



## SOCIAL AND ECONOMIC IMPACTS

### GISERA | Gas Industry Social and Environmental Research Alliance

# Understanding and managing impacts to biodiversity from roads and pipelines in the Beetaloo Sub-basin, in the NT

To understand the potential impacts of shale gas production on biodiversity in the Beetaloo Sub-basin, researchers have mapped vegetation connectivity, road mortality, and the dynamics of habitat patches.

A major environmental impact from development of an onshore gas industry in the Beetaloo Sub-basin will be the construction of new and extension of existing components of linear transport infrastructure (roads, tracks, railways, pipeline corridors, power lines) and from the subsequent use of roads by heavy-vehicle traffic.

CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA) has completed a study into the impact of roads and pipelines on biodiversity in the Beetaloo.

#### Key points

- There are community concerns about the impact of roads, infrastructure and habitat fragmentation on the Sub-basin's biodiversity. Little is known about the impacts of habitat fragmentation on the NT's biodiversity.
- To address this knowledge gap, CSIRO researchers have studied vegetation connectivity, the mortality of animals on different types of roads, and how the occurrence of animals and plants is influenced by the size of habitat patches.
- CSIRO researchers also developed measures to mitigate any future risks from the development of roads.
- This study provides information for the government, industry and the community, for future planning.

#### Research objectives

The project had four objectives:

- To use remote sensing data to **map vegetation connectivity** and identify habitat corridors and links.
- To **assess road mortality** of animals on roads that differ in width, traffic volumes and degree of disturbance in order to predict how impacts may increase with road widening, increased traffic volumes and an increase in extent of road network.
- To **examine patch dynamics**: how the occurrence of species of plants and vertebrate animals is influenced by the size and degree of spatial isolation of patches of habitat.
- To **develop appropriate measures of mitigating risk** from the development of roads and pipelines for consideration by the regulator for possible use in gas field design and policy settings.

#### Shale gas and the Northern Territory

The Beetaloo Sub-basin is southeast of Katherine in the NT and has been identified as a potential area for onshore gas production.

In 2018, GISERA partnered with the NT Government to deliver independent and transparent research on gas development. This includes issues around the impact of shale gas production on biodiversity in the Beetaloo.



## What does connectivity and fragmentation mean?

When a habitat has a high degree of connectivity, animal and plant species can move freely across landscapes. Roads, pipelines and other linear infrastructure can lead to habitat fragmentation (a breakdown in habitat connectivity) which can create barriers to species' movements and lead to mortality from vehicle collisions.

## How was the research conducted?

Field research occurred from June 2022 to February 2023.

Researchers mapped vegetation fragmentation and connectivity based on high-resolution (10m) satellite imagery from the 2021 dry period (July to September). The study focused on vegetation higher than two metres, and methods for assessing fragmentation and connectivity were applied to four 50km<sup>2</sup> regions.

Researchers assessed vertebrate road mortality based on three road types: primary highway, secondary highway, secondary road. Each road type had two replicate transects 50km in length. Researchers drove transects at 50km/hour and identified each individual vertebrate killed or injured in a vehicle collision. Road transects were driven in early dry season (June 2022), late dry season (November 2022) and wet season (February 2023).



Centralian blue-tongued skink *Tiliqua multifasciata*

### More information

The full report on this study is available on [GISERA's website](#). You can also read about [other studies in the NT](#).

## What did the study find?

### Vegetation fragmentation and habitat connectivity

The study successfully created connectivity maps for four regions in the Beetaloo Sub-basin. Once the footprint of future onshore gas development in the Beetaloo is understood, the connectivity maps can be used to assess potential impacts. Locations of proposed well pads, new roads, tracks, and pipelines can be superimposed on the connectivity map for a region. This will enable planners to identify the intersection of linear infrastructure with high value areas in the landscape including core habitat, bridges, and branches.

### Patch dynamics

In this study, patch mosaic assessments focused on two community habitat types that potentially support the highest concentrations of species 'at risk' from linear corridors-lancewood (*Acacia shirleyi*) and bullwaddy (*Macropteranthes kekwickii*) communities.

The study found that the species-rich small bullwaddy stands may persist as low flammability islands in the landscape matrix of highly flammable savanna.

Small patches typically supported thicker stands of bullwaddy and were more productive with the highest concentrations of plant and animal species.

### Road mortality

- The study found a total of 411 dead or injured native animals from 44 species, including mammals, frogs, reptiles, and birds. Body mass of roadkill species ranged from 90kg (male red kangaroos) to 7g (small birds). Six species of macropods (kangaroos and wallabies) dominated the sample numerically, making up 70% of all roadkill. The number of macropods killed was high in the early dry and late dry seasons but declined during the wet season. Reptiles and birds made up a higher proportion of road kills in the wet season than at other times of year. Frogs were only recorded in the wet season.
- There were no detected 'hot spots' of wildlife mortality (areas where there was a concentration of wildlife mortality from vehicle collisions).
- The secondary roads had a low rate of wildlife roadkill because of a low traffic volume. But traffic volumes on several roads, especially the Stuart and Carpentaria Highways, are predicted to increase markedly during construction and operation phases of an onshore gas industry. This will lead to an increase in wildlife-vehicle collisions and the resulting mortality of wildlife.
- Wildlife crossing structures (including overpasses, underpasses, wildlife bridges) are unlikely to be necessary as a form of mitigation. Instead, researchers suggest road signs, vehicle speed limits, fencing roads to prevent access for wildlife, and habitat modification (removing vegetation from the sides of major highways during the wet season).

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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.