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Lake Eyre Basin Springs Assessment (LEBSA)

Queensland Herbarium | DSITIA

Improving our understanding of groundwater dependent ecosystems in the Lake Eyre Basin

Background

The Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (the IESC) provides independent advice to Australian Government and state government regulators on potential water-related impacts of coal seam gas (CSG) and large coal mining development proposals.

Bioregional assessments (BAs) are one of the key mechanisms to assist the IESC in developing this advice and ensuring it is based on the best available science and independent expert knowledge. A BA is a scientific analysis, looking at the ecology, hydrology, geology and hydrogeology of a bioregion. It explicitly assesses the potential direct, indirect and cumulative impacts of coal seam gas (CSG) and coal mining development on water resources.

The Lake Eyre Basin (LEB) (Figure 1) has been identified as a current area for a bioregional assessment. The main areas of focus for the LEB are the Galilee and Cooper basins (including the Desert Channels region) within Queensland and the Arckaringa, and Pedirka geological basins in South Australia. The Desert Channels region is the State's largest catchment and comprises the Queensland section of the Lake Eyre Basin (509,933 sq km) which is divided into the Georgina/Diamantina Catchment and the Cooper Creek Catchment.

The Lake Eyre Basin Springs Assessment (LEBSA) project is a critical data acquisition project that will supply up to date scientific baseline data to be used as part of the bioregional assessment for the LEB.

LEBSA is funded by the Australian Government Department of Environment and is being jointly managed by the Queensland Department of Science, Information Technology, Innovation and the Arts (DSITIA) and the South Australian Department of Environment, Water and Natural Resources (DEWNR).

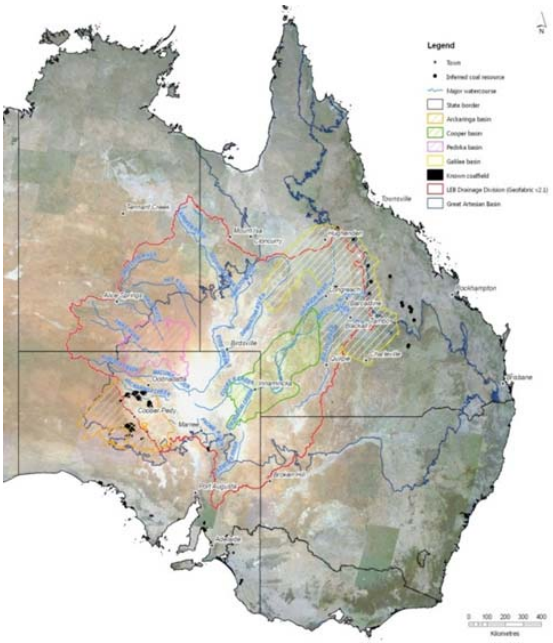

Figure 1: Lake Eyre Basin (includes coal-bearing basins).

Objectives of LEBSA

The aim of LEBSA is to support the Australian Government's Bioregional Assessment Programme in its analysis of the impacts of CSG and large coal mining development on water resources.

Queensland and South Australia will produce a range of LEBSA technical products that will feed into the LEB Bioregional Assessment. These inputs will contain information on groundwater dependent ecosystems (GDEs), including spring vents (a point or points where groundwater comes to the surface) to promote better management and understanding of these assets.

Delivery of this science will be through national frameworks such as the national GDE Atlas (hosted by the Bureau of Meteorology), as well as state mechanisms such as the Queensland Government website: Wetland*Info*.

Queensland's role

Key LEBSA deliverables for Queensland include:

- Improving the knowledge on spring vents and other groundwater dependent ecosystems and their function (Figure 2), and key landscape eco-hydrological processes for the Galilee and Cooper geological basins within the LEB.
- Mapping of GDEs for key areas of the LEB.
- Production of pictorial conceptual models depicting the eco-hydrological processes associated with GDEs.
- Undertaking a basin-wide spring vent survey, including their location (such as source aquifer/s) and characteristics.
- Undertaking further targeted LEB surveys to verify attribution of GDEs.
- Identification of key knowledge gaps relating to the function of GDEs in the LEB and recommendations to address these in the future.

Figure 2: A spring vent of the Great Artesian Basin

Project tasks

Queensland's project activities are aligned with the needs of the LEB Bioregional Assessment Programme and the Queensland Government programs on ecosystem mapping and wetland management.

The following are key steps in the overall LEBSA project:

1. Review and consolidation of existing GDE data and literature for the LEB.
2. Collation of potential source data, including spring vents for GDE mapping and identification of key spatial datasets.
3. Inclusion of local and expert knowledge relating to the location and characteristics of LEB water assets (obtained through regional consultation and engagement and using the Queensland "Walking-the-Landscape" methodology).
4. Application of mapping rule-sets to develop customised GDE map layers for the LEB.
5. Extensive field surveys of spring vents, including water chemistry, flora, flow rate and wetland area.
6. Compilation of LEB GDE and spring vent data into fully aligned state databases for integration into national and state GDE database and information frameworks.

This approach will provide a unified and aligned Queensland and South Australian methodology, attribution, mapping and conceptual modelling for the delivery of LEBSA products to support the Australian Government's Bioregional Assessment Programme.

Regional consultation and engagement

Technical GDE workshops will be held to capture local and expert knowledge to inform mapping and the development of conceptual models for the Galilee and Cooper Basins of the LEB.

LEBSA conceptual modelling

Conceptual pictorial models for the LEB to describe how ecosystems and groundwater are likely to interact over defined areas will be developed from the combination of local and expert knowledge. These models synthesise the understanding of the key processes, factors and dependencies of the system. The modelling begins at the landscape scale, identifying areas where broad generic rule-sets may be applied and areas where finer scale modelling (such as individual spring vents or clusters of vents) is necessary.

LEBSA mapping and mapping rule-sets

Mapping will involve the delineation of LEB regions with similar ecology, geology, climate, and groundwater-surface water interactions that produce an expected GDE type/behaviour or hydrological process. This will inform the development of LEB conceptual models and rule-sets that may be applied to spatial datasets through GIS[1] analysis to identify the presence or potential presence of GDEs in key catchments of the LEB.

Once the conceptual models are developed, they will be translated into rule-sets developed for each area displaying similar characteristics. This process involves the use of information from literature and a generic understanding of groundwater-ecosystem interaction and hydrological processes in the landscape. When applied to spatial datasets through GIS analysis, the results indicate where these interactions are likely to occur.

[1]Geographic Information System (GIS) is a system designed to capture, store, manipulate, analyse, manage, and present all types of geographical data.