Concept Plan SP 2021-011

Novel methods combining ground-based monitoring and remotely sensed observations to inform management and measurement of ecosystem condition in the rangelands

Remote Sensing and Spatial Analysis

Project Core Team

Supervising Scientist	Katherine Zdunic
Data Custodian	Katherine Zdunic
Site Custodian	

Project status as of June 8, 2021, 3:31 p.m.

Pending project plan approval

Document endorsements and approvals as of June 8, 2021, 3:31 p.m.

Project Team	granted
Program Leader	granted
Directorate	granted

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Biodiversity and Conservation Science Program

Remote Sensing and Spatial Analysis

Departmental Service

Service 6: Conserving Habitats, Species and Communities

Aims

This project will deliver new insights into the functioning of rangeland ecosystems in WA, as well as tools to undertake future monitoring and evaluation of these ecosystems. Specifically, this project aims to develop:

- A method to relate remote-sensing based measurement of ecosystem condition to on-ground monitoring datasets.
- The integration of new remote sensing technologies into assessments of rangeland condition and change detection.
- An understanding of the recovery potential of degraded rangeland ecosystems in Western Australia.

Expected outcome

This project will produce an archive of remote sensing products (1988 – present) that will be used to evaluate the ecological condition of vegetation communities across CSIRO and DBCA properties in the West Australian rangelands. Remotely sensed satellite imagery will be combined with high-resolution terrain data and other satellite data (synthetic aperture radar, LiDAR), climate records and management histories to make assessments of the spatial distribution of vegetation condition and disentangle the complex interactions between landform, climate and management actions. This project will also produce an analysis of long-term field monitoring data, principally WARMS data, across all DBCA and CSIRO properties in the mid-west region. This analysis will help us to provide locally-derived estimates of growth rate, recruitment and mortality for a range of long-lived woody perennial species that are key to the ongoing management of rangeland ecosystems and also directly relevant for many human induced regeneration (HIR) projects in the region, including potential future HIR projects on DBCA and CSIRO properties. The outcomes can also inform future management plans in the region and monitoring components could be integrated through management effectiveness framework (Corporate Policy No.2).

Strategic context

This project will contribute to multiple strategic goals outlined in the Science Strategic Plan 2018-21, including:

Pressures and threats to ecosystem composition, function and values

- Identify long-term changes in vegetation condition across DBCA and CSIRO properties in the WA rangelands.

Impacts of climate change on biodiversity and ecosystem function

- Disentangle the influence of climate, terrain features and management on the condition of vegetation communities in the WA rangelands.

Ecological restoration

- Provide a spatial assessment of vegetation condition and recovery following historical management interventions and assess the potential for natural recovery following conversion from agricultural land-use.

Availability of scientific information for evidence-based decision making

- Produce an archive of spatial data products that will be used to evaluate the effectiveness of management interventions and restoration projects in the WA rangelands.

Innovative science and effective use of technology

- Adapt existing, emerging and cutting-edge remote sensing platforms to monitor ecological condition of the WA rangelands.

Effective data management

- Innovate cloud-based analytical methods for remote sensing data.

Engagement with traditional owners

- Native title over Boolardy Station is held by the Wajarri people. Wajarri representatives will be included in all field work on the station and engagement with the Wajarri is planned for a workshop towards the end of the project.

Collaboration with science providers, science users and other stakeholders.

- Collaboration among a wide group of land managers, traditional owners and science agencies has been built into the project plan. Ongoing engagement with an advisory group is scheduled for 6-monthly updates, and regional outreach through workshops and annual meetings has been included in the project budget.

Expected collaborations

This project will establish a joint research program between CSIRO and DBCA focusing on ecological monitoring and restoration technologies in the WA rangelands. Gerald Page holds a joint appointment with DBCA and CSIRO, and will collaborate widely within CSIRO and across a number of state government and federal agencies. CSIRO Astronomy and Space Science (CASS) manages the Murchison Radio Observatory (MRO) and Square Kilometer Array Observatory (SKAO) at Boolardy Station and are providing project funding and logistical support.

The project has also established an advisory group to provide regular feedback on a six-monthly timeline, with members selected based on relevant expertise.

- Dr Ian Watson (CSIRO Agriculture and Food) [formerly DPIRD, established WARMS]
- Dr Shaun Levick (CSIRO Land and Water) [remote sensing expert]
- Dr Kristen Williams (CSIRO Land and Water) [remote sensing expert]
- Rebecca Wheadon (CSIRO Astronomy and Space Science) [Operations Manager, SKAO]
- Nathan Penny (DPIRD) [Manager, Rangelands Program]
- Prof. Stephen van Leeuwen (Curtin University)
- Anthony Desmond (DBCA) [Regional Leader Nature Conservation, Midwest Region]

Proposed period of the project

June 8, 2020 – July 8, 2025

Staff time allocation

Role	Year 1	Year 2	Year 3
Scientist	0.9	0.6	0.6
Technical			
Volunteer			
Collaborator			

Indicative operating budget

Source	Year 1	Year 2	Year 3
Consolidated Funds (DBCA)	50000		
External Funding	110000	100000	100000