance in April 2007 after being seconded from the Goldfields region. Her role involves the coordination of the Esperance Nature Conservation outputs including fauna surveys, land planning issues, clearing, flora surveys, fire and catchments. Julie has a Bachelor of Environmental Science from Murdoch University, and has carried out numerous roles within the Department over the course of her career including Reserves Officer, Project Coordinator (Mining) and Threatened Flora Project Officer. Julie has a strong interest in flora and fauna and has a particular interest in fire ecology.

Emma Adams has been working with DEC for the past four years. She is currently working as the Esperance District's Conservation Officer (Flora) where she is responsible for planning and implementing recovery programs for rare and threatened flora in the district. Emma recently graduated from DEC's two-year Graduate Recruit Program which saw her spend one year working in the Esperance District as a firefighter, and the second year as a Reserves Officer in Shark Bay. Emma has also had the opportunity to work in Purnululu National Park, out of DEC's Kununurra office, and at Perth's Swan Region as a Conservation Officer.

Peter Collins is a Fauna Conservation Officer based at DEC's office in Albany. Peter has worked in fauna conservation in the South Coast Region for many years and has a strong interest in marine fauna. He is a skilled boat handler and operates DEC's vessel *Breaksea* while taking part in research visits to Bald and Breaksea islands in the Albany area. Peter

has considerable skill, knowledge and experience of marine and island surveys on the South Coast.

Mark Harvey has been working at the Western Australian Museum since 1989, where he is Senior Curator of Arachnology and Head of the Department of Terrestrial Zoology. Mark is passionate about invertebrate animals and their conservation. He is a world authority on many different arachnids groups and publishes regularly on their taxonomy and systematic relationships. His major contribution has been to develop and promote the concept of short-range endemism within the Australian biota, which has revolutionized how major resource development projects undertake biological survey prior to development activities.

Deon Utber has been working on the South Coast since 2006 as the South Coast Natural Resource Management (NRM) Inc. Biodiversity Facilitator and recently began acting as the Regional Leader for Nature Conservation for the Department of Environment and Conservation. Having started in the department in 2002 focusing on biodiversity and NRM, Deon has work with community group and environmental scientists and managers across the state on biodiversity strategic planning and implementation. This has included the northern sandplains and wheatbelt areas as well as rangelands conservation. On the south coast Deon has developed and coordinated programs for biodiversity inventory, planning, restoration and revegetation.

EXPEDITION DIARY AND REUNION

An exercise book will be provided for volunteers to take turns recording each day's events. Anything goes! Each person takes a turn. This will be transcribed and a copy distributed to each expedition member as a memento of the trip. Please include highlights of each day, interesting data, and anything of interest to you. Much information can be gleaned at 'Show and Tell' and 'Meet the Scientist' each evening when the leaders summarise the day's activities and plan for the following day. So, if you have the diary for the day, take it to 'Show and Tell' and record the day's events. A copy of the expedition diary will be provided soon after the conclusion of the expedition.

A reunion for all 2008 expeditions will be held in November 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 are to make their own way to Esperance on **Monday 20th October 2008**. Accommodation has been arranged at the Bayview Motel, 31 Dempster Street. A pre expedition dinner at 1830 hrs will be held this evening at a local restaurant where you will meet the expedition leaders and have a trip briefing. You will also receive garbage bags to put your personal gear in for the crossing. Volunteers and all personal gear will be picked up from the Bay View Motel at **0600 hours on Tuesday 21st October 2008.** You will then be transported to either Duke of Orleans Bay (approx 60 Minutes drive) or Poison Creek where you will board the charter vessel which will take you on the journey through the Recherché Archipelago to Middle Island. The journey from Poison Creek is approximately 90 minutes shorter than the voyage from Duke of Orleans Bay. Morning tea will be served on the boat. There is room on the boat for people to move around and get to know their fellow travellers along the way.

Once we reach Middle Island all volunteers and gear will be transported onto the island via the dingy. This will take some time so please be patient and assist.

The boat will stay just offshore, providing shower and toilet facilities (a pit toilet will be set up on the island) as well as for transporting expedition members to Goose Island.

If you are delayed on the afternoon of the rendezvous or prior to the pre-expedition dinner for any reason, please phone Julie Patten on 0429 201 218.

ITINERARY

Day 1	**Mon**	**20 Oct**	**Esperance**
		1700	Expeditioners meet at Bayview Motel
		1830	Expedition Briefing at local Restaurant - Introductory talk on the project and volunteers will be allocated to work groups. Leaders will outline tasks for the next day, and the whole trip.
		1900	Expedition dinner
Day 2	**Tue**	**21 Oct**	**Esperance to Middle Island**
		0600	Depart Esperance and travel to Duke of Orleans Bay or Poison Creek
		0730	Board charter vessel (1100 for those meeting the boat at Poison Creek) Establish base camp on Middle Island On Tuesday afternoon the group will open pit traps, cage and Elliott traps for live trapping of vertebrates
Day 3	**Wed**	**22 Oct**	**Middle Island – Fieldwork**
		0630	Breakfast
		0730	Check traps- score vegetation plots – establish hair arches
		1200	Return to camp for lunch
		1300	Afternoon trek to Black Jack's Cave or time for painting/swimming

		1730	Return to camp, showers (rotate groups)
		1830	Dinner
Day 4	**Thu**	**23 Oct**	**Middle Island - Fieldwork**
		0630	Breakfast
		0730	Check traps- score vegetation plots
		1201	Return to camp for lunch
		1300	Afternoon trip to Wickham Island to conduct seal and Cape Barren goose counts
		1730	Return to camp, showers (rotate groups)
		1830	Dinner
Day 5	**Fri**	**24 Oct**	**Middle Island – Fieldwork**
		0630	Breakfast
		0730	Check traps- score vegetation plots
		1200	Return to camp for lunch
		1300	Afternoon walk up Flinders Peak, or free time
		1730	Return to camp, showers (rotate groups)
		1830	Dinner
Day 6	**Sat**	**25 Oct**	**Middle Island – Fieldwork**
		0630	Breakfast
		0730	Check and close traps- score vegetation plots
		1200	Return to camp for lunch
		1300	Afternoon trip to Glennie Island and Douglas Island for seal counts, or free time for painting/swimming
		1730	Return to camp, showers (rotate groups)
		1830	Dinner
Day 7	**Sun**	**26 Oct**	**Middle Island –Esperance**
		0630	Breakfast
		0730	Pack up camp
		1000	Depart Middle Island and return to Duke of Orleans Bay
			Settle into accommodation
			Informal dinner together
Day 8	**Mon**	**27 Oct**	**Esperance**
			Breakfast and end of expedition

This itinerary is provisional and may be varied at the discretion of the expedition leaders & weather conditions.

DAILY SCHEDULE

Research activities are listed under Volunteer Assignments. Expedition members will be placed into small groups to carry out the various research tasks required each day. During the expedition groups will be rotated between tasks so that everyone gets a chance to experience the range of activities.

0700 hours	Breakfast.
0730 hours	Begin day's activities (as per Itinerary above).
1200 hours	Lunch.
1700 hours	End of daylight activities. Clean up and preparation of evening meal. A small group will be transported to the Firepower Vessel for hot showers.
1730 – 1830 hours	'Show and Tell', briefing on next days activities, 'Meet the Scientist'
1830 hours	Dinner
1930-2030 hours	Evening Activities (Spotlighting, Lectures, Information Sessions)

There will be some free time each day for people to follow personal interests. There will also be plenty of photo opportunities throughout the day.

TEAM DEVELOPMENT

Team spirit will initially be built by travelling together on the boat trip to Middle Island. Having meals together, sharing in preparation and clean-up, working and living together, and being involved with this exciting project will enhance team spirit.

ACCOMMODATION AND LOGISTICS

We will be camping on Middle Island. Facilities will be **basic**. You will be provided with dome tents, and swags with mattresses. **Volunteers will need to provide their own sleeping bags, sleeping bag liners and pillows.**

We will have a field kitchen set up and an enclosed eating / social area. A pit toilet will be provided at the site. Our charter vessel will be moored just offshore and showers will be aboard the boat. **(Please note showers will not be available to each participant each day – every second or third day only)**

Volunteers should have four items of luggage – your *LANDSCOPE* Expeditions duffel bag, sleeping bag (lightweight, compact but warm), daypack, and pillow. Bag labels are provided, however, as all the bags look the same, you may wish to mark your bag with a coloured ribbon, or something else that helps you spot your bag quickly. You should also bring a large plastic heavy duty garden bag with ties to protect your bag from getting wet when unloading onto the island. If you have dry bags for your gear you may want to take these (especially for cameras etc).

A small generator and power packs will be supplied at base camp so you can charge up digital camera batteries.

FOOD AND DRINKS

Food will be provided, and participants and organisers will share in the preparation of meals each day on a rotation basis. Please advise Cheryl Tonts immediately if you have special dietary needs (work 08 9334 0319 or email: cheryl.tonts@dec.wa.gov.au).

After we leave Esperance there will be no opportunity for you to restock your personal supplies, so we recommend you bring all you need with you at the start of the trip. There are a number of bottle shops in Esperance for that "something extra" to enjoy with your evening meal. Cask or canned beverages are preferred. You may also wish to bring a small stash of lollies, snacks or "trail mix" to your liking. The expedition will supply some cask wine.

PHYSICAL CONDITION

The expedition will not demand an elite level of fitness. However, some level of physical fitness is required to service the traps each day and for those expeditioners who wish to climb Flinders Peak. Some flexibility is required for getting into and out of dinghy's. Landing on Middle, Goose and Wickham Islands is via sandy beaches, whereas Glennie, Gulch and other small islands nearby will require participants to negotiate granite rocks. You should be prepared to cope with warm days and cool to cold nights. The weather can change very quickly and participants should be prepared for a range of climatic conditions. **Adequate wet weather gear and windproof clothing is essential.** There will be as much walking, exploring and searching as you want, so ensure that you have comfortable, solid boots. Reef shoes or boots are recommended for landing on grantie islands. 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

Climate: At this time of year temperatures and conditions can vary quite dramatically even on the same day. Average daytime temperatures are 21°C, although temperatures can vary significantly either way. Night time temperatures average around 10°C, but can be much colder. Strong winds are common for this area at all times of the year and can increase the "wind chill" factor. The average rainfall in October is 47mm.

Terrain: Walking through bush and over rocks will be an essential part of the work. To reach some of the scenic vantage points, participants will need to walk reasonably long uphill sections. The more arduous trails will be optional.

ISLAND HYGIENE PROTOCOL

The islands of the Recherché Archipelago are sensitive ecosystems that have had relatively little impact from introduced species, for example *Phytophthora* (Dieback). It is vital that there is no contamination from outside sources which could have an impact upon the relatively pristine environments of the islands. When packing equipment, please be careful to ensure that your equipment is not carrying any dirt, dust, seed or any other material that may harbour species that do not occur in the area. Pay particular attention to shoes and boots, clothing, camera bags, backpacks and other items that may have been used in other areas. For more information please refer to Appendix 4 'Conserving Western Australia's Islands.'

SAFETY AND HEALTH

Your safety, health and comfort are of paramount importance at all times.

Sunburn: This is possibly the greatest medical problem that may arise. You must guard against it. Loose-fitting, long-sleeved shirts, full-brimmed hats, sunglasses, sunscreen

lotion and lip-block are all essential. Protect yourself against sunburn and windburn on land and at sea. Wear your hats in the field, as you will be out in the open a lot.

Dehydration: This can be a significant issue in the field. To guard against dehydration, it is vital to always carry an adequate supply of drinking water with you in your daypack. Drinking water will be available at camp, and you must fill your bottle regularly. Remember to drink plenty of water during the day.

Exposure: There is the possibility of bad weather occurring at any time on the south coast. Combined wind and rain can be a dangerous mix for the unprepared. It is vital that you bring along clothing and equipment that will ensure your comfort as well as your protection. **Please bring good quality wet weather gear (preferably a jacket with a hood and waterproof pants) and adequate warm clothing including a beanie.** Cotton clothing is not appropriate to wear in inclement weather as it stays wet and gets very cold.

Seasickness You will need to be prepared for the possibility of being sea sick and will need to bring appropriate remedies.

Safety Mates and Safety Tags: To improve volunteer safety, expeditioners will be assigned a 'safety mate' for the duration of the expedition and will be given a 'safety tag' to use while on board the vessel . 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.

Insect pests: Insect repellent and fly nets for your hats will make it more pleasant as flies can be a nuisance during the day. Mosquitoes can also be a minor problem during the night. Sand flies may also be present. Repellents are effective, and antihistamine tablets and creams are advised if you are particularly susceptible to insect bites. Ticks may be encountered.

Swimming: The north side of the island where base camp will be established has a sheltered bay. A swim in the ocean will substitute for a shower on the days that you are not returning to the boat for showers. We advise that there are inherent risks associated with swimming that are beyond the control of expedition leaders and charter boat crew. **Whilst all care will be taken, if you choose to participate in swimming activities, you do so entirely at your own risk.**

Medications: Check that you have any required prescriptions filled beforehand, including antihistamines if you think you may need them.

Snakes: For safety reasons volunteers are not to handle snakes. The crown snake is the only snake recorded on Middle Island, but the highly venomous Dugite and Southern Death Adder have been recorded from other Islands in the Recherché Archipelago. Two elasticised bandages should be carried in your daypack at all times as first aid treatment in the event of a snake bite. If you are moving around at night, always wear closed footwear (not thongs) and take a torch. Reptiles are still active at night.

Clothing and footwear: Long pants and boots that protect your ankles are recommended. If you prefer wearing shorts, bring some canvas gaiters or leggings; shorts leave your legs susceptible to sunburn, bites and as the bush is quite thick and prickly it will scratch exposed skin. Leather boots with ankle protection, suitable for walking, are therefore recommended – well worn in to avoid blisters. You will need comfortable light shoes to wear in camp, in the evenings and on the boat. A pair of thongs (for showertime or on the

beach) will be useful, and bring your bathers should you be inclined to a dip in the ocean. Canvas garden gloves may be used to protect the hands when in the field. As mentioned previously you are advised to bring good quality wet weather gear (preferably a jacket with a hood and waterproof pants) and adequate warm clothing, including a beanie. Shake any clothing left outside in case insects have taken up residence.

Safety at night: A good head torch and a spare, small back-up torch are essential. It is essential to bring spare batteries. If you get up at night, use a torch to illuminate the ground, and put your boots on (not thongs or open sandals) to minimise bite risk, as reptiles and insects etc. can be active at night. Keep your boots inside a bag at night so nothing crawls into them.

Camp hygiene: In camp, wear **disposable gloves** if helping with food preparation. These will be supplied. Separate bowls will be supplied for washing up, and the rinse bowl should contain some Milton preparation. A separate bowl will be supplied for washing hands, together with a plunger pack of antibacterial hand-washing liquid.

Personal hygiene: For washing bodies and clothing, Peter G's liquid soap is a good soap to use in hard water. A hot water shower will be available on the boat, Please note only a small group of participants will be able to have showers each night. Medicated soaps such as gamophen, or sandalwood, which is natural to the bush, are also good choices. Don't use highly scented soaps, or perfumed toiletries, as these are irresistible to insects, flies in particular. Away from camp, moisturised wipes can be used for cleaning hands, and can be disposed of later. Some pegs for your washing may be useful.

Wilderness survival: *Please familiarise yourself with the enclosed Wilderness survival card, and carry it in your daypack when in the field.* It is easy to become disoriented when walking away from tracks or vehicles. Take careful note of landscape features to guide you back to the vehicle or study area if you move away.

Most importantly, never leave the group without telling one of the leaders or your safety mate where you are going, and preferably you should be accompanied by at least one other person.

First aid: The expedition will carry a comprehensive first aid kit. Expedition Leaders are trained in Senior First Aid.

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 maybe some contact with water fowl on expeditions, volunteers are advised that they are not permitted to handle birds, especially those that appear to be sick or injured. For further information please refer to the following website on Avian Influenza.

http://www.health.gov.au/avian_influenza

FIELD COMMUNICATIONS

Satellite phones and VHF radios will be available for use in the event of an emergency. The vessel will be in 24 hour radio contact with the expedition while moored at Middle Island. The vessel carries the latest marine navigation and communications equipment.

Daily morning scheduled calls will be made to the DEC Esperance office.

Communications will be through DEC's office in Esperance (08 9083 2100) LANDSCOPE Expeditions has the capacity to the expedition via the DEC Esperance District Office, **but only in an emergency**. The office will in turn contact the expedition. It is likely that any message will only be passed on during scheduled contacts which may be up to 24 hours after you have contacted LANDSCOPE Expeditions.

If you need to be contacted urgently while you are away, communication can be established via the *LANDSCOPE* Expeditions office on (08) 9334 0401.

Mobile phones work in the Esperance townsite, but do not work at Middle Island or in the Recherché Archipelago.

CRISIS / EMERGENCY MANAGEMENT

The expedition, in consultation with the Royal Flying Doctor Service (RFDS) has developed a crisis management plan in case a medical emergency or other emergency should arise.

ADVANCE PREPARATION

FIELD SUPPLIES

Check each item carefully. Small plastic bags have a range of uses. You may wish to bring a large, sturdy plastic garden bag with ties to protect the contents of your bag from dust or moisture during transport or when in camp.

Check List

- ❑ sturdy, comfortable, worn-in walking boots or shoes with good tread
- ❑ light shoes for around camp
- ❑ thick walking socks
- ❑ Underwear
- ❑ long trousers, loose and tough
- ❑ shorts
- ❑ Bathers
- ❑ Reef shoes or booties
- ❑ long-sleeved, loose-fitting shirts
- ❑ casual clothes for travelling, motel stay, and around camp
- ❑ t-shirts
- ❑ jumper, warm jacket, or 'polarfleece'
- ❑ warm beanie or cap to wear at night
- ❑ warm scarf
- ❑ protective, windproof and wet weather gear – rain jacket (with hood) and trousers.
- ❑ cord to anchor hat (if not using your volunteer's hat)
- ❑ Sunglasses
- ❑ fly net (optional)
- ❑ gaiters (optional) (useful protection if you like wearing shorts)
- ❑ sleeping bag (with a rating of 0°C)
- ❑ sleeping bag liner (protects the bag and adds warmth)
- ❑ ground sheet and tent if you prefer to bring your own – otherwise a hire tent will be provided
- ❑ Pillow
- ❑ 1-litre water bottle, leak-proof
- ❑ personal toiletries, including tissues
- ❑ Towel
- ❑ moisturised wipes
- ❑ insect repellent and sunscreen
- ❑ personal first aid, prescription medicine and spectacles
- ❑ matches or lighter
- ❑ small robust torch plus spare batteries and spare globe. (A head torch is preferable as it leaves both hands free) A second small backup torch.
- ❑ A daypack (rucksack) to carry camera, film, water bottle, snacks, etc
- ❑ Camera, spare batteries and film if required
- ❑ binoculars (field glasses), and field guides if you have an interest in the local bird life
- ❑ hand lens and canvas garden gloves if you have an interest in botany
- ❑ notebook and pen
- ❑ compass and whistle
- ❑ small clothesline and a few pegs
- ❑ pocket knife
- ❑ Art supplies if you want to do some painting / drawing
- ❑ lots of enthusiasm and smiles

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

YOUR CHARTER VESSEL

You will be transported to Middle Island aboard *TMAREE,* a brand new vessel launched in 2008. Facilities and specifications of *TMAREE* include:

Specifications: *TMAREE* is a 10.7m catamaran with a beam of 3.5 m, drawing 1m. The vessel is purpose-built for fishing, eco tours and sightseeing cruises in the Southern Ocean. She is powered by two x 250HP 4.2 ES Cummins Mercruiser engines and carry's 1,400 litres of fuel. She is surveyed for up to 12 passengers in open waters. *TMAREE* can carry 120 litres of fresh water, and extra water will be carried and stored at Middle Island.

Accommodation: Onboard facilities include a toilet and shower below deck in the bow.

Facilities: *TMAREE* carries the latest navigational equipment, radios and satellite phone. There is a spacious viewing deck and an area for the preparation of equipment and conducting data analysis. The boat has been thoughtfully designed for the comfort and enjoyment of passengers.

Tenders: *TMAREE* has a 3.5 m tender with a 5hp outboard which can lifted onto the vessel.

Food and drink: The catering on this expedition will be undertaken in a field kitchen on Middle Island.

Emergency procedure: Safety equipment includes life jackets, flares, fire extinguishers and a full compliment of radio communication systems. The vessel is fitted with hydrostatically released life rafts (with a total capacity of 16 people), which are 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: Gear will be supplied if needed and 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: *TMAREE* will be in attendance for the entire time that the expedition is on Middle Island and will be used to undertake trips to nearby islands. Participants will be ferried to and from the vessel in the *TMAREE* tender. Participants will have the opportunity to use the on board shower on *TMAREE* a couple of times during the week. Participants will be camping on Middle Island and meals will be prepared in a field kitchen set up at the base camp.

TMAREE Photos

REFERENCE MAPS

The following commercially available maps show the route from Perth and the Esperance Region:

1. The Greater South West: StreetSmart Touring Map Available from DEC; newsagencies; bookstores.
2. Cape Arid 1:100 000 Topographic Map Sheet

REFERENCES

Several brochures on Middle Island and the Archipelago of the Recherché have been included in this briefing package. The expedition will also have copies of articles on the history of the area and field guides for animal and plant identifications. Please bring your own field guides if you wish.

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Bindon, Peter. (1996). Report on a visit to Middle Island Recherche Archipelago, February, 1996. Western Australian Museum. Anthropology Dept.

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Pearson, D.J. and Kinnear, J.E. (1997). A review of distribution, status and conservation of rock-wallabies in Western Australia. *Australian Mammalogy* **19**, 137-152.

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Thomson-Dans, C. and Vance, M. (Eds). 1999. *Wild Places, Quiet Places*. Revised Edition. Department of Conservation and Land Management, Perth.

Triggs, B. 1996. *Tracks, Scats and other Traces.* A Field Guide to Australian Mammals. Oxford University Press, Melbourne.

Tyler, M. J., Smith, L. A. and Johnstone, R. E. 2000. *Frogs of Western Australia.* Revised Edition. Western Australian Museum, Perth.

Wilson, S. K. and Knowles, D. G. 1988. *Australia's Reptiles. A photographic reference to the terrestrial reptiles of Australia.* Collins Australia, Sydney.

LANDSCOPE magazine articles

Burbidge, A., Haberley, B., Halse, S., Lane, J. and Pearson, G. 'How many geese are enough?' *LANDSCOPE* Spring 1993 p. 27-33.

Thomson-Dans, C., Kendrick, G., and Bancroft, K. 'Researching the Recherche' LANDSCOPE Winter 2003, p. 6-8.

WEB SITES

Online resources and websites:

http://www.naturebase.net
http://www.ea.gov.au/biodiversity/index.html
http://www.museum.wa.gov.au
http://www.calm.wa.gov.au/florabase/index.html

NOTES

APPENDICES

LANDSCOPE Expeditions 2008

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's (DEC's) *LANDSCOPE* magazine, a quarterly publication 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 WA's 27 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.

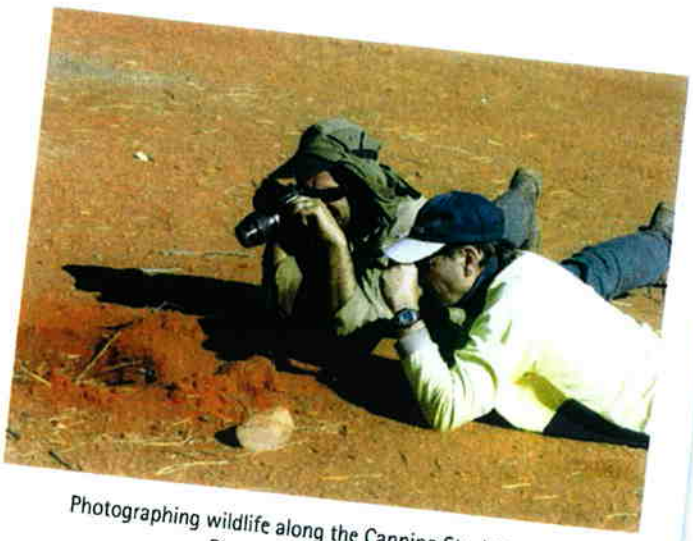
UWA Extension has been operating as a public outreach arm of UWA since 1913. It is a Centre for Continuing Education and promotes community awareness in a variety of ways, including educational travel.

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 and 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 WA. Anyone can be involved subject to fitness and provided they are over 13 years of age.

The expeditions give you the opportunity to visit and gain an understanding of remote places and natural ecosystems and 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 ones who benefit. 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.



Photographing wildlife along the Canning Stock Route.
Photo – Andrew Spiers

APPENDIX 1

LANDSCOPE Expeditions 2008

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

WA 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 WA – 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 WA 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.

These extensive land and seascapes provide a magnificent natural setting for a vast array of plant and animal species. It is in this huge natural laboratory that 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 towards answering this intriguing and pivotal question.

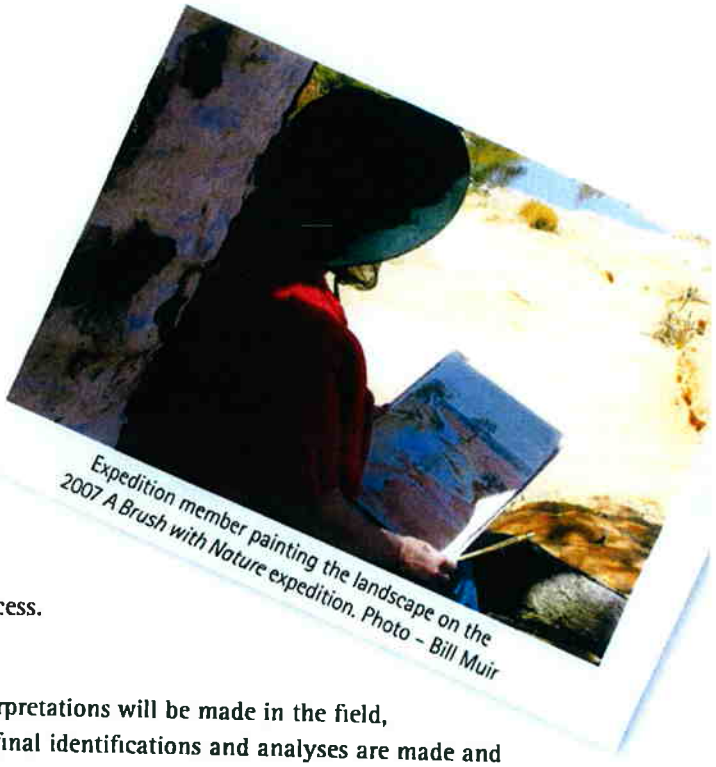
In the sparsely populated western third of the continent, the distribution of most plant and animal species is very poorly known and many *LANDSCOPE* Expeditions focus on trying to improve scientists' understanding of species' distributional patterns. Detailed records and prudent collections are made 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 helps define the distribution of many botanical and zoological species and facilitates 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.

WA's conservation reserve system aims to be comprehensive, adequate and representative. However, 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.

Examining pit fall traps along the Canning Stock Route. Photo – Graeme Liddelow

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.

You can make a difference



Expedition member painting the landscape on the 2007 *A Brush with Nature* expedition. Photo – Bill Muir

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 help – be assured that your assistance will make a contribution to nature conservation in WA. 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 aim 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.

Middle Island

Mammals

Rattus fuscipes
Macropus eugenii

Reptiles/Amphibians

Litoria cyclorhyncha, Spotted-thigh Frog
Diplodactylus marmoratus, Marbled Gecko
Underwoodisaurus milii, Barking Gecko
Ctenophorus ornatus, Rock Dragon
Gemmatophora norrisi
Cryptoblepharus virgatus clarus, Wall Skink
Ctenotus labillardieri, Red legged Skink
Egernia kingii, King Skink
Egernia napoleonis
Hemiergis peronii
Bassiana trilineata
Morethia obscura
Lerista dorsalis
Tiliqua rugosa rugosa, Bob-tailed Skink
Varanus rosenbergi, Rosenberg's Monitor
Notechis coronalis, Crowned Snake

Birds

Wedge-tailed Eagle
Pied Oyster Catcher
Sooty Oyster Catcher
Banded Plover
Red-necked Stint
Great-winged Petrel
Spotless Crake
Great Cormorant
Banded Land Rail
Cape Barren Goose
Brown Quail
Eastern Reef Heron
Pacific Gull
Silver Gull
Caspian Tern
Crested Tern
Brush Bronze-wing Pigeon
Rock Parrot
Fan-tailed Cuckoo
Barn Owl
Sacred Kingfisher
Welcome Swallow
Tree Martin
Golden Whistler
Red-eared Fire-tail Finch
Singing Honeyeater
Red Wattle-bird
New Holland Honeyeater
White-browed Scrub Wren
Striated Field Wren
Grey-breasted White-eye
Australian Raven
Little Penguin
Black-faced Cormorant
Fleshy-footed Shearwater
Australian Kestrel
White-breasted Sea Eagle

WAHERB SPECIMEN DATABASE LATLOCFORM for MIDDLE ISLAND - Recherche Archipelago, WA

Acacia anceps DC.
Acacia conniana Maslin
Acacia cupularis Domin
Acacia cyclops G.Don
Acacia myrtifolia (Sm.) Willd.
Acacia nigricans (Labill.) R.Br.
Acacia nitidula Benth.
Acacia rostellifera Benth.
Acrotriche cordata (Labill.) R.Br.
Actites megalocarpus (Hook.f.) Lander
Allocasuarina trichodon (Miq.) L.A.S.Johnson
Alyogyne hakeifolia (Giord.) Alef.
Alyogyne huegelii var. wrayae (Lindl.) A.S.Mitch.
Alyxia buxifolia R.Br.
Amphiroa anceps (Lam.) Decne.
Amyema melaleucae (Miq.) Tiegh.
Angianthus preissianus (Steetz) Benth.
Anthocercis genistoides Miers
Anthocercis viscosa subsp. caudata Haegi
Arctotheca calendula (L.) Levyns
Areschougia congesta (Turner) J.Agardh
Asparagopsis armata Harv.
Astartea fascicularis (Labill.) DC.
Asteromenia peltata (W.R.Taylor) Huisman & A.Millar
Atriplex cinerea Poir.
Atriplex paludosa subsp. cordata (Benth.) Aellen
Austrodanthonia caespitosa (Gaudich.) H.P.Linder
Austrodanthonia caespitosa (Gaudich.) H.P.Linder
Baumea juncea (R.Br.) Palla
Beyeria viscosa (Labill.) Miq.
Billardiera fusiformis Labill.
Boronia alata Sm.
Boronia tetrandra Labill.
Borya nitida Labill.
Bossiaea dentata (R.Br.) Benth.
Cakile maritima Scop.
Caladenia graminifolia A.S.George
Callitris drummondii (Parl.) F.Muell.
Callitris tuberculata R.Baker & H.G.Smith
Callophyllis rangiferina (Turner) Womersley
Calothamnus quadrifidus R.Br.
Calytrix tetragona Labill.
Carpobrotus aequilaterus (Haw.) N.E.Br.
Carpobrotus virescens (Haw.) Schwantes
Carpopeltis phyllophora (Hook.f. & Harv.) F.Schmitz
Caulerpa brownii (C.Agardh) Endl.
Caulerpa obscura Sond.
Caulerpa papillosa J.Agardh
Caulerpa sedoides forma geminata (Harv.) Weber Bosse
Centaurium spicatum (L.) Janch.
Centrolepis drummondiana (Nees) Walp.
Centrolepis glabra (Sond.) Hieron.
Centrolepis polygyna (R.Br.) Hieron.
Centrolepis polygyna (R.Br.) Hieron.
Cerastium glomeratum Thuill.
Chaetomorpha aerea (Dillwyn) Kütz.
Champia zostericola (Harv.) Reedman & Womersley
Cheilanthes austrotenuifolia H.M.Quirk & T.C.Chambers
Chenopodium murale L.
Chorizema ilicifolium Labill.
Cirsium vulgare (Savi) Ten.
Cladia aggregata (Sw.) Nyl.
Cladophora albida (Nees) Kütz.
Cladophora valonioides Sond.
Clematis linearifolia Steud.
Cliftonaea pectinata (Harv.) Harv.
Codium galeatum J.Agardh
Codium lucasii Setch.
Codium muelleri Kutz.
Codium pomoides J.Agardh
Codium spongiosum Harv.
Coeloclonium verticillatum (Harv.) J.Agardh
Colpomenia sinuosa (Roth) Derbes & Solier
Comesperma confertum Labill.
Conyza bonariensis (L.) Cronquist
Corallina officinalis L.
Cotula coronopifolia L.
Craspedocarpus blepharicarpus (Harv.) Min-Thein & Womersley
Crassula exserta (Reader) Ostenf.
Crassula pedicellosa (F.Muell.) Ostenf.
Crassula sieberiana subsp. tetramera Toelken
Cryptonemia kallymenioides (Harv.) Kraft
Curdiea obesa (Harv.) Kylin
Cutleria multifida (J.E.Smith) Grev.
Cystophora retorta (Mert.) J.Agardh
Cystophora subfarcinata (Mert.) J.Agardh [Goose Island Bay, Middle Island WA]
Cystophora subfarcinata (Mert.) J.Agardh Belinda Beach, Middle Island, Recherche Archipelago WA
Cystophora subfarcinata (Mert.) J.Agardh Goose Island Bay, Middle Island WA
Dasya cliftonii Harv.
Dianella brevicaulis (Ostenf.) G.W.Carr & P.F.Horsfall
Dichondra repens J.R.Forst. & G.Forst.
Dictyosphaeria sericea Harv.
Dictyota dichotoma (Huds.) J.V.Lamour.
Dillwynia pungens (Sweet) Benth.
Dilophus fastigiatus (Sond.) J.Agardh
Disphyma clavellatum (Haw.) Chinnock
Disphyma crassifolium subsp. clavellatum (Haw.) Chinnock
Dodonaea ceratocarpa Endl.
Doxodasya bolbochaete (Harv.) Falkenb.
Ecklonia radiata (C.Agardh) J.Agardh
Enchylaena tomentosa R.Br. var. tomentosa
Eriochilus dilatatus Lindl. subsp. dilatatus
Erythrymenia minuta Kylin
Eucalyptus angulosa Schauer
Eucalyptus conferruminata D.J.Carr & S.G.M.Carr
Eucalyptus cornuta Labill.
Eucalyptus utilis Brooker & Hopper
Euphorbia paralias L.

Eutaxia myrtifolia (Sm.) R.Br.
Ficinia nodosa (Rottb.) Goetgh., Muasya & D.A.Simpson
Galaxaura marginata (Ellis & Solander) J.V.Lamour.
Galium migrans Ehrend. & McGill.
Gastrolobium bilobum R.Br.
Gloiocladia australe (J.Agardh) R.E.Norris
Gloiosaccion brownii Harv.
Glossophora nigricans (J.Agardh) Womersley
Gnaphalium indutum Hook.f.
Gonocarpus scordioides (Benth.) Orchard
Griffithsia teges Harv.
Gyrostemon sheathii W.Fitzg.
Hakea clavata Labill.
Hakea clavata Labill.
Hakea drupacea (C.F.Gaertn.) Roem. & Schult.
Halimeda cuneata K.Hering
Haliptilon roseum (Lam.) Garbary & H.W.Johans.
Haloplegma preissii (Harv.) Mont.
[Goose Island Bay, Middle Island]
Haloragis acutangula forma stellata Orchard
Haloragodendron racemosum (Labill.) Orchard
Halymenia floresia (Clemente) C.Agardh
Hennedya crispa Harv.
Heterosiphonia gunniana (Harv.) Reinbold
Hibbertia cuneiformis (Labill.) Sm.
Hibbertia racemosa (Endl.) Gilg
Hibbertia ulicifolia (Benth.) J.R.Wheeler
Hormosira banksii (Turner) Decne.
[Goose Island Bay, Middle Island WA]
Hormosira banksii (Turner) Decne.
Hornungia procumbens (L.) Hayek
Hydrocotyle hispidula Bunge
Hydrocotyle medicaginoides Turcz.
Hymenena multipartita (Hook.f. & Harv.) Kylin
Hypnea ramentacea (C.Agardh) J.Agardh
Hypnea valentiae (Turner) Mont.
Hypochaeris glabra L.
Hypoglossum heterocystideum (J.Agardh) J.Agardh
Hypoglossum revolutum (Harv.) J.Agardh
Isoetes australis S.Williams
Isolepis cernua (Vahl) Roem. & Schult. var. cernua
Isolepis marginata (Thunb.) A.Dietr.
Isotoma scapigera (R.Br.) G.Don
Jania affinis Harv.
Jania micrarthrodia J.V.Lamour.
Juncus bufonius L.
Kennedia nigricans Lindl.
Kunzea baxteri (Klotzsch) Schauer
Lachnagrostis filiformis (Forst.) Trin.
Lasiopetalum discolor Hook.
Laurencia elata (C.Agardh) Hook.f. & Harv.
Laurencia filiformis forma heteroclada (Harv.) Y.Saito & Womersley
Lepidosperma gladiatum Labill.
Leptoceras menziesii (R.Br.) Lindl.
Leucopogon apiculatus R.Br.
Leucopogon interruptus R.Br.
Leucopogon parviflorus (Andrews) Lindl.
Leucopogon revolutus R.Br.
Leucopogon rotundifolius R.Br.
Limosella australis R.Br.
Lobelia alata Labill.
Lobophora variegata (J.V.Lamour.) J.C.Oliveira
Lobospira bicuspidata Aresch.
Logania vaginalis (Labill.) F.Muell.
Melaleuca globifera R.Br.
Melaleuca lanceolata Otto
Melaleuca pentagona Labill. var. pentagona
Metagoniolithon radiatum (Lam.) Ducker
Metagoniolithon stelliferum (Lam.) Weber Bosse
Metamastophora flabellata (Sond.) Setch.
Microtis media R.Br. subsp. media
Muehlenbeckia adpressa (Labill.) Meisn.
Mychodea aciculare (J.Agardh) Kraft
Mychodea ramulosa J.Agardh
Myoporum insulare R.Br.
Notheia anomala Harv. & Bailey
Opercularia hispidula Endl.
Oxalis corniculata L.
Pachydictyon paniculatum (J.Agardh) J.Agardh
Paraserianthes lophantha (Willd.) subsp. lophantha
Pelargonium australe Willd. subsp. australe
Pelargonium littorale Huegel
Pelargonium littorale Huegel subsp. littorale
Peyssonnelia capensis Mont.
Phyllangium divergens (Hook.f.) Dunlop
Phyllanthus scaber Klotzsch
Pimelea argentea R.Br.
Pimelea clavata Labill.
Pimelea ferruginea Labill.
Plantago debilis R.Br.
Platythalia angustifolia Sond.
Plocamium angustum (J.Agardh) Hook.f. & Harv.
Plocamium mertensii (Grev.) Harv.
Poa poiformis (Labill.) Druce
Poa porphyroclados Nees
Podotheca angustifolia (Labill.) Less.
Polysiphonia decipiens Mont.
Pomaderris myrtilloides Fenzl
Pomaderris paniculosa subsp. paralia N.G.Walsh
Poranthera microphylla Brongn.
Poranthera triandra J.M.Black
Posidonia robertsoniae J.Kuo & Cambridge [Goose Island Bay] WA
Posidonia sinuosa Cambridge & J.Kuo
Pseudognaphalium luteoalbum (L.) Hilliard & B.L.Burtt
Pteridium esculentum (G.Forst.) Cockayne
Pterocladia lucida (Turner) J.Agardh
Ptilocladia vestita (Harv.) E.M.Woll.
Pultenaea heterochila F.Muell.
Rhadinothamnus euphemiae (F.Muell.) Paul G.Wilson
Rhadinothamnus rudis (Bartl.) Paul G.Wilson subsp. rudis
Rhagodia baccata (Labill.) Moq. subsp. baccata
Rhagodia candolleana Moq. subsp. candolleana
Rhagodia crassifolia R.Br.
Rhodanthe citrina (Benth.) Paul G.Wilson
Rhodopeltis australis (Harv.) Harv.
Rulingia cygnorum (Steud.) C.A.Gardner

Sagina apetala Ard.
Sarcocornia blackiana (Ulbr.) A.J.Scott
Sargassum sonderi (J.Agardh) J.Agardh
Scaevola aemula R.Br.
Schoenus sculptus (Nees) Boeck.
Scytothalia dorycarpa (Turner) Grev.
Senecio picridioides (Turcz.) M.E.Lawr.
Senecio pinnatifolius A.Rich.
Sida hookeriana Miq.
Siloxerus filifolius (Benth.) Ostenf.
Solanum symonii H.Eichler
Sonchus oleraceus L.
Sonchus oleraceus L.
Sonchus oleraceus L.
Spinifex hirsutus Labill.
Sporobolus virginicus (L.) Kunth
Spyridia dasyoides Sond.
Spyridium globulosum (Labill.) Benth.
Stipa flavescens Labill.
Stylidium calcaratum R.Br.
Stylidium glandulosum Salisb.
Stylidium inundatum R.Br.
Stylidium perpusillum Hook.f.
Taxandria marginata (Labill.) J.R.Wheeler &
N.G.Marchant
Tetragonia implexicoma (Miq.) Hook.f.
Threlkeldia diffusa R.Br.
Thryptomene saxicola (Hook.) Schauer
Thuretia quercifolia Decne.
Thysanotus patersonii R.Br.
Trachymene pilosa Sm.
Triglochin dubia R.Br.
Triglochin dubia R.Br.
Triglochin minutissima F.Muell.
Trymalium spatulatum (Labill.) Ostenf.
Villarsia parnassifolia (Labill.) R.Br.
Wahlenbergia gracilenta Lothian
Westringia dampieri R.Br.
Wollastoniella myriophylloides (Harv.) Gordon-Mills
[Goose Island Bay, Middle Island, Recherche
Archipelago WA]
Wrangelia plumosa Harv.
Zonaria crenata J.Agardh
Zonaria spiralis (J.Agardh) Papenf.
Zonaria turneriana J.Agardh
Zygophyllum billardierei DC.
Zygophyllum glaucum F.Muell.
Zygophyllum simile H.Eichler

Above: WA has a wide variety of islands. This is Middle Osborn Island in the Kimberley. Photo – Andrew Burbidge.

Respect island conservation reserves

- Picnic on beaches or other naturally-cleared places. Use portable fuel stoves. Do not collect firewood—it provides habitat for reptiles, invertebrates and fungi.
- Leave sealions and fur seals alone. Disturbing them may cause them to lose sleep and distress them. Seals are capable of inflicting a nasty bite and breeding seals can be extremely dangerous both on land and in water.
- Respect seabird breeding colonies and observe from a safe distance. Disturbance may lead to gulls eating eggs and chicks, or they may die from exposure if the parent is not looking after them. Watch out for nesting burrows dug by shearwaters, petrels and storm-petrels. Don't walk near the burrows as they are easily damaged. Be particularly careful not to disturb bird nests on beaches — the nests may be almost impossible to see but if the adult birds use distraction displays they are likely to be nesting. Be aware of this behaviour and respond by moving to another area.
- Marine turtles nest on most island beaches from Shark Bay northwards. Do not disturb nesting turtles and do not use lights at night on or near turtle-nesting beaches. Keep lighting on boats moored nearby to a minimum.

Live on your boat. Camping is not permitted on islands that are conservation reserves unless approved as part of a management plan or with a special permit. Check with the local CALM office if in doubt.

Managing our islands

CALM has an enormous task managing the State's conservation reserves and natural biodiversity. This job can be made much easier with public support and assistance. You can help by:

- ***learning*** more about WA's islands and telling your friends about their conservation values and how they can be protected;
- ***reporting*** introduced animal sightings and weed establishment to the nearest CALM office and reporting people who fail to adhere to the island quarantine procedures (record the boat registration number and the name of the vessel); and
- ***asking*** CALM for a more detailed quarantine protocol if you want additional quarantine advice or have approval to camp on an island.

WA's islands are worth conserving. Help protect them.

Leave nothing but footprints, take nothing but photographs and memories.

Introduced species cause extinctions on islands

There are 429 populations of 65 species of native mammals on 174 islands around Australia. At least 41 populations have become extinct during the past 200 years.

Research has shown that most of these extinctions were caused by introduced cats, foxes and rats. Other populations are at risk. For example, the dibbler and dunnart populations on islands in Jurien Bay are threatened by the introduced house mouse. There have also been several extinctions of native birds on islands because of introduced predators. It is highly likely that populations of other native animals have become extinct because of the introduction of non-local species.

Above: The dibbler is threatened by the house mouse on islands in Jurien Bay.

Photo–Babs and Bert Wells/CALM

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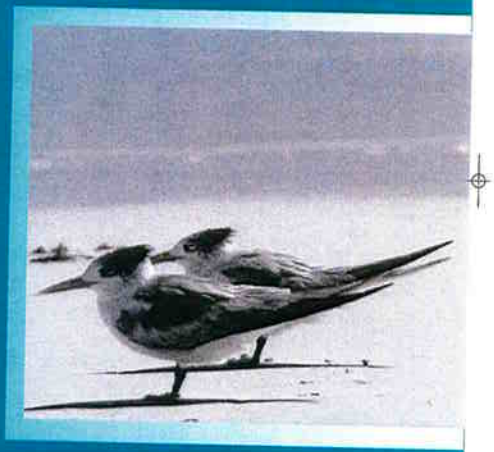
DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

Conserving Western Australia's islands



Government of Western Australia

Department of Conservation and Land Management

APPENDIX 4

A valuable heritage

Off Western Australia lie more than 3420 islands, islets and rocks, more than any other State or Territory. About 530 of them are larger than 20 ha and 220 are more than 100 ha.

The greatest risk to their values is the establishment of non-native animals, plants and diseases.

Our islands are an enormously valuable resource. They provide safe anchorages, sheltered beaches and unique experiences, and harbour an amazing array of plants and animals.

Without islands, Australia's record of mammal extinctions (22 species, more than any other country in the world) would be even worse, because eight species that became extinct on the mainland survived on islands. This is because most islands have none of the damaging introduced animals—foxes, feral cats, black rats, house mice, pigs and others.

Islands are important breeding places for seals, seabirds and turtles. The lack of introduced grazing animals including rabbits, goats and sheep means that the vegetation of most islands is largely unchanged from pre-European settlement days. Some islands have unique species, subspecies or populations of animals and plants.

Front cover: Crested terns nest on WA's islands.

Above: WA's islands are haven to a variety of wildlife. Photos – CALM.

Risks

These nature conservation values are at risk if non-native animals and plants become established. Introduced predators can rapidly eradicate native mammals, birds, reptiles and invertebrates while grazers can damage and weeds can overrun and eliminate native plants. New animal and plant diseases could have devastating consequences.

Eradicating introduced species – where possible – is always expensive and time consuming. In some cases eradication is not possible without extreme damage to the island's biodiversity conservation values.

Most WA islands south of the Kimberley are nature reserves, conservation parks or national parks vested in the Conservation Commission of Western Australia and managed by the Department of Conservation and Land Management (CALM). Their reservation reflects their great importance to the conservation of our biodiversity. Many Kimberley islands are Aboriginal reserves and approval to visit them is required from the Department of Indigenous Affairs.

All islands are valuable, whether reserved or not.

Above: Three threats to island plant and animal populations ... the house mouse, the feral cat and the introduced cockroach.

Photos – Andrew Burbidge; Babs and Bert Wells/CALM; Department of Agriculture.

Quarantine vital

The greatest risk to islands is the establishment of non-native animals, plants and disease. There is no way of predicting which species might survive and breed on islands if they arrived there, so the best method is to prevent their arrival. Some simple and easy to implement quarantine rules can eliminate the chance of you introducing damaging organisms to WA's islands.

Please

- **Keep your boat clean and check it before launching or leaving the mooring.** Don't allow soil, seeds and pests (or even native animals like geckoes and crickets) on your boat. Maintain rat and mouse poison (wax blocks are best for damp places) in your boat and replace it every three months before it becomes unpalatable. (Ensure the baits are secured if small children board your boat.) Watch out for ant, wasp, bee and termite nests on boats and destroy them if found. If travelling by aircraft, the same rules apply.

- **Check your clothing and footwear.** Before leaving the coast, check your clothes (including trouser cuffs and socks) and footwear for soil and seeds, and remove any found.

- **Check your food.** Ensure your food is free from pests and diseases and store it in insect-proof containers. Avoid using cardboard boxes. Make sure that pests such as mice, cockroaches, crickets and spiders are not living in food containers. Separate bananas from bunches so that small animals can not live in the nooks and crannies. Don't discard seeds from fruits and vegetables on islands.

- **Store fishing and other equipment in pest-proof containers.** Spray the container with household insecticide just before the trip. Use residual (for example, permethrin-based) sprays in non-food areas, as they will kill bugs that walk over the treated surface for up to a couple of months, depending on exposure to weather. Check that containers are free from soils and spider webs.

- **Bring your rubbish home.** Don't leave it on an island, don't bury it there and don't throw it in the ocean.

- **Use the sea for bodily wastes** where possible (salt water and sunlight quickly destroy harmful bacteria). Otherwise dig a deep hole (more than 30 cm deep) and cover completely.

- **Don't take pets to islands.** Dogs and other pets can disturb or kill native animals. It is illegal to take dogs (other than guide dogs for the blind) into national parks and nature reserves.

- **Check** that your crew and guests are aware of and have followed these quarantine rules.

Above: Boats are the number one source of introduced predators and pests to islands.

Photo – CALM.

Right: Quokkas are common on Rottnest Island but, because of introduced predators, are a threatened species on the mainland.

Photo – Babs and Bert Wells/CALM.