



Journal of the Scientific Expedition Group Inc. Volume 35 No. 4 March 2020

Scientific Expedition Group Inc.

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Cover Photo: Flinders Red Cliff. Mangroves in Spencer Gulf at High Tide. Matthew Flinders climbed this cliff in March 1802 and took sightings of points in the ranges now named after him. Photo AALBG.

Rear Cover Photo: Australian pelicans are nomadic and have been recorded flying 3200 kilometres over a nine month period. Photo: Greg Johnston The Scientific Expedition Group is a not-for profit organisation which began in 1984. SEG undertakes several expeditions each year to record scientific information on wildlife and the environment in many parts of South Australia.

A major expedition to conduct a biodiversity survey occurs each year over two weeks. Scientific experts lead volunteers in surveying mammals, reptiles, invertebrates, vegetation, birds and physical geography. The data collected on each survey are archived with the relevant State scientific institutions to ensure they are available to anyone interested in our State's environment.

In addition to the major expedition, a number of trips for the Vulkathunha-Gammon Ranges Scientific Project are organised annually. A long term study of rainfall on the ranges and of water flow in arid-zone creeks is undertaken. All data are supplied to the Department of Environment Water and Natural Resources and to the Bureau of Meteorology and are available for analysis.

SEG conducts four-day biodiversity surveys at eight different sites each autumn and spring in the Heritage Area of scrub on "Minnawarra" farm near Myponga. Data collected are entered into the Biological Data Base of SA. SEG also conducts annual mallee-fowl monitoring over a weekend in the Murraylands.

ISSN 2208-7443

SEGments is the authorised journal publication of the Scientific Expedition Group Inc., PO. Box 501, Unley SA 5061. It is published four times a year to promote articles about biodiversity, scientific exploration and ecological research.

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SEGment



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EDITORIAL

On 1st July 2018, the Australian Space Agency (ASA) was launched, and earlier this year the Prime Minister opened the headquarters of the ASA at the old Royal Adelaide Hospital site. We are very late to the table according to the Agency's Head, Dr Megan Clarke. However, Australia is well placed to contribute much to the use of space in the future, both geographically and scientifically, building on a long and distinguished history in space projects.

On 29th November 1967 Australia launched its first satellite, WRESAT, the fifth country in the world to do so. The satellite and its scientific experiments were engineered, built and tested in 11 months, in a partnership between the Weapons Research Establishment, Salisbury SA (WRE), and the Physics Department of the University of Adelaide. Australia received a great deal of kudos from the international community, and even a "welcome to the 'Space Club'" congratulatory message from the USSR, although it was during the height of the Cold War. However, the Australian government of the day did not fund further satellite launches.

In overtures to successive Governments since the 1980's, various agencies and more recently the Space Industry Association Australia (SIAA) have lobbied for an Australian Space Agency. Australia had had a presence in space over quite a few decades, beginning with the partnership of the Anglo-Australian Joint Project signed in 1947 (which established the Woomera Rocket Range and the Long Range Weapons Establishment (later renamed WRE)), and the partnerships with the European Space Agency and NASA. Australian scientists have had scientific experiments on many of NASA's missions, and engineers and scientists have contributed to the design and testing of elements of NASA's space vehicles, including the space shuttle. Australians have gained valuable expertise in operating tracking stations and using data from multiple satellites to enhance the understanding of weather and other earth systems.

In a foreword to James Lovelock's "The Vanishing Face of Gaia. A Final Warning", published in 2009, Astronomer Royal, Martin Rees wrote that the Apollo 8 images taken by Frank Borman, James Lovell and William Anders as they orbited the moon on Christmas Eve, 1968 "raised global awareness that 'Spaceship Earth' was vulnerable, and that sustaining it was an ecological imperative".

Space offers much in terms of surveillance and intelligence for National Security, however satellites can equally be an eye from space revealing information about the earth and its environment enabling a better understanding of the land, sea and the air. A suite of weather monitoring satellites was launched by NASA in the 1960's, with Australian meteorologists being the first in the world to receive live weather images. Remote sensing satellites followed the meteorological satellites in the 1970's. These satellites provide valuable data for agriculture, mining, environmental monitoring, land-use and urban planning, water resource management, fisheries management, ocean studies, atmospheric research and **disaster management**. Over the last few months the internet has been buzzing with NASA's and other Agencies' observations of the Australian bushfires.

On New Year's Eve 2019, NASA tracked a series of massive thunderstorms generated by the fires across NSW and Victoria. The thunderstorms resulted in a smoke layer across an area of 1.75 million square kilometres moving across the Tasman Sea. By 30th January, significant amounts of smoke had landed on glaciers in New Zealand, affecting the reflective properties of the snow and will likely be the cause of increased snow and glacier melting.

At the end of December 2019, the space-borne LIDAR onboard NASA's Calipso satellite observed that smoke had crossed the troposphere and was into the stratosphere above NZ at 20 km altitude. Researchers are currently studying how long the plume will stay in the upper atmosphere, and whether there will be climate impacts at the surface.

On 2nd February 2020 the European Space Agency's Sentinel 5 Precursor satellite detected the presence of carbon monoxide emitted by the fires. Researchers do not know the consequences on the ozone layer.

Much can be learned from remote sensing satellites about the consequences and future management of disasters. Perhaps we can be grateful at this critical time in our fight to sustain 'Spaceship Earth', that these satellites now have resolution capabilities approaching military surveillance satellites.

Australia's entry into the international space arena allows us to be a full player in the fight.

https://disasters.nasa.gov/australia-fires-2020/nasa-satellitesobserve-smoke-transport-stratosphere-2020-australia-fire https://disasters.nasa.gov/australia-fires-2020/nasa-tracks-carbonmonoxide-2020-australia-fires "Australia in Space" Kerrie Doherty, ATF Press, 2017

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THE AUSTRALIAN ARID LANDS BOTANIC GARDEN, PORT AUGUSTA

John Zwar

In January 1975 I commenced working at Port Augusta as the City Council's first Parks and Gardens Superintendent. Port Augusta is 318km north of Adelaide, near the head of Spencer Gulf, and is the main service centre for the vast South Australian arid zone. Following an overseas Churchill Fellowship study tour investigating amenity horticulture in arid regions in 1979, I proposed to the Port Augusta City Council (PACC) in 1981 that a botanic garden featuring arid zone plants should be established in the city, both for its scientific and educational value and as a tourist attraction. Although not enthusiastic, Council gave me approval to investigate the proposal. There was no budget and so the help of some keen local supporters of the idea was enlisted. Over the next few years the concept was publicised in local and state media, letters were sent to politicians, presentations on the concept made to interested groups and promotional displays were mounted at events and in public places in the region. There was considerable interest and support shown by the wider community.

A fine site of more than 250 ha of crown land at Port Augusta West was identified. It included the best remaining, although degraded natural vegetation close to the city, with a range of soil types and direct access from the Stuart Highway. Part of the site was earmarked for a public housing estate, but fortunately this did not proceed. The site commands impressive views of the Flinders Ranges, upper Spencer Gulf and inland over saltbush plains to the Tent Hills.

In 1984 a Friends support group was formed and incorporated, and with an active committee, vigorously promoted the garden and commenced fund raising. Regular meetings were held and a newsletter produced. Petitions were prepared and more than 30,000 signatures of people supporting the development of the botanic garden were presented to both state and federal parliaments. In the 1980s early site clean ups and fencing were funded by the Friends group, City Council, and government unemployment relief schemes. Volunteer assistance by members of the Friends was also very important. The Friends of the Australian Arid Lands Botanic Garden, Port Augusta Inc. is one of the oldest botanic garden friends groups in Australia and is unusual in that it was formed before the botanic garden it supports was established.

After further investigation by a state government committee, support of the concept came from the state, but without financial commitment. There were occasional meetings held by the City Council to discuss the proposal with interested parties, but progress was slow and little happened for long periods. Eventually the state government commissioned a plan for the garden which proposed displaying collections of arid zone plants from around the world, but with no funding this plan lapsed.

The Port Augusta City Council established a Management Advisory Committee in 1988 to seek funding and oversee development. At this time corporate sponsor Western Mining Corporation (WMC) became interested and funded initial botanical surveys of the site. WMC then commissioned a detailed master plan by landscape architect Grant Henderson which was adopted as the basis for future development. WMC successfully put pressure on both state and federal governments to provide some funding for the garden and they made a substantial contribution as well. The City council contributed also and finally after more than 12 years \$1.2 million was available to develop the garden which it was decided should showcase the vegetation of the vast southern arid zone of Australia. The area represented includes the southern arid zone of Western Australia, the 4/5 of South Australia which is arid. Western New South Wales and a section of South West Queensland. The garden's first permanent worker, Bernie Haase, commenced in 1994 which greatly advanced site progress, aided considerably by Friends volunteers.

In February 1996 a Board of Management reporting to the Council met for the first time replacing the Garden Advisory Committee. Stage 1 of the Australian Arid Lands Botanic Garden (AALBG) opened in September 1996. The Port Augusta City Council operates and funds the garden which continues to develop on a low budget with a small number of paid staff. Up until 2004, WMC Resources provided a total of almost \$A1 million for developments in the Garden. State and federal governments have had little further input. Friends volunteers with a wide range of skills and expertise assist substantially with garden development and maintenance, plant propagation, tour guiding and working with visiting students. The Friends have provided considerably more than \$A1 million for the garden since their inception. Records of volunteer hours worked for the last few years show Friends volunteers have provided approximately \$5 million worth of voluntary labour in the Garden in that period.

The development of The Australian Arid Lands Botanic Garden has been difficult, slow and drawn out and would not have happened without the dogged persistence of the Friends group, wider community support and the substantial input of WMC Resources. The garden now has an impressive plant collection, visitor interpretive centre, meeting room and nursery facility, Arid Explorers Garden (a nature play area for children) and a research area looked after by a small number of paid staff and a group of dedicated volunteers. It plays an increasingly important role in the scientific and cultural life of the region and the state.

The AALBG is owned and operated by the Port Augusta City Council (PACC) and has become the most visited attraction in the city. It is one of few botanic gardens in South Australia outside the Adelaide area. The garden's budget is low compared with major capital city botanic gardens but



Flinders Ranges bottlebrush, *Callistemon teretifolius* with Mt Brown in the background.



Central Courtyard at the AALBG featuring plants of the Great Victoria Desert. Photo ABC, Pt Pirie.

development is of a high standard. There is a small and dedicated paid workforce of full time and part time employees, aided considerably by volunteers, mainly members of the Friends with a diverse range of expertise. The expenditure budget for the garden for 2018/2019 was \$1,581,500; expenses were \$1,706,202 and the garden generated income of \$866,147 leaving a deficit of \$840,135. Visitor numbers totalled 112,793 in 2019 and many of these are interstate and overseas visitors as well as local residents and people from other regions of SA. A recent federal government survey of tourism spending in various regional centres around Australia indicated that the Garden is currently bringing in more than \$20,000,000 annually in tourism revenue to the city. The Garden's presence and popularity has considerably improved the image of Port Augusta, which is becoming known as The Arid Garden City.

The Garden has four business areas - its popular Blue Bush Café; the unique Gift shop and adjoining native plant sales area; the nursery; and the botanic garden itself. Most of the plants needed in the Garden are propagated in the AALBG nursery along with a range of arid zone native species not readily available elsewhere, for sale to retail nurseries and direct to the public. The staff in each of these areas are employed by the PACC, but volunteers play a key role in working with paid staff to achieve projects, maintain the garden and propagate plants. The award winning Visitor Reception Building houses the very popular Bluebush Cafe which includes local native foods on the menu; a well stocked gift shop selling quality plant-related products; books and quality local craft items; interpretive display areas; an attractive small retail nursery area; and the WMC Meeting Room and Herbarium. The building is designed for the climate and incorporates rammed earth walls, verandas, polished concrete floors, plantation grown timber and is appropriately orientated for passive heating and cooling aided by evaporative air conditioning. A large bank of solar panels provides power for the building and much of the garden's electricity requirements, and all roof run-off water is collected in a large underground tank for use in the cafe and public toilets. Large windows in the cafe and meeting room provide impressive views over the extensive Eremophila Garden and saltbush plain to the Flinders Ranges beyond. A tiny pond, the gardens only water feature, attracts birdlife and lizards which can be observed at close range by cafe patrons.

The Stuart Highway intersects the AALBG, leaving a relatively small triangular section on the western side which has not been developed as garden, but instead has become the Research Area. Sites here are available free of charge to institutions or individuals undertaking research on arid zone flora with water provided if needed. A number of universities and other organisations have undertaken research at the Garden and the AALBG is acknowledged when research papers are published. Friends volunteers assist with research projects when help is required.

Initially the Friends developed and operated the nursery and sold plants to the wider community, so had regular income and made many substantial donations of equipment, materials and machinery to the garden. Some years ago Council took over the nursery which ended the Friends main income stream. Since then our ability to make large donations has been greatly reduced, but the Friends have been able to support the Council with direct loans for a large new solar array and for a new tractor. Each loan has been paid back to the Friends in instalments with interest. More recently the Friends have sought corporate donations and sponsorship for the Garden which has largely funded materials for a 7 km feral proof fence around the Garden. This is being constructed mainly by Friends volunteers with some staff and contractor assistance. Prolonged drought has attracted a large number of kangaroos, emus, rabbits, sometimes feral goats which have significantly damaged some plantings, and feral foxes and cats which prey on fauna within the garden. The original boundary fences have deteriorated and are being replaced with a much more expensive 2 m high feral proof fence with a floppy top (similar to that at The Arid Recovery Project near Roxby Downs). This will keep out grazing native and feral animals as well as cats and foxes. It is due for completion later in 2020.

Much of the site of 250 ha is retained as natural bush. This consists of open areas of slightly undulating chenopod plains, significant areas of sand dunes supporting open woodland and shrubland vegetation and some lower lying clay pan areas. The dominant tree on the dunes is *Acacia papyrocarpa*, Western Myall, the emblem of the AALBG. These beautiful long-lived trees with silvery foliage can live for more than 600 years and have hard dark red timber which was widely used for fencing and other structures on pastoral properties. The eastern boundary of the garden is the narrow upper reach of Spencer Gulf with high red clay cliffs dropping down to a beach with samphire and Grey Mangrove, *Avicennia marina* (cover photograph).

The very first area planted at the AALBG is in the north west corner of the site where there is a landscaped car park



Recent drought has resulted in a large number of kangaroos, emus, sometimes feral goats, and rabbits coming into the Garden and eating and damaging vegetation. Here Quandongs have been broken down by kangaroos and foliage eaten

adjacent to the Stuart Highway and a board walk leading over sand dunes to a lookout shelter at a high point commanding views of the garden site and the vast expanses of arid country beyond. Interpretive panels in the shelter describe the garden, wider landscape and natural history of the area. This area was developed before work began in the main garden with the aim of providing people with an overview of the garden project. It is still visited today even though separate from the main body of the garden. Although adjacent to housing along the southern boundary, most of the site slopes away and views are of wide open rangeland country and distant ranges and hills rather than urban development.

The developed sections of the garden include a large Eremophila Garden adjacent to the Visitor Reception Building with what is probably the world's most extensive Eremophila collection, and a large circular courtyard featuring plants of the Great Victoria Desert. There are extensive plantings of mixed species from the vast southern arid zone of Australia nearer the Visitor Reception Building and further out are extensive regional plantings featuring plants from various botanical regions such as the Simpson Desert and Flinders



Two metre high feral proof fence with a floppy top. This will keep out grazing native and feral animals as well as cats and foxes, due for completion later in 2020. Photo B. Reichelt

Ranges. There is a large section for species which are rare and endangered in the wild and an extensive screening shelter belt of mixed plantings between the adjacent housing subdivision and the entrance road into the garden. Plantings are drip irrigated and wood chip mulch is used extensively.

A very successful development has been the establishment of six 'Arid Smart' display gardens along a main path. These six adjoining gardens are about the size of and simulate suburban front gardens and each is distinctly different in style and design. They display a range of plants suitable for home garden use. There is information on plants used and their water requirements with most being available for sale at the AALBG.

Some distance away from the main planted area is the Flinders Redcliff Lookout with views over Upper Spencer Gulf to the Flinders Ranges including Mount Brown, the dominant peak in the region. The plantings in this area around the car park and lookout are all species collected by Dr Robert Brown the Scientist and Botanist on Matthew Flinder's voyage of discovery in 'The Investigator' in 1802, charting the unknown southern coastline of Australia. Brown and some of the crew went overland on an expedition from the coast south of present day Port Augusta to the summit of Mt Brown, collecting plants. (I was a member of the SEG group which reenacted Brown's expedition to the summit of Mt Brown 200 years to the day after his expedition in March 2002). Meanwhile Flinders and some other crew members rowed in a long boat as far up the Gulf as they could go, to prove that it did not lead to an inland sea. Flinders climbed the cliff, now known as Flinders Red Cliff to survey the surrounding country. This is commemorated by a plaque and information panels at the site.

The AALBG has a rich bird life. The first bird survey on the undeveloped AALBG site was done in August 1987 and 39 species were recorded, an impressive total on the 250 ha site consisting of only three habitats, plus Spencer Gulf on the eastern side. The time of the year also helped the numbers as



Quandongs, Santalum acuminatum grow naturally at the AALBG. Fruit is used in desserts in the Gardens Bluebush Café, along with some other native foods.



The Arid Smart Gardens are small suburban size simulated front gardens, each demonstrating how some of the plants on display at the AALBG may be used in a home garden setting

nomadic species (Woodswallows and Chats) and migratory species (Red-backed Kingfisher and Blue-winged Parrots) were present. In the years after, and up to the present, the plantings in the Garden have had a major effect on the number of species and the number of birds present at any time. Eucalypt plantings have meant that birds such as Whiteplumed Honeyeater, Red-eared Wattlebird, Striated Pardalote and Weebill have moved in. The eremophilas have attracted more of the resident Honeyeaters (Singing and Spiny-cheeked) and also nomadic species such as Pied Honeyeater, Black Honeyeater, and White-fronted Honeyeater, that are now seen every year when they are flowering.

In the taller trees near the path to the main entrance of the visitor reception building the resident pair of Australian Ravens rear a brood of 2 to 3 young every year. After the ravens have left the nest, Nankeen Kestrels use it to raise their 2 to 3 young.

Two bird-hides were built in 2000, one in the sand hill area near the nursery compound and the other on the chenopod plain towards the Flinders Red Cliff Lookout, each with a tiny watering point which attracts birds. The latter is a good spot to photograph White-winged Fairy Wrens coming in to drink with Zebra Finches, Southern White-face and many other species. In the 33 years since the first survey, the bird list has risen to 162 species including some rarities like Scarletchested Parrot and unusual species for the site such as Inland Dotterel and Spotted Crake. The mangroves and the gulf at the Flinders Red Cliff Lookout also host marine species and the AALBG has become a hotspot for bird watchers from Australia and overseas.

The steady flow of "birders" through the Garden significantly boosts visitor numbers as they look for some of the arid-land species like the Red-throat, Rufous Field Wren and the Chirruping Wedgebill (residents) or the Pied and Black Honeyeaters, nomadic species which usually arrive after September. The garden, because of its range of arid plantings is an oasis for birds to live, rest and feed and provides an important refuge in times of drought.

The AALBG has become a showpiece of southern Australian arid zone vegetation. Interpretive displays also introduce visitors to the fauna of arid regions and in particular the fauna which may be encountered in the garden. Two fauna surveys have been carried out and general opportunistic sightings have also helped to identify the vertebrate animals inhabiting the site. Friends volunteers and staff assist with the Garden's educational program for visiting school groups and university students.

The AALBG site encompasses three main habitat types; low sand dunes, flat chenopod shrub-land and a mangrove and fringing samphire community. The site is largely unwooded except for several Western Myall, Acacia papyrocarpa, groves which are present in the dune areas. Domestic stock and rabbits have grazed the country heavily in the past, and the site was historically common land used for grazing animals in the 1800's. In the 1900's the site was used by off-road vehicles and as a site for three council rubbish dumps. These disturbed areas have been rehabilitated but many weed species have invaded since European settlement. As a result the habitat has been significantly modified from its pristine state with obvious implications for the fauna which inhabit the region. However, the exclusion of stock and vehicles along with the control of rabbits and weeds has slowly resulted in an improvement of the habitat, particularly in regions of minimal development. Much of the 250 ha site preserves the original native vegetation as the developed Garden area occupies approximately 15 ha within this natural bushland setting.

Reptiles including the Large Sand Goanna, Bearded Dragon and Sleepy Lizard are all common and easy to observe in the garden. The smaller species are more difficult to find but are nevertheless abundant in their selected habitats. Painted Dragons and Striped Skinks are common in the sand dunes and sandy areas near the Flinders Red Cliff. Emus and kangaroos are commonly seen.



Children having fun in the Arid Explorers Garden adventure play area which was funded by the Friends of the AALBG and developed largely with Friends volunteer labour. Photo C. Gerlach



The sandhill bird hide is one of two bird hides in the Garden which is a very popular location for birders with 162 species recorded on site.

Many of the plants grown at the AALBG are well suited and would blend in well with mixed plantings in Mediterranean gardens in drier parts of South Australia. All are drought tolerant and will thrive in alkaline soils. All are native to the southern arid zone of Australia. Some are very showy in flower and many have contrasting foliage colours and textures. Birds are attracted to many of the plants. The peak time of flowering is late winter to mid spring although there are always some plants in bloom and a visit at any time is worthwhile. With a warming and drier climate generally, the Garden is being used more and more for information on, and as a source of, attractive drought tolerant plants for gardens and landscaping projects in areas further south.

As the AALBG is a young garden there is still much to be done, but some areas are now well established. The garden rates highly with visitors and locals alike and several tourism and environmental awards have been received. It was recently rated first of the top 10 of more than 100 botanic Gardens in regional Australia, by Australian Geographic Magazine. In 2018 The Guardian newspaper rated the AALBG as one of the 10 most significant botanic gardens in the world, high praise indeed! The Garden is a credit to The City of Port Augusta and is performing a valuable educational and research role as well as providing a beautiful natural area for locals and visitors to enjoy our unique arid zone flora in an impressive setting.

More information can be found on websites including: www.aalbg.sa.gov.au/ and www.<u>australian-aridlands-</u> botanic-garden.org/

John Zwar OAM, Churchill Fellow, is the Founder, Member of AALBG Reference Group and President of The Friends of the Australian Arid Lands Botanic Garden, Port Augusta Inc. Acknowledgements: Bernie Haase, Brian Reichelt, Peter Langdon, and Cherie Gerlach contributed to this article. Photographs: J Zwar unless otherwise indicated. jzwar@bigpond.com

GREAT SOUTHERN ARK REWILDING – SEG BIODIVERSITY SURVEY INNES NATIONAL PARK

Dr Andy Sharp and Grace Hodder

The Great Southern Ark

The Great Southern Ark is a collaborative project between a wide range of organisations that seeks to improve the condition of the natural landscape of southern Yorke Peninsula and deliver tangible improvements to the district's biodiversity assets, agricultural production and the local economy.

Re-wilding for resilience

Many threats to Australia's natural resources have defied traditional management practices and continue to degrade our remaining landscapes. In many cases, the loss of native species has severely compromised ecosystem health and the services that natural systems provide to the community (e.g. crop and plant pollination, soil health, pest control). As a result, the ongoing cost of land management to both farmers and Government agencies continues to escalate. *Rewilding* is an innovative approach to land management that seeks to reinstate natural processes, through the reintroduction of key species to build self-sustainability into the landscape, thereby reducing management costs. There are now rewilding projects on many continents, including USA, Europe, Canada and Siberia.

Over the next 15 to 20 years, the *Great Southern Ark* project aims to reintroduce a suite of carefully selected native species to southern Yorke Peninsula to foster the ongoing conservation of the district's unique environment, and improve agricultural productivity.

Southern Yorke Peninsula

SYP is recognised for its productive farmlands and pristine environment, which produce opportunities for tourism and generates significant activity for local businesses, adding to the local economy. However, all is not as it seems. Ninety-five percent of the peninsula's original 29 native mammals are now locally extinct (Aitken 1973, Brandle 2008, McDowell et al. 2012), including species of Hopping Mice, Bettongs, Bandicoots and Bilbies. Without the supporting ecological functions provided by many of these missing species, the area's native vegetation communities are undergoing a slow deterioration in condition, with 18% of plants considered threatened, another 21% considered rare, and 41% of species thought to be in decline. Alongside this, the district's farmers must contend with the ongoing management of numerous pest species which impact on their production - foxes, rabbits, mouse plagues and feral cats. The goal of the Great Southern Ark project is to reintroduce selected native mammal species over the next 15-20 years to off-set these major imbalances.

Species for reintroduction

Over the next five years, the project anticipates the reintroduction of two native *soil engineers* - the brush-tailed bettong (*Bettongia penicillata*) in 2020/21, followed by the

southern brown bandicoot (Isoodon obesulus). The reintroduction of these "ecosystem engineers" will reinstate fundamental soil engineering processes such as fungal spore dispersal, improved nutrient turnover and improved water infiltration within soils, creating the right conditions for native plant seedlings to become established, thus breathing new life into the region's native vegetation and ultimately improve the condition of the Southern Yorke Peninsula ecosystem. The small predatory red-tailed phascogale (Phascogale calura) will be reintroduced in 2024 to contribute to the management of mouse populations in native vegetation. By year 15, in 2029, is it anticipated that western quolls (Dasyurus geoffroii) will be reintroduced to manage rabbit populations, and further enhance mouse control. Phascogales and Western Quolls will also serve to keep the populations of bettongs and bandicoots in balance.

An emerging issue with no-till farming is the year-round presence of habitat for house mouse populations (stubble), facilitating constant background densities and enabling population irruptions following major rainfall events. Mitigating the effects of rodents has proven difficult, unsustainable and costly for farmers, due to ongoing input costs (bait application) and production losses. Enhancing the density of predators offers a mechanism to control mouse populations, without the dependence on rodenticides. Avian predators have shown great promise in reducing rodent damage to crops worldwide, e.g. Israel, Spain, and the United States. This project will demonstrate the agricultural benefits of enhancing barn owl (Tyto alba) populations on southern Yorke Peninsula. A pilot study from the region has demonstrated the ability to rapidly increase owl numbers through the provision of nest boxes, and has led to substantial interest within the farming community for the expansion of the program.

Current management actions

To ensure the success of species reintroductions, the project will build on the community-driven *Baiting for Biodiversity* program for the next five years, incorporating the control of feral cats. To prevent the long-term movement of foxes and feral cats on to the peninsula, and reduce the longterm cost of control to farmers, a 25 km strategic fence has been built across the peninsula. The fence is designed such that the movement of traffic along roads is not impeded.

Triple-bottom-line benefits

The *Baiting for Biodiversity* program has already reduced fox numbers and landholders are reporting an increase in lamb survival, by up to 30%. The more effective control of foxes and feral cats will lead to further improvements, as cats spread *toxoplasmosis* through the landscape, which has been associated with a 15% decrease in lambing rates on Yorke Peninsula. It is anticipated that the presence of red-tailed phascogales and barn owls will lead to a > 20% reduction in damage to crops by mice on participating farms (Labuschagne *et al.* 2016; Johnson and Menz 2019). The reintroduction of native species to Yorke Peninsula provides unique opportunities for the development of local lowimpact ecotourism ventures that focus on one-on-one interactions with wildlife, providing a boost to the local economy.

Monitoring

While each of the above species has an important role to play in reinstating the health of this ecosystem, it is important that we monitor several aspects of the ecosystem prior to, during and after these species reintroductions, to ensure that there are no negative effects of each reintroduction. This monitoring will advise adaptive management of the project as it progresses.

As a first step, in spring 2019 the Scientific Expedition Group conducted a biological survey to collect baseline data at selected sites across the SYP. Biological surveys are intended to be repeated at 4-5 yearly intervals. These surveys are intended to capture any changes in small mammal and reptile abundances, as well as changes in vegetation condition and recruitment throughout the project. The specific aims are to determine whether there is an effect of the reintroduction of brush-tailed bettongs and southern brown bandicoots (measured in 2023), the reintroduction of red-tailed phascogales (measured in 2028), and the reintroduction of western quolls (measured in 2032), on the abundance of small reptile species on the SYP.

SEG conducted the baseline surveys of fauna and flora on Southern Yorke Peninsula from 27th October to 9th November 2019. Fourteen survey sites located in Innes NP, Warrenben



Annette Vincent installing micropits to catch ants and other invertebrates.



Installing a macropit line in thick scrub in the Innes NP.

Conservation Park and adjacent Heritage Agreement Properties were each surveyed over four trapping nights.

Fauna trapping was conducted using the standard Biological Survey Methodology, to enable comparisons with historical trapping data at the same sites. In addition, standard 1-hour active searching for reptiles, tracks, scats and signs was undertaken during daylight hours, and some 1-hour active spotlighting for mammals was undertaken at night at some sites. Flora surveys were conducted using the standard Biological Survey Methodology.

The data will be analysed to determine whether the small reptile abundance, pygmy possum distribution (the only small native mammal captured during the survey), and woodland bird abundance and diversity vary over the course of the project, and as each new species is reintroduced.

While conducting the biological surveys, several helpful and "naïve" SEG members also found the time to assist one very relieved Landscape Ecologist Grace Hodder to conduct mouse abundance surveys in paddocks of wheat and barley. These surveys will be undertaken twice-annually in late spring and late autumn for five years (the first was conducted in spring 2019), in 6 chosen study areas to obtain baseline data on mouse populations. Later down the track, the Great Southern Ark Project will bring in funding to install barn owl nest boxes across farmland within 3 of the 6 study areas. The data collected by Grace and the SEG teams will be crucial in determining whether the installation of barn owl nest boxes can influence mouse abundances (by comparing before, after, control and impact mouse numbers). Despite the (sometimes) tedious nature of carefully searching a 100 x 1 m area for active mouse burrows, and setting a line of baited Elliott traps and oily "chew cards" at each site, the positive attitude and enthusiasm of Grace's new-found helpers made the task a breeze. All sites were re-visited after one day, to inspect mouse tracks in cornflour placed around burrows (this told us the burrow was active), to check and remove Elliott traps and to count mouse chew marks on chew cards. At night, SEG also assisted with spot-light surveys to assess the numbers of barn owls present within study areas.

Daily temperatures were recorded at Stenhouse Bay during the survey. For the first week, the average daily

maximum was 31.2°C, the minimum was 12.8°C and the weather was dry. A cold front came through over the middle weekend and for the second week the average daily maximum was 19.3°C, the average minimum was 11.5°C, and there were scattered showers. Thus in the second week the temperature was almost 12°C lower than in the first week, with some wet rather than dry weather.

Mammal and Reptile Results

Table 1 gives details of the reptiles and mammals captured over two weeks at the Innes Survey. There were 129 reptiles captured, with greatest numbers being *Menetia greyii*, Dwarf Skink and *Morethia obscura*, Mallee Snake-eye. There were only 46 mammals captured with half of them being

Table 1 Reptiles and Mammals captured at the Innes Survey

REPTILES		
SPECIES	COMMON NAME	Species Count
Aprasia striolata	Lined Worm-lizard	6
Christinus marmoratus	Marbled Gecko	3
Ctenophorus chapmani	Eastern Heath Dragon	1
Ctenophorus pictus	Painted Dragon	1
Ctenotus orientalis	Spotted Ctenotus	2
Ctenotus spaldingi	Eastern Striped Skink	1
Delma australis	Barred Snake-lizard	3
Demansia psammophis	Yellow-faced Whipsnake	5
Diplodactylus calcicolus	South Coast Stone Gecko	11
Hemiergis peronii	Four-toed Earless Skink	7
Lampropholis delicata	Delicate Skink	2
Lerista dorsalis	Southern Four-toed Slider	22
Liopholis multiscutata	Bull Skink	4
Menetia greyii	Dwarf Skink	26
Morethia obscura	Mallee Snake-eye	27
Notechis scutatus	Tiger Snake	2
Pygopus lepidopodus	Common Scaly-foot	2
Tiliqua occipitalis	Western Bluetongue	2
Tiliqua rugosa	Sleepy Lizard	2
Varanus rosenbergi	Heath Goanna	1
Total		129

MAMMALS		
SPECIES	COMMON NAME	
Cercartetus concinnus	Western Pygmy-possum	23
Macropus eugenii eugenii	Tammar Wallaby	3
Macropus fuliginosus	Western Grey Kangaroo	2
Mus musculus	House Mouse	18
Total		46

Table 2 Invertebrates captured at the Innes Survey

	WK1	%	WK 2	%	WK 1+2	%
<i>Formicidae</i> (ants)	1952	75.5	664	6.4	2616	20.2
Collembola (springtails)	134	5.2	9395	90.4	9529	73.4
Other invertebrates	500	19.3	335	3.2	835	6.4
Total specimens	2586	100	10394	100	12980	100



Bob Sharrad, Olly Cirocco and Ian Preston checking a funnel trap

Cercartetus concinnus, Western Pygmy-possum, followed closely by *Mus musculus,* House Mouse.

Invertebrate Results

The total number of invertebrates captured in the micropits during the two weeks of the survey was 12,980, with 2,586 captured from seven sites during week 1 and 10,394 captured from seven sites during week 2 as shown in Table 2.

Ants (*Formicidae*) formed 75.5% and springtails (*Collembola*) formed 5.2% of invertebrates captured in week 1. In week 2 the ratio of ants and springtails reversed (6.4% versus 90.4%). The weather was too cold for ants in the second week, and they went to "bed". In the same week "purple" springtails came alive and multiplied profusely! Results are listed in Table 2

Of the other invertebrates captured in week 1, the most common were beetles (62%). In week 2 the most common other invertebrates were beetles (42%), followed by flies (12%), earwigs and mites each with (11%), and spiders (7%).

The parasitic form of a mite is a tick. There were two ticks caught in the micropits in week 1, but many were captured opportunistically on the SEG team and on lizards.

Apart from the kangaroo ticks (*Amblyomma triguttatum*) that attached to some expeditioners reptile ticks were also found, *Bothriocroton hydrosauri*, on four reptile species: sleepy lizards (*Tiliqua rugosa*), an Eastern bearded dragon (*Pogona* *barbata*), a tiger snake (*Notechis scutatus*) and a yellowfaced whipsnake (*Demansia psammophis*). The whipsnake turns out to be a new host record for that tick.

Bird Results

There were 27 species of birds seen on the survey with nothing unusual for the Southern Yorke Peninsula, but numbers were considered to be low. Purple-gaped honeyeater, silvereye, golden whistler, grey shrike thrush and variegated fairy wrens were the most common sightings.

Vegetation Results

The plant species collected at each site will be verified to provide a baseline for monitoring changes in vegetation condition and recruitment as the project progresses.

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A reptile tick, *Bothriocroton hydrosauri*, on a tiger snake *Notechis scutatus*.



The science "lab" at the Stenhouse Bay Community Centre, the base for the Innes Survey. From left, Beth Reid, Jill Tugwell, Stuart Pillman and Annette Vincent.

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PELICAN'S PROGRESS

Dr Greg Johnston

The first thing you notice on approaching breeding pelicans is the smell. After visiting a colony in 1908, the noted bird photographer Arthur Mattingley described the experience well (in the polite language of that time): "Enchanting as the scene was at a distance, as we drew nearer an odour, faintly noticeable at first, became more pronounced, until it fairly reeked, and we straightaway were disillusioned."

Despite the olfactory onslaught, visiting a large pelican colony is one of the great wildlife experiences. Having said that, it should not be done without good reason and due care. Unlike other birds, pelicans use their webbed feet to incubate their eggs. If they are disturbed, the adults fly away from the colony in panic. In doing so they flick eggs out of the nest with their feet as they take off, and those eggs usually die as a result. Many pelican colonies have been abandoned following unwanted and unwarranted visits. Standard, internationally-



The blue-rimmed eye-patch of Australian pelicans resulted in them being called the spectacled (i.e. glasses-wearing) pelican, *Pelecanus conspicillatus*.

accepted guidelines suggest staying at least 200m from breeding pelicans. Another rule-of-thumb could be, if you can smell 'em, you're too close – retreat and enjoy them from afar so they'll stay around for others to enjoy.

The pelicans we see in South Australia belong to one of eight species that occur around the world. The scientific name for the Australian pelican is *Pelecanus conspicillatus*, alluding to the spectacled (i.e. glasses wearing) appearance of their bare skin around their eyes. Oz pelicans are one of the largest and most spectacular pelicans, with females weighing up to 8kg and males up to 10kg. At up to half a metre, they have the longest bill of any bird. Their bold black-and-white plumage is enhanced by bright pink and blue on the throat pouch in breeding Oz pelicans. Consequently, our pelicans are popular in zoo displays around the world. If you visit a European zoo you may well come across a "spectacled" pelican that looks familiar. That is what Europeans commonly call our Australian pelicans.

Australian pelicans occur from verdant tropical coasts of Queensland to the dry inland deserts. While they only breed in Australia, young pelicans sometimes disperse from breeding colonies to neighbouring countries. Young Oz pelican have been recorded flying to Sulawesi, Palau, New Caledonia and New Zealand. These records usually follow El Niña years when Australia experiences unusually high rainfall. For example, the most recent Australian pelicans arrived in New Zealand following the wet years of 2010-11. They all died over the following three years. Subfossil pelican bones found in New Zealand alongside extinct, flightless Moas were initially thought to be a separate species that only occurred in New Zealand (P. novaezealandiae). We now know they were pelicans that had flown from Australia. The record for distance travelled by an Oz pelican is held by an individual, leg-banded as a nestling on the Coorong in 1984 that flew at least 3206km

over the next nine months, only to be killed in southern New Guinea and have its feathers used as head-wear.

I'm often asked how long pelicans live. A young pelican that flew from Australia to New Zealand was captured and kept at the Wellington Zoo, until it died at the ripe old age of 62 years. Wild pelicans don't live anywhere near that long though. The oldest record for a wild Australian pelican is 18 years.

Like some other long-lived animals, pelicans have a prolonged juvenile period. They do not mature until they are at least three years old. Many juveniles spend the first year with adults (presumably their parents), learning to fish. Young pelicans hunting on their own capture fish about half as often as young that accompany adults. When they mature most young pelicans return to the colony where they hatched to find a mate. Adults can breed each year, but many breed every second year. One pelican I tagged bred every other year near Adelaide. Appropriately it spent the rest of its time at the seaside holiday town of Port Vincent on the Yorke Peninsula.

Pelicans vary in abundance over time. These local changes in abundance are difficult to interpret because they may be due to birds moving into or out of a particular area. Alternatively, local changes in abundance may reflect broadscale changes in breeding success or mortality. A local example illustrates this point. On the Coorong, pelicans declined markedly between 2000 and 2010. There was reasonable concern that they may be in trouble, but then pelicans using the Coorong increased markedly following the wet years of 2010-11, salving concerns, at least temporarily. The pelicans had moved elsewhere when the Coorong was too saline for them. The decline and subsequent increase in pelicans on the Coorong shows they can respond to deteriorating and improving environmental conditions. For this reason, pelicans are good indicators of wetland condition.

I have seen many changes in the abundance of pelicans at the breeding colony I study. This colony is on an artificial island on the coast north of Adelaide. I have been able to follow the establishment of the colony on the island and see it



Male (shown here) and female pelicans incubate their eggs and young.

grow to around 1200 pairs. When the young were on the island with their parents, there could be up to 3000 pelicans there at once; quite a site (and smell)! The colony now fluctuates with around 800 pairs on average, with more in wet years and less in dry years. Unfortunately, the colony has been disturbed by foxes since 2004. Normally foxes have limited impact on the breeding pelicans, but they can kill every egg laid on the island during droughts when the number of breeding pelicans is already low. Each year young foxes reach the island in autumn as they disperse out of their parent's territories on the nearby mainland. The colony is now reliant



Pelicans develop bright colouration on their throat pouch when they are about to breed. This colouration last 3-5 weeks and disappears over 1-2 days after they have laid eggs.



A baby uses an egg tooth on the tip of it's bill to break though the eggshell.



Graph showing the establishment of a new pelican colony near Adelaide on an artificial island that was built in 1977. The bars show the number of pelican nests on the island in each of 24 years since 1985

on fox control for its continued existence. Pelicans have abandoned at least three breeding sites in South Australia. In Victoria only two pelican breeding sites are now still active, out of the ten colonies once known there.

That the adaptable pelican has not been able to withstand the environmental changes wrought by humans does not bode well for our future in this driest state of the driest inhabited continent. In 1802 Matthew Flinders recorded the first breeding place of Australian pelicans known to Europeans. He named the place Pelican Lagoon, on Kangaroo Island. Pelicans no longer breed on Pelican Lagoon. A short while after Flinders was there, Baudin visited Pelican lagoon and his men collected "a large quantity of pelican eggs and 30 birds...taken in their nests". The last evidence of pelicans breeding on Pelican Lagoon are some eggs in the South



A 30 million year old fossil pelican skull looks almost identical to the skull of living pelicans. Source: <u>http://</u> <u>www.lazerhorse.org/2014/09/07/living-fossils/living-fossilspelican-beak/</u>

Australian Museum collected in 1885. The colony was destroyed by fisher-people unwilling to share the fish they sought with pelicans.

After visiting Pelican Lagoon Flinders mused in his journal:

"From the number of skeletons and bones there scattered, it should seem that ...[this place]...had for ages been selected for the closing scene of ... [the pelican's].. existence. Certainly, none more likely to be free from disturbance of every kind could be chosen, than these islets ... upon an unknown coast near the antipodes of Europe; nor can anything be more consonant to the feelings, if pelicans have any, than quietly to resign their breath, whilst surrounded by their progeny, and in this same spot where they first drew it. Alas for the pelicans! Their golden age is past; but it has much exceeded in duration that of man."

Fossils show that pelicans have lived on Earth for at least 30 million years, compared to less than two million for humans. Let us hope that the "golden age" of pelicans has not passed. This will depend on whether Australians can bring ourselves to better manage our limited water. I hope future generations will be able to experience the splendiferous sight and smell of breeding pelicans.

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All photos by Greg Johnston

TORRENS LAKE Garry Trethewey

Macbeth's three witches had a special recipe. Eye of newt, toe of frog, wool of bat, tongue of dog, all brewed up in a horrible great big cauldron.

Adelaide's cauldron is Torrens Lake and the special recipe - well, I'll tell you about that in a minute.

Originally the river had pools, billabongs, short rapids, reedbeds and floodplains, and its course and flow varied over time, and through the year. A weir was built in 1881 to give Adelaide an expanse of water flowing gracefully through the city and English park-like environment. But like Macbeth, the people of Adelaide haven't quite got what they were hoping for.

Our special recipe is the plastic rubbish we can see, and worse, the invisible phosphorus, nitrogen, carbon and other pollutants that we can't see. This mixture is directed into the Torrens River, and thence the lake, via a series of so called creeks.

These creeks, named First to Fifth Creek, run through what are now suburbs. The original wetlands and floodplains were drained for agriculture, then covered in houses and roads, then, to avoid property damage from floods and bank collapse, the creeks were straightened, lined with concrete and covered over. It might surprise you to know that Tea Tree Gully used to be a gully. And used to have Tea Trees. But not now. A better description for the creeks is drains.

In Second Creek for instance, the 'original' course crossed under a street, but as a resident told me, 'it flooded, we had to sandbag it, houses got ruined, so now it's been rerouted along the road'.

In winter, with a lot of rain and high flows, plastic rubbish is washed into the system and gets caught up in the vegetation, like white flags. Much of the chemical pollution simply flushes through the system and out to sea. But in summer after showers, phosphorus, nitrogen and carbon, which are all fertilisers, are swept into the drains, the river and the lake, and stay there. And the lake brews up its magic.



Second Creek, 'original' course above, 'original' outlet RIGHT

Blue-green algae (BGA) cleverly manipulates its environment. It takes nitrogen gas from the atmosphere and converts it to fertiliser. And it just loves phosphorus and sunlight. It forms a floating layer that catches sunlight and warms up. The more the top layer warms up, the more strongly it floats, so the harder it is for wind and waves to stir and mix the water. The bottom stays cool and dark and gets no oxygen. Bacteria on the bottom eat up any carbon pollution – dead BGA, leaves, tyre rubber off the roads. They use up all the oxygen, killing just about everything. Then the anoxic water lets the bottom mud release more phosphorus, feeding more BGA.

Except for the BGA, it's a dead lake: ugly green scum, recreational paddle boats unused so as to avoid dangerous splashes, a bad smell, fish gasping for air at the surface, all decorated with floating plastic.

The most visible intervention is the nets that are placed across the drains to catch plastic, and pontoons across the river that redirect rubbish into more nets. These catch much but not all of the plastic – arguably the least damaging part of the pollution. They are expensive and in winter need regular emptying, which is impossible because of the high water level.

To deal with the chemical pollution, there are some small wetlands, with educational displays and signage showing how reed beds and water plants intercept nutrients and introduce oxygen to the water, just like in a natural creek. Whilst inspiring to the public, they are too small to be useful.



Expensive and scarce "environmental flow" pumped from the Murray River provides some relief, mainly by moving the problem downstream, although the movement itself stirs and re-oxygenates the water a bit. In the lake, the BGA and deoxygenation is dealt with poorly. Large destratification pumps, expensive to run, move water from the bottom anoxic layer to the top, aiming to mix and oxygenate layers, but research shows they have surprisingly little effect.

There is a political trade-off between personal and

public interest. More and bigger wetlands would be good, but not where I've built my house. More regulations about chemical use - paint or soap or garden fertiliser, new planning



Second Creek, new course, above left , new outlet, above right

regulations about unpaved soakage space - all these make sense, but not if they cost me money.

Engineering solutions on public space might be more acceptable. More trash nets. More and bigger destratification pumps. More environmental flows down the Torrens River, perhaps even down the feeder creeks.

Toward the hills and the newer suburbs, much of the Torrens River, less so the feeder creeks, are in public parkland. Perhaps an educated public might accept more pools, riffles, billabongs, wetlands, floodplains, tea-tree stands and reedbeds, perhaps even unconfined banks that erode and collapse and change course with winter floods.

Macbeth got what he asked for, but then found it wasn't what he'd imagined. That story, having been written, can't change. But our story isn't finished yet. I wonder how it will turn out.

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ANIMAL ETHICS, THE DUNNING-KRUGER EFFECT, AND ME

Garry Trethewey

In April 2019, following a circular that came through SEG, I went to an animal welfare training session at Adelaide Uni.

I had studied ethics and law pertaining to humans in a few previous degree courses, but never ethics and law pertaining to animals. However in my travels, bushwalking, on biological surveys, or as a driver coming across injured animals on the road, I've encountered various situations in which 'animal welfare' law presents a Sword of Damocles for both the suffering animal and any human wanting to intervene. What's best? What's legal? Often it seems that when opinion varies, and emotion runs high, the legally safest thing to do is nothing - walk away.

So I wanted to find out about official attitudes to animal welfare ethics, how the public views the issue, and the actual law as it applies to the sort of situation I find myself in.

What sort of situations?

(1) Driving home from work I came across two very distressed cops who had been called out by a very distressed driver, to deal with a badly injured roo. They were awaiting permission to shoot it, but that was being decided slowly at increasing levels of their hierarchy, and the animal obviously suffering in the mean time. I offered to smash its skull with an iron bar, but they doubted the legality of that.

(2) A roo trapped in a rocky gully with a broken leg in a remote area, three hours walk from vehicle access, no chance of being rescued. It was fated to die by thirst, starvation or cold. Ironically, perhaps its best fate was to be found by a wild

dog. Cutting its throat was deemed cruel and illegal by my companions, so it was left alone.

(3) A feral cat caught in a cage trap, in a remote area. Options canvassed were to let it go, or kill it, and if so, how? There was a dam about 5 minutes walk away, in which it could be drowned. But the decision was made to humanely euthanase it. So after some time in the car, and at considerable danger to the humans involved and the cat's enormous distress (it badly injured itself hurling itself at the cage walls) it was injected with Lethabarb, a barbiturate designed for humane euthanasia.

(4) While bushwalking I found a three or four year old unshorn feral sheep that had collapsed and was unable to get up, or even raise it's head. Rolling it over revealed yellow new grass that had grown 9cm since the sheep had gone down. Nobody was looking so I cut its throat.

So these were the kind of situations I was interested in.

It turned out that this animal welfare seminar was mainly about lab animals, kept in very controlled environments. Lots about 'quality of life' in their usual day-to-day lives - toys, company - and lots about their use in experiments. Lots about interactions between researchers and ethics oversight committees, and who fills in what forms, who has to supervise, countersign. And a bit about how they are killed.

So not much really relevant to my area of interest.

I was struck by the amount that 'animal welfare' was influenced by uneducated and inconsistent ideas of the public, and influenced by the law (in itself a very blunt instrument), and common misunderstandings of the law. Workers are advised to keep abreast of current ideas (which change), and keep in mind the 'light of day' test - essentially, what would the public think? In my opinion and experience these lead to all sorts of anomalies.

From the training session, the reasonableness of an animal's treatment or mistreatment depends on who is doing it. An eight year old boy is allowed to mistreat an animal in ways that would result in strong censure if a professional did the same.

My neighbour's little moggie can bring home and torture all sorts of animals, but any threat to the moggie's freedom will be met with the strongest reaction.

Furry animals with big eyes, coat of arms animals, other privileged types require different treatment from animals we don't like. I can shoot goats with a heart/lung shot, rendering them unconscious in 5-10 seconds, but roos, just as damaging due to overabundance, must be shot through the head for an instantaneous death, and only in limited numbers and with special permits.

My neighbour's dog can kill roos, slowly and painfully, because it's an incompetent dog. If they were my sheep I could take action, in terms of economic loss. But because roos are 'protected', I can't own them, so have no power to actually protect them. And because the dog owner didn't actually intend the dog to kill the roo, no action can be taken.

Incompetent dog? One of those intentionally deformed breeds that has difficulty breathing and needs pain medication daily. Its owner loves it, so apparently that's ok.

In many instances, like my four outlines above, the 'right' thing to do is what makes the people present feel the least uncomfortable. Thus, what is espoused as animal welfare is in fact avoidance of uncomfortable feelings in humans. If I look away, do nothing, don't get involved, then that's ok, or at least, avoids censure by my companions and interaction with the law. And the person who feels really really terrible afterwards seems to get extra brownie points.

After the seminar I approached a couple of the speakers to canvass a couple of my issues.

The feral cat. Drowning is unacceptable and illegal and would carry a heavy penalty. What was done was considered the second best. The best would have been to release the cat. When I queried its effect on hundreds of other animals, 'that isn't you doing it.'

The roo with a broken leg, trapped in a rocky gully. Yes, cutting its throat would have been unacceptable, and I could have found myself in court. What I needed to do was shoot it. I made it known that I didn't have a rifle, and it was illegal for me to use one without landowner and DEWNR permission. I was then advised to hit it on the head with a rock, to obtain instant painless death. In fact I have tried this in a few situations, generally with smaller animals, and it doesn't work. Battering an animal to death in no way promotes animal welfare. I made this known, and was told I should use Lethabarb. Lethabarb is a restricted drug needing special training, and I had in no way indicated I carried the drug while bushwalking, or was qualified to give it.

Conclusion

I believe I have more interest, knowledge and experience of animal welfare issues than the average bystander or juror. That puts a suffering animal at a disadvantage, and me at a legal disadvantage. I obviously have more practical experience in uncontrolled situations than the speakers at an animal welfare training session, who would be called as 'expert witnesses'.

Regarding my hope for guidance, I have found no acceptable guidance in matters of animal welfare. In my opinion decisions regarding animal welfare are guided not by what is best for the animal in question, but by how people feel.

When confronted with a suffering animal, please keep in mind, your feelings of discomfort are not a guide to the welfare of an animal.

Afterword. The Editor has asked me to explain the Dunning-Kruger effect. Two social psychologists, David Dunning and Justin Kruger, in a 1999 study, "Unskilled and Unaware of It: How Difficulties in Recognizing One's Own Incompetence Lead to Inflated Self-Assessments" worked out that the less a person knows about a subject, the less they are aware of that fact, and the more they think they are an expert. The Dunning-Kruger effect was an underlying theme prominent in my mind right through this article.

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