



SEGments



**Journal of the Scientific Expedition Group Inc.
Volume 33 No. 1 June 2017**

Scientific Expedition Group Inc.

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SEGments Editors

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Alun Thomas

SEG Website

Michelle Trethewey
Garry Trethewey

SEG Administrative Officer

Alun Thomas Email: alunulna@gmail.com

SEG Treasurer: Graeme Oats

Email: gdoats@bigpond.net.au

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 0816 6463

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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Contacts:

SEG Secretary: Sarah Telfer
PO. Box 501, Unley SA 5061
Email: sarahtelfer@internode.on.net

SEG email: scientificexpeditiongroup@gmail.com

SEG website [Http://www.communitywebs.org/ScientificExpeditionGroup](http://www.communitywebs.org/ScientificExpeditionGroup)

Front Cover Photo: Australian sea lion bull at Olive Island Dec 2014. Photograph Peter Shaughnessy.



SEGments



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cotton under irrigation. The real story is one of which these countries perhaps should not be so proud.

The main river which flows between Uzbekistan and Turkmenistan is the Amu Darya. It rises in Afghanistan and has flowed into the Aral Sea for millennia. In the 1960's, Russia which at that time controlled these countries, built a network of huge irrigation canals to produce cotton and other crops. The longest of these canals, the Karakum Canal, is over 1300 Km long. These canals drain so much water off the Amu Darya that in about thirty years the Aral Sea has reduced to less than 10 percent of its original volume, and vast tracts of its original bed are now deserts.

What is worse is that the canals were so badly constructed that it is estimated that seventy five percent of the water is wasted by seepage and evaporation. To add to that, the salinity of what is left of the Aral Sea has changed from it being a fresh water lake to being more saline than the Dead Sea. It is also highly polluted from chemical run off from irrigated crops.

Russia had been warned about the potential environmental damage from canal construction, but the region is a long way from Moscow and it appears they did not care.

There are scary parallels between what has happened in Central Asia and what could happen with the Murray River in Australia. For Moscow, read Canberra and for the Aral Sea, read the Coorong. Irrigators upstream from the Lower Lakes and Coorong have little regard for what happens at the South Australian end of the river and without vigilance, gains that SA have achieved by hard work with the River Murray Agreement will be lost by Federal politicians only interested in upstream votes, and by the cotton irrigators in the upstream states.

Once it rains, the press forget the water issue and the gains are whittled away. Even as recently as this month there have been calls by Federal politicians in New South Wales and Queensland to stop the water "going to waste" in South Australia (Advertiser 15 June 2017, P 14).

Eternal vigilance is necessary, or there will be another ecological disaster.

Alun Thomas

EDITORIAL

Kathleen and I have just spent four weeks in Central Asia. We were there to look at the history of the Silk Road but while this was fascinating another thing struck us quite forcefully. Coming from a dry state of Australia it was interesting to see vast tracts of irrigation. Our guides in Uzbekistan and Turkmenistan were proud of the fact that these countries grow huge amounts of

SEALS IN SOUTH AUSTRALIA

Peter Shaughnessy

Three species of eared seal (or otariid seal) of the family Otariidae breed in southern Australia: the long-nosed fur seal *Arctocephalus forsteri* which is also known as the New Zealand (NZ) fur seal; the Australian fur seal *A. pusillus doriferus*; and the Australian sea lion *Neophoca cinerea* (Kirkwood and Goldsworthy 2013). All three of them breed in South Australia (SA).

Population status

Long-nosed fur seals

In SA, the long-nosed fur seal is the most abundant of the three resident seals. They breed from Baudin Rocks in the south-east to Fenelon Island, Nuyts Archipelago in the north-west (Shaughnessy et al. 2015). Based on a survey of this species at the end of the 2013-14 breeding season, 29 of the breeding colonies produced 20,431 pups; a number 3.6 times greater than an estimate made in 1989-90. The increase is attributed to recovery from overharvesting in the early 19th century. The 2013-14 pup estimate leads to an estimate of abundance of long-nosed fur seals (pups and adults) in South Australia of 97,200. Most animals were on Kangaroo Island (49%) and the Neptune Islands (39%) (Fig. 1).

A long-term study of pup abundance has been undertaken since 1988-89 at two colonies on Kangaroo Island (Shaughnessy and Goldsworthy 2015b). At Cape Gantheaume (36.07S, 137.46E) at the south-eastern headland of the island over 26 consecutive breeding seasons, pup numbers increased at an average exponential rate of 10.0% per annum. At Cape du Couedic (36.06S, 136.71E), at the southwestern headland, the population increased over 21 breeding seasons at 11.4% p.a. At both sites the increases were accompanied by expansion in sub-colonies that existed in January 1989, and the establishment of several new sub-colonies nearby. These two colonies are accessible by vehicle and on foot, which made them suitable sites for long-term study. The study ceased at Cape du Couedic in 2013-2014 but it has continued at Cape Gantheaume where the population size appears to have reached a plateau over the last five years (Fig. 2 and Goldsworthy et al. in preparation).

Australian fur seals

The main breeding area of the Australian fur seal is in Bass Strait. In recent years breeding colonies have developed in SA, primarily at North Casuarina Island, about 400 meters south of Cape du Couedic. We first found evidence of them breeding there in February 2007 (11 pups). At the last census, in February 2014, there were 76 pups (Shaughnessy et al. 2014).

North Casuarina Island has been an important breeding colony of long-nosed fur seals. As numbers of Australian fur seals there increased over the last decade, numbers of long-nosed fur seal pups decreased from about 500 in three seasons in the mid-1990s to 245 in 2013-2014. This has been contrary to the increasing trend in SA for long-nosed fur seals.

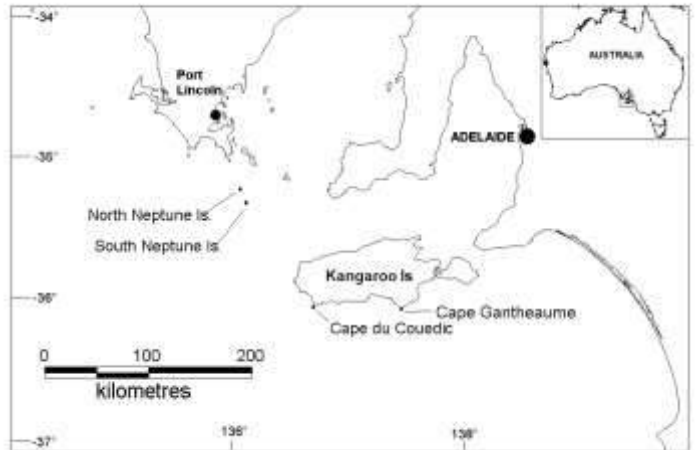


Figure 1. Map of the central part of South Australia showing locations of main breeding colonies of the long-nosed fur seal on the Neptune Islands and south coast of Kangaroo Island.

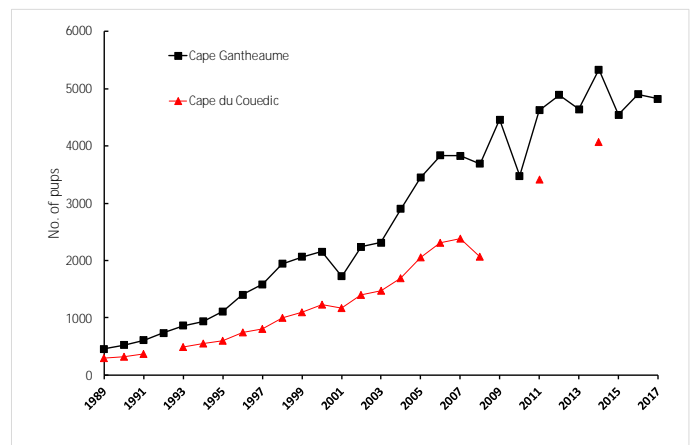


Figure 2. Increase in pup numbers of the long-nosed fur seal at two colonies on Kangaroo Island from 1988-89 to 2016-17. The surveys were carried out in late January each year at the end of each breeding season.

Australian sea lions

The Australian sea lion is an Australian endemic with distribution limited to southern Australia. It is unusual among seals in having a non-annual (~18 month) breeding cycle that is asynchronous across their range. They have the longest gestation period of any pinniped (carnivorous aquatic

mammal), and they have protracted breeding and lactation periods'. Females exhibit extreme philopatry relative to other pinnipeds (meaning they tend to return to or remain near a particular site or area).



Australian fur seals at Cape Gantheaume

The 76 known breeding colonies are between The Pages Islands in SA and Houtman Abrolhos in Western Australia. Of those, 43 are in SA, with pup production of 2,520 estimated at the state wide survey in 2014 and 2015, leading to a population size of 9,700 (Goldsworthy et al. 2015b).

Overall, the sea lion population has been declining by 2.6% per year. In SA, declines have been ongoing for at least 1-3 decades and pup abundance has declined by almost 25% over the last decade or less. An example is from Olive Island near

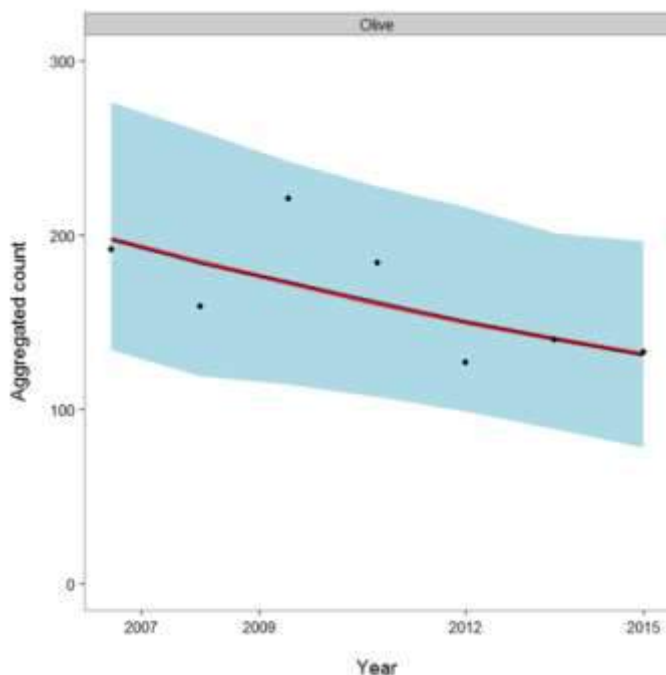


Figure 3. Decrease in pup numbers of the Australian sea lion at Olive Island over seven breeding seasons from 2007 to 2014-15. (Goldsworthy et al. 2015b)

Streaky Bay where the decrease has been at 4.4% per annum or 6.5% per breeding season (Fig. 3).

Management implications

Fur seals

The documented increase in abundance of long-nosed fur seals has led to reports of interactions between fur seals and various fisheries, and to complaints from fishers. This has led to calls for them to be culled, enhanced by the mistaken belief that they have been introduced from New Zealand on the basis of the vernacular name 'New Zealand fur seal'. That name was introduced in 1968 (King 1968) when she recognised the species from collections made in SA. As a result of this misunderstanding, Simon Goldsworthy and I have had the name 'Long-nosed fur seal' accepted by the taxonomic committee of the international Society of Marine Mammalogists (Shaughnessy and Goldsworthy 2015a), and it has been adopted by the SA Department of Environment, Water and Natural Resources (DEWNR).



Australian sea lion pups at Olive Island

Long-nosed fur seals now use the Coorong and lower lakes near the mouth of the River Murray, where they are attracted to fishers' set nets and to their discards. Efforts being made to mitigate the interactions include trialling 'seal crackers' to frighten seals from the nets and altering the fishing method so that nets are in the water for shorter soak periods. Fur seals have also been observed killing water birds in the Coorong, including pelicans which are a totemic animal for the local Indigenous population. Fur seals are blamed for preying on little penguins *Eudyptula minor* at tourist viewing locations on Kangaroo Island and Granite Island (Wiebkin 2011). Fur seals also are blamed by industry bodies and in the local media for removing fish from nets of commercial fishers, and for entering aquaculture pens near Port Lincoln where they disturb farmed southern bluefin tuna *Thunnus macoyii*. In each instance, complaints have been made to the relevant government agency, DEWNR, accompanied by requests to cull

or translocate fur seals. Translocation is unlikely to be successful; in southern Tasmania, translocation of fur seals foraging at salmon aquaculture pens resulted in 56% of the animals being recaptured at pens (Robinson et al. 2008). Culling would be futile unless applied intensively because other fur seals are likely to replace the perpetrators quickly. Proposals for an intensive cull are unlikely to be viewed favourably by conservation bodies, the general public or by tourism operators in SA who make use of seals.

Australian sea lions

Bycatch mortality in demersal (demersal fish are bottom-feeders) gill-net fishery for shark has been identified as the major threat to Australian sea lion populations. Management actions to limit the bycatch of sea lions introduced by the Australian Fisheries Management Authority (AFMA) between 2010 and 2012 include spatial closures to the fishery around sea lion colonies, electronic monitoring, bycatch trigger limits and cameras on boats. Fishers' logbook data on Australian sea lion interactions reported at meetings of AFMA's Marine Mammal Working Group suggest these measures have reduced Australian sea lion bycatch in the shark gill-net fishery, with ten mortalities reported between 2012 and 2016.

Although these actions should reduce that bycatch and impact on the sea lion population and enable it to recover, increases are not yet apparent. Information on known age females from Seal Bay Kangaroo Island indicate that few of them produce a pup until aged 6 years (Goldsworthy et al. 2015a). Consequently, any recovery of the population is likely to be a few years away.

It has been suggested that the increase in population size of long-nosed fur seals has led to the decrease in numbers of the Australian sea lion. This seems unlikely as there is little ecological overlap between the two species. Australian sea lions forage on the sea floor and their aquatic distribution is restricted to shelf waters off South Australia and Western Australia. Long-nosed fur seals forage through the water column and many of them feed well off-shore; adult female long-nosed fur seals forage on the bottom, and only for part of the year (Page et al. 2006). On the other hand, Australian fur seals are bottom foragers (Page et al. 2005) and hence are more likely to compete with Australian sea lions.



Long-nosed fur seal *Arctocephalus forsteri* bull at Cape Gantheaume 2007

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- Contact: Peter.Shaughnessy@samuseum.gov.au
(Honorary Research Associate, South Australian Museum, Adelaide)
- Editor's Note: In an article "Abundance of Fur Seal Pups on Kangaroo Island" in SEGments March 2014 Vol 29, No. 4, Alun Thomas described how a seal pup survey is conducted.



Australian sea lions at Olive Island beach December 2014

SEG EXPEDITIONS 2017 — 2018

Circumstances sometimes conspire to upset the normal routine. This is one such year for the Scientific Expedition Group, as a number of key players are not available to run a Spring expedition. SEG is however planning to hold its next expedition to the Lower Eyre Peninsula in Autumn 2018, when the weather will be suitable for enjoying all that the Eyre Peninsula has to offer. However, members can enjoy SEG's four day Minnawarra spring survey (see dates in this edition) when the numbers of captures can be in excess of 200 animals. The Vulkathunha-Gammons Ranges trip conducted in spring over about four days offers a hiking experience in a wilderness surrounded by steep gorges and spectacular cliffs. The malleefowl monitoring project provides an opportunity to enjoy a pleasant weekend in the Riverland later in spring. Watch out for notices for these expeditions, or check the SEG website.

For members looking for a longer expedition to more far flung parts of the State, the Friends of Great Victoria Desert are advertising field trips in their newsletter on page 9.

<http://www.communitywebs.org/fgvd/assets/gvd-newsletter-48-june-2017--lowquality.pdf>

EXPEDITION EYRE RECCE MAY 2017

Trent Porter

It was cold and dark as I made my way down to Glenelg North to pick up Helen Johnson and all the food for this recce. The purpose was to locate all the GPS waypoints that we had been supplied by DEWNR for the proposed Expedition in March/April 2018. These waypoints were the locations for a survey which had been done some 15 years prior and were scattered throughout Coffin Bay National Park and Lincoln National Park, both of which are situated at the bottom end of Eyre Peninsular.

As I was stuffing my vehicle to the gunwales with all the food and accommodation gear we would need, I wondered how Stuart Pillman was getting on. He, as a Hills dweller, was picking up Margie Barnett and Justin Jay, who also live in that area. Our arrangement was, to each do our pickups and to meet at the nifty little 'shed' café at Lochiel at about 8.30. Helen and I had no sooner ordered our coffees and breakfast than the other carload pulled up and charged in. We took this as a good omen for things to come.

The rest of the journey through Pt. Augusta, Whyalla and Cowell was uneventful and after a last fuel stop at North Shields, we took the short cut road across to Coffin Bay and then into the Park where we set up our camps at the recently renovated Yangie Bay Campground. Very comfortable and sooo picturesque. Straight out of the brochure!!

Next morning we set off to find the first of our waypoints along the very *interesting* track which leads out on to the Peninsular. Some sections could be described as rough (potholes bigger than my car), and others almost smooth (sand up to 2 feet deep), but all passable even though average speeds were quite low. Our first few 'dropper sites' were fairly easy to locate in the sand dune country although some were up to 300m away from the indicated photo points.

After about a third of the distance of the site locations had been covered we found that the track leads out on to a very pretty beach for about 8kms and a site was indicated about half way along, which we left to the second day for reasons of tide. We found that tide timings were critical at this time of year, because the sea at high tide comes right up to the dunes in places, and the track becomes impassable 'til the tide recedes.

On the second day, we returned to look for sites not searched for or that had been difficult to locate on our first attempt. We scrambled up a sandy bank and found a site. Too easy, this one, right next to the beach!! BUT in exploring the site in low scrubby bushes, I stepped over a little pile of sticks before the brain registered that one of the sticks looked unusually marked. A very quick check slowly resolved into a Death Adder lying in ambush with *almost* perfect camouflage. Stuart quickly captured the surprised reptile and he/she posed for many photos before being released. NOT a place to wear shorts and thongs.



Death adder, Coffin Bay National Park. Photo T Porter

We spent two days driving into the Coffin Bay National Park from the Yangie campsite, slowly working our way along, but the waypoints became harder and harder to locate and we had to give up on a number of them. It became apparent also, that servicing 8 trap lines along the length of the track would take all day, and the Bird people would just not be able to complete their task if based at Yangie Bay.

So, we were glad to find, almost at the end of the track near Reef Head, a great little building with tank water, toilets and big verandah which could form a satellite camp for Birdo's and veg people to cut travel to a minimum. The Mammal/ Reptile people could perhaps share this facility to shorten the runs back and forth. Back to camp after dark but a great dinner was had in the Coffin Bay Pub and then a campfire was lit and many yarns were told.

Next day was pack up and off to Pt. Lincoln for resupply and to move on to Lincoln Park on the eastern side of Eyre Peninsula.

Here, we found that the roads were much better for the most part but, given the inaccuracy of the GPS waypoints, and the incredible density of the bush, we were unable to locate a lot of sites. It also became apparent that National Parks had closed a lot of tracks by ripping them with a bulldozer and making at least two of the sites totally out of the question. However, we determined that the Lincoln NP as well as the Coffin Bay NP would probably each require a whole expedition and each require a satellite camp because of the sheer distances involved. For Lincoln NP the satellite camp would need to be at Memory Cove, one of the most gorgeous camps I've seen, and therefore not without compensations (see photo Page 16).



The Recce group, Margie Barnett, Helen Johnson, Trent Porter, Justin Jay and Stuart Pillman.

The main camp would need to be at September Beach (WOW) with the only downside being the resident kangaroos, one of which in particular, had a great sense of entitlement to our gear and would upend our camp looking for any food that might be around. Not the best at 2.00am, 3.00am and 4.00 am. He even managed to eat part of a cardboard box which had been stashed under the vehicle. Which illustrates the folly of feeding wild animals, especially big, aggressive blokes like this (see photo back cover).

On the last day, Stuart managed to get all four of the other folks on board with their gear for the return to Adelaide, as I went back to Coffin Bay to start a two week fishing holiday - Job Done!!



Sunrise at September Beach

RIVER MURRAY HIGH FLOW EVENT: HYDROLOGICAL SOCIETY SA RIVERLAND TOUR DECEMBER 2016

Bob Newman

Background

2016 was a big year for the River Murray. In April, the Murray Darling Basin Authority (MDBA) storages were only 27% full. A wet winter commenced with rains generated across the basin and by July heavy unseasonal rain in Queensland and northern NSW had generated flows in the northern rivers. In the south rain in September started to fill the southern storages, and by October the Murray system was on flood watch. Upstream inflows peaked at over 250,000 ML/day, and flooding was giving distress to some communities. Figure 1 shows the upstream inflows in 2016 and the much lower inflows in 2015, and the comparison with the long term monthly average inflows.

However, the Murray travels through flat terrain and the flow

Riverland in early December 2016 to coincide with the peak flows reaching South Australia. We had around 25 participants over the two days and our timing was perfect. The group included participants from the Australian Conservation and Nature Foundation SA.

We arrived in Renmark on 1st December just as the peak flow of 95,000 ML/d crossed the border. Even this flow covers only about 70% of the floodplain, although it did concern some shack owners further downstream and SA issued 'flood warnings' for below Lock 1 at Blanchetown.

At the time we were there the river was experiencing a 'blackwater event', which is a natural occurrence of the receding high flows draining from upstream wetlands and billabongs. While this can cause fish kills, it is relatively short lived and the overall benefits of large flows are crucial for a sustainable system.

Day 1 Thursday 1st December 2016

Our tour started in perfect weather at the McCormick Environment Centre at Renmark with an excellent presentation by Tony Herbert (DEWNR) on the planning and negotiations for environmental water allocations at the Basin-wide scale. Some of the presentations we received will be uploaded to the HydSoc SA website (www.hydsoc.sa.org).

Our first visit was to Calperum Station, North of Renmark, where we were hosted by Karen Brown of the Australian Landscape Trust (<http://www.austlandscapetrust.org.au/>), and we were taken to overlook the water flowing into the Woolpoolool wetland. This is one of the large wetlands on the Northern side of the Chowilla floodplain. Chowilla floodplain covers some 20,000 ha and spans across Lock 7 (upstream of the SA Border) to Lock 5 (downstream of Renmark). These large wetlands fill from downstream and only become 'flow through' at the largest inflow events such as the one South Australia was experiencing at the time.

The Johnson's Water hole just upstream of Renmark (Lock 5) was visited en route from Woolpoolool to Chowilla. It is managed by the Renmark Irrigation Trust and Nature Foundation SA, using an environmental water allocation from the Commonwealth Environmental Water holding. Johnson's Water hole is one of forty such smaller sites receiving water and being managed through community groups.

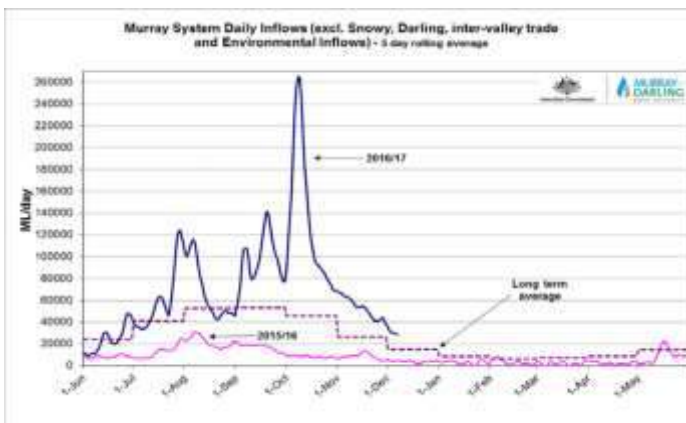


Figure 1 River Murray system inflows ML/d (source MDBA)

is attenuated as the peak travels slowly downstream. By the time the flow peak reached SA it had reduced to about 95,000 ML/d but even this is regarded as a good 'high flow' for the SA system. It gave the SA floodplains and wetlands a much needed drink. Such flows once occurred every two to three years but nowadays, even with the latest Murray-Darling Basin Plan, it's more likely a one in ten year event. The last such event was in 2010 and before that in 1993! Figure 2 shows flows to SA between 1st July 2016 and 24th February 2017.

Hydrological Society SA Tour

The Hydrological Society SA organised a two day tour to the

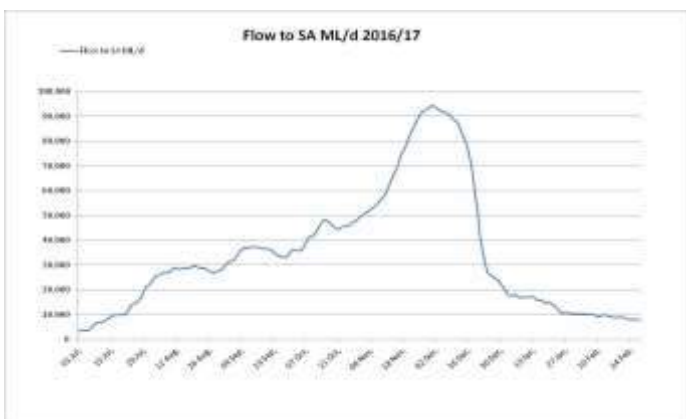


Figure 2 Flow to SA ML/d (source MDBA)



Woolpoolool wetland at full flow (Calperum Station)

Day 1 Visit 3: A highlight of the Riverland tour was a river cruise to the Chowilla creek environmental regulator which is the major feature of a complex system of structures used to manipulate water flow around the 20,000 ha of floodplain on the NSW/SA border. The works were constructed by SA Water, on behalf of the Murray Darling Basin Authority under the Living Murray Works and Measures Program, and completed in 2014 at a cost of around \$60M. (See article by Jan Whittle in this edition of SEGments)

The cruise started with a BBQ at the Wilkadene Station on the Paringa to Murtho Road. Wilkadene is an historic property; the home of the Bagot family which was previously at the Ned's Corner pastoral property in the 1850's. It now hosts the Woolshed Micro-Brewery and tourist accommodation. (<http://www.woolshedbrewery.com.au>)

The Chowilla creek environmental regulator structure is close to the downstream end of Chowilla Creek and can hold higher water levels upstream covering some 8000 ha of floodplain.

There is an extensive monitoring system along the Murray including real time data measurements including a salinity and DO (dissolved oxygen)/pH station downstream of the Chowilla creek outlet to the Murray.

Interestingly, in August 2016, prior to this flood event, the Chowilla regulator was used to artificially inundate around 7000 ha of floodplain using environmental water allocations. The subsequent natural short sharp flow peak extended and enhanced the earlier inundation. The combination of these two actions provides even more benefit than just one or the other!

The boat trips went superbly with excellent commentary by Jan Whittle and Tony Sharley.

After the boat trip and a BBQ lunch hosted by Peter Forward, most of the group visited Headings Cliff lookout (up stream of Paringa) where the sheer scale of a 95,000 ML/d event at its peak could be appreciated

Day 1 Visit 4: Following the boat cruise, Peter Forward (SA Water Corporation) introduced us to one of the many salt interception schemes which have been constructed along the length of the Murray, mainly in SA. The Murtho scheme



River Murray in flood from Headings Cliffs

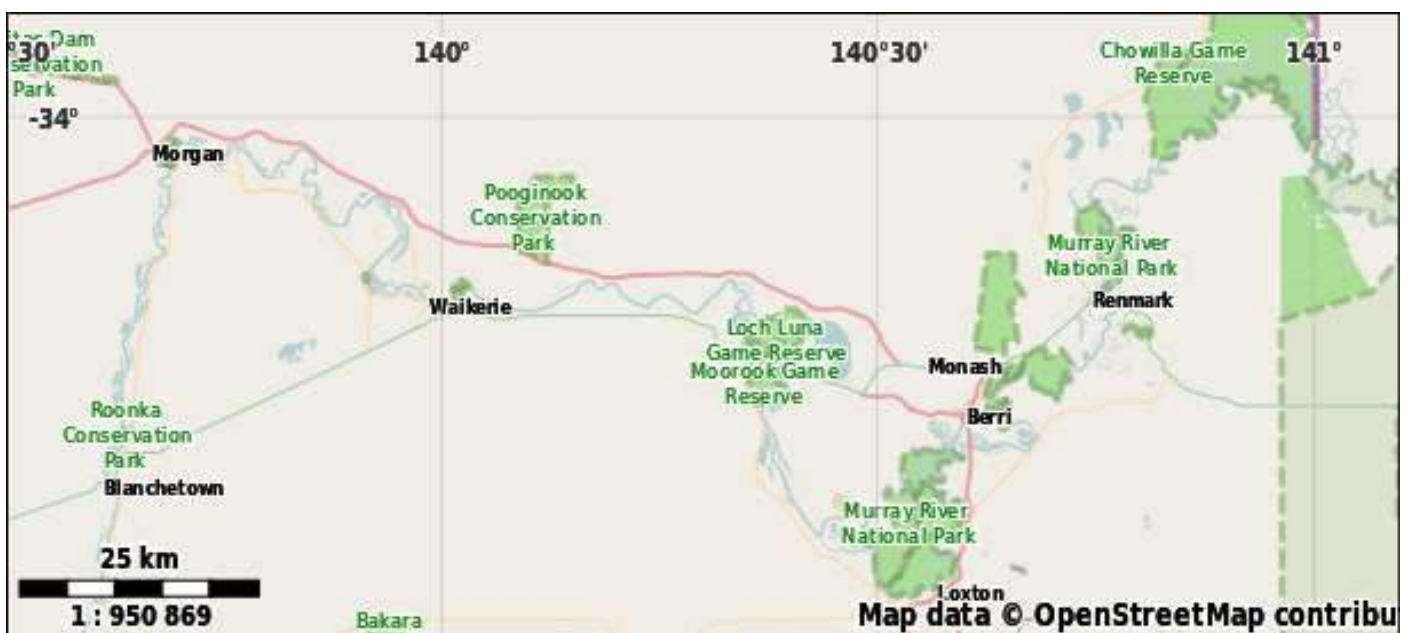
involves 23 bores extending from the SA Border to Paringa along the Murtho road. Peter has responsibility for 10 schemes throughout SA with a capacity for protecting the Murray from some 400,000 tonnes of salt per year. The scope of actual salt interception at the river itself is somewhat less due to the characteristics of groundwater pumping.

Day 2 Friday 2nd December 2016

On Friday, Daniel McCullough (DEWNR) gave us a presentation on the hydraulic modelling of management scenarios for the Pike River and Katfish reach floodplain projects. (www.HydSoc.org)

Day 2 Visit 1: After the DEWNR presentation, we were back on the bus to Lock 5 at Renmark where Brad Hollis (DEWNR) and Kym Butcher (SA Water) guided us through the construction works at Margaret Dowling reserve, where there is a much larger inlet to the Pike River system (Lock 5 to Lock 4 (upstream of Loxton)), and also the potential for groundwater control using interception bores on the adjacent highland, primarily for ecological benefits on the floodplain.

The construction is nearing completion and includes a fish ladder at the Pike River inlet. These works will allow for the emulation of natural flow and inundation regimes at the Pike River floodplain, another major off river wetland system. Further downstream, across the river from Lock 4, another



similar project is planned for the Katfish reach floodplains (using Eckert's Creek and Katarapko Creek).

Day 2 Visit 2: We then travelled through the Gurra Gurra Lakes wetlands complex from Lyrup, with numerous inflows just being initiated by the high river. This system also contains sites which are managed by the local community and Nature Foundation SA to provide for flow manipulation using local structures.

Todd Goodman (DEWNR) joined us on the bus for a briefing on irrigation licensing and salinity impact zoning. The Riverland region is SA's primary irrigation district with a range of crops. The region is diversifying from the traditional grapes, citrus and stone fruit and increasingly includes many new niche crops.

Day 2 Visit 3: As if to confirm the increasing diversity of crops, we visited a date plantation and had lunch with Dave Reilly.

Having struggled with extremely high salinity irrigation source water from the Gurra Gurra lakes which had cost him his grape crops during the drought, Dave Reilly now has a large date palm plantation which is beginning to thrive after 10 years of experimentation. Dates are much less sensitive to high salinity than the lost grapevine crop. (<http://www.gurradowns.com.au>)

Dave's crop is now exported to the Middle East, providing counter seasonal fresh dates to complement their local market. Fresh dates are only recently appreciated in Australia driven by our recent trend towards Middle Eastern cuisine.



Date palm plantation

Day 2 Visit 4: We next briefly visited Lock 4 where the volume of the flood flow passing the barrage could be appreciated, even though the peak had not yet reached there. Time, or the lack of it, prevented us from reaching Loxton where we would have liked to tell the story of the refurbished Loxton Research Centre as part of the South Australian River Murray Sustainability Irrigation Industry Improvement Program. Look up the details of this major production initiative which complements the Murray Darling Basin Plan

<http://www.pir.sa.gov.au/sarims-iiip> .

We then returned to Renmark crossing the River at Lyrup ferry at near peak flow.

Day 3 Saturday 3rd December 2016

In the morning those few of the tour group who had not

departed to travel back home the previous evening, visited Brian Caddy's irrigation property at Barmera. Brian provided the story of the progressive development of a nearly 100 year old irrigation 'block' growing wine grapes. This property has been under continuous improvement for the past 25 years, and Brian now uses the latest technology for irrigation management, and changes wine grape varieties to suit market trends.

Later we had lunch at Banrock Station, and then visited Liz Frankel's gallery, Riverglen View Art Studio at Good Hope Landing, which overlooks the Nature Foundation's Yarra watering site. (<http://www.frankelglassandbooks.com.au/>)



Banrock Station wetland

A discussion around the variety of niche market produce now coming from the Region led to another opportunity for a local visit. A small business in Waikerie on the Sturt Highway, 'Illalangi' stock a great variety of the local niche products. <https://illalangi.myshopify.com/>

Post Tour Reflection

This Hydrological Society of SA tour was first considered about a year ago when dry conditions were anticipated to continue. The focus of that proposed tour was to be on the 'managed wetlands and backwater creeks' under dry conditions.

I'm informed that the river floodplain system has responded magnificently to this 2016 flow. The results of response monitoring to this natural event and future managed interventions will be eagerly awaited and could be the subject of future technical presentations.

I'm confident that everyone got much out of this tour, no matter what their prior knowledge of the Riverland and its produce.

The Hydrological Society will be considering further field visit opportunities. Please let the Society know of your interests, and (where possible) your capacity to assist in organising such events.

Bob.Newman@McCloudHouse.com.au



Margaret Dowling fish pass

CHOWILLA FLOODPLAIN ICON SITE AND CHOWILLA CREEK REGULATOR

Jan Whittle

The Chowilla Floodplain is part of the Riverland Ramsar wetland of international significance and is also one of six Icon Sites under The Living Murray program of the Murray-Darling Basin.

The Chowilla Creek floodplain contains one of the largest remaining areas of natural river red gum forest in the Lower Murray and has highly diverse floodplain vegetation including large areas of black box woodland. Under natural conditions prior to river regulation and extraction the SA floodplain areas such as Chowilla used to receive flooding flows generating broad-scale inundation at least every 2-3 years. Floodplain health has suffered due to the significant reduction in the frequency of such high flows and flooding.

The Chowilla Creek environmental regulator and ancillary structures have been built to support environmental water delivery to improve the health of the Chowilla Floodplain. The environmental regulator is a weir-like structure built across Chowilla Creek consisting of a series of concrete piers and a deck. The Chowilla Creek environmental regulator operation enables water levels in the Chowilla Creek to be raised to generate broad-scale inundation of the floodplain under lower river flows. The construction of the Chowilla Creek environmental regulator and ancillary structures was completed in early 2014.

Operations Update - December 2016

After smaller scale testing in 2014 and 2015, further testing of the Chowilla regulator was undertaken from August to November 2016. Testing involved placing stop logs between concrete piers of the Chowilla regulator to raise water levels behind the regulator. The target operating height of 19.75 m AHD (Australian Height Datum, height above sea level) was reached in the last week of September when flows in the River Murray were around 35,000 megalitres/day (ML/d). This generated inundation across areas of the floodplain that would require natural River Murray flows of around 80,000 - 90,000 ML/d to occur. The event enabled inundation of



Landsat 8 image 28 Sept 2016 showing 7,650 ha inundated during the Chowilla regulator testing event

approximately 7,650 ha of floodplain and wetlands which extended to fill all of the major high elevation wetlands including Coombool Swamp, Lake Littra and Gum Flat and large areas of woodland and shrubland vegetation.

The gradual removal of stop logs at the regulator to start lowering water levels commenced from mid-October. At that time, flows in the River Murray were continuing to rise and water levels exceeded the managed water level at the regulator in mid-November. At that point the remaining stop logs were removed from the regulator, effectively concluding the managed inundation event with the increased water level then caused by the natural flooding.



Chowilla Creek regulator during the peak of the operation- 27 Sept 2016 Photo: D. Haines (SA Water)



Floodplain Inundation around Chowilla Creek Bridge and Lock 6 road, 27 Sept 2016. Photo: D. Haines (SA Water)

During the regulator testing, Lock and Weir 6 on the River Murray at Murtho was also raised to 19.84 metres AHD, (59 cm above normal pool level). Raising the Lock 6 water level in conjunction with operating the regulator is important to ensure maintenance of good flows through the Chowilla anabranch to manage water quality and protect important fast flowing native fish habitat (an anabranch is a stream that

leaves a river and re-enters it further along its course). Several smaller regulating structures and fishways were also operated during the event in conjunction with regulator.

The area inundated during the testing event included significant areas that had not been flooded since the natural high flow event in 2010/11. Large areas of black box and river red gum woodlands, river cooba, lignum and floodplain understorey vegetation received a much needed watering.



Black box and lignum inundation on Lock 6 Road floodplain.
Photo A. Stokes (DEWNR)

The regulator testing event provided significant benefit to floodplain vegetation and fauna including many species of frogs, birds, and invertebrates. The widespread floodplain inundation mobilises a large amount of organic matter with carbon and nutrients from the floodplain moving back to the river channel. This provides the critical building blocks for food webs within the anabranch and the River Murray ecosystem.

Seven species of frogs were recorded calling during the event including the Southern bell frog which is listed as vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*.

The Chowilla Creek regulator testing event was coordinated by the Department of Environment, Water and Natural Resources (DEWNR) with SA Water undertaking the operation and maintenance of the infrastructure. The testing was undertaken with a combination of environmental water from The Living



The vulnerable Southern Bell frog was recorded at Chowilla during the testing event. Photo: A. Stokes (DEWNR)

Murray Program and from unregulated flows. The event was closely monitored to manage risks and to the benefits of operation.

The extensive rainfall and resultant flooding in the upper catchments in NSW and Victoria inundated extensive areas of floodplain forests for the first time since the early 1990's. This resulted in a whole of River Murray hypoxic blackwater event.

The managed inundation on Chowilla did not contribute to this blackwater event, with dissolved oxygen levels across the floodplain remaining higher than the main river channel, and levels only dropping as the low dissolved oxygen water from upstream moved through the system.



Inundated floodplains

River Murray high flows build on benefits of the managed inundation

The natural high flow which occurred at the end of the managed floodplain inundation was a much needed and welcome event for the River Murray. Flow to SA peaked at the SA border on 30 November 2016 at around 94,500 ML/d. The managed watering ahead of the brief natural flooding provided the floodplain vegetation with an extended watering. With the floodplain already wetted from the managed inundation, the natural flow peak further raised water levels across the Chowilla floodplain. This natural flow importantly also inundated the eastern sections of the floodplain not inundated through the managed event and pushed water further out into areas of black box woodland, providing the many additional benefits that occur with natural flooding.

More information about the Chowilla Floodplain Living Murray Icon Site can be found at

<http://www.environment.sa.gov.au/chowilla-floodplain>

Contact: Jan.Whittle@sa.gov.au



Icon Site Coordinator
Environmental Water Operations | River Murray
Operations | Water
Department of Environment, Water and Natural Resources

MINNAWARRA AUTUMN SURVEY 2017

Janet Furler

The 2017 autumn Minnawarra Biodiversity Survey was held on 19th to 23rd April. We set up all the sites on Wednesday, with a forecast for a bit of rain overnight and clearing showers on Thursday. There was maybe 2mm overnight, then, while trying to sort transport for 16 people, a clearing shower started. It finished as we finished the round much later in the morning! It was a good demonstration of my need for a new waterproof as every item of clothing was dripping. Fortunately it wasn't too cold.

The rest of the time was ok with maximum temps of 15 to 21 and light winds.

We had a very small crew most days, with some sessions having five people between the two rounds. One sorely missed person was Richard Willing, who had to be in Adelaide and spent 5 days wondering how we were getting on. I believe that, apart from an overseas jaunt one autumn, it is the first one he has missed in 33 surveys. The backbone was the two Furler boys and their friends and rellies and they did a great job. However, David started fulltime work the day after the survey and the others are threatening similar actions. We may well need a different workforce in the future!

We were able to show two officers from the AMLR NRM (Adelaide and Mt Lofty Ranges Natural Resource Management) Willunga office what we do, which they appreciated greatly.

Overall we got 49 *Antechinus flavipes*, 65 *Rattus fuscipes* and 20 *Rattus lutreolus*; 21 from previous surveys. Counting all critters there were 200 individuals handled 330 times.

Site 1 has had a *R. lutreolus* explosion. Usually *R. lutreolus* are the least common of the 3 common species caught but this time we got 6 *A. flavipes*, 5 *R. fuscipes* (bush) and 15 *R. lutreolus* (swamp).

We found a male *R. fuscipes* which has travelled from Site 8 to 7 – a distance of 180m. While this is not a very long journey and is following the creekline, it is our first confirmed movement between sites, thanks to unique identification by microchip.

There were many (35) feral mice (*Mus musculus*) at all but 1 site (7), and 3 feral rats (*Rattus rattus*). I put this down to the wet spring and summer. Farming communities have also noticed increased mouse activity.

There were 3 banjo frogs/pobblebonks (*Limnodynastes dumerilii*) and 19 *Crinia signifera* identified. I think it has been a good season for frogs, but identifying them has been made much easier with an information sheet and key provided by the Upper River Murray Landcare Group Inc. I am happy to forward a PDF to anyone who is interested.

Eight garden skinks (*Lampropholis guichenoti*), one each of three toed earless skink (*Hemiergis decresiensis*) and southern grass skink (*Pseudomoia entrecasteauxii*) and 2 yellow bellied water skinks (*Eulamprus heatwolei*) were caught. One of the water skinks was caught in an Elliott, one in a pit, close together. Their weights were 14g and 2g. It is quite possible that they are family, as the young stay with mum for some time. As they are listed as Vulnerable in SA, with a restricted range, it is a pleasing find.



Yellow bellied water skinks (*Eulamprus heatwolei*)

MINNAWARRA BIODIVERSITY SURVEY SPRING 2017

Sat 30th September to Wed 4th October 2017

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 email thefurlers@gmail.com

VULKATHUNHA-GAMMON RANGES TRIP APRIL 2017

Garry Trethewey

The April 2017 trip to the Gammons for the GRaSP project was, as seems routine now, in two parts. Garry & Michelle had been in Quorn and popped up to the Gammons, and all the hydrologists & electronics people went a couple of weeks later. From our point of view, other than being a standard twice yearly photopoint trip, this trip was interesting because of the evidence of a substantial but unwitnessed flood on 24/1/2017.

In the report of the last trip (Sept 2016), I waxed lyrical about the amount of water in the creek as we walked up it. However, that hadn't altered the creek bed noticeably. Since then, on 24/1/2017, pluviometer and stream gauge records document intense brief rain and a much bigger flood that has substantially affected the stream bed and damaged vegetation.

Evidence seen by a lay observer, familiar with the area includes:

- Patches of bark (1m high x 400 mm across) newly smashed off bigger trees, up to 2 m above bed level. This occurs on the upstream side of trees in the creek, as rocks &/or other trees are swept down and collide, hard.
- Newly exposed tree roots with parts of the bank cut back 200mm (200m above Lake Willing).
- Newly exposed alluvium in a 2.5m vertical bank. (200m down from Upper Vandenberg).
- Well known & used paths washed away (50m above Wild Ass Waterhole).
- Newly broken rocks in creek, fragments up to 400mm diameter.
- 'Dunes' of medium sand to 10cm high on formerly flat tent sites.
- Lots of knocked down and piled up trees and shrubs.
- Collections of uprooted and broken Xanthorrhoeas, e.g. one collection including trunks up to 1m long stacked up together.
- The last 400 metres of tangled melaleuca before Vandenberg, previously a frustrating chore, now cleared and easily walked.
- Freshly deposited sand on a ledge a metre above the overflow level of Wild Ass Waterhole.
- A landmark live pine tree for SAMBOT photopoint, about 200mm diameter, now gone.
- SAMBOT bank profile raised ~300mm and big rocks covered or removed.



Photos showing changes in the past year at Sambot Waterhole.

Top photo (04/2016), rock1 had been at least half visible since the start of the GRaSP project, in Sept 1988. Rock2 has been visible since April 2006 (prior to that, a slightly different photo angle was used). Tree3, a live Callitris pine about 200mm diameter, exists.

Middle photo (09/2016) shows rock1 and rock2 more buried in sand, and tree 3 still in situ. The line of sand is only a few centimetres below the water level of that event. Bottom photo (04/2017) shows rock1 & rock2 have either been buried or have been removed. Tree 3 has been removed.

See <https://drive.google.com/open?id=0B8XS-SUHC1o5OGJQdVktTGNMWkk> for photos and commentary. Or, in a few months when they are removed, email garrytre@bigpond.com

I'm trying to guesstimate the frequency of such large effects. I've been walking up & down Arcoona Creek at least twice a year for 10 years. Although there have been small changes from time to time, (e.g. young River Red Gums germinating in a thick lawn, growing for a year or three, then washing away) this re-modelling is of a different order of magnitude. So, intuitively 30 - 100 years doesn't seem too unreasonable. That is not inconsistent with David Kemp's more scientific thought, below.

David Kemp's 2017 paper describing this flood event, submitted to the Hydrological Society, can be found on the SEG website under Projects, VGrasp. Also an article by David Kemp on the Arcoona Creek flood will be in the September edition of SEGments.

Streamflow and pluviometer records can be found at http://www.communitywebs.org/ScientificExpeditionGroup/hydrology_data.php

find **'SA Government Water Connect'** on that page. Then click the Arcoona Creek flow gauge / Historic Data / Plot - Flow Volume - Recorded Monthly Total - All Record

- and something similar for all the pluviometers.

Interestingly, all the above does not necessarily signify a wet year. Overall, shrubs and trees and spinifex were looking pretty happy, but there was no recent germination, no young plants, and no grasses other than the perennial spinifex. And aside from the plants that continually flower, none of the intermittent or opportune plants were flowering.

The most recently burned area is greening over, with seedlings germinated last year, as well as faster growth from tubers and roots.

Spangled perch were seen in Wild Ass and SAMBOT Waterholes, which both still contain water a bit under half maximum depth.



Xanthorrhoea debris brought down by flooding Arcoona Ck. January 2017. Michelle Trethewey in photo.



Sand on a ledge at Wild Ass Waterhole shows how high fresh sand was washed up above the overflow height of Wild Ass Waterhole. My pack and blue sleeping mat for scale.



This photograph shows a 50 metre section of uprooted vegetation in Arcoona Creek

SEG ANNUAL GENERAL MEETING

The Scientific Expedition Group Inc. Annual General Meeting and Talk will be held as follows:

Date: 25 August 2017

Time: 7:30 pm

Place: Fullarton Centre, Corner of Fullarton Road and Fisher Street, Fullarton

After a short business meeting our talk will be:

“Those Wild Rabbits ”

The speaker will be Bruce Munday. Bruce will speak to his recently published book “Those Wild Rabbits. How they shaped Australia”. During 42 years of farming in the Adelaide Hills, Bruce and his wife Kristin have seen plenty of rabbits. Bruce has had a long history in Landcare, often in leadership roles, and a strong conviction that community action is the first line of environmental defence. With a PhD in physics and 20 years as communications consultant in agriculture and natural resource management, he has a keen understanding of the nexus between scientific research, government policy and community action. Telling Australia's rabbit saga proved irresistible, particularly capturing recollections of old-timers who were so much a part of the tale.

Nominations are open for positions on the SEG Committee. Nominations forms can be obtained from the Secretary and should be received by the Secretary at least one month before the AGM.



Memory Cove in the Memory Cove Wilderness Area of the Lincoln National Park. Grindal and Taylor Islands in the distance. It was called Memory Cove by Matthew Flinders. Named after drowned seamen of the crew of HMS Investigator. February 1802. Memory Cove has been chosen as a possible satellite camp area for the Port Lincoln portion of Expedition Eyre.

Photo: Helen Johnson

SCIENTIFIC EXPEDITION GROUP INC.
APPLICATION FOR MEMBERSHIP AND MEMBERSHIP
RENEWAL for 2017 —178

Membership is open to any persons, family or organisation interested in the following aims:

- * The promotion and running of expeditions of a scientific, cultural and adventurous nature.
- * The furthering of knowledge, understanding and appreciation of the natural environment.
- * Promotion of the values and philosophy of wilderness.
- * Enabling people to learn the skills required for planning and running expeditions, and to develop sound field techniques

SUBSCRIPTION RATES

Adult member -----	\$30.00
Concession cards/ student -----	\$15.00
Family membership -----	\$35.00
Corporate membership -----	\$35.00

HARD COPY SEGments:- If you like to receive a hard copy though Australia Post of our quarterly journal – SEGments, please include in your payment an additional \$30.00 for a SEGments subscription.

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Telephone (H) (W)

E-mail

Details of scientific, cultural, and adventuring or other relevant skill or interests you may be prepared to share with the group:

.....

.....

ELECTRONIC PAYMENT

If you have access to the internet, payment can be made using SEG's bank account at Bank of South Australia, details as follows:

Acc Name – Scientific Expedition Group Inc.

BSB - 105-086

Acc No. 330629440

Please use your last name if possible to identify your payment **AND** also advise us by email that you have made a payment to our bank account via email to gdoats@bigpond.net.au

PLEASE NOTIFY ANY CHANGE OF POSTAL OR ELECTRONIC ADDRESS

Or send a cheque made out to Scientific Expedition Group Inc. with a photocopy of this page to:

The Secretary
Scientific Expedition Group Inc.
P.O. Box 501
Unley S.A. 5061



Kangaroo at September Beach campsite. Photograph Trent Porter