Fact sheet

Remote sensing for rangeland ground cover management

> **Remote sensing:** The observation or measurement of an object without coming into contact with it. e.g. maps of the Earth's surface generated by stitching together reflectance data or photographs captured by satellites.

Remote sensing tools are available to improve the management of ground cover. Several are online and free and some provide Australian ground cover maps with resolution down to 10m. These allow producers to quantify vegetation cover, detect changes over time and inform decisions to improve ground cover management.

Value of monitoring ground cover with remote sensing

Ground cover is important for preventing erosion, maintaining soil health, improving water infiltration and retention and supporting healthy, productive landscapes. Using remote sensing to estimate ground cover overcomes the challenges of monitoring vast and diverse rangeland environments. Additional advantages include:

- **Scale** – estimation and visualisation across large areas
- **Time frames** – ability to observe changes over past seasons and years
- **Low cost** – an effective and efficient method compared to manual on-ground surveys
- **Real-time** – information can be accessed when it suits you, supporting timely decision making
- **Informed decision making** – assess paddock level trends or management impacts to inform decision making.

How these products help producers

1. Visualise total cover

Total cover includes both green and dry vegetation covering the soil surface. Monitoring total cover helps to understand how rainfall or grazing impact different parts of the landscape and identify areas vulnerable to wind erosion.

Figure 1: Monthly total vegetation cover for a property
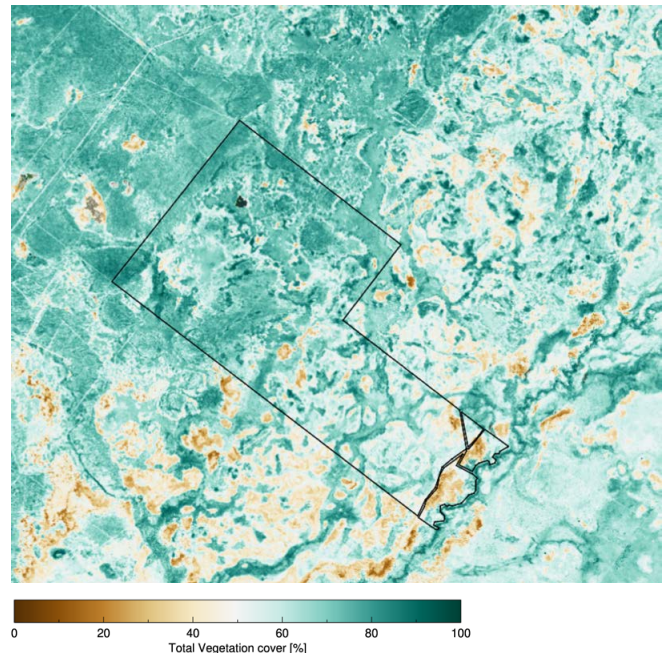
> **Try it yourself – follow these steps:**
> map.geo-rapp.org
>
> Explore map data >Australia >Vegetation Cover – Landsat/Sentinel (30/20 meters) >Monthly Total Vegetation Cover (PV+NPV) –Landsat/Sentinel2, CSIRO algorithm >add to the map.

> **Tip:** Navigate to your property quickly by entering your property coordinates into the 'search for locations' box, or dragging a polygon (eg a .kml or .kmz file) of your property boundary onto the map.

2. Visualise the different types of ground cover over different seasons

Fractional ground cover maps split ground cover maps into three parts. They distinguish between bare soil (red), green vegetation (green), and dry vegetation (blue). This information can help identify areas of fast-growing annuals and resilient perennials. Comparing maps over time can improve understanding of landscape changes.
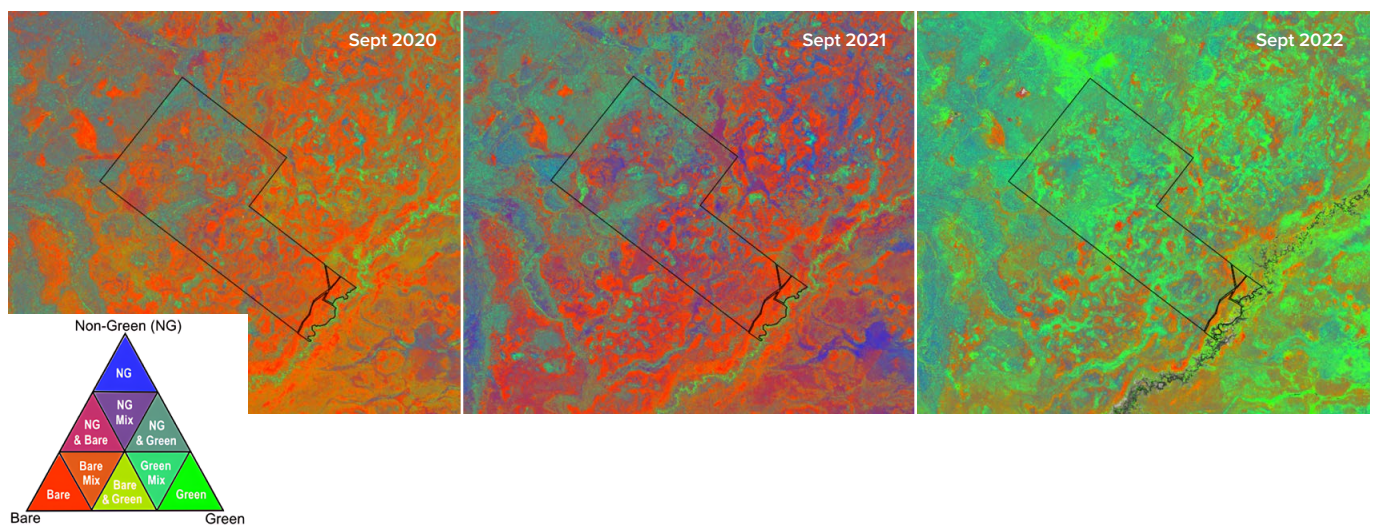
For example, observe shifts from bare soil during drought (2020) to dry vegetation post-rainfall (2021) and subsequent greening in response to above-average rainfall (2022) (Figure 2).

Figure 2: Maps from September of sequential years 2020–2022 demonstrate changes in fractional cover over time

3. Track trends in cover over time

Analysis tools may be used to track changes in total or fractional cover over time, alongside rainfall. This enables monitoring of trends in response to management or seasonal rainfall patterns (Figure 3).
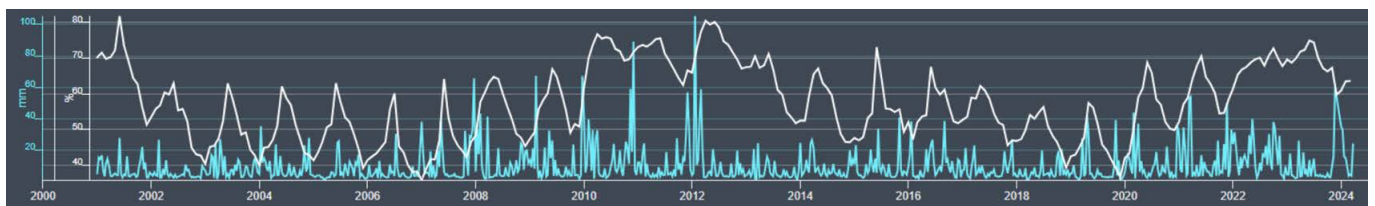
Here highly variable but slowly improving total ground cover (white line) is shown alongside the monthly rainfall totals (blue line).

Figure 3: Graphing ground cover over time allows trends to be visualised

4. Compare cover with a benchmark or between management areas

Compare cover between areas such as where a change in management has occurred and a benchmark or reference area to understand changes despite seasonal variations (Figure 4).

Figure 4: Map and graph comparing scolded areas with and without ponding

The southern area outlined on the map has been improved with waterponding. The graph shows that cover across the ponded (red) and unponded (blue) areas was initially similar, but over time has improved.

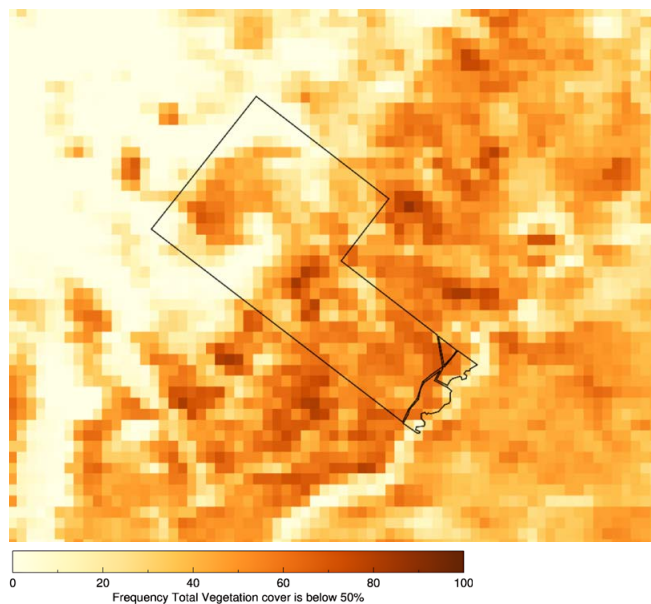**Try it yourself – follow these steps:**

vegmachine.net

Interactive Analyses >Australia Wide >Vegetation >Polygon Comparison >Ground Cover.

Tip: First create your two polygons using the 'Draw a polygon' button.

5. Identify areas of long-term low ground cover

Management that maintains ground cover at 50% or greater significantly reduces the risk of wind erosion. By visualising the areas of the landscape that are frequently below 50% cover, managers can consider strategic management interventions to minimise erosion (Figure 5).

Figure 5: Property mapped to identify the frequency that total vegetation cover is below 50%

The more frequently ground cover falls below 50%, the darker the colour. Lighter areas represent a lower frequency of ground cover falling below 50%.
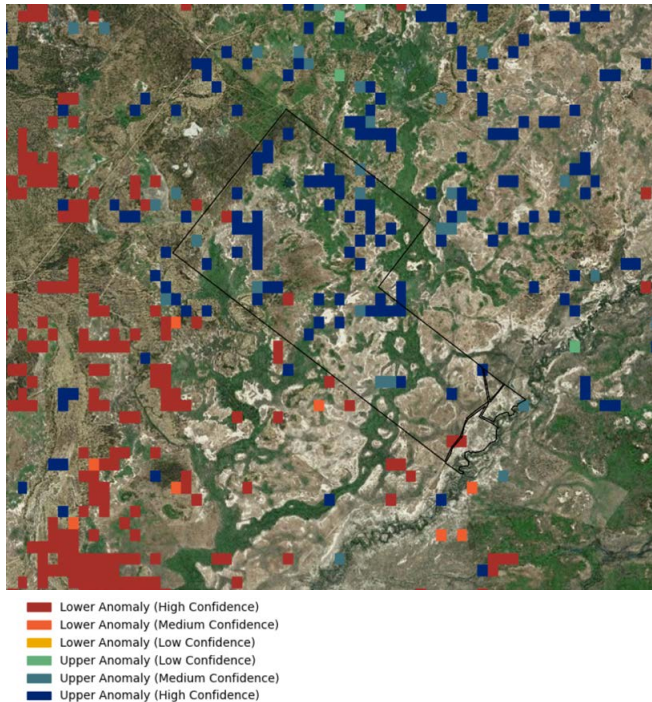
Try it yourself – follow these steps:

map.geo-rapp.org

Explore map data >Australia >Vegetation Cover (MODIS, 500m) >Summaries >Frequency of Total Veg Cover below 50% >Annual – Tot Cov below 50% >Add to the map.

6. Explore ground cover response to recent rainfall

Anomaly maps highlight areas where rainfall results in an unexpected change in ground cover. This helps identify areas that may require additional interventions for improvement (Figure 6).

Figure 6: Ground cover anomaly map based on rainfall

- Lower Anomaly (High Confidence)
- Lower Anomaly (Medium Confidence)
- Lower Anomaly (Low Confidence)
- Upper Anomaly (Low Confidence)
- Upper Anomaly (Medium Confidence)
- Upper Anomaly (High Confidence)

Areas with ground cover above what was expected given recent rainfall are shown in blue/green, and areas below expected coverage shown as red/orange.

Try it yourself – follow these steps:

map.geo-rapp.org

Explore map data >Australia >Vegetation Cover (MODIS, 500m) >Monthly >Accumulated Antecedent Rainfall >Add to the map.

Available products

There are different products available to assess ground cover across your property. Listed below are some examples of freely available products. More advanced analyses or property-specific data reporting is provided by various paid subscription services.

- **VegMachine:** Free access. 10–30m spatial scale. Seasonal averaged data: vegmachine.net
- **Australian Feedbase Monitor:** Free registration for MLA members. 1ha spatial scale. Weekly averaged data: mla.com.au/afm
- **GEOGLAM RAPP:** Free access. 10–500m spatial scale. Eight day, monthly and seasonal averaged data: map.geo-rapp.org/#australia

Resources

- Factsheet: Maintain and improve groundcover
- Maintaining groundcover to reduce erosion and sustain production
- Assessing native ground cover
- Using drought lots to manage groundcover
- The glove box guide to tactical grazing management for the semi-arid woodlands
- Prograze manual
- Dustwatch
- Feedbase planning and budgeting tool
- Stocking rate calculator

Contact:

Sarah McDonald – Research Scientist, NSW Department of Primary Industries sarah.mcdonald@dpi.nsw.gov.au

Craig Strong – Associate Professor, Australian National University craig.strong@anu.edu.au