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GISERA | Gas Industry Social and Environmental Research Alliance

Identifying drought refuges for terrestrial species in the Cooper Basin

CSIRO scientists will combine desktop and field-based approaches to locate, assess and manage terrestrial habitats that are essential for protecting and maintaining threatened species during dry periods in the Cooper Basin.

Key points

- The Cooper Basin is one of the most prospective sedimentary basins in Australia for development of unconventional gas resources.
- There is community concern about potential environmental impacts on the Cooper, particularly its rivers and floodplains, however, the region's environmental values extend far beyond the floodplain.
- A key challenge is protecting and maintaining threatened species through dry periods.
- This CSIRO project seeks to identify key drought refuge areas for terrestrial species.
- One of the project outcomes will be information that can be used by the gas industry to avoid sites of conservation significance.

physiological adaptations, their occurrence and distribution is decoupled from the availability of surface water. This situation precludes the use of standard methods – such as remote sensing to develop indices of 'greenness' or similar – to locate them.

Researchers will build on the extensive knowledge we already have of aquatic environments and use that to better manage terrestrial environments during natural gas exploration and development in the region.

In particular, the study seeks to transfer the concept of drought refuges from freshwater environments to the land, and to develop this approach to better manage the land and its biodiversity.

The Cooper Basin

The Cooper Basin as defined in the Geological and Bioregional Assessment (GBA) Program is about 130,000 km² and incorporates parts of Queensland, South Australia and New South Wales.

The Basin is highly prospective for the development of unconventional gas resources. It is also a dynamic region with nationally and internationally important biodiversity values.

Cooper Creek, which lies within the Cooper Basin, is part of one of the world's last major free-flowing desert river systems. It flows for 1500 kilometres, and has a vast floodplain that spans a large area of south-west Queensland, along with a smaller area of north-east South Australia.

This project, conducted through CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA), seeks to find and assess habitat for threatened species that live in terrestrial environments of the Cooper Basin.

This task is particularly challenging during dry periods because many species of arid-adapted Australian vertebrates do not need to drink water. Therefore, through a variety of



Dramatic variation in rainfall and river flows in the region lead to major environmental changes over time, often described as alternating phases of boom and bust. A key challenge in the Cooper Basin is to protect threatened species – and their habitats – during dry periods.

Although some areas of the Cooper Basin will be excluded from gas development, concerns remain about the protection of the natural environment. Traditional Owners, pastoralists, conservationists, tourism operators and the broader community all have a strong interest in ensuring the ongoing resilience of the Basin.

This research seeks to address some of the specific concerns around threatened terrestrial species.

Drought refuges

Research in aquatic environments has focused on the role of waterholes as drought refuges.

These are the locations within the region that provided habitat for fish and other aquatic animals as the wider landscape dries. It is widely understood that the protection of these sites is essential if aquatic species are to persist in the Cooper Basin.

This study will apply the concept of drought refuges to the terrestrial environments of the Cooper Basin that surround the riverine and floodplain environments. These environments are critical for nature conservation because, without them, core species that live on land are likely to die out during dry periods.

While the locations of freshwater refuges are well known, and mechanisms are in place to protect them, this knowledge and management action does not yet exist for terrestrial environments.

Terrestrial drought refuges are difficult to locate as the location of these is not related to surface water. The study team will apply learnings from previous research in the Simpson Desert of the Northern Territory that has focused on drought refuges of the plains mouse (see images) to this project.

This research seeks to address that knowledge gap and provide vital information to gas industry stakeholders so they can avoid sites of conservation significance.



A functioning drought refuge of the plains mouse, *Pseudomys australis*, in the Simpson Desert, Northern Territory, during (left) a prolonged dry period (bust phase) and (right) a period of high primary productivity driven by big rain events (boom phase). The images were taken in August 2021 and July 2016, respectively. Photo credit: Chris Pavey



Plains mouse, *Pseudomys australis*. Photo credit: Lisa Nunn

Project approach and outcomes

The overall objective of this study is to obtain scientific understanding of the location, condition and management of the habitat of species occupying terrestrial environments in the Cooper Basin.

Through this, researchers will seek to identify discrete sites in the landscape that are drought refuges for threatened and significant species.

The four key elements of the research program are to:

- Use existing information – including reports, databases, climate data and maps – to identify the potential location of drought refuges of focal threatened species.
- Undertake field surveys at potential drought refuge locations to confirm the presence of the target species.
- Measure habitat attributes at each occupied drought refuge in order to quantify habitat condition. These will include vegetation structure, floristics and condition, soil type and condition, and the presence of any threats.
- Develop approaches for assessing habitat quality for each species and for monitoring of habitat condition.

Information generated through this research about locations of significance will help inform decision-making within the gas industry.

Additionally, the project will develop habitat quality assessment criteria for a number of significant or threatened species and this will help facilitate future site assessment by the industry.

More information

Find out more [about this project](#)

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GISERA is a collaboration between CSIRO, Commonwealth and state governments and industry established to undertake publicly-reported independent research. The purpose of GISERA is to provide quality assured scientific research and information to communities living in gas development regions focusing on social and environmental topics including: groundwater and surface water, greenhouse gas emissions, biodiversity, land management, the marine environment, and socio-economic impacts. The governance structure for GISERA is designed to provide for and protect research independence and transparency of research.