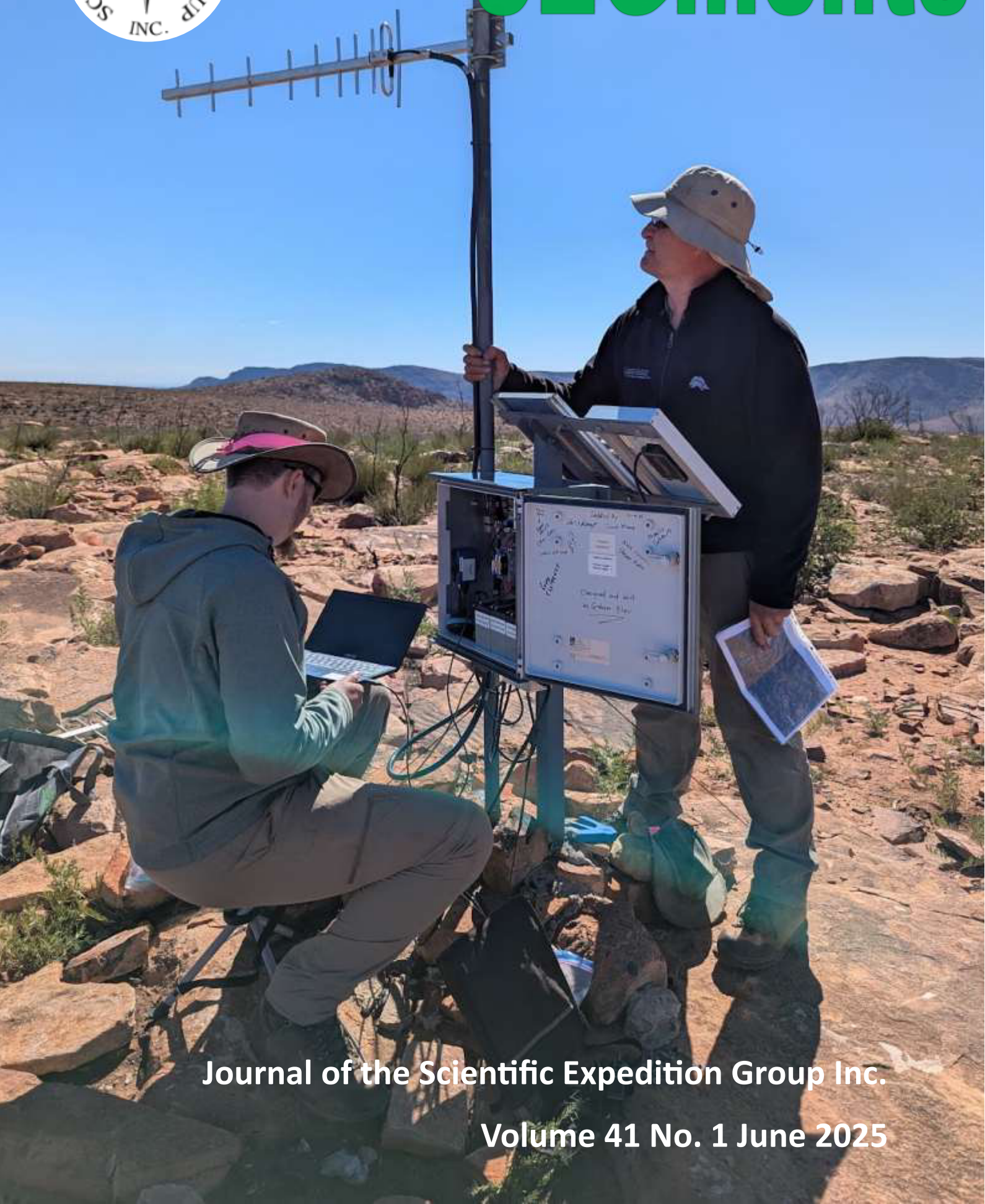




SEGments



Journal of the Scientific Expedition Group Inc.

Volume 41 No. 1 June 2025

Scientific Expedition Group Inc.

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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 for Environment and Water 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 mallee fowl monitoring in the Murraylands.

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Cover Photo: Chris Kemp and Steve Gatti doing final checks on the transmitter for the Plateau pluviometer of the VGRaSP rainfall project. Photo: Sarah Kemp

Rear Cover Photo: Lord Howe currawong (*Strepera graculina crissalis*), Lord Howe Island currawong or Lord Howe pied currawong, is a large and mainly black [passerine](#) bird in the family [Artamidae](#). It is [endemic](#) to [Lord Howe Island](#) in the [Tasman Sea](#), part of [New South Wales, Australia](#), and is a [threatened subspecies](#) of the [pied currawong](#). Photo: Alun Thomas



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EDITORIAL

SEGments readers will recall that about 18 months ago there was a lot of commotion around the South Australian Museum. The newly appointed Director and the Chairman of the Museum Board faced by budget shortages and perhaps a misguided idea of the role of a museum, proposed a Museum restructure which would have had the effect of downgrading the science staff to only curatorial staff.

There was, as many will remember, a major outcry which culminated in a huge public protest outside Parliament House. This caught the attention of the State Premier and a number of review committees were subsequently set up.

SEG had a particular interest in the proceedings because under several Acts we were obliged to lodge voucher specimens and suddenly that action was not able to be carried out. SEG also has worked with Museum science staff over many years and has had Museum scientists on our expeditions.

The major review worked through a number of stages and came to head in late 2024 when the Chairman of the Board resigned and the Director was relieved of his position.

A new Board Chairman, Dr Robert Saint, was appointed and a Acting Director, Clare Mockler, was appointed. They were asked to prepare a five-year strategic plan for the Museum.

A Strategic Plan Discussion Paper has been released and was open for feedback until the end of May.

Besides my interest in relation to the links between SEG and the Museum I have a particular interest because I volunteer in two sections of the Museum Science Centre and my family has donated a considerable collection to the Museum. I have attended a number of meetings working up to issue of the Draft Strategic Plan and attended the Public Forum in mid-May.

The Draft Strategic Plan sets out the following:

Purpose We care for and manage South Australia's natural and cultural collections. We grow, research and share this heritage to build a legacy that celebrates our unique place in global history and deepens our knowledge of the world.

Vision The way we use outstanding collections and research to fascinate and educate connects people with our deep natural and cultural past, engages them with the present, and inspires them to shape the future.

Actions We will work side by side with Aboriginal and Torres Strait Islander communities to restore, repatriate and tell the story of Australia's First Peoples and their unique relationship to Country. We will use cutting-edge science to curate and explore the collections to reveal our natural history and biodiversity. We will engage with the community to foster learning and discovery and to inform decision-making.

The Museum Board will now work through the many submissions and in consultation with the Government will publish the Strategic Plan for the future of the Museum.

It is obvious, however, that the major factor that will determine the future of the Museum is money. The chronic underfunding which caused the original proposed restructure still needs to be addressed. It can only be hoped that the strong public support shown by the protest last year and a carefully thought out Strategic Plan for the future results in adequate funding for such a valuable scientific institution.

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GOVERNMENT PROTECTED AREAS AND LAND-OWNING CONSERVATION ORGANISATIONS OPERATING IN SOUTH AUSTRALIA

Martin Caon

In South Australia, the Department for Environment and Water (DEW) is responsible for establishing and managing "Protected Areas". They cover more than 21% of the State. National Parks are just one of the different sorts of government-owned protected land areas. There are nine categories of Government-owned Protected Areas which have varying degrees of protection and conservation value. But how do they differ? We will find out by describing the gazetted categories listed below. The extinction of species, loss of bushland and the disappearance of native animals from their previous ranges, not to mention the degradation of pastoral land from overstocking, has prompted a response from private organisations. The conservation of land, and native flora and fauna is no longer the exclusive preserve of government instrumentalities. There are now (2025) lots of different non-government organisations (NGOs) that privately own or lease and/or manage land in South Australia for conservation purposes. These also are presented below.

Government Protected Areas (for a list of the names of land areas and an explanation, see: https://en.wikipedia.org/wiki/Protected_areas_of_South_Australia)

National Parks are areas of major scientific or ecological value that are open to the public. They are a primary marker of conservation and are known for their large populations of wildlife. National Parks are "areas considered to be of national significance due to wildlife, natural features of the land, or Aboriginal or European heritage". There are 30 National Parks in South Australia. *The Gammon Ranges National Park (The Yankaninna pastoral lease's former Arcoona Block) was declared a National Park in 1970. Most of the Balcanoona pastoral lease was added to the Park in 1980, and in 1984 the Station's "Plains Block" between Balcanoona homestead and*

Lake Munda, was added to the National Park. In 2003, the name was officially changed to Vulkathunha-Gammon Ranges National Park. The Park protects Mogurnda clivicola as well as Quoll and Yellow-footed Rock Wallaby (YfRW). Most National Parks have a "Friends of" volunteer group like ours to support the activities of the Park.

Wilderness Protection Areas (The Wilderness Protection Act 1992) provide for "the protection of wilderness and the restoration of land to its condition before European colonisation". Exploration and mining are not permitted in these areas. There are 14 in SA.

A **Conservation Park** is an area that is not necessarily of national significance, but is of particular scientific or ecological value. Conservation parks permit camping and other recreational activities, but these are not encouraged. Conservation parks are "areas protected for the purpose of conserving wildlife or the natural or historic features of the land". 270 in SA.

A **Regional Reserve** is an area where conservation takes place alongside other uses, such as mining and grazing. Regional reserves in South Australia allow for mineral exploration and mining. Are "areas proclaimed for the purpose of conserving wildlife or natural or historical features while allowing responsible use of the area's natural resources" (ie mining). There are only five of these but they make up more than 6% of the area of SA. *Lake Frome Regional Reserve, which adjoins Vulkathunha NP, was proclaimed in 1991, was named Munda-Lake Frome in 2004 and upgraded to Lake Frome National Park in November 2021. Many reptiles such as the Lake Eyre Dragon, Sand Goanna and Bearded Dragon as well as Dingo can be seen here.*

Conservation Reserves are parcels of "land set aside for conservation of natural and cultural features under the Crown Land Management Act 2009". 16 in SA!

Recreation Parks are "areas managed for public recreation and enjoyment in a natural setting". 13 in SA.

Indigenous Protected Areas (IPAs) are areas of land and sea Country managed by First Nations groups in accordance with the traditional owners' objectives. Some areas of IPA land are recognised as part of the National Reserve System, for protection of the nation's biodiversity and cultural heritage. South Australia has 10 IPAs that cover 6.19 million hectares. They are:

Antara-Sandy Bore IPA, Aparra-Makiri-Punti IPA, Kalka-Pipalyatjara IPA, Oak Valley rangers, Watarru and Walalkara IPA (all in the north-west of SA); Mount Willoughby IPA (80km north of Coober Pedy),

Nantawarrina IPA (adjacent to Vulkathunha NP), Wardang Island Sea Country IPA, Walalkara IPA (in the Great Victoria Desert), Yalata IPA (from Eyre peninsula to the WA border), Yappala IPA (near Hawker). *In 1998, the Adnyamathanha people of the Nipapanha Community created Australia's first Indigenous Protected Area on the old pastoral station of Nantawarrina which is adjacent to Vulkathunha GRNP. Mount Serle is a pastoral lease - held by an Adnyamathanha organisation - to the west of Nepabunna and abuts Vulkathunha. It hopes to become an IPA.*

Game Reserves are "areas set aside for conservation of wildlife and the management of game for seasonal hunting". SA has 10.

Native Forest Reserves (The Forestry Act 1950) allows for the declaration of forest reserves for "purposes relating to the conservation, development and management of land supporting native flora and fauna". Native forest reserves, SA has 60, are administered by the South Australian Forestry Corporation (ForestrySA), a wholly owned state government business.

If you are interested, the names of 484 conservation areas in South Australia may be found on the World-Wide Flora and Fauna site here: <https://www.wwffaus tralia.com/south-australia-vk5.html> (then scroll down). Not intentionally included in the list are private properties with a Heritage Agreement of which there are more the 1500.

Non-Government Protected Habitat Areas

From the late 20th century, there arose many non-Government organisations that aimed to own, manage or rehabilitate areas of natural habitat in South Australia. They are mostly located on land where arid pastoral activities have failed or on land unsuitable for agriculture. Many have facilities for tourists to stay overnight, eat, walk and drive on the areas. Their management usually involves controlling feral cats, foxes, rabbits, goats and weeds, (and sometimes, mice, rats, pigs, camels, donkeys and deer). They often have areas

surrounded by feral-proof fences to protect (often reintroduced) native animals and plants. Their income comes from corporate sponsors, Government grants, tourist fees and donations from private individuals. Summaries of 23 NGOs and collaborations of land holders, are alphabetically listed below (zoos are not included).

(FYI: Units of area: 1are (pronounced "air") = 100m²; 1 hectare = 1ha = 100are = 10,000m²; 1km² = 100ha; Area of South Australia: 98,251,136ha)

1 Arid Recovery

Commenced in 1997 by John Read and Katherine Moseby, Arid Recovery is an independent not-for-profit organisation dedicated to advancing conservation science for Australian threatened species such as Kowari, Stick-nest Rat, Quoll, Bettong, Bandicoot, *Pseudomys*, Dunnart, *Notomys* and Bilby. Their reserve, adjacent to the Olympic Dam mine site, spans a total of 12,300ha across six large enclosures. Arid Recovery is currently Australia's largest feral-proof fenced reserve.

2 Arkaba Conservancy (Wild Bush Luxury)

Arkaba is a private wildlife conservancy of 25,500ha in the Flinders Ranges located on the southern edge of Wilpena Pound and the Ikara -Flinders Ranges National Park. Previously a sheep station, Wild Bush Luxury purchased the property in 2009 and transformed it into a wildlife conservancy. They provide guided "immersive wilderness experiences", high-end (expensive) accommodation, food and hosted walking. Like National Parks, there are abundant Western Grey and Red Kangaroo, Common Wallaroo (Euro), YfRW, Emu, Echidna and Wedge-tailed Eagle.

3 Arkaroola Wilderness Sanctuary

Lies about 600km north of Adelaide in the northern Flinders Ranges and *adjacent to Vulkathunha GRNP*. This 610km² Wilderness and Dark Sky Sanctuary was founded by the Sprigg family in 1968. The Village has camping, motel accommodation, a swimming pool, a restaurant, fuel, vehicle tyres, telescopes, walking and conducts air and 4WD tours. They have all the usual large native animals including YfRW, but also Spidery wattle, Iga and Quandong and now probably Quoll. The Arkaroola Protection Act 2012 was created to "establish the Arkaroola Protection Area; to provide for the proper management and care of the area; and to prohibit mining activities in the area". The protection area includes the Arkaroola Pastoral Lease and the adjoining Mawson Plateau part of the Mount Freeling Pastoral Lease.

4 Australian Landscape Trust

Manages the former pastoral leases **Calperum Station** purchased by the Chicago Zoological Society in 1993, and **Taylorville Station** purchased by the Australian Landscape Trust in 2000 - both with assistance from the Australian Government. Together they comprise part of the Riverland Biosphere Reserve (previously known as the 'Bookmark')

Biosphere Reserve). It covers 337,000ha of Mallee country, just north of Renmark. The reserve contains stretches of creeks, rivers and wetlands that provide habitat for a wide range of native flora and fauna including Malleefowl (*Leipoa ocellata*), the regionally vulnerable Bush Stone-curlew (*Burhinus grallarius*). The reserve's many component properties include protected areas, pastoral leases and privately owned land such as the following: Calperum Station; Chowilla Regional Reserve; Chowilla Game Reserve; Cooltong Conservation Park; Danggali Conservation Park; Danggali Wilderness Protection Area; Gluepot Reserve; Loch Luna Game Reserve; Moorook Game Reserve; Murray River National Park; and Taylorville Station.

5 Australian Wildlife Conservancy:

Began on August 2, 1991 by Martin Copely (but founded in 1995) in Western Australia. It has since grown to become the largest private owner and manager of land for conservation in Australia, having acquired many of John Walmsley's Earth Sanctuaries after the publicly listed Earth Sanctuaries Ltd company went broke. They translocate animals that have become locally extinct, to their five fenced SA sanctuaries:

Yookamurra Wildlife Sanctuary (formerly a John Walmsley Earth Sanctuary) protects over 5,000ha of habitat in the Murray Darling region north west of Swan Reach and contains stands of old growth and unburnt mallee Brush-tailed Possums and Numbats.

The Western River Refuge at 395ha within a feral-proof fence on Kangaroo Island, is a joint project between Australian Wildlife Conservancy, Kangaroo Island Land for Wildlife (see below) and private landholders. Contains KI dunnart.

Dakalanta Wildlife Sanctuary, 13,618ha, located on the Eyre Peninsula between Lock and Elliston, protects a diverse range of ecosystems and supports a large population of the Southern Hairy-nosed Wombat and some Western Pygmy Possum and the Little Long-tailed Dunnart.

Buckaringa Wildlife Sanctuary conserves over 2000ha of the central Flinders Ranges in South Australia, 30km north of Quorn. Contains YfRW and Short-tailed Grasswren (formerly a John Walmsley Earth Sanctuary).

Kalamurina protects 679,666ha of desert in the heart of Australia, on the shores of Kati Thanda-Lake Eyre. It contains Crest-tailed Mulgara, the Dusky Hopping Mouse, the Eyrean Grasswren. Open for camping.

6 BirdLife Australia

Acquired **Gluepot Reserve** in 1997. Gluepot Reserve is located about 64km from Waikerie, and about 200kms from Adelaide. This 54,390ha area of virgin scrubland contains 18 nationally threatened bird species including the Black-eared Miner (*Manorina melanotis*), 53 species of reptiles and 12 species of bats –some of which are also nationally threatened.

Gluepot also has the greatest number of permanent biodiversity sites (200) of any Australian land area.

7 Bush Heritage Australia:

Began in 1991 after Bob Brown bought two properties in Tasmania. BHA is a not-for-profit conservation organisation protecting ecosystems and wildlife across the continent. They own properties that have been bought, gifted or bequeathed. Their 45 reserves cover over 1.4 million hectares, and are on the way to doubling this area by 2030. In South Australia their reserves are: **Boolcoommatta** established in 2006 (63,000 ha, 100km west of Broken Hill), with Plains-Wanderer, YfRW, Tree skink (*Egernia striolata*), Dusky Hopping Mice, Narrow-nosed Planigale; **Bon Bon** (216,700ha, north of Glendambo), with Stripe-faced Dunnart, was bought in 2008 with funds from the Commonwealth's National Reserve System Program; **Evelyn Downs** established in 2024 is 235,000 ha, 150km north of Coober Pedy, with the Fat-tailed False Antechinus (*Pseudantechinus macdonnellensis*).

8 Ecological Horizons

Ecological Horizons (commenced by John Read and Katherine Moseby in 2007) owns the **Secret Rocks Nature Reserve**. This is a 25,900ha area (4,000ha fenced) of mallee scrub near Kimba on Eyre peninsula (abutting the Ironstone Hill Conservation Park) which has been placed under a conservation covenant. It contains Mallee Fowl and the Sandhill Dunnart. They operate a remote camera monitoring program for goats and foxes and use aerial baiting in partnership with DEW's Bounceback program to control foxes. Felixers, traps and Eradicator cat baits are used to control feral cats.

9 Field Naturalists Society of South Australia Inc.

Own and manage the **Manning Flora & Fauna Reserve** in McLaren Vale. This 45ha reserve is a pink gum woodland and was established in 1955 after Sydney Manning bequeathed the land to the Society. **Forest Range Reserve** is 15ha of sclerophyll woodland of the higher Mount Lofty Ranges; **Tookayerta Marsh** - a section of natural swamp near Mount Compass on the Fleurieu Peninsula; **Nicholls Reserve** is 58ha of coastal scrub at Carpenter Rocks in the South East.

10 Kangaroo Island Land for Wildlife

This private land conservation program has been running since 2018, and protects almost 25,000ha of remnant bushland across 80 member properties on Kangaroo Island. A focus is on the removal of invasive predators (feral cats & pigs). Feral goats and deer have already been eradicated from the island.

11 Marna Banggara (Great Southern Ark) Southern Yorke Peninsula:

An ambitious project that aims to restore southern Yorke Peninsula's landscape by re-introducing locally extinct species such as Tamar Wallaby and Phascogale. Mallee Fowl are already there. In 2020 a north-south 25-kilometre predator

control fence with 30 gates and open at major roads, was erected across the peninsula to prevent/deter the migration of foxes and cats from the north of the peninsula into the project area. The area includes Dhillba Guuranda-Innes National Park and all farmland west of the fence. Feral cats are controlled via baiting, shooting and trapping, while foxes are baited with *Foxoff* 1080 meat baits.

12 National Trust SA

National Trust SA manages 28 Natural Heritage reserves totalling over 1,500ha. Read about them here: https://www.nationaltrust.org.au/explore/?place_type=nature-reserves&content=places&state=sa The reserves have been gifted to the National Trust and are mainly small (<20ha) in area. The largest are: **D. B. Mack Reserve** comprises an area of 265ha; **Lenger Reserve**, 95ha in size is just to the west of the River Murray corridor near Mannum; The 92ha **Wilabalangaloo Reserve** is located on the western bank of the River Murray on the outskirts of the Berri township; **Overland Corner Reserve** surrounds the historic Overland Corner Hotel downstream from the township of Barmera. It is 300ha in size.

13 The Nature Conservancy Australia

They are not a land-banking organisation but during 2017 & 2018 have built Australia's largest (20ha) restored shellfish reef (**Windara**) in the Gulf St Vincent near Ardrossan. Also "installed" and seeded with Australian flat Oysters (*Ostrea angasi*) are the 2ha reef west of Glenelg in 2020, and in 2021, one 500m off O'Sullivan Beach. In addition, in 2022, Nepean Bay in Kangaroo Island also had an oyster reef restored over a 3ha area. They are "helping to protect the southern stop-off point of many transcontinental migratory birds at the 85ha Adelaide International Bird Sanctuary" (north of Adelaide). They "established the Murray-Darling Basin Balanced Water Fund to provide water security for farmers, while protecting culturally significant wetlands that support threatened species and ecosystems. The Fund invests in permanent water rights in the Southern Murray-Darling Basin and allocates those rights in a smart way."

14 Nature Foundation

Begun in 1981, it manages nine nature reserves for conservation comprising over 500,000 ha (5,000km²): They include **Witchelina** with Thick-billed Grasswren and Spinifex Hopping Mouse (purchased in 2009) and **Hiltaba** (purchased in 2012) – both open for tourism. **Watchalunga** (on Fleurieu Peninsula), **Para Woodlands** (3km south-east of Gawler), **Tilibqua** (10km north-east of Burra), **Murbpook Nature Reserve** (between Blanchetown & Morgan), **Geegelina Nature Reserve** (20km from Frances in south-east SA), **Bullock Bridge Nature Reserve** (east of Kingston) and **Mongolurrung Nature Reserve** (east of Mt. Bryan).

15 Nature Glenelg Trust

Nature Glenelg Trust is a mission-driven, not-for-profit organisation publicly launched in

2012. "Native fish conservation and aquatic ecological projects are a major ongoing priority for NGT. We contribute to on-ground recovery actions; research and monitoring, the development of resource documents and ongoing education and awareness activities that aim to protect and restore populations of threatened species." "We operate a regional community nursery in Mt. Gambier (SA) to grow plants for biodiverse revegetation projects. Our specialist wetland ecologists undertake wetland restoration investigations and works across all land tenures in southern SA".

They own 3 NGT restoration reserves in SA. **Mount Burr Swamp restoration reserve; Hutt Bay Wetland restoration reserve; Eaglehawk Waterhole restoration reserve;**

Their Fleurieu Peninsula projects include consulting at Aldinga Washpool, the Southern Bell Frog breeding facility at Clayton, breeding Southern Purple-spotted Gudgeon, Glenshara Swamp and other Fleurieu Peninsula swamps.

16 Raukkan Community

Mount Sandy conservation project is 200ha of coastal shrublands and saline wetlands, south of Meningie and between the Princes highway, Narrung Road and the Coorong. Owned by the Ngarrindjeri community based at Raukkan, the area is being revegetated with seedlings grown at the Raukkan Community nursery.

17 Warrawong Wildlife Sanctuary

At Mylor near Adelaide. Established by John Walmsley 1969 and fenced to provide a feral-free area for Bandicoots, Potoroos, Bettongs etc. It includes a café, campground and gift shop. Once owned by Adelaide Zoo, then abandoned. It is now reduced to about 17ha in area and home to Platypus sourced from Kangaroo Island.

18 Wetlands and Wildlife:

Founded by Tom Brinkworth in 1993. **Warraweena Station Conservation Park** 540 km north of Adelaide in the northern Flinders Ranges of South Australia is a former sheep station, 355km² in size and destocked since 1996. The reserve is known for its scenic 4WD tracks. **Watervalley Wetlands** about 250 km south-east of Adelaide, comprises over 27,000 hectares of wetlands and heritage scrub land in the Upper South East. From 2008, it has been re-vegetated and is open to duck shooters in season.

19 Wildlife Land Trust (Humane Society International):

The WLT has affiliated 52 small-acre sanctuaries in SA. They belonging to individual landholders and encompass a variety of land uses. "The WLT supports a vast range of landholders, from wildlife carers, eco-accommodation providers, to regular landholders, who each share a desire to take conservation action through preserving their land. Through on-the-ground restoration, regeneration and

conservation, landholders can help maintain their local biodiversity and contribute to broader ecosystems." <https://hsi.org.au/australian-wildlife-and-habitats/wildlife-land-trust/find-a-sanctuary>

20 Wombats SA (formerly Natural History Society of SA)

Manages and maintains six sanctuary reserves:

Moorunde (established in 1968), **Wombat Camp**, **Nardoo**, **Lake Short**, and **Malurus Reserves**, all between Swan Reach & Blanchetown. They have an area of 7770ha within which reside ~2000 Southern Hairy-nosed Wombats. They also manage the 29ha **Cullen Reserve** near Robe for Bare-nosed Wombat.

21 The Yellow Footed Rock Wallaby Preservation Association Inc.

The YFRWPA own **The Bunkers Conservation Reserve**. It is a private reserve, situated adjacent to Ikara-Flinders Ranges NP within the traditional lands of the Adnyamathanha aboriginal people. It is approximately 140km² in area and was purchased from Willow Springs Station in 2001. It boasts of having the highest self-drive 4WD track in the Flinders Ranges – the Caernarvon track. Permission is needed to access this land, and may be granted by contacting the secretary.

22 Developing News 1: Flinders Island Safe Haven

Flinders Island is a privately owned (by the Woolford family) 4000ha off-grid island located 35km south west of Elliston Eyre Peninsula, in the Investigator Group Islands. The Australian Government and the SA Government (DEW) will together invest \$4.8M for rehabilitation to create a safe haven for threatened species. In 2025, the island will be closed to visitors for the eradication of mice, rats and cats, after which reintroductions of Banded Hare-wallaby, Shark Bay Bandicoot, Dibbler (*Parantechinus apicalis*) and Nuyts/Southern Brown Bandicoot will occur.

23 Developing News 2: The Koala Sanctuary Limited

The charity announced it has purchased a 530-hectare property in the north-west of Kangaroo Island from plantation

company *Kiland Limited*. Known as **Kellendale**, the property is planned to be home to KI's chlamydia-free Koalas. Currently the property is mainly covered by introduced Tasmanian Blue-Gum trees, but *Kiland* will help the sanctuary with the gradual and staged removal of the trees and replacement with vegetation native to the island.

Other NGOs

The following are four conservation-based tourist ventures and commercial enterprises on pastoral leases, rather than dedicated reserves. They may or may not still run stock on the lease (there may be others):

Banrock Station is near Kingston-on-Murray, and owned by Accolade Wines. It grows grapevines and has wetlands with boardwalks and surrounds of over 1000ha, as well as a wine cellar-door and restaurant. A RAMSAR site.

The **Hanson Bay Sanctuary** is a 2000 hectare, privately owned sanctuary adjacent to Flinders Chase National Park (FCNP), located about 110 kilometres from Kingscote. Reopened after being extensively damaged the Christmas 2019 bushfires.

Martins Well Rangeland Reserve (currently closed for accommodation & camping and is/was currently For Sale). It is located approx. 95km North East of Hawker, 50km due East of Ikara-Wilpena Pound and 386km from Adelaide. It consists of approx. 105,000ha or 1050km² of land. ?Runs cattle & sheep? It contains extensive bodies of water fed by the Artipena Springs, in their section of Wilpena Creek.

Rawnsley Park Station was formerly a sheep station but has transformed to a 12,000ha tourist business with a campground, lots of accommodation, some walking and a restaurant. It still runs 2000 sheep. A Heritage agreement covers the Rawnsley Bluff.

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MINNAWARRA BIODIVERSITY SPRING SURVEY 2025

Spring Survey 27th September—3rd October 2025

Come for half a day, one day or several days.

Minnawarra is situated on the southern Fleurieu Peninsula

For further information and registration forms, contact:

Janet Furler on 0419 842 667 or thefurlers@gmail.com

AUSTRALIAN ANTARCTIC GEOMAGNETISM AND THE SOUTH MAGNETIC POLE

Andrew Lewis, Geomagnetism Lead Scientist, Geoscience Australia

Expeditioners who were fortunate enough to experience the brilliant auroral displays during their time down South in 2024 and those currently settling in for the majestic 2025 winter auroral displays will be interested in the following two-part article by Andrew Lewis of Geoscience Australia. In fact all past winterers would have witnessed these whole of sky ethereal auroral displays and indeed the Australian public were treated to a series of colourful auroral outbursts last year being observed as far north as Queensland.

Andrew studied geophysics at the Mawson Laboratories, University of Adelaide and wintered at Mawson in 1990 as the Bureau of Mineral Resources geophysicist and now works at Geoscience Australia as a geomagnetic scientist. He has contributed to geomagnetic field survey work and observatory operations throughout Australia and Antarctica and has made summer trips to all the Australian and New Zealand Antarctic geomagnetic observatories. Andrew manages the annual training for many of the geomagnetic observers who head south and operate the observatories as part of their work

Members will be interested to know that a set of auroral-themed postage stamps will be released in the first half of this year. Australia Post have been working with the Club on the design of the

stamps which feature the work of our Membership Officer, Barry Becker.

David Dodd - President ANARE Club Inc.

Throughout 2024 and into 2025 we are progressing towards the peak of the current 11-year solar cycle, and the resultant enhanced solar activity is driving increased geomagnetic activity. This is reflected in the significant geomagnetic storm of May 2024 and frequent aurora sightings at lower than usual latitudes. This increased geomagnetic activity and the recent release of global and regional geomagnetic field models such as Geoscience Australia's (GA) Australian Geomagnetic Reference Field (AGRF, figure 1) and the International Geomagnetic Reference Field (IGRF, figure 2) are a reminder of the importance of understanding the Earth's magnetic field for diverse applications such as navigation, mineral exploration, natural hazard mitigation, space weather monitoring and scientific research.

The Earth's magnetic field, the geomagnetic field, requires co-ordinated global efforts to monitor and study. The Australian and Australian Antarctic Territories cover a large portion of the globe and Australia has made a significant contribution to the science of

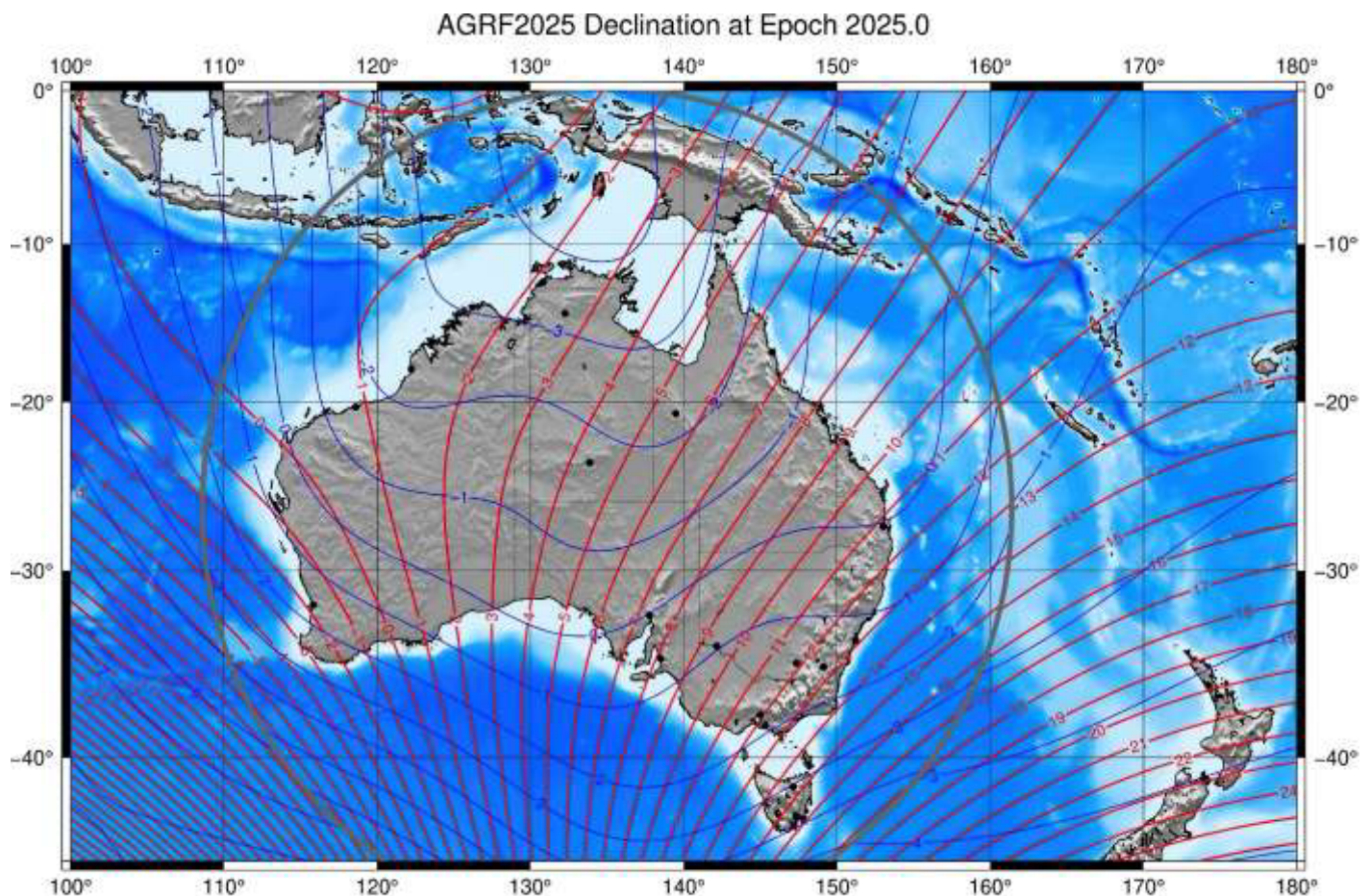
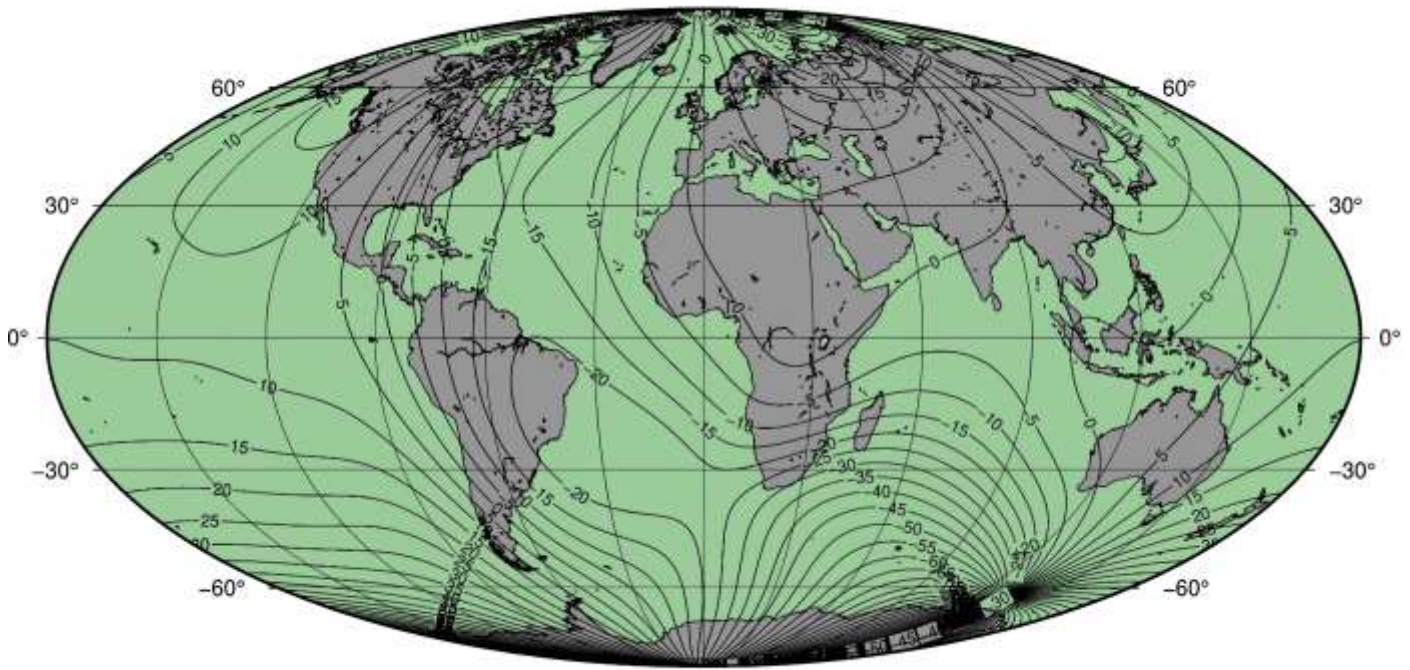


Figure 1 Declination (red) and rate-of-change of declination (blue) in the Australian region derived from the 2025 revision of the Australian Geomagnetic Reference Field model

**Figure 2**

Declination contours in 5 degree intervals

Global geomagnetic declination at 2025.0 derived from the 14th revision (2025) of the International Geomagnetic Reference Field model.

geomagnetism in the region through early exploration and long-term monitoring for more than a century.

The science of geomagnetism was a primary consideration in Australia's early Antarctic exploration and has contributed to the rich history of Australian activities in the Antarctic, such as heroic expeditions to locate the south magnetic pole and establishing magnetic monitoring programs.

Geoscience Australia currently operates a network of 10 geomagnetic observatories in the Australian region. Three of these observatories are located at Australian Antarctic and sub-Antarctic stations and are operated in close co-operation with the Australian Antarctic Division (AAD). A further six observatories are located on mainland Australia and one on Cocos (Keeling) Islands in the Indian Ocean. GA's predecessor organisations, the Australian Geological Survey Organisation (AGSO) and before that, the Bureau of Mineral Resources, Geology and Geophysics (BMR), have managed the geomagnetic observatory network commencing from 1946.

The South Magnetic Pole

Geomagnetism is one of the oldest branches of geophysics and careful study of the magnetic field over many centuries has shown the field is complex and constantly changing.

A simple model often used to explain the morphology of the geomagnetic field is that of a centred dipole, or bar magnet, at the centre of the Earth. While this is a useful model, it is far from accurate and does not capture the intricacies of the geomagnetic field. In reality, the main contribution to the geomagnetic field, more than 95%, originates from Earth's liquid outer core with other significant influences from multiple magnetic sources both internal and external to Earth's surface. Internal sources include magnetic minerals in the crust and currents induced in electrically conductive geological

structures and ocean waters. Amongst the sources external to Earth's surface are electrical currents in the ionosphere and magnetosphere which are driven, primarily, by solar activity.

One feature of the geomagnetic field that has long captured the imagination is the magnetic poles. There are several definitions for the magnetic poles. The so called "magnetic dip pole" is the location where the magnetic field is vertical and the horizontal component of the vector field is non-existent, so the magnetic inclination is -90° for the southern dip pole and $+90^\circ$ for the northern dip pole. The location of the dip pole can be measured by direct observation and also determined mathematically from global models of the geomagnetic field. As the geomagnetic field is not a simple dipole field the locations of the northern and southern dip poles are not expected to be antipodal.

The instantaneous location of the dip poles is in constant motion as the magnetic field responds to ever-changing internal and external influences. There is a slow progression of the average location of the dip pole over years and decades as the structure of internal currents of molten iron in the liquid outer core of the Earth slowly change. Overlain on this slow change are more rapid variations in the field driven by external sources of geomagnetic activity. Daily movement of the instantaneous location of the dip poles can be anywhere from 10 to several 100 km depending on the activity of the geomagnetic field at the time.

Another definition of magnetic poles is the "geocentric dipole pole", more commonly referred to simply as the "geomagnetic pole". The north and south geomagnetic poles are the locations where the axis of the best-fit centred-dipole intersects Earth's surface. The north and south geomagnetic poles are antipodal and form the basis of the geomagnetic co-ordinate system which is often used in scientific

studies of geomagnetism. The geomagnetic pole locations change slowly with time as the internal field changes. Pole locations can be calculated from global mathematical models, such as the IGRF mentioned above. These global geomagnetic field models are derived from detailed analysis of vast amounts of geomagnetic data gathered from low earth orbiting science satellites and the global ground-based observatory network. The commonly available models are updated on a five-yearly cycle to keep track of the slow change of the field, so they remain accurate for compass-based navigation and scientific applications.

There are other, more esoteric, magnetic poles such as the 'eccentric dipole poles' and 'virtual geomagnetic poles'. Eccentric dipole poles are the northern and southern locations where the axis of the best-fit, off-centred, dipole intersects the Earth's surface. Virtual geomagnetic poles are calculated pole positions derived from remnant magnetic directions in continental rocks and are used to track polar wander throughout geological history.

The south magnetic dip pole is the pole relevant to this discussion. The dip poles and the geomagnetic poles are not expected to be co-incident with each other. Nor are they co-incident with the geographic north and south poles which define the rotation axis of the planet and are integral in the system of geographic latitude and longitude used for location.

The position of the southern dip pole was first calculated by the mathematician Carl Friedrich Gauss from his early mathematical model of the global field. Measurements by French and American expeditions to the Antarctic in the early 1840s concluded the pole position was to the east of Gauss's predicted location. These efforts were soon followed by the British naval explorer James Clark Ross, who determined the pole location to be about 250 km east of magnetic observations made on the later-named Ross Island during his 1839-1842 voyage of discovery. On his extended voyage from London, on the vessels *Erebus* and *Terror*, Ross also established several sites for routine magnetic observation in the southern hemisphere, including at Hobart, in the current-day location of the botanic gardens. Data collection commenced in Hobart in 1840 and continued until 1854, thus establishing the first magnetic observatory in the region.

The vicinity of the south magnetic dip pole was first, and famously, visited in January 1909 by TW Edgeworth David, Douglas Mawson and Alistair Mackay during their participation in Ernest Shackleton's British Antarctic Expedition. The party used an instrument known as a dip-circle to make multiple measurements of the vertical angle of the magnetic field and used the data to calculate the instantaneous location of the dip pole, assuming theoretical rates-of-change of the field with distance. The calculated mean location from their observations was $72^{\circ} 25' S$, $155^{\circ} 16' E$. Some years after the expedition, the geomagnetist from Mawson's later 1912-13 Australasian Antarctic Expedition, Eric Webb, calculated that the closest approach to the instantaneous pole position made by the 1909 expedition was probably about 130 kilometres.

Eric Webb made the second close approach when he took measurements within about 62 km of the pole location in late 1912 during a sledging expedition from Cape Denison as part of the

Australasian Antarctic Expedition of 1911 to 1914 lead by Douglas Mawson.

The final close approach to the southern dip pole while it was still on land was made by the French geomagnetist Pierre-Nöel Mayaud in 1952 during the French Antarctic Expedition to Adélie Land. Mayaud made a number of observations at Cape Denison and some inland locations. He calculated a pole location of $68^{\circ} 07' S$, $143^{\circ} 00' E$. His closest observation position was about 116 km from his calculated pole position.

In 1962, during a United States Navy summer program, AL Burrows from the New Zealand Department of Scientific and Industrial Research made magnetic observations at the old absolute and variometer huts at Cape Denison as well as Cape Hunter and on an iceberg about 24 km from the coast. Burrows calculated a pole position of $67^{\circ} 30' S$, $140^{\circ} E$, but the natural magnetic disturbances at such coastal locations make results difficult to interpret.

Since these early direct land-based measurements the southern dip pole has drifted past the French Antarctic station at Dumont d'Urville and offshore in the late 1950s and has been progressing slowly in a north-westerly direction away from the Antarctic coast.



The Northern Party of the British Antarctic Expedition, TW Edgeworth David, Alistair Mackay and Douglas Mawson, at their closest approach to the South Magnetic Pole in January 1909. This photograph was taken by Mackay using the string which can be seen extending from his right hand.

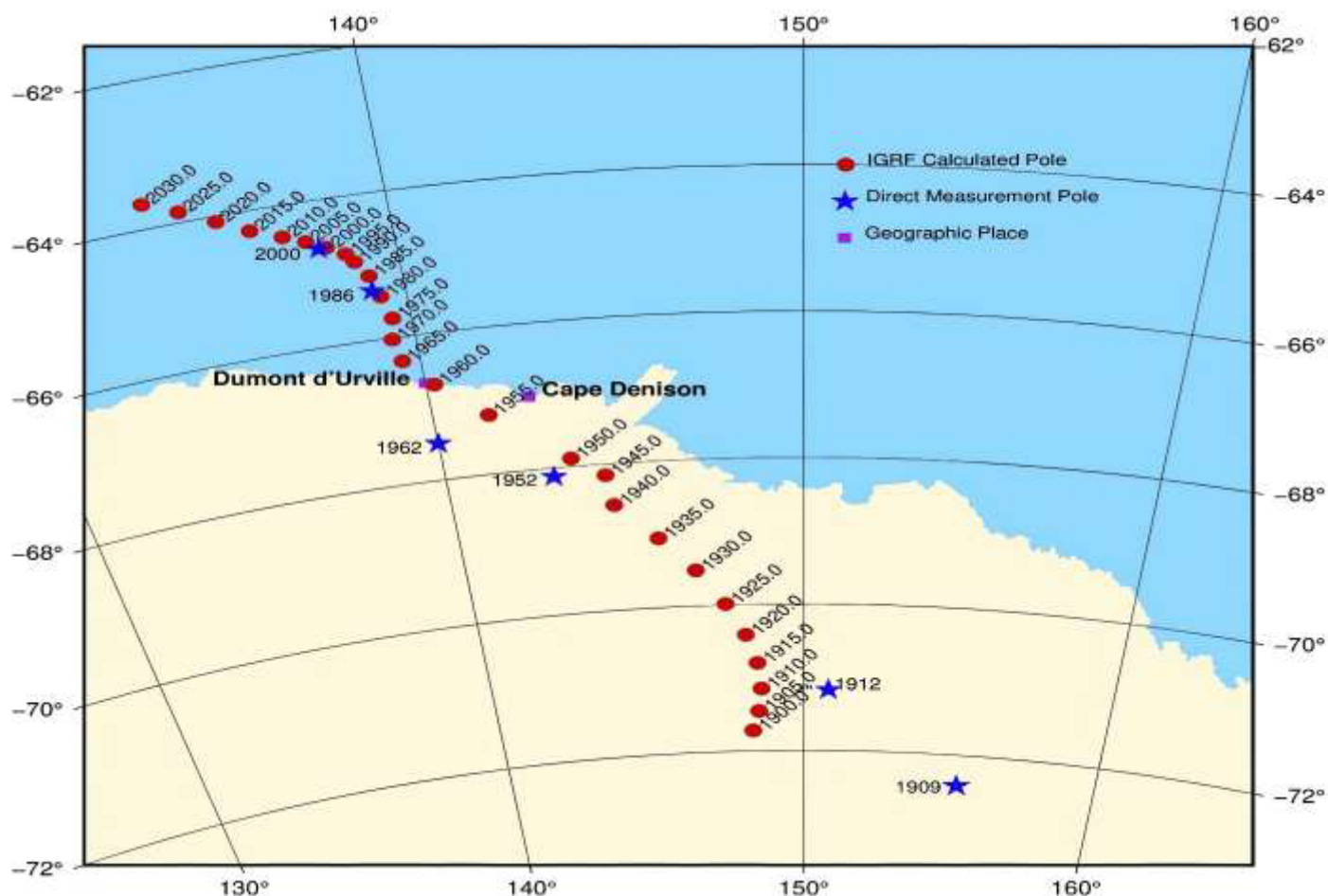


Figure 3 Southern dip pole locations derived from the IGRF model over the period 1900 – 2030 and dip pole locations measured by direct observation.

Three expeditions have measured the location of the southern dip pole at sea. All used a gimballed fluxgate magnetometer mounted from the stern of a ship with helmholtz coils surrounding the magnetic sensor to make first-order corrections for the magnetic influence of the ship. A novel method of integrating the horizontal components of the field as the ship moves in tight circles was used to measure the field and refine the correction for residual ship-induced magnetic contamination. The first expedition, in January 1986 by BMR and AAD on MV *Icebird*, calculated the mean pole position as 65° 20' S, 139° 10' E with the closest approach to the instantaneous location of the pole at 11.3 km. The second survey was made from MV *Nella Dan* in December 1986.

The third attempt was a privately funded expedition by Ocean Frontiers on the vessel *Sir Hubert Wilkins* in late 2000, which achieved the closest ever approach to the southern dip pole at a distance of 1.6 km. The mean position of the pole calculated from observations during that expedition was 64° 40' S, 138° 07' E.

Charles Barton arranged those sea-borne missions and participated in the latter. Barton was also involved in a 1994 survey to re-locate the northern dip pole and achieved a closest approach of about 3 km. The Canadian government undertook regular surveys for direct measure of the pole location between 1948 and 1994 while the northern dip pole traversed Canadian territory and at the time of the 1994 survey the pole was on land in the Canadian high Arctic. Barton

was the first and, to the best of this author's knowledge, only person to achieve closest approach to both the north and south magnetic dip poles.

Figure 3 shows the progression of the southern dip pole locations as calculated using the IGRF model from 1900 to 2025 and the predicted location out to 2030. The predicted IGRF location for mid 2025 is 63° 50' S, 134° 59' E. The IGRF model predicts, over the next few years, the pole will move in a NNW direction at a speed of about 9 km/year. In addition to the IGRF modelled locations shown on Figure 3, the various measured dip pole locations mentioned above are also shown.

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Part 2 of this article will appear in the next issue of SEGments.



Steve Gatti, Chris Wright and Clem Colla working on the Plateau Pluviometer and the Gammon Ranges rainfall project.

REPORT ON PLUVIOMETER REPAIR TRIP TO GAMMON RANGES APRIL 2025

Chris Wright

The purpose of this trip to the Gammon Ranges during Easter 2025 was a combination routine service to visit six of the ten sites in the SEG pluviometer network as well as to reinstatement of the bushfire damaged equipment at the Plateau Pluviometer site.

In Part 1 of this major undertaking on Thursday 16th April 2025 was in one vehicle, John and Peter Love, Chris Wright and Clem Colla drove to North Moolooloo, stopping at Shearer's Quarters to set up camp and then continued to the pluviometer close by. Here they completed a routine service, calibration and battery change. Garry and Michelle Trethewey also arrived that evening at North Moolooloo. They stayed overnight and next morning continued to Pfitzner's Well pluviometer, which was serviced as for the North Moolooloo pluviometer. They then continued to Mocatoona and completed the service at that pluviometer. Garry and Michelle took a track south to look for an Exclosure that Rick Davies

had built a while back. We continued to Maynard's Well Shearer's Quarters to stay the night. Friday 18th we went first to the nearby Maynards Well pluviometer and completed a service and battery change. We then went on to Henzell's Camp on Arcoona Creek to camp for the night, with Garry and Michelle also.

Part 2 of this expedition was to carry the reinstatement equipment up to Vandenberg Camp at the base of North Tusk Hill.

Chris and Sarah Kemp arrived that evening of Friday 18th April in the Perenti Land Rover to Henzell's Camp. Their vehicle was fully loaded with gear for the Plateau pluviometer repair.

The project for Saturday 19th April was an equipment drop at Vandenberg Camp day. All participated (apart from by John Love) in a 4-hour walk fully loaded with gear, which was left in the camp, and then we returned to Henzell's Camp



Walking across the fire ravaged Gammon Plateau from North Tusk Hill to the Plateau pluviometer.
From left: Steven Gatti, Alex Cornish, Sarah Hollis and Ethan Gates

where we found Alex Cornish, Steven Gatti, Sarah Hollis and Ethan Gates had arrived. That night all camped well except for Ethan who struck a whole lot of prickles that deflated his Thermarest.

Part 3 of this major expedition was to move camp from Henzell's Camp to Vandenberg Camp.

On Sunday 20th April, Easter Sunday, ten expeditioners set out for Vandenberg Camp with camping gear and water. Once in camp we spent a couple of hours servicing SAMBOT pluviometer near Vandenberg Camp, including a battery change and a set of battery clamps.

Overnight was spent at Vandenberg Camp.

Part 4 of this expedition was to climb up to the Plateau pluviometer and carry out the reinstatement. Monday 21st April Easter was the final haul of all gear up North Tusk Hill and across to the Plateau, arriving at 11am. After the obligatory billy of tea we set to work as directed by Chris Kemp. The temporary data loggers were disconnected and packed safely away. While Sarah Hollis, Steven and Ethan laid out and buried the new communication cable, Chris and Sarah Kemp

connected up the pluviometer, then the telemetry box was installed, the new Yagi antenna fitted and solar panels mounted. Fingers crossed, batteries were connected and everything worked! Hooray.



Chris Kemp calibrating the Plateau pluviometer after installation.



The maintenance and repair party ready to set out from Henzell's Camp.

From back left: Clem Colla, Gary Trethewey, Michelle Trethewey, Chris Kemp, Alex Cornish, Steven Gatti and Chris Wright.

From front left: Sarah Hollis, John Love, Sarah Kemp and Ethan Gates.

The next task was to find the best signal strength by rotating the Yagi antenna in small increments.

Rather to our surprise, the strongest signal was from Farina Repeater about 80km away. The Yagi was clamped in this setting. Finally the Pluviometer was calibrated, with the help of 2-way radios to communicate between instrument and telemetry box (50m).

After successful completion of the reinstatement of the Plateau pluviometer Part 5 of this expedition was the return to Vandenberg camp for the night and on the Tuesday morning return to the vehicles at Henzell's Camp. Alex and his team continued home that afternoon, while the rest of us stopped

off for a wash and the comforts of North Moolooloo and then we went on to dinner at the pub in Leigh Creek.

On Wednesday we returned to Adelaide having completed all the tasks on the list.

Christopher.wright45@outlook.com

All photographs by Sarah Kemp.

OSPREY UPDATE

Ian Falconner

Set out below is the tracking path of the Osprey Marie (female) since becoming independent from her foster parents on the 16th February 2025 and departing Gleesons Landing. This Osprey young was fostered out to the Gleesons Landing pair of Ospreys after prematurely fledging from the Coobowie Bay nest during an extreme weather event.

Total distance travelled since leaving Gleesons Landing to Black Springs in Coffin Bay = 1,784km over a period of 8 days and 3 hours (approx.).

This is the longest flight of an Osprey young since the project commence in 2020.

Some interesting facts relevant to this movement below:

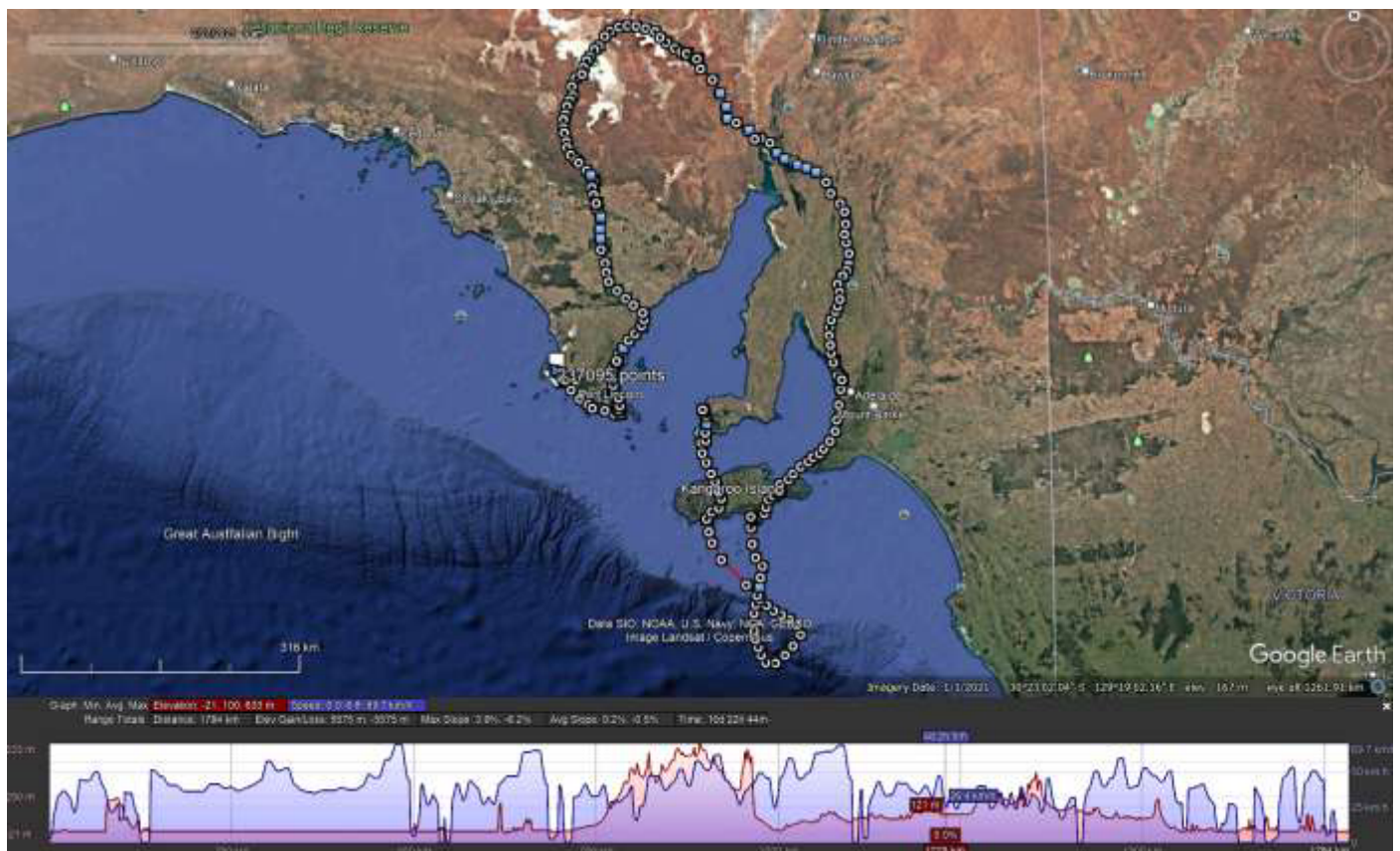
- Distance from Gleeson Landing to Cape Bouger near Hansons Bay on KI = 134km.
- Flight distance from Cape Bouger south to the continental shelf and return to KI (Cape Gantheaume) = 380km. This is an interesting flight as it was over a period of 20.5 hours. No places to land in this area apart from boats? As it turns out I was about 60km south of KI in a boat on the actual day the Osprey flew back to KI and the conditions were 4 mtr swell and 25 knot winds.
- Furthest distance travelled south of KI to continental shelf = 213km.
- The interesting flight north from the AIBS (*Adelaide International Bird Sanctuary*) over land and the dry pastoral areas to Lake Gairdner near Woomera and

then south to Port Neil on Eyre Peninsula = 824 km over a period of 66 hours.

- Maximum speed 69.7 km/hr and average speed 6.8 km/hr. (The blue line on the graph below.) Average elevation 100mtrs and maximum elevation 633 mtrs over the Flinders Ranges. (refer to elevation profile below. The red line,)
- Peaks on elevation profile are flights over land and flat sections are flights over water.
- Three stop overs perhaps to feed occurred over the 1,784km at Cape Bouger, AIBS near St Kilda and Stamford Hill in Lincoln NP, otherwise continuous flight.

In summary, how did this Osprey complete such a marathon flight of 1,784 km successfully through some of the very dry pastoral areas of SA? This Osprey and the other two Ospreys at the Coobowie nest were by far the heaviest female Ospreys tracked and banded so far (well above average weight). Success in part maybe due to fat which is the fuel that makes these flights possible. It is well known that migratory Ospreys and shorebirds that travel long distance with little food along the way, fat provides essential energy as well as releasing significant amounts of water when metabolised. Therefore an Osprey's movement through the dry interior of SA may enable it to maintain flight even though it has not eaten and had access to water.

Further more detailed analysis of these movements continues





The survey team at Minnowarra Site 5. From left: Janet Furler, Jill Tugwell, Clarantina, Janet Davill and Phil Davill.

MINNOWARRA BIODIVERSITY PROJECT AUTUMN 2025

Richard Willing

The weather for the few months leading up to the autumn survey was characterized by high pressure systems in the Great Australian Bight contributing to a dry winter, spring and summer in South Australia. This made for conditions ideal for people conducting a biodiversity survey with mostly warm sunny days and mild nights. The only exception to this was a heavy downpour late in the survey which drenched those unwary souls who did not take a rain jacket into the field, but only put 3mm into the rain gauge. The ground was very dry and soil moisture low. Farmers from all over the state are worried about such a late arrival of rain this season.

Because of many problems leading up to the survey and a depleted team it was decided to do a mammal survey only. Elliott and cage traps were used and the pits were left closed and no fences stood up. The survey commenced on Wednesday 23 April and ran until Sunday 27.

In spite of the dry season the survey was quite busy. A total of 325 native mammals were trapped, plus one feral white bellied Black Rat (*R. rattus*). Of these 162 were new animals to our survey: 82 *Antechinus flavipes*, 55 *Rattus fuscipes*

(Bush rat) and 25 *R. lutreolus* (Swamp Rat). Site 1 (NW paddock swamp) was the most prolific with total 72 captures including 33 new animals - 12 *Antechinus*, 11 Bush Rats and 10 Swamp rats. Site 7 (South paddock swamp) had 61 total captures including 24 new *Antechinus*.

The surprise site during this survey was Site 4 (North paddock near creek and large dam). The yield over 5 days was only 1 *Antechinus* and 2 Bush rats. Site 9, just up the hill from Site 4 (hill with many yaccas) yielded only 2 *Antechinus*. Site 4 is usually a reliable source of small mammals during these surveys, and it is interesting to speculate about the cause of this deficiency. It is so local that it might suggest an increase in predation in this vicinity, or possibly the soil has dried out more here. Another interesting observation that this long-standing monitoring program has produced!

Many thanks to the workers who did so much to make this survey happen. They were very busy. The next survey commences in late September. Watch this space.

rwilling01@gmail.com



It rained. Jill Tugwell and Richard Willing.



Richard Willing handling a catch.



Phil Davill baiting Elliot traps



Janet Davill recording the catch.

All photographs courtesy of Anthea Habel.

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