

# Echidnas and Goannas On Kangaroo Island

DISCOVERY WEEKEND BRIEFING

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**Team 1:      October 30 – November 1, 2009**

# GENERAL INFORMATION

PRINCIPAL INVESTIGATOR:	<b>PEGGY RISMILLER</b>
POSITION AND AFFILIATION:	Pelican Lagoon Research & Wildlife Centre
PROJECT TITLE:	<b>ECHIDNAS AND GOANNAS OF KANGAROO ISLAND</b>
RESEARCH SITE:	PELICAN LAGOON, KANGAROO ISLAND
RENDEZVOUS POINT:	KINGSCOTE AIRPORT, KANGAROO ISLAND
EXPEDITION DATES:	Team I: 30 <sup>th</sup> October – 1 <sup>st</sup> November
EXPEDITION LENGTH:	3 days
TEAM SIZE MINIMUM/MAXIMUM:	5/7 VOLUNTEERS
MINIMUM AGE OF PARTICIPATION:	18 years of age (16 if accompanied by an a parent or guardian)

# VOLUNTEER FORMS

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All Earthwatch expedition participants are required to read and complete a number of volunteer forms. Some of these forms are used to ensure your safety in the field, to inform Earthwatch and project staff of your current health and fitness as they pertain to your expedition, to notify Earthwatch and project staff of your travel plans, etc. These forms must be filled out and returned to Earthwatch. Other forms are for your reference and will inform you of certain Earthwatch policies and resources. You do not need to return these forms. See below for details.

**Volunteer forms have already been sent to you via email or post. Volunteer forms are also available online at**

**[http://www.earthwatch.org/australia/expeditions/volunteer\\_forms/](http://www.earthwatch.org/australia/expeditions/volunteer_forms/).** Instructions for completing your forms are included on this web page. However, you may not need to complete all of the forms listed online. **Please see below for a list of the specific forms required for this expedition.**

**Note:** It is very important that you read and understand both your Expedition Briefing and the volunteer forms listed below.

## **Volunteers Forms to be Returned to Earthwatch**

Please complete and return the following forms to your Earthwatch Expedition Coordinator:

### **Required Forms -**

- [A: Personal History Form](#)
- [B: Health Form](#) - *Must be printed, signed by you and your doctor and returned.*
- [C: Itinerary Form](#)
- [D: Privacy Statement and Authority](#) - *Must be printed, signed and returned*
- [E: Liability Release](#) - *Must be printed, signed and returned*

**How to return your forms:** Forms B, D and E require written signatures and must therefore be printed out and signed. All other forms may be filled out electronically. You may return your forms to your Earthwatch Expedition Coordinator by mail, fax, or email (forms requiring signatures may be scanned and emailed). If you mail hard copies of your forms to Earthwatch, please do not staple them together and be sure to keep a copy of each form for your records. *Please see the welcome letter at the start of this briefing for your Expedition Coordinator's name and contact information.*

**Deadline for form submission:** Your volunteer forms must be completed and returned to Earthwatch no later than 60 days prior to your expedition.

**If you sign up within 60 days of your expedition:** If signing up to participate within 60 days of an expedition's start date, please complete each form to the best of your ability and send them to Earthwatch immediately. Please note the date of your doctor's appointment on Form B: Health Form. You will need to resend Form B: Health Form after having it completed and signed by your doctor.

### **Other Forms for Your Reference**

The forms listed below are for your reference only and do not need to be returned to Earthwatch. However, **it is very important that you read and understand these forms.**

- [Expedition Terms and Conditions](#)
- [Earthwatch Institute Policies & Volunteer Rights and Responsibilities](#) - *You must read and agree to these*
- [Liability Release Frequently Asked Questions](#) - *read in conjunction with form E: Liability Release*

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# PELICAN LAGOON RESEARCH & WILDLIFE CENTRE



P.O. Penneshaw  
Kangaroo Island  
Australia 5222  
Tel: (08) 8553 7174

Solar sourced e-mail: [echidna@kin.net.au](mailto:echidna@kin.net.au)

Dear Echidna Discovery Weekend participant!

Welcome to the echidna and goanna discovery season. These fascinating creatures represent groups of animals that have survived hundreds of thousands of millennia! You will be joining me and my staff on Kangaroo Island to investigate, document and explore the secrets of these ancient survivor's ecology and life history.

Sometimes erroneously referred to as the "spiny anteater", the echidna is not related to any of the "anteaters", the hedgehog or the porcupine. They form a special group of mammals called monotremes, the only egg-laying mammals in the world. Their ancestors roamed the planet with the dinosaurs! Similarly, the goanna, a monitor or varanid lizard, has been on the planet for a long time. Rosenberg's goanna on Kangaroo Island is special because it is a varanid lizard that lives furthest away from the equator. This means it has had to adapt to survive. KI is their last stronghold and they were recently listed as a threatened species.

Echidnas were discovered and described by Europeans over 200 years ago. One would imagine that the biology of this unusual creature is well understood and documented. Quite the contrary! A major problem with echidna field research is the animal's shy nature, sporadic activity and reclusive habits. With the aid of Earthwatch volunteers and intense field observations, we have been able to identify and isolate previously uncontrolled variables. We are now effectively quantifying, analysing and incorporating new techniques into environmental field science.

You, the Earthwatch Discovery Weekend participant will share some of the experiences of an Earthwatch volunteer. Volunteers are an invaluable asset to new discoveries being made within the realm of echidna and goanna ecology. Volunteers help find, track, observe, map and monitor activities of echidnas, goannas and other organisms within their ecosystem. Our detective work is unlocking the secrets of these species survival strategies and supply guidelines for species conservation strategies.

My staff and I look forward to greeting you on Kangaroo Island. Both echidnas and goannas continue to bring lots of surprises into this long-term project. We believe you will find your experiences and work in "nature's laboratory" rewarding.

Cheers,

Dr. Peggy Rismiller

## DISCOVERY WEEKEND

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Discovery Weekends are an opportunity to join Earthwatch Scientists at their field site. Together you can explore continuing programs of research, how they function and some of the results of this work. Discovery weekends are brief and full of information. Depending on the season, moon phase and current conditions you will have a wide range of opportunities.

The following are excerpts from the briefing for a 2 week Echidna and Goanna Earthwatch expedition. This information gives an idea of the scope of field activities and experience volunteers have during their 2 week stay. On the Discovery Weekend you will participate in some of these activities. We look forward to you joining us!



# RESEARCH PLAN

## 1. The Project

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Project goal: To offer practical solutions for the management of natural resources by generating sound, comprehensive data about the biology of short-beaked echidnas, Rosenberg's goanna and their ecosystems.

We are achieving these goals:

- by documenting the life histories of individual echidnas and goannas in intact habitats, with focus on reproductive biology/ecology (neither species breeds readily in captivity)
- quantifying echidna and goanna activities in ecosystems they inhabit and how these activities affect biodiversity
- establishing practical, user-friendly methods for assessing progress of land restoration through monitoring microclimates and wildlife activity

### Background of Echidnas

Short-beaked echidnas are one of three egg laying mammals. The other two are the platypus, whose amphibious lifestyle restricts its natural distribution to waterways in mainland eastern Australia and Tasmania, and the long-beaked echidna, now found only in Papua New Guinea. These mammals, known collectively as Monotremes, represent the oldest surviving mammals on the planet. Their relatives date back to the time of the dinosaurs and may have been around when Australia separated from the super-continent of Gondwana 140 million years ago.

Short-beaked echidnas (usually referred to simply as echidnas) are aptly described by their Latin name, *Tachyglossus* (swift or rapid tongue) *aculeatus* (with points). Their outward features are whimsical. The back is covered with spines that are modified hairs, the legs and belly are soft and furry and the hind feet point backward. Echidnas have no teeth. The tiny mouth, located at the end of its bird-like beak, only opens the width of the tongue which can extend up to 17cm (7in.)! Echidnas are phenomenally adaptable and can be found throughout Australia from the desert regions to alpine areas above the snow line, in the rain forests, and along the coasts. There is no other native Australian vertebrate species that occupies a greater diversity of ecosystems. Despite their wide distribution, little is known about population numbers, except that they are on the decline.

Due to the echidnas cryptic lifestyle, studying this species and documenting its biology has not been easy. Echidnas were discovered and described by Europeans in 1792. It wasn't until 92 years later (1884) that their unique mode of reproduction, egg laying, was discovered. The echidna's mastery of camouflage, tenacious and secretive nature continued to challenge researchers over the next 100 years.

Much of the monotreme research carried out between 1792 and 1989 was compiled by the recently deceased monotreme authority, Dr. Mervyn Griffiths (1968, 1978, 1989). His own contributions were numerous and covered a broad range of biological disciplines. In the 1960s Griffiths determined that an echidna egg incubates in the female's pouch for 10.5 days before hatching. He also discovered that the composition of milk in lactating females changes during growth of the young (Griffiths et al. 1969). Despite numerous studies, there was still little known about echidna reproduction and life in the wild.

Enter Earthwatch. More than 100 years after the discovery of egg-laying in echidnas, Earthwatch volunteers came to Kangaroo Island to assist in field studies on these elusive creatures. In their first 2 seasons (1988, 1989) they helped answer one of a series of questions posed by Richard Owen in 1834...how echidnas mate in the wild (Rismiller and Seymour 1991). In 1991 a long-term study with Earthwatch volunteers was initiated at the Pelican Lagoon Research Centre. Since then Earthwatch volunteers have been instrumental in filling large gaps in knowledge about echidna behaviour, ecology and population dynamics. Unravelling the biological secrets of echidnas has taken tens of thousands of field hours.

With volunteers as tenacious as echidnas we have been able to follow individuals and make major discoveries about their life cycle such as:

- females in a population breed and produce a single young once every 3 to 5 years (Rismiller and McKelvey 2000). This took 8 years of fieldwork and we now have new material to expand this.
- females must be a minimum of 5 years old and sometime up to 12 years old before they are sexually mature and reproduce for the first time (Rismiller and McKelvey 2003). These findings required 14 years of fieldwork. We are still not sure when males become successful breeders.
- young echidnas leave their natal areas and travel at least 3km and up to 40km before establishing a home range area (Rismiller 1999; Rismiller and McKelvey 2000). We still need to do a lot more work in this area, because first finding and then keeping transmitters on young animals is very difficult.

There have been published findings about other aspects of echidna biology such as breeding behaviour (Rismiller 1992, 2009), home range sizes (Rismiller and McKelvey 1994) and body temperature (Rismiller and McKelvey 1996). There are also numerous investigations that are being continued because they are not yet "ripe for the press". These include the fate of the young, echidna 'finger printing', detection of soil invertebrates (i.e., communication and hearing) and most recently the role of echidnas as cultivators, recyclers, and indicators for assessing habitat restoration progress.

### Background of Goannas

Echidnas and goannas on Kangaroo Island share much of the same habitat and some of the same food sources.

As the only natural predator for burrow young echidnas, Rosenberg's goanna, *Varanus rosenbergi*, was a logical candidate to include in this long-term study.

Goanna is the common name in Australia for a lizard belonging to the family Varanidae. It is believed to be a corruption of the name 'iguana'. Rosenberg's goanna is actually a relative of the largest varanid, the Komodo Dragon. Varanids or monitor lizards are usually associated with warm climates. Rosenberg's, is of special ecological interest, because it is one of the largest varanid species living furthest south of the equator.

This means they have adapted to living in a cooler climate and adopted different strategies to cope. We are investigating some of the strange relationships between goannas and their environment that allow them to live successfully here.

Documenting Rosenberg's goanna biology and ecology in the wild is especially important to the conservation of this species as it now listed as threatened.

Rosenberg's was once wide spread throughout many parts of southern Australia. In recent years, goanna numbers have declined in both their mainland ranges and on Kangaroo Island due to pressures on habitat, increased road traffic, and increased feral predation. Rosenberg's goanna have never been successfully bred in captivity, nor has artificial incubation of eggs taken from the wild been successful.

Although some aspects of Rosenberg's goanna biology have been extensively studied (Christian and Weavers 1994, Green 1972, Green et al. 1991, King and Green 1979), there are still many unanswered questions concerning its reproduction, seasonal movements and body temperature regulation. Little comprehensive field data have been collected due to difficulties keeping radio tracking transmitters on the animals for continuous monitoring in the wild. We have overcome this problem in adult animals by using implantable transmitters whose pulsed rate is used to measure temperature as well as for location.

Early research found that goanna home ranges were relatively small, but variable (Green and King 1978, 1993). Using more direct techniques and following animals on a daily basis over the past 3 years, we have found that Rosenberg's goanna is highly mobile from October through April. Their home range may be as large as 78 hectares (~170 acres) and an individual may use up to 30 different burrows during this time of year (personal observations, unpublished data).

Courtship, breeding and egg deposition in Rosenberg's occurs between December and February. It was once believed that these solitary living goannas were monogamous during the breeding season. Observations collected with Earthwatch volunteers have proven differently. Some males in our study population court and breed with 2 or more different females. We are currently assisting a Ph.D. student who is investigating successful parenting in this species through DNA work.

Rosenberg's goanna lay their eggs in termite mounds where they incubate for approximately 7 months before hatching (King and Green 1979, Green and King 1993, Rismiller 2009 in press). Artificial egg incubation experiments for species conservation purposes have not been successful. We are therefore currently investigating the daily and seasonal fluctuations of temperature and humidity in termite mounds in the hope of discovering the secrets of goanna egg incubation in the wild. Some of our initial trials were fraught with difficulties (termites tend to eat anything placed in their mounds but goanna eggs), but we are currently making progress with these investigations.

In autumn (April/May in Australia), goannas on Kangaroo Island go into a winter burrow. It is known that on sunny winter days some individuals emerge wholly or partially to bask (Christian and Weavers 1994, Rismiller personal observations). Earthwatch volunteers recently assisted a Masters student investigating oxygen consumption and body temperatures in goannas during the winter (Biebach 2003). We discovered that some animals use more than one winter burrow, moving when the environmental conditions seem 'inhospitable' for a reptile. We will continue investigating the biology and activities of Rosenberg's goanna and how the microclimates they frequent affect their reproductive status.

## 2. Research Objectives

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Our long term goals embrace the concept that the health and survival of a species depend on understanding the biology of wild/ free ranging populations, realising their active role in dynamic biodiversity and identifying their environmental needs for a sustainable future.

Key objectives are to:

- Continue studies on population dynamics of echidnas and goannas living in intact native ecosystems
- Quantify echidna and goanna activities as cultivators and recyclers
- Monitor microclimates and habitats in human altered and natural environments
- Establish guidelines to assess habitat restoration progress

Specifically, we:

- Radio track individuals in a population to monitor population numbers of both adults and juvenile recruitment (Rismiller 1992, 1993), determine movements and home ranges (Rismiller and McKelvey 1994), document activities and special behaviour (Rismiller 1999, Rismiller and McKelvey 2000; 2003), and monitor feral predation
- Continue the search for the echidna ‘finger print’
- Determine habitat usage by native and introduced species in intact, denuded and revegetating areas
- Document microclimates at animal burrow sites, in areas of digging activity and in areas where no animals or activity is found
- Survey, document and record numbers, volumes and areas of soil disturbance by goannas, echidnas and other vertebrate animals (Feuerherdt 2002)
- Work with the community on monitoring revegetation projects (Document changes in soil parameters and provide comparative microclimate data to community groups)

There are still numerous unanswered questions about goanna life history. In the past 4 years we have gained considerable insight into home range sizes, breeding behaviour, duration of egg incubation and body temperatures. However, some of the basic biological facts, relevant to conservation, are still unanswered ie, what are recruitment numbers, how fast do young grow, at what age are Rosenberg’s sexually mature? From over 100 hatchlings marked in the past 3 years, only 3 have been recovered so far. Continued long term monitoring of known individuals, marking and recaptures of young will provide the answers.

The past year has seen the culmination of 16 years hard work in the field finding, monitoring, refinding and observing the behaviour of lactating echidnas. These data were presented at a conference late in 2008 and are now in the process of being published.

Data collected provided evidence for an early project observation that echidnas must be a minimum of 5 years old (and up to 12) before reaching sexual maturity, unlike their platypus cousins who breed at 1 to 2 years of age. Our new

proposed research activities evolved based on long term field observations. One reoccurring question from volunteers and others who have observed echidnas is: How do they find their food sources?

During the past 7 years monitoring we have become very aware that echidnas and goannas play an active role in shaping the habitats and microclimates they live in. They are diggers, cultivators and aerators. Pilot studies indicate that these species' activities support soil biodiversity (i.e., invertebrate food sources and dispersal or germination of native plants). With continued and expanded research in these areas we intend to develop tools for monitoring ecosystem health and assess progress in habitat restoration programs.

### **3. Methods**

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As a participant for only a weekend you will gain some experience in some of the follow up tasks that are a regular part of our ongoing research program.

#### Finding, Retrieving, Marking, and Tracking Echidnas and Goannas

Echidnas are a challenge to study because they do not use home dens or regular trails, cannot be trapped using baits, and are not attracted by recordings. We search on foot to make initial contact. After finding an echidna, timing and decisive movements are key in picking up the animal. This will be demonstrated in situ in the field.

The procedure for finding goannas is the same, searching the research area on foot. In months when animals are active, goannas are often spotted out foraging. Their freshly dug burrows are also easy to identify. Volunteers encountering new goannas on routine searches mark the burrow with survey flagging and report the location. Adult goannas are retrieved by the PI or other trained staff who noose the animal or catch it by hand.

When an echidna or goanna is caught, sex, weight, reproductive condition, body measurements, and any distinguishing features are documented. Upon first encounter, new individuals have small (12.5 by 2.0 mm, 65 mg) electronic transponders (Animal Electronic ID Systems, Kiama, New South Wales, Australia) inserted under their skin. This provides a lifetime positive ID. Because it is necessary to handle individuals to read the 15-digit code with a scanner, we visually identify echidnas with coloured tubing (Rismiller 1992) and goannas with dots of correction fluid applied at the base of the tail.

The tracking transmitter is attached between clipped spines on the lower back of the echidna with a two component epoxy (Rismiller and McKelvey 1994). Individuals are kept overnight and released the next day at the site of capture. Tail transmitters on small goannas are glued to the base of the tail with the same type of epoxy. They are generally released within hours of capture.

All animals are radio tracked on foot with a hand held receiver and 3-element antennas. Through long term experience we have devised methods of unobtrusive location and observation to accurately document behaviour. Volunteers are trained to use wind, terrain, light, and sound conditions to optimise tracking efficiency. Each time an animal is tracked, field data collection forms are used to record its location, environmental conditions, animal activity (e.g., foraging, moving, resting), shelter site, habitat and body weight or food source when applicable. On return to base camp, the location of the animal is marked on a contour map and data are entered into the computer. Using a GPS, daily movements and burrow sites are transferred to aerial photographs. All field and lab equipment are directly powered or charged on sustainable DC solar.

## Fingerprinting

To date no one has found an individualistic trait/characteristic for an echidna that can be used as a 'fingerprint'. The palate of the echidna may be the key. Each palate consists of a number of rows of small keratinous spines. When road killed echidnas are brought to the research centre, volunteers assist by counting the number of spines per row and document this on a sketch of the palate. Information is entered into a database. When enough samples are available (number of road kills are sporadic and we don't hope for them) we will engage an IT student to develop a pattern recognition program to analyse the palate designs.

## Surveys

Surveys are conducted throughout the year at 4 sites:

- 1) native woodland in intact ecosystem
- 2) native shrubland in intact ecosystem
- 3) native grassland in an intact ecosystem
- 4) cleared land with revegetation

### a) Wildlife and plant surveys

In natural, intact ecosystems, volunteers will learn to recognise tracks, digs, burrows, scats and traces of echidnas, goannas, kangaroos, bandicoots and feral species. They will also be made familiar with the most common native and introduced plant species. Habitat usage in intact ecosystems will be determined by surveying transects of 50 x 50 m and recording all animal signs.

When possible, similar sized areas will be surveyed in the other 2 sites. Vegetation density and diversity will be recorded along permanent transect lines at all sites.

## Microclimate Monitoring

Long term microclimate monitoring is being conducted using micro weather stations set in permanent positions at each of the 4 survey sites. The weather stations record air temperature, humidity, ground temperature, solar radiation and wind speed. Rain gage cylinders will be emptied bimonthly. Teams use hand held anemometers to determine wind speed at different elevations and locations (i.e., effect of vegetation) within the survey sites. Temperature and humidity data loggers will be placed in the field for a week at a time in sheltered and exposed parts of the habitat to determine the role of vegetation and to compare different areas. Hobo data loggers (temperature and humidity) are placed outside the entrance of goanna burrows and the smaller iButton® data loggers are placed inside to monitor temperature. Loggers are also used to monitor microclimates at echidna nursery burrows when found. Data are entered into a database to establish and compare microclimate profiles for different areas and seasons.

## Impact and Management of Invasive Species

At all survey sites, presence of feral animals are identified by tracks, scats and other traces (e.g., dead wildlife). Echidna nursery burrows and goanna egg mounds in all habitats are closely monitored for disturbance by predators. Cat scats are collected and their content analysed. Depending on frequency and freshness of scats, live traps will be set to assess and monitor numbers within the survey areas.

During all surveys, invasive plant species are identified. Teams may be assisting with the removal of feral plant species without the use of herbicides or pesticides.

#### **4. Application of Results**

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At a local level, we personally share results and information with conservation, educational and government groups through workshops slide lectures and on-site information days. Pelican Lagoon Research & Wildlife Centre is actively involved with education at the three local Kangaroo Island community schools. Each year programs about the ongoing research are given during Environment, Volunteer, Maths and Careers Week. A number of local students are directly involved through work experience programs or participation in special workshops on biodiversity and environment. The research centre also participates in community forums, providing facts and background information on issues from road kills to revegetation.

Information resulting from the research has been published in scientific journals as well as popular science magazines, newsletters, newspaper articles and on the web.

Numerous radio interviews covering all aspects of the research have been reported on local, national and international stations throughout the years. There has been participation in national or international film or video media nearly every year.

Our long term documentation of echidna life history has led to reviews and changes in State and Federal Government policy about permanent removal of any native species from the wild that does not breed readily in captivity. In the past 7 years, numerous local councils in South Australia and other parts of the country have erected echidna road-crossing or wildlife warning signs on motorways that communities have designated as hazardous to echidnas based on the number of road kills. Our findings are also being consulted for local and regional formation of new policies on feral cat management and policy for regulating the height of the lowest live wire on an electric fence.

Due to findings from this project, government and community animal rescue/care groups are establishing policies of non-interference with echidnas found in suburban areas. Community education provided through these groups, especially with regard to the relocation of echidnas, has probably saved the lives of many animals. Documentation of echidna activities and habitat use is having a direct positive result on policies concerning captive husbandry. The project provides echidna natural history facts to a number of international zoos that have echidnas. Through habitat enrichment, zoos have increased echidna visibility, hence increasing the educational potential for the greater public. In addition, decreasing noise and/or changing diet has increased breeding behaviour in some captive animals. There is to date no successful echidna breeding program in the world (i.e., no progeny of captive bred animals have yet reproduced).

Biological findings from this project resulted in the IUCN (International Union for the Conservation of Nature) changing the status of all short-beaked echidnas from "common" to "near threatened" in the lower risk category. This lead was not followed by the ANCA (Australian Nature Conservation Agency), which only listed the Kangaroo Island echidna as "near threatened". We have currently been asked to provide input for a "Review of the status of threatened species in SA" for the reassessment and reclassification of the short-beaked echidna at a national level.

News of this project and what we have learned about the short beaked inspired a PNG (Papua New Guinea) student to apply our field methods to research the world endangered long-beaked echidna. Mike and I joined Muse Opiang, a local PNG student, in the field in 2003. We are currently consulting with PNG conservation groups and wildlife authorities about establishing long-term research and a policy for protection of the long-beaked echidna at the local level.

Internationally, data from this project reaches thousands of people a year through the educational web site: <http://www.echidna.edu.au>. The book, *The Echidna, Australia's Enigma*, which resulted from Earthwatch assistance has been the basis for innumerable school projects from primary school to university and is used as part of the biology/wildlife management curriculum at some universities, as is the documentary film, *Echidna the survivor*.

Through e-mail we provide factual, up-to-date information and photos to students, schools, and educational institutions around the world, as well as material through the media and on-line classrooms. This project provides students from various disciplines and universities opportunities for projects at honours, master, PhD and postdoctoral levels.

Of the many volunteers participating in this project, a great number have taken educational components back to their jobs, communities or homes.

Skills such as radio tracking, mapping, survey and other hands-on field methodologies learned on this project are now being implemented in 'home town' conservation projects across the globe. Teachers from around the world have integrated the echidna and goanna icons into maths, geography, art and literature as well as ecology, environmental studies and conservation curriculum.

Because of the echidnas' and goannas' links with the land, they have provided international communities with working models about the role of wildlife in sustainable land husbandry and biodiversity. Economics students have even based course work on this project, examining the value of wildlife as a natural resource on the cash flow into communities.

Sustainable research and living examples gleaned from this project have been adopted by volunteers in their community groups, businesses and homes. Simple, effective and practical applications of solar power and water management show how research and daily living can be conducted with minimal expenditure of costly environmental resources.

Within the local business community, especially in the area of tourism, the echidna is viewed as an incentive species, which generates repeat business. Locally and nationally, echidnas have had positive and measurable benefits on regional tourism. During the course of this project we have developed specific transmitters and data loggers, which are being used by other colleagues, thereby supporting small Australian businesses. Field methods developed with the assistance of Earthwatch teams have lead to portable and practical energy systems for operating field labs and facilities.

The national socio-economic value of the echidna has risen because of the media and public awareness generated by this project. Echidna likeness on clothing, household articles, cards, coins, stamps and in the form of paintings, glass, ceramics, jewelry, sculptures and toys has increased exponentially since inception of this project because of documentaries such as *Echidna the Survivor* and other publicity. Echidna status has risen to the point that it is used to advertise high profile vehicles such as Mercedes and promote mineral exploration companies.

Data collected on this project has formed a sound biological/ecological foundation to base further studies on. These include not only our direct field studies, but also the involvement of other disciplines that rely on field samples for laboratory work. We have learned and documented a lot about echidna biology, but there are still numerous areas that need further investigation. These include communication, hearing, social structure and fate of the young. For Rosenberg's goanna, there are still many basic biology questions (i.e., growth rates, age of sexual maturity, longevity, effect of termite mounds on eggs) that have not been answered. Continued life history documentation of known individual echidnas and goannas is the only way to answer questions relevant to the conservation and sustainability of these species.

Based on accumulated knowledge, the ongoing research activities expand the echidna and goanna research to encompass habitat restoration for conservation. This promotes more understanding of species (including human) interaction with the environment, encourage responsible land management and engage people in sustainable practices. People are keen to revegetate and encourage echidnas and goannas back onto their land. Investigating the dynamics between echidnas, goannas and their environment will provide new tools for scientists and community to assess revegetation, habitat restoration, and soil biodiversity at a local, state and national level.

In addition, with our present level of knowledge, we will gain a better understanding about the ecological balance between microclimates and survival of native species as well as how humans can positively alter microclimate for species survival.

## **5. Field Training**

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Volunteers receive training in the use of radio-telemetry and monitoring equipment by the PI and on-site staff. Other on-site briefings with practical field applications include:

- use of a compass and GPS
- basic mapping techniques
- contour and aerial photograph interpretation and
- habitat and vegetation identification within the research site.

Participants learn to identify tracks, scats and other traces of native and feral wildlife. All teams assist in placement of specific field equipment for measurement of microenvironment data and body temperature monitoring. Each team assists with data input collected while tracking, observing. Where applicable, team members become involved in the day to day maintenance and practicalities of sustainable living.

There are opportunities for presentations about echidna and goanna biology and informal round table discussions during the weekend. Through these talks, you will be introduced to field methodologies and different aspects of the past and ongoing research, as well as background information on Kangaroo Island biodiversity, geology, wildlife communities and topics related to echidna/goanna ecology research.

## **6. Volunteer Assignments**

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You will be involved in some of the following tasks depending on the research schedule (please note you may not be able to participate in all of these activities in a weekend program):

- Wildlife surveys for tracks, scats and traces of echidnas, goannas other native species and feral animals in different ecosystem sites
- Plant surveys
- Collection of climate data using hand held instruments and data loggers (eg air and ground temperature, rainfall, humidity, wind speed, etc) in natural native habitats and in revegetating areas
- Surveys and monitoring echidna and goanna activity
- Searching research area for new echidnas and goannas or animals who have shed their transmitter
- Radio tracking of animals to record location, habitat, vegetation types, microclimate and activities
- Mapping of animal locations, and entering data into computer database
- Monitoring termite mounds for goanna activity
- Monitoring of cat traps

Except for patience, no special skills are required for this project. Volunteers must be capable of walking 10-15 kilometres (6-9 miles) each day with a small rucksack containing field supplies weighing about 6 kg (14 lb) plus any personal equipment (camera, etc.). Volunteers will walk along rocky tracks with **loose stones** and along natural wallaby trails over low, rolling shrubland and eucalyptus woodland. Radio-tracking echidnas or goannas through dense bush can be demanding. Anyone who is reasonably fit, has good hearing and eyesight (with or without glasses), will be able to participate and have a good time as well.

### **Recreational Time**

Earthwatch has a duty of care to our participants from the rendezvous to the end of the expedition. In order to ensure you are as safe during your recreational time as you are during research time, we have put a number of measures in place.

- If there is a recreational day during the expedition, the project staff will offer either a planned team activity or a small choice of recreational activities that have been vetted and comply with Earthwatch standards. You will also have the option of remaining at the project accommodation to rest. All participants are strongly encouraged to take part in the group activity, but if you are determined to pursue other options you will be asked to sign a release before doing so, stating that Earthwatch is not responsible for your welfare.
- When there is a period of free time scheduled into a regular research day, the staff will ask you to sign out of the project (using a means which may vary by project and project location) if planning to leave the group. This will include your destination and estimated time of return. If participants do not show up to the next activity the project staff will then know where to begin a search.

In the evenings when you can go out at night, you will again be asked to sign out of the project as above. The project staff will give you 24-hour contact information

for them should assistance be needed. The sign-out is informational only and will not be used to enforce a curfew. Please be aware that project staff would not start a search until the following morning or the next scheduled activity unless contacted for help sooner.

## 7. Project Staff

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**Peggy Rismiller** has more than 25 years experience as an environmental physiologist and wildlife biologist. She is an experienced Earthwatch Principal Investigator, who has worked with Earthwatch volunteers on Kangaroo Island since 1988. Peggy completed her Ph.D. in biology/environmental physiology at the Philipps University in Marburg, Germany and was the first woman to receive the university's Science Dissertation Award. A post-doctoral position at the University of Adelaide brought her to Australia in 1988 to work with tiger snakes (a live bearing reptile) and echidnas (an egg laying mammal). After a short research interlude back to Germany in 1990, she returned to Australia to stay. Since 1991 she has been a Visiting Research Fellow in the Discipline of Anatomical Sciences, University of Adelaide and Senior Research Scientist at Pelican Lagoon Research and Wildlife Centre.

Peggy's professional studies centre on whole animal physiology, ecology and how animals interact and help shape their environment. Of special interest is how photoperiod and climate affect biological processes and species survival. Her other interests include puppetry, magic, aboriginal history, native bush tucker and herbal medicine. Peggy is responsible for research methodologies, logistics and organisation of the echidna/goanna Earthwatch project as well as analysis of all data collected. She instructs volunteers on the use of tracking equipment, behavioural observations, and physiological measurements, as well as provides encouragement in the kitchen with one of the many Research Centre cookbooks. She resides full time at the Pelican Lagoon Research and Wildlife Centre on Kangaroo Island.

**Michael McKelvey**, manager and full time resident at the Pelican Lagoon Research and Wildlife Centre, has lived on Kangaroo Island for over 30 years. Originally from California, he completed a B.Sc. in biology in the USA. This was followed by an apprenticeship in large format photography and a position as magazine editor. He has travelled the world and worked as a ship's cook, museum proprietor, photographer and jackaroo (to name a few) before establishing the Pelican Lagoon Research & Wildlife Centre in 1982. Mike is responsible for all the solar equipment and maintenance that keeps the research facility running.

He shares the insights of sustainable power and water conservation with volunteers. In addition, he instructs volunteers in the use of a compass, interpretation of aerial photographs, drafting, field mapping and maintenance of field equipment. Mike also familiarises volunteers with signs of echidnas and other native animals and shares his vast knowledge about Kangaroo Island's history, bird life and colourful characters.

## 8. Research Area

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Kangaroo Island from the air

Kangaroo Island (or K.I. as it is usually referred to) is the third largest island in Australia. Located off the south coast of South Australia, the island is approximately 150 x 50 km, with a population of about 4000 people. The largest population concentration is in the township of Kingscote, approximately 50 km by road from the research area. The research site is located on the north shore of Pelican Lagoon, an aquatic reserve and is near the east end of Kangaroo Island. Expanses of intact habitat including natural mallee woodlands, shrubland, ephemeral fresh water and intertidal swamps are found on this island.

The Pelican Lagoon Research & Wildlife Centre is privately operated. It is totally self-sufficient, with solar power and natural rainwater collection for all cooking, domestic and sanitary needs. Pelican Lagoon Conservation Park borders two sides of the Research Centre with the aquatic reserve bounding the southern shoreline. The Research Centre and most of the adjacent study area are vehicle free spaces, and adhere to a strict carrying capacity (number of people working in the area at any one time) so ecosystems have remained intact. The Island and Pelican Lagoon in particular, is known for its ecosystems and wildlife that inhabit the area. Although there are no animal species on Kangaroo Island that cannot be found elsewhere in Australia, wildlife behave differently on Kangaroo Island because of the intact habitats. The island has a lot of intact habitat because there are no rabbits or foxes. We refer to Kangaroo Island as "a biological window in the past". Here you can observe plants and animals much as they were 200 years ago, before European settlement. Kangaroo Island's Aboriginal and European history will be explored and discussed during your stay.

At the primary study area, over 130 species of birds can be observed during the year. The majority of the Island's native mammals, including the restricted-range Tammar wallaby and the shyer pygmy possum, are also in the area. There are few conspicuous amphibians and reptiles, with the exception of the large varanid lizard, Rosenberg's goanna, and some diminutive geckos and skinks. Recent work by a local field botanist has increased the recorded number of the island's vascular plants from 790 species to over 1,000. Included in this increase were several species new to taxonomic science. For nine to ten months of the year, some of the island's 60 known orchid species are in bloom. Many of these orchids occur in and around the primary study area.

The climate on KI is considered Mediterranean, but being an island conditions can vary quickly. During the summer (February) echidna/goanna expedition we expect day/nighttime air temperatures to range between 40° and 15°C (100 - 58°F). Some nights are warm and pleasant enough for sleeping outside if you enjoy watching the southern constellations! June – August are our winter months and night temperatures can be cool (5°C/40°F), however daytime temperatures are often a pleasant 15-20°C (58 - 69°F). Humidity ranges from 40-100%, drier in the summer and wetter in the winter. Pelican Lagoon has an annual average rainfall of 500 – 580mm (20 - 22 inches) . We generally experience our heaviest rainfalls between June and September, with a general pattern of alternating rain and fine days. Because of the island conditions, there is almost always a nightly dew, which leaves the shrubland bespangled in dew drops early in the day.

The highest point on the island is approximately 300m (900 feet)) above sea level. We will work mainly between sea level and 60m (200 feet).

The infamous white pointer shark has been declared an endangered species and can be seen at certain times of the year around the island. Tiger snakes inhabit the island, but they are shy and generally seen only after some diligent looking. The greatest "danger" lies in accidentally standing on an ant nest! We have several species of ants that have an additional surprise to the normal nip of their pincers. These species also sting! However, it is more annoying than anything serious, unless the victim has a definite allergy to bee or ant stings. Your senses may feel challenged if you go out in the bush without your compass, but weekend participants will not be venturing out alone.

You will have the opportunity to observe Western Grey kangaroos and Tammar wallabies close up. On our travel back to the airport we'll view some of the beautiful, rugged coastlines and walk one of many secluded beaches punctuating the landscape.

## **10. Travel Planning For Discovery Weekends**

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Kangaroo Island can be reached by light plane or by ferry.

### **BY PLANE**

A short 30 minute flight in a light plane from Adelaide brings visitors to Kingscote Airport on Kangaroo Island. **If flying, it is recommended that volunteers catch the following flight in order to be at the rendezvous on time.**

Depart Adelaide on **REX** Regional Express flight at 5.25pm on the Friday evening.

Arrive Kingscote airport, Kangaroo Island at 6.00pm.

### **REX**

Regional Express flies 7 days a week between Adelaide & Kingscote  
Reservations:

Toll Free                    1300 664 080

Fax:                            (08) 8217 6132

Email:                        [reservations@regionalexpressholidays.com.au](mailto:reservations@regionalexpressholidays.com.au)

For lowest fares you can book on-line at: [www.rex.com.au](http://www.rex.com.au)

If you choose to fly, you will be travelling in a light plane so try to avoid excess baggage. **Luggage restrictions are 15 kg per person.** We will not have time to return to the airport next day for following luggage.

OR:

Depart Adelaide on **Air South** at 5:30pm on Friday evening

Arrive Kingscote airport, Kangaroo Island at 6:10pm

**Air South** contact: Freecall: 1800 339 629

Book on line at: [www.airsouth.com.au](http://www.airsouth.com.au)

Luggage restrictions are the same as REX

## **BY FERRY**

If you have time to travel around the island before or after the weekend and want to bring a vehicle, you might like to consider taking the ferry.

### **KANGAROO ISLAND SEALINK**

This operates the new *Sealion 2000* and *Island Navigator*, two large ocean-going, vehicle and passenger ferries between Cape Jervis (mainland ferry terminal) and Penneshaw (Kangaroo Island ferry terminal). Four departures daily (additional services during peak times).

Travelling time is 40 minutes (*Sealion 2000*) to 1 hour (*Island Navigator*). Coach connections are available from Adelaide to Cape Jervis ferry terminal on the mainland. Cape Jervis is approximately two hours drive south of Adelaide.

You can bring your vehicle from the mainland by KI Sealink ferry or you can hire a vehicle from the airport or Penneshaw. Four wheel drive vehicles are not necessary.

Once there, apart from the free shuttle bus which runs between Kingscote and Penneshaw, public transport is almost non-existent, so your own vehicle would be a definite advantage. Drive time from Penneshaw to Kingscote airport is approximately 55 mins or 70kms.

Reservations: 13 13 01  
Fax: (08) 8202 8666  
Email: [bookings@sealink.com.au](mailto:bookings@sealink.com.au)  
Website: [www.sealink.com.au](http://www.sealink.com.au)

## **Departure**

Peggy and Mike will drive everyone back to the Kingscote airport on Sunday evening, in time to meet the Rex or Air South flights, both depart at 6:30pm. People flying back to Adelaide on the Sunday evening will need to book this flight. You will arrive back in Adelaide at approximately 7.05pm. ***Ongoing flights from Adelaide should be booked from 8:00pm onwards.***

## **Late Arrival**

Because this is a three-day project there is no room for late arrivals. REX often does not have a later flight and no guarantee they can get an extra passenger across the next morning. Miss Friday flight, miss the weekend.

**If you have any difficulties or miss your flight please phone Pelican Lagoon on 08 8553 7174. You can also contact the Melbourne Earthwatch office.**

The Research Centre	(08) 8553 7174
REX Regional Express	13 17 13
(International Residents)	+61 2 6393 5550
Earthwatch Institute Melbourne (9am – 5.30pm)	(03) 9682 6828
Earthwatch Institute Melbourne after hours emergency	(03) 9625 0822

## **11. Daily Schedule**

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We will time our activities around those of the echidnas and goannas. How early and how active they are depends on the season and the weather.

Generally we rise shortly after dawn (earlier in the spring and later in the winter) and enjoy morning coffee/tea and breakfast before beginning the day's activities. The workshop activities will introduce much of the routine field work and take advantage of what is happening at the moment. We will track, search or monitor specific animals on foot throughout the day and sometimes at night. This is done in shifts with a rotating schedule for all involved. Some tracking, observing and monitoring may be made at odd times of the day, involving arising before sunrise or observing some animals at night.

We will return to the centre for lunch (during longer stays, some volunteers prefer taking a lunch and staying with their animals). After lunch we'll return to the bush for monitoring and survey work. The evening meal is usually about 7:00 p.m. After dinner, there will be a daily debrief and discussion time. Some previous team members have used evenings repairing, refining and even modifying or designing new field equipment used in this study. Brainstorming and inventive genius are welcome.

## **12. Team Development**

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The catalyst for the esprit de corps of teams is the enthusiasm brought by each participant. One immediate reward is the chance to explore a new, natural setting involving sustainable research and lifestyle with others who have a common interest. Staff and volunteers remain together throughout the project and share daily research and household tasks. As the bush becomes familiar team members may see themselves as detectives, trackers or behaviourists. Jointly, each team gathers new, original data and makes new contributions to the understanding of long-standing echidna questions. Joint interpretation of data and imagination in the development of scientific field equipment are a positive part of the team atmosphere. Slide shows, brainstorming and speculation of team members are enjoyed activities.

On Sunday we will try to leave early for the airport in order to explore a couple areas of interest on the island. We may walk a beach on the Southern Ocean or search the trees for introduced koalas.

## **13. Accommodation**

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The Pelican Lagoon Research & Wildlife Centre is a small private facility that has grown over the years through the efforts of the researchers who use it. Here, emphasis has first been on sustainable research, living, and the natural environment. Please note: Due to fire regulations of the area, there is NO SMOKING at the Research Centre. Volunteers sleep in continental-style tents

with off the ground beds or a small cabin (beds and pillows provided; however, volunteers will want to bring their own sleeping bag and pillowcase). Males and females bunk separately. Sleeping areas are shared with other volunteers. If you are a light sleeper it may be wise to bring ear plugs. Separate provisions for couples can be made, but we must have prior notice to arrange a private continental-style tent.

The large, comfortable dining/work area is furnished with a wood stove for heating, gas cooking facilities, and solar-powered 12-volt DC electricity, **no** 240 or 110 volt AC! Video/camera batteries can be recharged using 12 V DC car adaptors. Please bring your own specific charger with car adaptor. If you have any questions, please contact us ahead of time.

The shower house is simple but functional with gas-heated water during the winter months. During the summer fire ban season, solar heated shower bags are used. There are conventional flush/septic toilets, plus a thermophilic composting loo. Because all of the water used at the Centre is collected (and treasured) rainwater, no laundry is done there.

## 14. Food

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A cook will prepare meals. Every one will help with the clean up.

**Breakfast:** self-serve with fruit juices, cereals, muesli, toast, coffee (decaf and regular), tea, fresh fruits, milk and Island yoghurt.

**Lunch:** may be hot or cold depending on the time of year and creativeness of the cook.

**Dinner:** red or white meat, fresh vegetables of the season and canned goods to complement main courses and fruit or some other dessert.

A selection of juices, cordials and a taste of Australian wine or beer will be provided with evening meals.

People with special medical diets, vegetarians or those with specific allergies should indicate in advance both on their application forms and when talking to their Expedition Manager, so that appropriate arrangements can be made. **Non-meat diets can be provided only if we have prior notice!!** Vegetarians - please indicate what type of vegetarian you are, including 'flexible'! The island is short on corner supermarkets and shopping centres, which means we are in the habit of doing bulk shopping "over in Australia", and that involves a sea trip and hours of driving. Whenever possible, we try to use locally grown fresh vegetables, eggs, fresh milk and cream. If you have a favourite treat or secret food fetish, you will have to provide these for yourself.

## 15. Physical Conditions

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### Overview

You must be able to walk for several kilometres (an average of 5-10 km) a day over rolling, loose rocky terrain. Finding echidnas in the bush can be demanding at some locations, but once one is located, all fatigue is forgotten! All participants should be able to comfortably carry light loads in a day pack (tracking receivers, notebooks, echidna bag, etc. average 4-6 kilograms) and be able to work in a kneeling position. For the weekend projects, the physical demand will be slightly less, due to time constraints.

In past seasons perhaps the most consistent casualty of physical conditions has been rain clothing! Volunteers work in natural scrubland that has not seen the impact or thinning effect of the introduced rabbit. This really makes a difference to lightweight rain trousers and spray jackets. Gore-Tex, though stylish, often does not fare well in these conditions. For wet weather, we find old-fashioned, heavy duty waterproofs (oil skins or rubber) very good. During the winter it is wet from the knees down even without rain. I wear gaiters.

## **16. Field Communications**

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Postal address: Pelican Lagoon Research and Wildlife Centre  
Penneshaw, Kangaroo Island  
South Australia 5222  
Australia

Telephone: International: +61 8 8553 7174  
National: 08 8553 7174

Solar sourced E-mail: [echdina@kin.net.au](mailto:echdina@kin.net.au)

## **17. Field Equipment**

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***Remember to bring 15kg maximum!***

- Warm sleeping bag and sleeping sheet, pillowcase
- Comfortable Hiking clothes (long sleeves and long pants) with warmer clothes for the evening
- Towel
- Wet weather gear! Rain jackets or oil-skins are best. Plastic coats can be as wet inside as on the outside. Plastic does not survive well in the bush.
- Walking shoes, ankle high running shoes or light weight hiking boots (NO heavy or corrugated shoe soles)
- Broad brimmed hat (for sun and rain protection)
- Small day pack
- Compass
- Torch (with new batteries)
- Plastic water bottle
- Camera, film, binoculars
- Toiletries, including insect repellent (biodegradable, if possible)
- Any special personal snacks you need

## **18. The Reading List**

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### **Books**

These books summarise practically everything known about monotremes. They are written by the world's foremost authorities on these animals and provide a complete, scholarly introduction. All of these and more are in the Research Centre's library.

Rismiller P 1999. *The Echidna, Australia's Enigma*. Hugh Lauter Levin Associates, Connecticut. ISBN 0-88363-788-X.

This book is a result of 10 years of research with Earthwatch volunteers. Lots of pictures and factual information written for the general public.

Augee M and Gooden B 1993. *Echidnas of Australia and New Guinea*, Aust. Natur. Hist. Series, NSW Univ Press.

General information about echidna biology.

Augee M (ed) 1992. *Platypus and Echidna*. Royal Zoological Society of New South Wales. A collection of symposium papers, including many on reproduction and behaviour.

Griffiths M 1968. *The Echidna*. Pergamon Press, New York.

Griffiths M 1978. *The Biology of Monotremes*. Academic Press, New York.

Goanna book:

Green B and King D 1993. *Goanna, The biology of varanid lizards*. New South Wales University Press. Kensington, NSW

### **Articles in magazines and journals**

Stewart, D 2003. The enigma of the echidna. *National Wildlife* Vol 41 (3):36R-36X

Rismiller PD 2000. The echidna enigma. *Geo Australasia* Vol. 22 (4):25-32

Rismiller PD 2001. Echidnas: Secrets beneath the spines. *BBC Wildlife* Vol. 19 (1):30-36

Heilbuth, B 2001. Just call me Spike. *Australian Reader's Digest* Vol 12:52-60