

# EARTHWATCH INSTITUTE FIELD REPORT

**Project Title:** Echidnas and Goannas of Kangaroo Island

**Principal Investigator:** Peggy Rismiller

**Position/Affiliations:** Department of Anatomical Sciences, University of Adelaide,  
Adelaide South Australia 5005  
Pelican Lagoon Research & Wildlife Centre, Penneshaw, South Australia 5222

**Research Site (geographic location, include coordinates if known, e.g. Lat/Long):**  
Pelican Lagoon Peninsula (35°47'S, 137°47'E)

**Local Management Status of the Research Site:** Educational land trust, free hold, crown land and state conservation park are all part of the study area on the Pelican Lagoon peninsula

**Scientific names of primary species being studied:**

Short-beaked echidna (*Tachyglossus aculeatus multiaculeatus*)  
Rosenberg's goanna (*Varanus rosenbergi*)

**Key Research Objectives:**

- Continued life history documentation of known echidna and goanna individuals in populations inhabiting the Pelican Lagoon peninsula
- Further investigate temperature and humidity in the incubation chambers for Rosenberg's goanna eggs, ie termite mounds
- Monitor body temperatures of Rosenberg's goanna and temperatures within the micro habitats they utilize
- Collect microclimate data in human altered and natural environments
- Continue collection of material in search of the echidna 'finger print'
- Survey and monitor plant regeneration and presence of wildlife in recent fire area
- Link data from living models in the natural environment to the collective communities' actions toward sustainability

**Data Collection and Results**

a) Give a concise account of the data you have collected during the past field season. During the 2006 field season volunteers:

- found two new subadult echidnas

- radio tracked one young hatched the previous year, three subadults and four adult echidnas
- located and marked 36 new goannas (17 females, 10 males, nine subadults)
- relocated 24 known goannas including five subadults
- collected body temperature and microhabitat data from four goannas
- observed and documented courtship behaviour in four pairs of goannas
- located, measured and mapped 11 different egg incubation termite mounds
- placed temperature and humidity data loggers in six egg mounds and six control mounds
- conducted quarterly plant and wildlife surveys in four different locations
- conducted four surveys at a fire site
- analysed palates from 12 road killed echidnas

b) What progress have you made towards achieving your original objectives?

A key objective in documenting the life history of Rosenberg's goanna has been to learn about growth rates and age of sexual maturity in the wild. With the recapture of two known aged goannas this year, we have made huge progress towards achieving this goal. The capture of nine new subadult goannas has added significantly to our data base of weights and body size parameters for surviving subadult animals. Another goal in documenting goanna ecology was to learn more about the termite mound incubation chambers and the conditions inside the mounds that lead to successful egg hatching. We have, for the first time, been successful in monitoring both temperature and humidity in egg incubation mounds as well as in control mounds. More progress has also been made in monitoring body temperature of goannas throughout the year and how body temperature relates to environmental conditions. These data add significantly to the base knowledge gleaned over the past 40 years.

More information was won about the duration of lactation in echidnas and about the movements and activities of a young echidna after weaning. Dissection of road killed echidnas added new figures to our growing database about seasonal size of reproductive organs. Palates were taken for analysis and will be integrated into our search for the echidna fingerprint.

Advancements have been made integrating GPS data into the established databases for mapping animal activities, burrow sites and other land marks of distinction. Although we were not successful in using the ESRI program, we found practical GPS programs that allowed us to develop user friendly applications for this and community based programs.

In addition to ongoing wildlife and microclimate surveys in native and human altered habitats, we used the opportunity of a January lightning fire to survey and make comparisons with other sites. The natural progress at the fire site is adding new dimensions to surveys being conducted at the other sites.

c) Please provide a summary of your results.

One of the greatest achievements of the 2006 season and one that highlights the importance and relevance of long term monitoring was the retrieval of two goannas of known age. These animals have been too small for internal transmitters. A tail transmitter has been used on the animal known as Yearling, but tail transmitters are

shed as the animal grows and sheds its skin. It is only through volunteers' watchful eyes in the field that we now have some yearly growth points as well as some comparative data with other individuals. Figure 1 (appendix) shows the snout-vent (SV), vent-tail (VT) and body mass of goanna Yearling who hatched in 2001. As a comparison, Figure 2 shows the same parameters, but at longer intervals of a goanna hatched in 2000. It is evident that both goannas are approximately the same length, but that Yearling is significantly heavier than the other goanna that is a year older. Neither goanna has been sexually active, and we still cannot determine their genders. Six years' documentation has not been long enough to determine the age of sexual maturity or if males and females grow and become sexually mature at different ages. The 2007 goanna breeding season will shed new light on these questions.

Long term monitoring of egg mounds and their fate is providing information not only about the success rates of hatching, but also about numbers of individuals breeding each year. We are also seeing that the number of mounds marauded varies from year to year and that this event is not related to the total number of eggs mounds in any one year (Figure 3, appendix). These long term data also pose questions about cycles in the success of goanna breeding. This possibility has not shown itself in previous short term studies.

We have had some success in past seasons monitoring temperature in the termite mound and goanna egg incubation chambers but have only had limited success in monitoring humidity. This year, using new ibutton data loggers, we were able to collect data in both termite mounds with and without eggs. The microclimate outside mounds was also monitored in order to evaluate how/if the termites are controlling temperature and humidity inside the mounds. Figures 4a and 4b are examples of the data retrieved from one egg mound where eggs successfully hatched. We won't know what it all means until data from all mounds has been analysed and repeated in another season.

Figures 5 and 6 show examples of how GPS data were used to map the movements of a one male goanna (Figure 5) and the explorations of a young echidna (Figure 6) after it was weaned and left the burrow. Figure 5 shows daily movements of a goanna just prior to the breeding season over a two week Earthwatch period. Other data points indicate where he was found outside of the breeding and courtship period. Results indicate that goannas have a much larger home range than previously believed. The movements of the young echidna after weaning (Figure 6) are typical of what we have documented in previous years for other young echidnas. It would wander away from the nursery burrow, sometimes over a kilometre on any one day and then return to the area again. Unfortunately this animal shed its transmitter before leaving the peninsula.

### **Significance/Benefits of Research**

- a) What is/are the significance/benefits of your research at the following levels?
- Local

Kangaroo Island is known as 'Nature's Island' because of the 'visible' wildlife. The unique behaviour of our wildlife lies in having intact ecosystems. Wildlife and the associated habitat are of utmost importance to the local economy. Echidnas have become vulnerable and Rosenberg's goanna nearly extinct in their natural range on the mainland. At a local level this research is providing information and educational tools for the community. This is used by landholders who are revegetating and attempting to

attract native wildlife, as well as by tour operators educating and entertaining national and international visitors.

- national

This project purposefully combines scientific knowledge with the collective knowledge of the greater community. Empowering the community with increased knowledge and experience allows them to get on with the necessary jobs in practical ways and to implement direct actions.

Data from this research is being shared with Threatened Species Networks and Land Care groups. Both groups confer directly or indirectly with federal ministers and members who seek a better understanding about biodiversity and the role of native wildlife. We often find the direct community involvement to be more effective, efficient and better received than initiatives from central departments.

- international

Data from this project is directly benefiting captive breeding programmes for both species being researched. Our resources have been used in international educational publications such as wildlife encyclopaedias, as well as general tourism material for the global community. It has and continues to provide correct and factual information about two Australian species whose vulnerability is assessed by the IUCN.

b) How do your findings contribute to issues of sustainability?

The Echidna and Goanna project functions through practical sustainability. Using sustainable research and sustainable methodologies we are investigating one of the world's most endangered mammals and an ancient species of reptile. Findings concerning the survival strategies of these two species show that they are models for sustainability. In addition to the research and scientific findings, all participants are submersed in a sustainable living atmosphere that has existed here for over 30 years. Their first hand experiences in sustainability often significantly influence their personal lives.

## **Dissemination of Results**

a) Have you provided details of results from your research to or within:

- Scientific papers

Rismiller, PD, McKelvey, MW and Steinlechner, S. (2006) Temperature and Humidity in Egg Incubation Mounds of *Varanus rosenbergi*, Mertensaiilla, (in press)

- Management plans and reports

New Kangaroo Island Dog and Cat Management plan. Implemented by Kangaroo Island council in 2006

- Popular articles or films

In Progress: goanna documentary and educational videos

NHK television Japan, Nature documentary goannas February 2006

Asia Television, Hong Kong. Wildlife Documentary, December 2006

- Presentations

Puggles, Finger Prints and Cultivators. Adelaide & Mount Lofty Ranges Natural Resources Management Board, Mt. Pleasant, SA. July 2006, 80 participants

Echidnas and Goannas as Cultivators. Angas & Bremer River Catchment Groups, Strathalbyn, SA. July 2006, 40 participants

Echidnas at Home. Mid Murray Local Action Planning Committee, Mannum, SA, October 2006, 50 participants

Biology, Rescue and Care of Short-beaked Echidnas. Hawkesbury WIREs Echidna Course. Tafe Uni, Richmond, NSW. November 2006. Limited to 50 participants

We're just warming up: how to compare arousal rates in different species. 23<sup>rd</sup> Meeting of the Australian and New Zealand Society for Comparative Physiology and Biochemistry. December 2006. Joint presentation with N. Andersen, S. Nicol. P. Rismiller and T Ruf

- Books, chapters, illustrations

Rismiller, PD. 2006. Biology, Rescue and Care of Short-beaked Echidnas. Publication written for WIREs workshop November 2006

In Progress: co-authoring revision of goanna book

Understanding Biotechnology. Contribution in chapter 1, Publisher, Oxford University Press (in press)