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**Basin Voice: Shared understanding and action
for a sustainable LEB future**
Linking science and management

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***Lake Eyre Basin – Australia's unique, natural, desert river system:
Healthy environments, sustainable industries, vibrant communities, adaptive cultures***

Poster Presentations

Pest fauna of the Queensland Lake Eyre and Bulloo Basins

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Authors

Joanna Blessing, Sara Clifford, Alisha Steward and Peter Negus

Presentation Summary

The Queensland Government's Stream and Estuarine Assessment Program (SEAP) undertook a condition and threat assessment of the Lake Eyre and Bulloo (LE&B) biogeographic province in 2011. This province includes the Georgina, Diamantina, Cooper, and Bulloo catchments. As part of the assessment, the presence and intensity of pest fauna was surveyed in both instream and riparian environments at 20 permanent waterholes throughout the Province. Instream pest species identified included *Carassius auratus* (goldfish), *Gambusia holbrooki* (eastern gambusia) and the crayfish *Cherax quadricarinatus* (redclaw). Within the riparian zone the presence and bank damage from *Sus scrofa* (feral pigs) and stocked cattle were also recorded.

The physical changes to aquatic ecosystems due to the impacts of cattle and feral pigs within riparian zones can result in numerous ecological responses within the system. Grazing (both pigs and cattle) can alter the structural diversity of vegetation in the riparian zone and reduce species diversity. Increased nutrient availability from urine and faeces can lead to increased algal growth which can lower oxygen availability, with increased incidence of anoxic conditions. The destruction of edge habitat by pest animals pugging, digging, and wallowing can alter suspended and deposited sediments, primary production of the algal "bathtub ring" and aquatic macroinvertebrate communities.

Exotic and translocated fish can reduce the survival of native fish species, particularly the survival of larvae, and effect native fish foraging behaviour, reproduction and therefore population structure. Overlap of food and habitat increases competition and places stress on native species. There is limited data on the impact of eastern gambusia in the Province; however, this predatory and highly competitive species is suspected to be the cause of decline of *Scaturiginichthys vermeilipinnis* (red-finned blue-eye) populations in GAB springs in the Province. Redclaw crayfish have the potential to displace native crayfish species in the Province and consume large quantities of invertebrates, thus altering community composition and trophic cascades.

Feral pig damage to waterhole banks and riparian zones was found to be widespread with few sites without evidence of impact. The LE&B Province was generally moderately disturbed by pigs with the higher impact being in the Georgina and Diamantina catchments. Lower disturbances were found in the Cooper and Bulloo catchments – possibly due to the presence of more active pig eradication measures in these catchments. Cattle damage to waterhole banks followed the same trend as feral pigs in these catchments.

Goldfish, eastern gambusia and redclaw crayfish were the only aquatic pests recorded in the Province, with at least one of these species recorded at six of the twenty sites sampled. No aquatic pest fauna was found within the Bulloo and Diamantina catchments. Where these were found in the Georgina catchment, these pests were low in abundance and proportions of pests compared with native species were low. In the Cooper Creek, catchment four of the eight sampling sites recorded the presence of introduced fish or crayfish, and the abundance of pest fish and the proportion of pest fish compared to native species were both high at sites in the lower Cooper Creek area.

The high occurrence of feral pigs throughout the LE&B Province highlights the importance of ongoing targeted management in the region by landholders and the continued assistance and coordination of baiting, trapping and culling feral pigs provided by Desert Channels Queensland and local councils. This management needs to be ongoing as this species remains a widespread threat to aquatic ecosystems of the region. Public awareness campaigns and advisory guidelines for stocking rates and consideration of off waterhole watering points will lead to a reduction of the disturbance of cattle in riparian areas.

The current distribution of introduced fish and redclaw crayfish is patchy across the Province, and while the condition of the fish community is not greatly impacted at present, these species have the ability both to disperse into currently unoccupied reaches and to rapidly increase in abundance during and immediately after higher flow events. Therefore, their presence indicates a potential future reduction in river health in the Province. No carp was caught in the LE&B Province. The presence of carp in the neighbouring Murray-Darling Basin catchments of Queensland presents a high possibility of invasion into the LE&B Province, and highlights that the continuation of current public awareness campaigns is critical to help prevent their spread through human assisted dispersal into these catchments. These campaigns could additionally help to prevent spread of goldfish from the Cooper Creek catchment.

Threats and condition assessment of waterholes in the Lake Eyre and Bulloo catchments of Queensland

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Authors

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Presentation Summary

The Queensland Government's riverine condition assessment program reports on assessments of the condition and threats in riverine ecosystems across the state and is based on a Pressure-Stressor-Response framework. During 2011 monitoring was undertaken in the Lake Eyre and Bulloo Biogeographic Province (LE&B) and assessments made within each catchment. This work was complementary to the Lake Eyre Basin Rivers Assessment (LEBRA).

A desktop review identified and prioritised threatening processes, and concluded that riverine ecosystems in the LE&B Province have few existing threats to their condition. Flow management is currently a relatively low threat in the Province while introduced species (both riparian and aquatic) are the most likely cause of ecosystem degradation in permanent waterholes and were prioritised for targeted monitoring and assessment. Future threats include pollutants (e.g. sediments, nutrients and toxicants), flow regimes (e.g. changes to flow and connectivity) and climate change.

Twenty sites were sampled to assess and validate the priority threats. Pig damage, presence and severity of listed weeds in riparian zones and communities of fish and crayfish were sampled at each site. Land use was used to consider the pressures occurring across the Province.

Riparian weeds were initially assessed as a low risk threat by the desk-top review, but they were found to actually be widespread across the three Lake Eyre catchments at the sites sampled. The Georgina River catchment had the highest average number of weed species at each site and also a higher density of weed cover. Recent rainfall and flooding prior to sampling most likely increased the potential for the spread and growth of weeds and this possibly increased the impact by weeds in the short term for all catchments. While weed densities may reduce as time since rainfall and flooding increases, these results highlight a potentially significant

impact. The initial low risk attributed to riparian weeds in the LE&B catchments should be reassessed with these results for future investigations. In contrast, few sites had weeds in the Bulloo catchment and at those sites, few specimens were found.

Feral pig damage to waterhole banks and riparian zones was found to be widespread with few sites without evidence of impact, with higher levels of damage in the Georgina and Diamantina catchments. Lower disturbances were found in the Cooper and Bulloo and this could be due to the presence of more active pig eradication measures in these catchments.

Aquatic pest fauna; goldfish, eastern gambusia or redclaw crayfish, were recorded at six of the twenty sites sampled. No aquatic pest fauna were present within the Bulloo and Diamantina catchments. The presence of aquatic pest fauna was identified at several sites in the Georgina catchment, however they were low in abundance and proportions of these pests compared with native species were also low. Introduced fish or crayfish was recorded at four of the eight sampling sites in the Cooper Creek catchment with the abundance of pest fish and the proportion of pest fish compared to native species being high at sites in the lower Cooper Creek area.

While there are threats to the waterhole ecosystems of the LE&B these are few in number and intensity compared to other regions and catchments in Queensland. Ongoing and targeted management action for the control of weeds and introduced fauna (in particular feral pigs) and ongoing monitoring and control of introduced fish and crayfish will contribute to the maintenance of good aquatic ecosystem conditions in the LE&B.

Cane toads in Great Artesian Basin springs of the Lake Eyre Basin – what are they eating?

Ms Sara Clifford - Queensland Department of Science, Information Technology, Innovation and the Arts

Authors

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Presentation Summary

Great Artesian Basin (GAB) springs are home to a large number of endemic flora and fauna. Due to processes such as grazing, aquifer draw-down, excavation of springs and feral animals, these communities are listed as 'Endangered' under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

The introduced cane toad (*Rhinella marina*) has been identified as a possible threat to these unique spring wetland communities because they are opportunistic generalist feeders and are able to withstand a wide range of climatic conditions. They are predominantly found in tropical and subtropical areas including much of Queensland. Numerous studies have documented the impact adult cane toads have on terrestrial ecosystems since their initial introduction to Australia in 1935. However, knowledge on cane toad impacts to aquatic ecosystems, including springs, is limited.

To begin to fill this knowledge gap we conducted an initial investigation into the diet of adult cane toads collected from within a GAB spring located on Edgbaston Reserve (managed by Bush Heritage Australia) in Central Queensland, Australia. The spring complex within Edgbaston contains the highest number of endemic macroinvertebrates of all the spring complexes in Australia and is home to three endemic fish, one crustacean species and several other aquatic invertebrates – the endangered red-finned blue-eye (*Scaturiginichthys vermeilipinnis*), the vulnerable Edgbaston goby (*Chlamydogobius squamigenus*), the undescribed myross / Edgbaston hardyhead (*Craterocephalus* sp.) and the unique thermal shrimp (*Caridina thermophila*). Aquatic macroinvertebrates were also collected from the same spring and identified in order to determine which of the available aquatic taxa the cane toads were consuming. It was hypothesised that given the opportunistic feeding

habits of adult cane toads and the limited surface water in these regions, adult toads will be consuming aquatic invertebrates from the GAB springs, including rare and endemic taxa.

The alimentary canal contents were recorded from 13 cane toad specimens collected from one spring in the Edgbaston springs complex in July, 2011. Detritus, sand and aquatic invertebrates made the largest contribution to the diets of the cane toads in terms of both contributions to alimentary canal volume and the number of individual prey items consumed. Cane toads were found to consume a large proportion of the available aquatic invertebrate taxa, with eight of the eleven orders found in the corresponding aquatic macroinvertebrate sample also found in alimentary canal contents including molluscs (Gastropoda), insects (Coleoptera) and crustaceans (Amphipoda).

The results of this initial investigation support the idea that cane toads directly impact GAB spring communities via predation of aquatic invertebrates. It is possible that the local consequences of this could be significant, given the small spring size and the endemicity of the aquatic invertebrate fauna. It is strongly advised that further research and monitoring is carried out to determine the scale of the threat the cane toad poses to GAB spring communities and appropriate management be implemented. This could incorporate ground-truthing distribution maps of cane toads in relation to the GAB springs, as well as determining if the cane toads are breeding within the springs. These springs could also be an ideal location to trial emerging methods of cane toad control such as the use of pheromones and parasites due to the remoteness of the site, and surrounding harsh conditions limiting dispersal opportunities.

Great Artesian Basin spring surface area extent and its relationship to aquatic macroinvertebrate diversity

Ms Sara Clifford - Queensland Department of Science, Information Technology, Innovation and the Arts

Authors

Peter Negus, Joanna Blessing, Sara Clifford and Alisha Steward

Presentation Summary

Great Artesian Basin (GAB) springs are of significant environmental value as they provide a consistent source of surface water and therefore a refuge for unique ecological communities. This perennial source of water also attracts a range of other users including humans, as well as introduced and pest species (e.g. cattle, feral pigs, pest fish, cane toads and weeds), which pose a significant threat to the endemic flora and fauna. The use of GAB groundwater via bores can result in a drop in groundwater pressure and levels, which can reduce the surface expression of springs and threaten the provision of habitat to spring communities.

Water resource planning in Queensland monitors surface expression of identified GAB springs. This is undertaken on the concept that as water flow from GAB bores increases, pressure in the underlying aquifer is reduced, decreasing the discharge levels and therefore the surface water area (extent) of the springs. Larger surface water extent is expected to provide more aquatic habitat for the endemic spring communities and support higher diversity.

The mosquito fish (*Gambusia holbrooki*) is a pest fish which is significantly impacting on the population of endangered red-finned blue-eyes (*Scaturiginichthys vermeilipinnis*) that are endemic to Edgbaston Springs. This pest also has the potential to affect the biological structure and function of spring fauna generally.

While the monitoring of perennial wetland vegetation directly relates to the relationship between spring surface extents and spring outflows, it may not hold that the maintenance of spring faunal diversity is maintained by surface water extent. Altered habitat may also provide competitive advantages for pest species like *G. holbrooki* and make relationships between diversity and extent difficult to assess. This study aims to review the

applicability of the use of extent mapping to assess if managing spring extent will provide for higher spring faunal diversity.

Surface extent of individual springs, defined by borders of permanent wetland vegetation, was mapped at Edgbaston Reserve during July 2011 using a GPS (global positioning system) methodology (¹Fensham & Fairfax, 2009). Aquatic macroinvertebrate samples were collected in 18 individual springs. In springs with open surface water, small bait traps were set to establish the presence of *G. holbrooki*. Presence was also recorded if *G. holbrooki* were caught during macroinvertebrate sampling. The relationship between the extent of springs and macroinvertebrate richness was assessed and the extent of springs with and without *G. holbrooki* was compared.

Spring extent was negatively correlated with the taxa richness which conflicts with the underlying premise for monitoring extent. The surface extent of springs with *G. holbrooki* present was significantly larger than spring vents without *G. holbrooki*. Therefore, it seems there is a larger threat to macroinvertebrate richness from the impact of these pest fish than there is to decreased extent of the springs (although spring extinction would be catastrophic).

These results indicate that threats other than water resource development are likely to be as important for the management of GAB spring ecosystem diversity. In particular, the presence of *G. holbrooki* continues to represent a serious threat for the Edgbaston Springs ecological community and possibly other spring communities. Whilst wetland extent monitoring may be cost effective it may not be sufficient on its own to achieve the overall ecological outcome intended by the Water Resource Plans. Aquatic fauna and flora may also need to be monitored to better understand interactions of confounding factors and provide more effective management strategies.

¹Fensham R.J. and Fairfax R.J. (2009) Development and trial of a spring wetland monitoring methodology in the Great Artesian Basin, Queensland. Department of Environment and Resource Management

How can we assess the health of rivers when they are dry?

Ms Sara Clifford - Queensland Department of Science, Information Technology, Innovation and the Arts

Authors

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Presentation Summary

Most, if not all of the rivers within the Lake Eyre Basin are temporary. After flood events, rivers cease to flow and dry up, with surface water confined to isolated waterholes for weeks, months or even years. During this time, much of the river network is represented by dry river beds (e.g. Figure 1).



Figure 1. A dry river bed in the channel of the Georgina River at Boulia, Lake Eyre Basin, Queensland

Despite their dominance in the landscape, dry river beds are important features that have largely been overlooked with regards to monitoring, assessment, policy and planning. However, they are known to support a wide range of human and ecological values (Steward et al. 2012).

River health monitoring and assessment programs, such as LEBRA, have traditionally used aquatic biological indicators, such as macroinvertebrates or fish, to define river health. Dry river beds have been excluded from such programs, even though they could be naturally dry and 'healthy'. A novel solution to this problem is to use terrestrial biological indicators that colonise and utilise dry river beds to assess the health of dry rivers. These terrestrial indicator based assessments could then be integrated with the aquatic ones to provide an overall assessment of the entire river network. Reporting on the condition of both wet and dry channels would provide a holistic and more representative view of the river network within the Lake Eyre Basin.

Invertebrates such as ants and beetles are widely used as indicators of human disturbance in terrestrial ecosystems, such as forests and rangelands. Pressures, such as grazing, could result in a stressor of reduced land cover. Are there ecological responses to this stressor in the invertebrate communities of dry river beds? If so, could terrestrial invertebrates be used as indicators of 'dry river bed health'? The suitability of using terrestrial invertebrates for this purpose was trialled at 5 sites in the Queensland portion of the Cooper Creek catchment in the Lake Eyre Basin. Sites were selected along a gradient of disturbance, based on land cover. Terrestrial invertebrates were sampled using pitfall traps and identified in the laboratory.

Terrestrial invertebrate communities of dry river beds were found to correlate with the disturbance gradient. Taxa richness and abundance were lowest at sites with low land cover. This trend was also evident in individual taxonomic groups, particularly ants and beetles. These results suggest that terrestrial invertebrates could be investigated further as biological indicators of dry river health, and incorporated into river health monitoring and assessment programs to provide a better understanding of both terrestrial and aquatic components of riverine ecosystems in the Lake Eyre Basin.

Reference: Steward, A.L., von Schiller, D., Tockner, K., Marshall, J.C. and S.E. Bunn. 2012. When the river runs dry: human and ecological values of dry riverbeds. *Frontiers in Ecology and the Environment* 10: 202 – 209

Tradition Meets Science – bringing Traditional Ecological Knowledge together with scientific methods to develop ongoing management plans and practices for Fletchers Lake Reserve

Mr Tom Fagan - Barkindji Maraura, Elders Environment Team Ltd

Authors

Tom Fagan, Dameion Kennedy, Brendan Harris, Ethan Harris, Dennis King, Greg Snowdon and Greg Warren

Presentation Summary

The Barkindji Maraura Elders Environment Team (BMEET), a contract works team for Indigenous people in cultural and natural resource management based in Dareton NSW, near the junction of the Darling and Murray Rivers, have undertaken a Caring for our Country project called *Tradition Meets Science*. This project focuses on the Fletchers Lake Reserve close to Dareton. BMEET has employed a group of workers, who they have trained in Agriculture Certificate III, to develop and implement a management plan combining Traditional Ecological Knowledge and scientific methodologies. This plan is an ongoing work in progress as the work team develops its skills and collects information about the area. Local Barkindji elders gave the work team a cultural heritage introduction to the area and helped with the identification of various culturally important sites and information. Scientists from the Murray-Darling Freshwater Research Centre have helped establish vegetation monitoring sites, and carry out the monitoring and data collection and analysis process. The team have also worked with a local archaeologist to identify and record important cultural sites. The team will present information about the project and some of their initial findings.

This project is described as “The bringing together of Traditional Ecological Knowledge (TEK) and Science”. From the start of the project the BMEET team have included the Elders in Transfer of Knowledge days, where they assist the BMEET team members in making decisions on how best to work on land with TEK and cultural awareness in mind.

These days included:

- Elders to assess the most appropriate way to form a fire break without damaging culturally sensitive areas.
- Elders directing the Archaeologist to sites that needs to be prioritised when survey takes place and instructing the Archaeologist on appropriate ways to work on sites with respect.
- Elders suggested methods to be undertaken to preserve the burial sites around Fletchers Lake.
- Elders and the team decided on the best methods to reduce vehicle damage to sensitive sites, using bollards to close tracks.
- The Elders and BMEET team facilitated an introductory day that was designed to inform and include the neighbouring property owners, managers and other interested parties in the Fletchers Lake project. As part of this day the Elders spoke to the guests on the cultural significance of this land, including their own culture and how it needs to be preserved. The day was a sharing with community and the team from BMEET.
- Elders introduced the BMEET team to some cultural heritage plants.
- Action on Ground.
- The transfer of knowledge days have given the BMEET team guidance to undertake works at Fletchers Lake Reserve with TEK and Cultural awareness in mind.

Some of the actions on ground so far are:

- grade existing sections of track around property boundary with a tractor mounted blade and use a tractor mounted slasher to clear sensitive areas, so as not to disturb the land

- pest animal control using non-destructive methods (no damage to burial sites, scared trees and artefacts)
- pest plant control using non-destructive methods
- track rationalisation, using pine bollards (reduce impact on sensitive sites)
- identification of burial sites and artefacts (in the process of registering)
- burial protection works using a combination of traditional and modern techniques
- plant health monitoring to give base line figures for future projects.

Future works include:

- burial protection works to continue
- culturally sensitive areas to be protected
- pest plant control to continue
- pest animal control (trial new methods that have minimal disturbance on land)
- revegetation works and monitoring of existing
- track rationalisation to continue
- community awareness programs to continue
- Transfer of Knowledge days with Elders to continue.

The Fletchers Lake Caring for our Country project has been funded until the end of June, but we are hopeful that the project will attract more funding to continue well beyond this date.

Managing the impacts of feral camels in Australia – a new way of doing business

Mr Andy Bubb - Ninti One

Presentation Summary

The Australian Feral Camel Management Project (AFCMP):

- covers over 3 million square kilometres and hundreds of landholders
- involves 19 project partners
- represents the largest Caring for our Country commitment to a single project
- is the first Australian project to manage a terrestrial vertebrate pest at this scale, using conventional control techniques, without the legislative support available to programs such as the Brucellosis and Tuberculosis Eradication Campaign.

The project's primary focus is biodiversity protection at nominated environmental sites, which are typically sites of cultural significance. The project has a secondary objective to improve soil management through reduced vegetation browsing on pastoral properties. Project measures include achievement of feral camel density targets, wetland condition, and vegetation browse damage and stakeholder views.

A significant proportion of the feral camel population is on Aboriginal lands and this requires comprehensive management consent processes which are different in each jurisdiction. Apart from the impact of feral camels on environmental and cultural sites, they also pose a safety threat on roads, airstrips and in the communities themselves.

Although the focus of the AFCMP is management, we are also improving our knowledge of feral camel movements, demographics, impacts and management, as well as better understanding what is involved in coordinating a national landholder engagement and environmental management project.

Integrating Climate Change Science into Rangelands NRM

Ms Mary-Ann Healey – Ninti One

Presentation Summary

The Integrating Climate Change Science into Rangelands NRM project is a collaboration between Ninti One, CSIRO, Monash University and seven NRM groups within the Rangelands Alliance known as the 'Rangelands Cluster' (Alinytjara Wilurara NRM, Desert Channels Qld, Rangelands NRM WA, SA Arid Lands NRM, South West NRM (Qld), Territory NRM, Western CMA (NSW)). The project is supported by the Australian Government's Regional NRM Planning for Climate Change Fund and aims to assist climate change researchers to work closely with planners in NRM organisations to deliver information on climate change, its impacts and potential adaptation responses.

Running from March 2013 to June 2016, the project will:

- Interpret and synthesize existing research data and models of broad scale ecosystem change into NRM ready information;
- Develop targeted scientific modelling or decision-making tools where required;
- Design better ways to capitalise on existing data, and translate best available knowledge about climate change impacts and adaptation options; and
- Provide an improved understanding of adaptive capacity to climate change in remote communities and the development of innovative and co-designed strategies to reduce vulnerability and enhance community capacity to adapt to climate change.

Ultimately the project is designed to assist rangeland NRM groups to include planning for climate change impacts into their normal NRM planning processes, making better informed decisions and strategic investments in relation to climate change impacts, and promote the sustainability of rangeland communities and industries in the longer term.

A Constitution for the Lake Eyre Basin

Mr Darian Hiles - Australian Civic Trust Inc. Water Action Coalition

Presentation Summary

There is an opportunity for traditional management practices in the Lake Eyre Basin to be recognised as an integral and complementary part of the modern management of the system. To achieve this, it would be a major advantage for the Aboriginal groups in the Basin to directly collaborate in a joint management system.

The proposal is to develop a constitution for the management of the Basin that allows the traditional owners to collaborate in a constitutional way. This would typically involve determining:

- the basics of the traditional governance structure and how it relates to modern government
- how the Basin governance is traditionally divided geographically, plus the overlaps of governance

- common laws between areas and how differences are to be managed
- the rights and responsibilities of elders and initiated & non-initiated people
- the place of traditional laws in the context of State & Federal laws
- what can be changed in the constitution in the future and how?

Discussion groups are proposed to address these areas and consolidate the scope of the constitution as the core of the final document. Other issues are likely to be identified and incorporated in the course of the discussions, which may continue with other elders and in remote areas after the conference.

Managing LEB arid rivers – a holistic management approach

Mr Henry Mancini - South Australian Arid Lands Region/Department of Environment, Water and Natural Resources

Presentation Summary

The Critical Refugia projects - Neales/Algebuckina (2009/10) and Cooper Creek (2010/13) - supported by the SA Arid Lands NRM Board, are based on a model of collecting baseline data (i.e. objective evidence and findings) to inform community, land managers and industry.

The key aims are to collate information about SA Arid Lands aquatic ecosystems into a format that will assist in regional planning and investment priority. Objective findings are used to identify threats and pressures and appropriate management interventions. It addresses knowledge gaps and, through an adaptive management approach, enables findings to provide recommendations for management priorities in collaboration with key stakeholders.

The model adopted for these projects are to:

- locate and assess key aquatic ecosystems (e.g. refuge waterholes, floodplains and lakes) providing a representative sample of wetland typologies of the river systems under investigation
- provide current state condition of each ecosystem and management influences affecting that condition through comprehensive baseline data collection.

This includes:

- hydrology (flow patterns, inundation and flooding extent)
- geomorphology (understanding geology, landform and fluvial processes)
- vegetation (responses to hydrological patterns)
- bird / floristics (bird assemblage and structural integrity patterns of bird distribution)
- soils (carbon, nutrient and vegetation associations)
- riparian ecological condition assessments (basis for determining health, pressures, threats and impacts)
- cultural landscape values (the human interaction with water resources)
- tourism management and interpretation (management through education and understanding visitor needs and behaviour).

Investigations centre on the natural features and human influences of key waterholes and wetlands to develop an understanding of ecosystem processes and functioning, identify threats and pressures (e.g. weed and feral animal control, tourism management, total grazing pressure management and best practice resource and mining development) and develop management strategies to protect key assets. Using an adaptive management approach when engaging with land managers, industry and the community enables the findings to be used to understand patterns and processes to support and build solutions that 'fit' the ecology and enterprise or land use. For example, a key finding of maintaining ground cover around major waterholes will help prevent channel incision/erosion and loss of a critical aquatic refuge waterhole. This can be used to assist with land management decisions into the future.

Another example of an adaptive management approach is cultural site management through participation in field trips. For example, the Cooper Creek project sought to address this major impact at a key cultural site. Through on-site investigation and discovery, a collaborative project was developed with the Aboriginal community to protect a key cultural and tourism site at Killalpaninna Mission near the Birdsville Track. This has been a successful outcome with the development of interpretive signage and information in partnership with the Aboriginal community and landholders. The site has a better chance of being protected through visitor behaviour management.

An adaptive management approach has its challenges for NRM organisations, particularly in being able to respond to findings from field investigations in a timely and strategic manner within the time constraints of the project. Early engagement and participation in project activities is an important component for this approach.

Tracing the flow - surface and groundwater interactions between the Lake Eyre Basin and the Great Artesian Basin

Mr Derek White - Department of Sustainability, Environment, Water, Population and Communities

Author

James Hill

Presentation Summary

The Great Artesian Basin (GAB) has sustained unique ecosystems for millions of years and underlies approximately 70% of the Lake Eyre Basin (LEB) Drainage Division. In March 2013, the Australian Government released the first comprehensive study of the Great Artesian Basin since 1980, highlighting that geological features such as faults, ridges and connections to adjoining geological basins are more common than previously understood and that these features influence local groundwater conditions.

This poster highlights the findings of newly reported interactions between GAB source waters and LEB surface waters, with the key messages being:

- GAB discharge to the regional groundwater table possibly supports base flow in the Barcoo River and Copper Creek.
- The Finke River is a losing stream contributing up to half the discharge at Dalhousie Springs.

It is important that further research be conducted to quantify the magnitude and direction of flux between the GAB and LEB ephemeral streams and sinks so that more accurate water balance predictions may be used to support future government water resource planning processes in the LEB.