Australian Government | BIOREGIONAL ASSESSMENTS | CSIRO

The GBA Bulletin

Issue 3, November 2020

Program Progress

The Geological and Bioregional Assessments (GBA) Program continues to work and engage effectively and has adapted to several new work arrangements due to COVID-19. Staff are working from home, videoconferences have been adopted for collaboration and there has been a reduction in travel. Some minor delays to field work due to travel restrictions have been overcome by using local contractors and the program remains on track for completion by mid 2021.

While the GBA team could not conduct the usual face-to-face user panel meetings in your region, virtual Microsoft Teams have been held. We also offered the option for secondary meetings to provide you with the opportunity to engage directly with the program scientists on specific topics. The program will continue to keep stakeholders informed of progress.

Stage 2 – Geological and environmental baseline assessments

Released

The reports and technical appendices for stage 2 of the program—Geological and Environmental Baseline Assessments, were released by the Minister for the Environment, the Hon. Sussan Ley on 15 May 2020 for the Cooper, Beetaloo and Isa GBA regions.

Stage 2 of the program has brought together all available information and data regarding gas resources, geology, water, chemicals and the environment in each GBA region as well as identifying potential hazards and prioritising them for further analysis. The baseline reports provide governments, the community and regional industries with an independent, robust scientific baseline from which the potential impacts of oil and gas development in each of the regions can be assessed.

The final stage of the program (stage 3) will focus on addressing data and knowledge gaps from the baseline analysis and assessing potential environmental impacts using causal pathways—a method which describes the logical chain of events that link activities associated with development with their potential impacts on water and the environment.
Download the stage 2 reports and appendices here

Cooper GBA region

User panel

The fourth Cooper GBA region user panel was held virtually on the 8 July 2020.

Program scientists from CSIRO and Geoscience Australia updated the panellists on the results from the Geological and Environmental Baseline Assessment (stage 2).

Traditional owners reiterated the importance of recognising 'Before Cook' sites of cultural significance within the Cooper GBA region. The program agreed, noting the cultural significance of the entire region for traditional custodians and explained how the landscape scale assessment applied in stage 3 can be used to consider these matters.

Panellists highlighted the importance of shallow groundwater systems for livestock watering. Given the importance of water in the region, there is interest in further understanding the use of shallow and deeper aquifers as water sources for industry development as part of the stage 3 assessment.

User panellists were keen to see the results from the Cooper Creek hydrodynamic flood inundation model being developed by the program. To underpin this model the program has acquired a significant volume LiDAR (Light Detection and Ranging) data.

LiDAR measures distance by illuminating a target with a laser light and measuring reflected light with a sensor. Differences in the time taken for the light to return and the wavelengths received can be processed to create three dimensional images of the target. An extensive LiDAR dataset focused on Cooper Creek was collected by Fugro Australia Ltd in two aerial surveys in 2019, covering a total survey area of 31,780 km^2 across the Cooper Creek floodplain, Thompson and Barcoo river systems.

The LiDAR data is available for download in 1 km^2 tiles through Geoscience Australia's ELVIS (Elevation Information System) data portal.

The full (over 160 gigabite) dataset is available for download via data.gov.au, the central source of Australian open government data— cooper basin lidar.

The User Panel Communique is available here.

Isa GBA region

User panel

The third Isa GBA region User Panel meeting was held virtually on Thursday 13 August.

The panellists were briefed on the findings from the Geological and Environmental Baseline Assessment (stage 2) of the program, especially use of this information in the future.

The GBA program representatives thanked the Carpentaria Land Council Aboriginal Corporation for providing a list of culturally significant flora and fauna following the last User Panel meeting.

The user panel heard from Santos about some early exploration plans within Isa GBA region and the broader area outside the region. Anyone in the user panel group wishing further information from Santos can contact the GBA team.

This was the final user panel meeting for the Isa GBA region. The program will not to be proceeding to stage 3 for the Isa GBA region. However, the work done to define the stage 2 baseline shows that the Isa GBA region contains a rich and unique environment that is critical for many local communities but also contains world-class gas resources that could increase Australia's gas supplies in the future.

The User Panel Communique is available here

Beetaloo GBA region

User panel

The third Beetaloo GBA region User Panel meeting was held virtually on Wednesday 12 August.

Program scientists from CSIRO and Geoscience Australia discussed the key findings from stage 2 of the program, application of results in stage 3 and how the user panellists and other stakeholders can use the information and data from stage 2.

Panellist's pointed out that areas of Indigenous cultural significance identified by legislation are located close to the GBA region and it is likely that additional unidentified sites exist within the Beetaloo GBA region. Representatives of the Northern and Central land councils highlighted the importance of engaging Traditional Owner

ranger groups when undertaking field studies to ensure the identification of culturally significant sites.

User panellists also asked how long-term well integrity risks were being considered by the program. This is particularly important to Traditional Owners and pastoralists, who want to know the potential risks to water resources over time. Stage 2 identifies well integrity as low risk; however, the program recognises that this is an area of concern to many in all the GBA regions and potential well integrity impacts will be assessed in stage 3.

The program provided a brief update on the progress of projects resulting from an additional $5 million committed by the Australian Government in the 2019–20 budget to align delivery of the Beetaloo GBA assessment to support the Northern Territory government's Strategic Regional Environmental and Baseline Assessment (SREBA).

The user panel Communique is available here.

Beetaloo GBA region Baseline Survey Program

The Baseline Survey Program is delivering valuable new information and baseline data of terrestrial and aquatic biodiversity distribution across the region, increasing our understanding of protected matters, groundwater- dependent ecosystems (GDE's) while revising existing vegetation and species distribution mapping.

This survey is being delivered through collaboration with researchers at Charles Darwin University, Griffith University and the NT Department of Environment and Natural Resources (DENR). The survey has been developed in consultation with NT DENR to ensure it informs SREBA as recommended by the Scientific Inquiry into Hydraulic Fracturing in the NT.

A number of field surveys were recently completed for this Survey. Initial results indicate the presence of *Environment Protection Biodiversity Conservation Act 1999* listed species such as the Crested shrike-tit (northern), Gouldian finch and Greater bilby in parts of the Beetaloo region. While aquatic surveys found a specimen that closely resembled the Gulf snapping turtle (*Elseya lavarackorum*), confirmation will require further sampling and analysis of eDNA data.

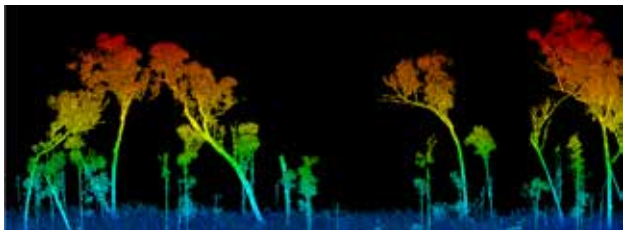
In addition to the animal surveys, land- and water-based vegetation surveys have been undertaken to improve the understanding of regional ecosystems. These data are used with high-resolution satellite imagery to map the distribution of ecosystems across the entire region.

Gulf snapping turtle, Ambullya waterhole, Arnold River headwaters, Tanumbirini Station, NT.
Source: Charles Darwin University

The Baseline Survey Program will be delivered by June 2021 with results and associated data to be available through data.gov.au and bioregionalassessments.gov.au.

Beetaloo GBA region LiDAR study

The objective of this project is to develop and apply new remote sensing techniques to assess changes in habitat condition within the Beetaloo GBA region. It will focus on habitat of potentially high biodiversity value (including GDEs and important habitat for threatened species, especially the Crested Shrike-tit (northern) and Gouldian finch). This will involve the use of both satellite remote sensing products and terrestrial LiDAR scanning to provide insights that cannot be measured through traditional fieldwork.



An example transect through a terrestrial LiDAR point-cloud. Ground-based LiDAR can capture the above ground elements of ecosystems in their entirety - providing avenues for assessing structural diversity and for quantifying changes over time.
Source S. Levick. C. Pavey, CSIRO

Well terminology

Vertical versus horizontal drilling

A key component of stage 3 of the program involves looking at the potential impacts of oil and gas wells. While the GBA program is not involved in drilling wells, data from previous drilling completed by industry, government and scientific organisations has been integral to the program's understanding of the rocks and structure of the subsurface in the GBA regions.

In our user panels we often talk about different types of wells and drilling, namely vertical and horizontal (lateral) wells. But what are the differences between vertical and horizontal drilling, and why do operators choose to drill one or the other?

The type of well drilled is chosen based on the nature of the resource, i.e. is it oil or gas, is it concentrated or dispersed in the host rocks and where is it relative to where the well can be drilled? These differences all influence the most effective technique needed to recover the resource and hence the type of well drilled.

The most important characteristic and limitation of vertical wells is that they can only target rocks and resources located below the point on the surface where the well is drilled (well pad). This type of drilling is relatively simple and has been used for a very long time in the oil and gas industry. However, it is becoming less common onshore as the easy-to-access resources in conventional reservoirs dwindle.

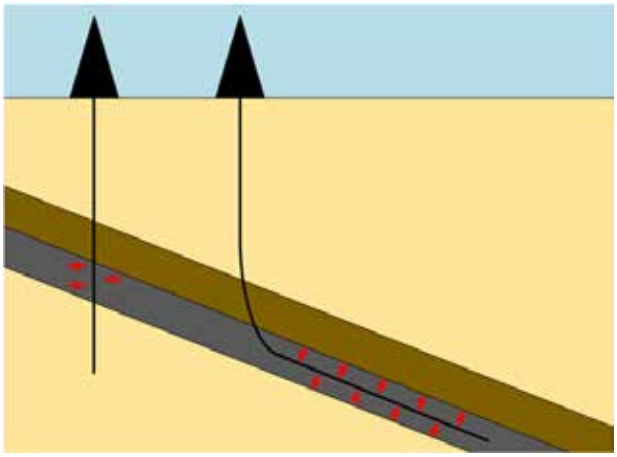
The technology needed to accurately control the direction a well is drilled (steer) was developed relatively recently. Directional drilling is used to access targets located away from the well pad.

Horizontal drilling is a type of directional drilling that is especially useful for shale and tight gas targets where the resource is widespread in a single layer of rock. Horizontal drilling allows the well to be drilled within the target rock layer maximising recovery from a single well, whereas to do the same with vertical techniques would require many closely spaced wells to be drilled over a wide area.

This drilling technology enables multiple wells to be drilled from the same point on the surface maximising recovery while minimising the number of well pads and footprint on the landscape.

While horizontal drilling is becoming more common, vertical drilling is still important. All horizontal wells start with a vertical well from the surface to the start depth for the horizontal (or lateral) section.

Vertical wells are also important in exploration. Vertical exploration wells (also called pilot holes or test holes) are drilled to enable geologists and engineers to examine the rocks at different depths helping them to determine where the resources are likely to be found, informing the location and direction of future drilling.



Vertical wells (left) can only target rocks and resources located directly below them, while horizontal wells (right) can be drilled within the target rock layer maximising recovery from a single well.
Source: Manually created by A. Stacey, Geological and Bioregional Assessments team.

For more information on conventional versus unconventional reservoirs see chapter 2 of the Geological and Environmental Baseline Assessment for your region or the Unconventional Gas Factsheet.

Find out more

Further information about the GBA Program is available here