

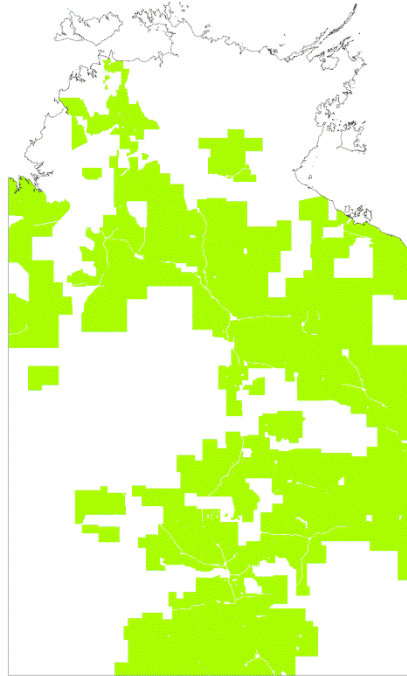
# Rangeland condition: how to effectively monitor and protect this essential natural resource

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# Pastoral land in the NT

- Approximately 600 000 km<sup>2</sup>
- 45% of the NT
- 224 pastoral leases
- Rangelands underpin the pastoral industry



# Why monitor?

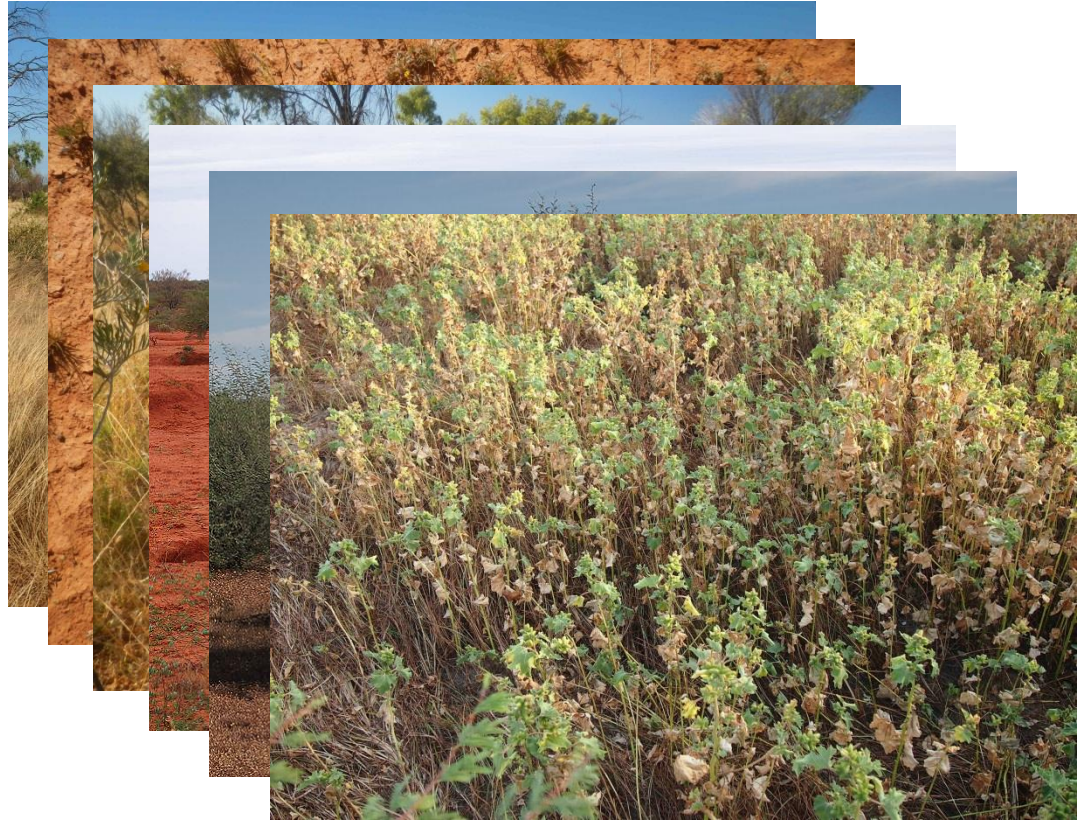
- What's there?
- Understand the effect that grazing management is having on landscapes
- Inform decision making (adaptive management)
- *Pastoral Land Act 1992*
  - Monitoring of pastoral land to detect and assess any change in its condition
  - Sustainable land use and economic viability



# Land Condition

Ability of vegetation to respond to rainfall

- Ground cover / amount of bare ground
- Species composition
- Accelerated soil erosion
- Tree / grass balance
- Presence of weeds





## Good

- Good ground cover
- Dominated by palatable annual grasses
- Palatable perennial grasses under trees



## Fair

- Good ground cover
- More palatable annuals absent
- No perennial grasses



## Poor

- Dominated by ephemeral and/or unpalatable grasses and herbs
- No perennial grasses
- Trees browsed

# Land condition

## Conventional field techniques

- Data limited in space and time
- Difficult to separate short term (e.g. rainfall variability) from long term (e.g. grazing) effects



1976



1981



1986

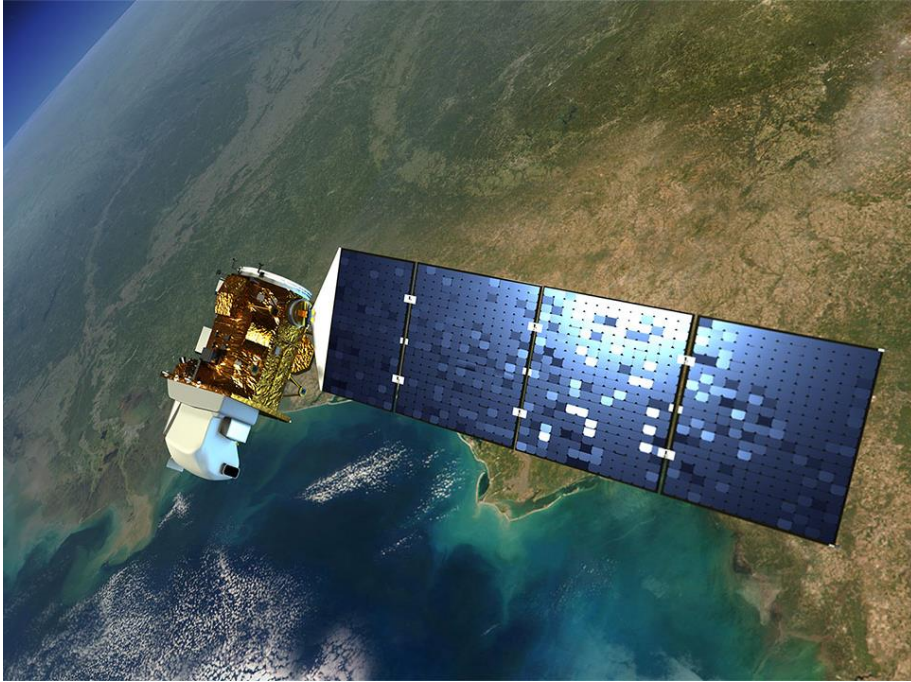


2004



1995

# Integrated monitoring



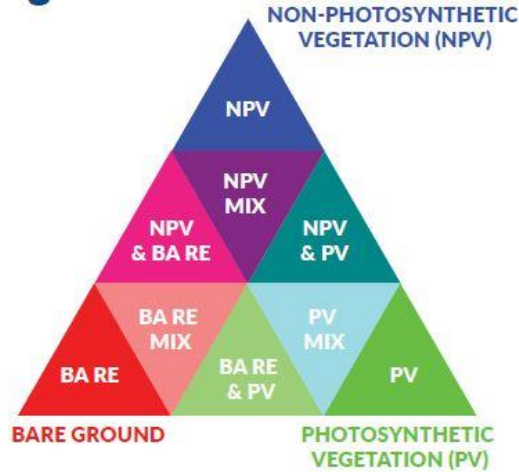


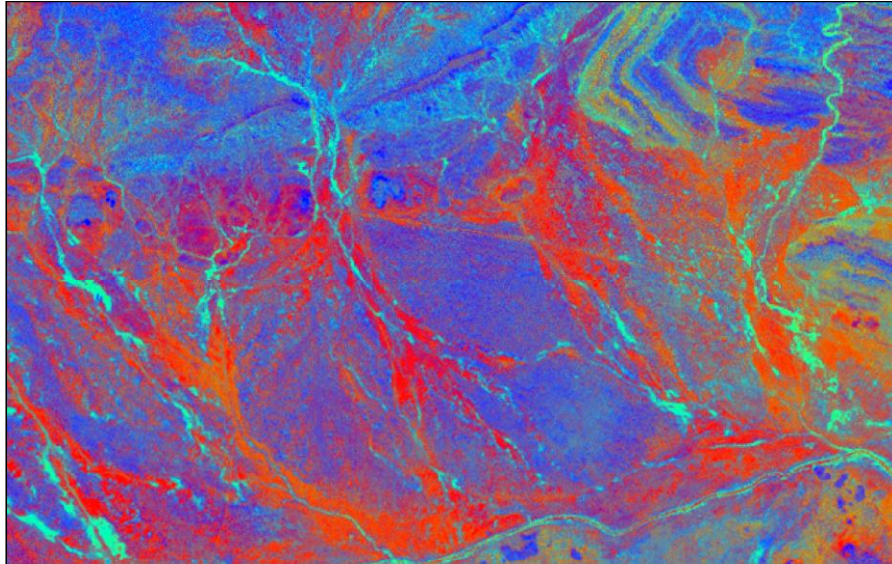
# Remote sensing

- Collaborative effort between the NTG and QLD Department of Science, Information Technology and Innovation
- Optimised to work across the continent
- Re-calibration is ongoing
- Complete coverage of the NT at 30m resolution (Landsat) and 10 m resolution (Sentinel)
- Fractional cover: green vegetation, brown vegetation and bare soil

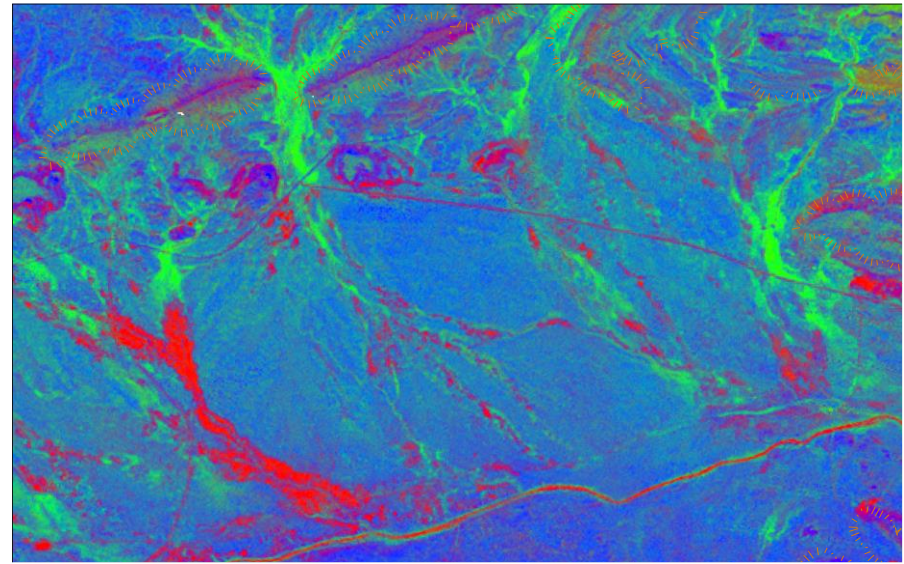


# Fractional Cover

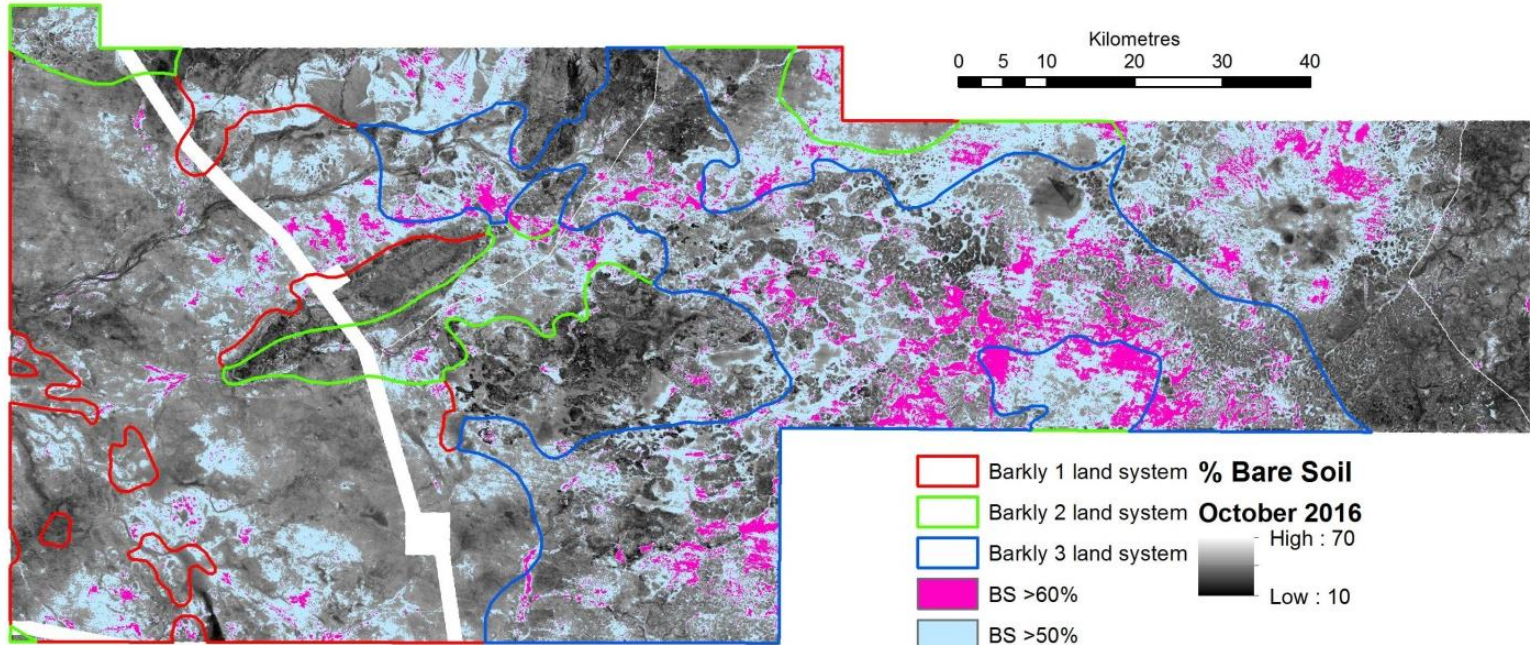


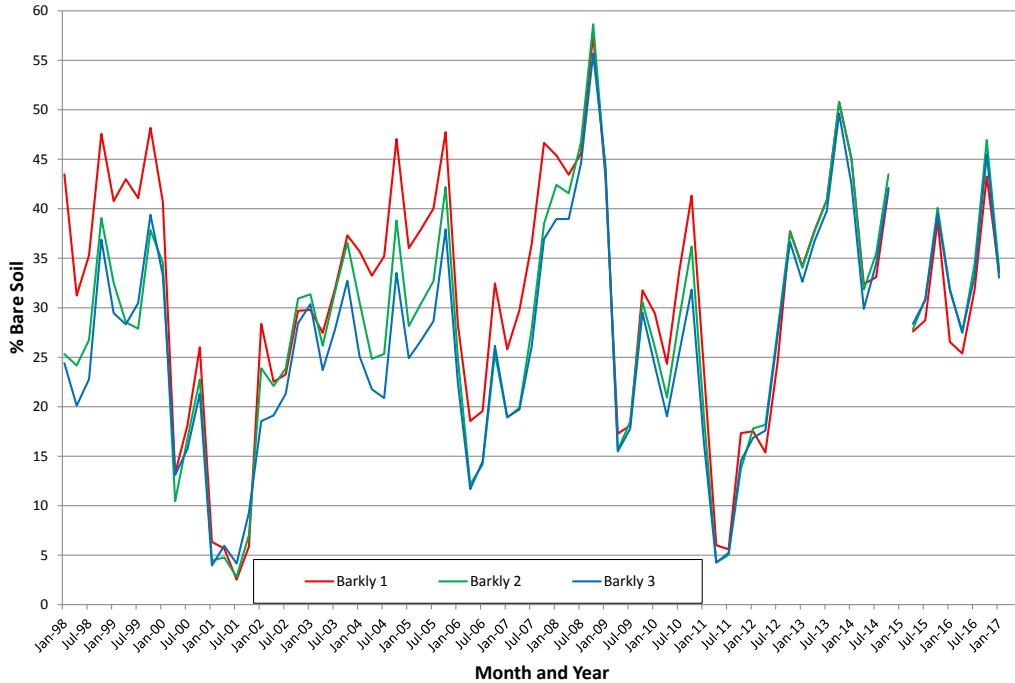


Autumn 2007



Autumn 2011



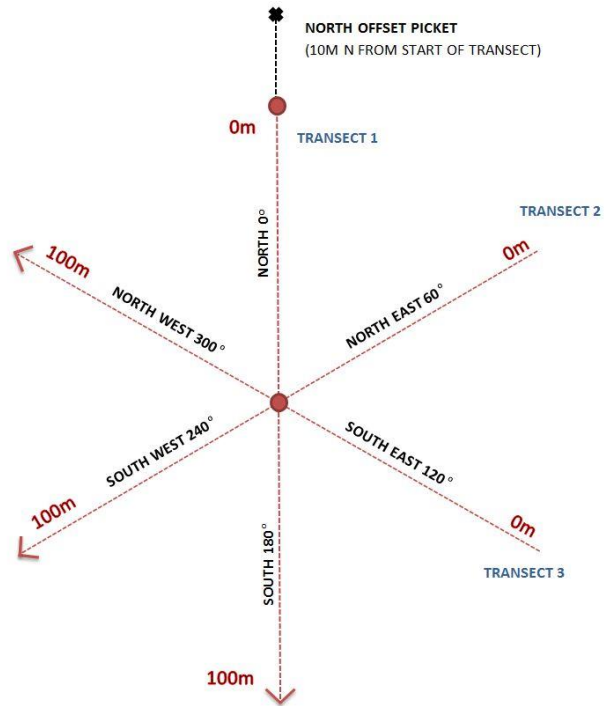


Time series of the dynamics of bare soil through time on pastorally productive land systems

# Ground-based monitoring

- Used to calibrate remotely sensed data
- On-ground measurements of fractional ground cover
- 3 – 5 km from water, and >50 m from track
- ABARES 'star transect' method (Muir et al. 2011)





● - PERMANENT SURVEY PEG



# Ground-based monitoring

Additional information across the whole site (one hectare)

- Ground cover / amount of bare ground
- Species composition
- Accelerated soil erosion
- Tree / grass balance
- Presence of weeds / ferals





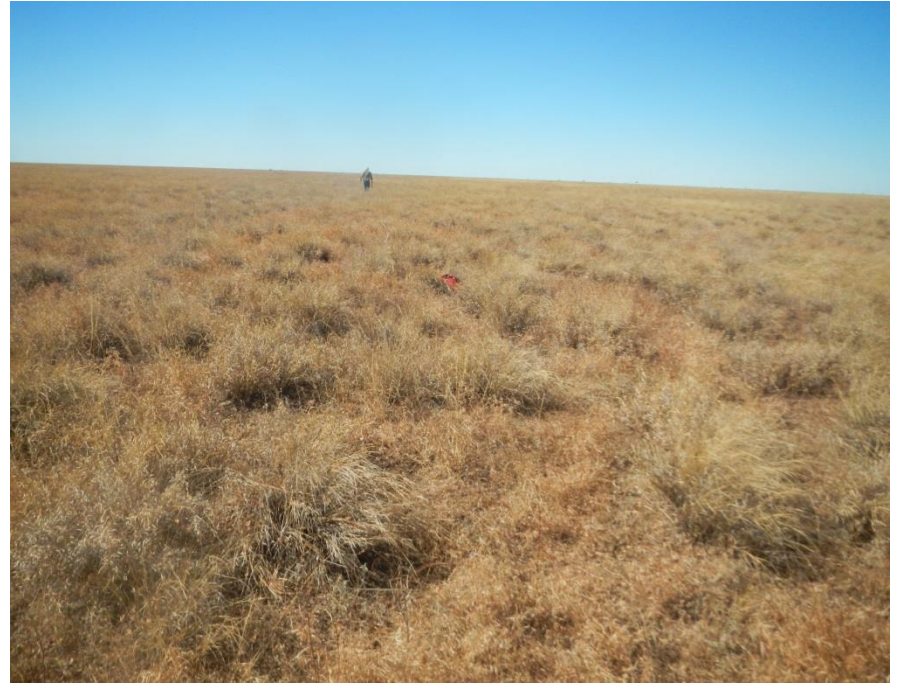
# Advantages of integrated monitoring

- Cost effective
- Objective
- Multiple spatial scales
- Key times within a year and over many years
- Allows immediate feedback on ground cover to pastoralists at the time of monitoring



# 2017 outcomes

- In 2017, integrated monitoring across approximately 140,000 km<sup>2</sup> of NT pastoral land
- Improved information to pastoral lessees and the Pastoral Land Board



# References

Muir, J, Schmidt, M, Tindall, D, Trevithick, R, Scarth, P & Stewart, JB. 2011 *Field Measurement of fractional ground cover: a technical handbook supporting ground cover monitoring for Australia*, prepared by the Queensland Department of Environment and Resource Management for the Australian Bureau of Agricultural and Resource Economics and Sciences.



# Acknowledgements

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