



Rangeland monitoring can engage graziers

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Abstract

Long-term monitoring is critically important in understanding how rangelands change across time in response to climate and management. In Queensland, the state-wide monitoring system called QGraze was established to monitor long-term pasture condition. The system has not only provided an opportunity to detect change in rangeland condition, but also engage with and build capacity with land managers in the livestock industry.

Beginning in 1991, the Queensland state Department of Primary Industries (DPI) in collaboration with land managers, installed nearly 450 sites on grazing lands across the state. Since then, these sites have been used by several projects to help inform the current state of rangeland condition and trends, such as monitoring the spread of the exotic grass *Bothriochloa pertusa* in the Burdekin district in North Queensland.

Just as importantly, enhanced engagement with graziers occurs as a result of surveying QGraze sites on their properties. This allows for the collaborative sharing of information and knowledge between DPI staff and the local grazing community. Graziers are interested to learn about their pasture and land condition in finer detail and the changes over time. The subsequent discussion regarding the contributing factors is valuable to inform their management decisions. Given the long timeframe over which monitoring has occurred, these conversations often span multiple generations, managers, and seasonal conditions. In turn, DPI staff are provided with perspective and context around the factors contributing to rangeland condition.

Due to the dedicated maintenance and monitoring of the sites by staff, QGraze provides a valuable resource for a combined understanding of the natural resource base underpinning Queensland's grazing lands.

Introduction

Native pastures provide the feed-base for a vast section of Queensland's grazing industry (ABARES, 2024). They also provide vital ecosystem services, and their management impacts major downstream ecosystems like the World Heritage Listed Great Barrier Reef – (GBR). Unfortunately, there is evidence of declining land condition through overgrazing and lack of resting (Gardener *et al.* 1990; McKeon *et al.* 2002). This includes declines in ground cover, loss of perennial grasses, invasion by the exotic *B. pertusa* and woody thickening, e.g., of the shrub *Carissa ovata* (currant bush)(De Corte *et al.*

1991; Rogers *et al.* 1999). Long-term monitoring of this native pasture resource is thus crucial for maintaining sustainable grazing land management and for the health of important ecosystems. Much of Queensland's grazing lands incorporate large spatial heterogeneity and are subject to high rainfall and climate variability within and between years (O'Reagain *et al.*, 2014). Detecting and interpreting temporal changes in the state of grazing lands can be difficult. While some changes in pastures are drastic, for example following fire, others are more subtle, such as the gradual loss of key perennial grasses or woody thickening and are less obvious to land managers. Furthermore, the recollection of past conditions can be subject to several cognitive biases which can lead to a misrepresentation of actual events (Roediger & Butler, 2011). Monitoring provides an objective record which helps to track changes in pasture composition and ground cover, identify trends in species diversity, and assess the overall health of vegetation.

Method

The Queensland Grazing Land Monitoring Project (QGraze) was established by the then QDPI in the early 1990's to implement a program to monitor change in condition across Queensland's grazed rangelands. At the time it aimed to provide a contribution to the National Rangelands Monitoring Program (Queensland Government, 2005). Nearly 450 permanent monitoring sites (Figure 1) were installed across a range of vegetation types and pasture communities. Sites are 4-hectare and consist of five 200m transects, spaced 20m apart, with each transect marked with a permanent centre peg. Twenty evenly spaced quadrats (0.25m²) are assessed along each transect, recording pasture species frequency, and estimates of ground cover and tree canopy cover. At each site 100 assessments are made along a series of 200m transects, recording pasture species frequency, and estimates of ground cover and tree canopy cover. Broader site estimates of soil condition, biomass and relative contribution to the biomass from the most dominant species are also recorded. Set point photos are taken, and tree basal area is calculated using a dendrometer.

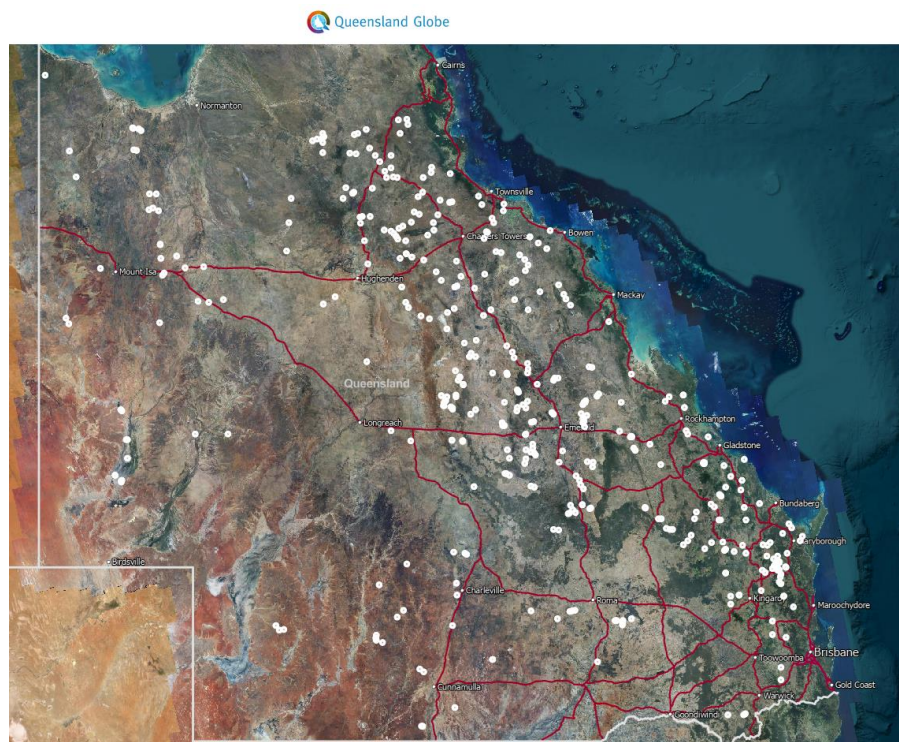


Figure 1: Distribution of QGraze sites across Queensland.

Following the survey, data is processed and stored on a central data server. A report is also shared with the grazier giving the frequency of the main species, the condition of the site, comparisons with previous assessments and images from the fixed transect markers.

Results

QGraze in the Burdekin region.

The Burdekin River in NE Queensland has a catchment of approximately 140 000 km² and is one of the main sources of sediment to the GBR lagoon (Furnas, 2003). Nearly 100 sites were installed in the catchment, with surveys first conducted from 1992 onwards. During this decade many sites were surveyed up to three times, however during subsequent decades monitoring frequency declined, due to changes in funding and government priorities. In 2014 several sites were re-surveyed as part of a project focussed on the spread of the exotic stoloniferous grass *B. pertusa* (Stacey, 2014). With the purpose of adding to the understanding of *B. pertusa* spread, several properties were re-surveyed in 2020/2021 while a further 10 properties were surveyed in 2024 as part of the DPI’s Reef Water Quality Grazing Extension Service. Despite the intervening 25 years since two of these sites were surveyed, both were intact, and the owners/managers of both properties knew the location of the site. This was despite one of the properties changing ownership during the period. This suggests that these monitoring sites are valued by the graziers. The 2024 survey sites represented a range of properties, which were managed by the owners, or employed managers, and some properties had changed ownership, including through family succession.

Understanding trends

Besides the site report that a grazier receives, district comparisons over time can also be made, giving both an indication of the influence of seasonal conditions and relative trend of the condition of that site. This contributes to a shared understanding of the rangeland condition across a district and the impact of an individual grazier’s management. For example, a comparison of the change in the frequency of the pasture grasses Indian couch (*B. pertusa*) and Black Spear (*Heteropogon contortus*) across seven properties within a district showed trends which suggest the influence of prevailing broader seasonal conditions (Figure 2).

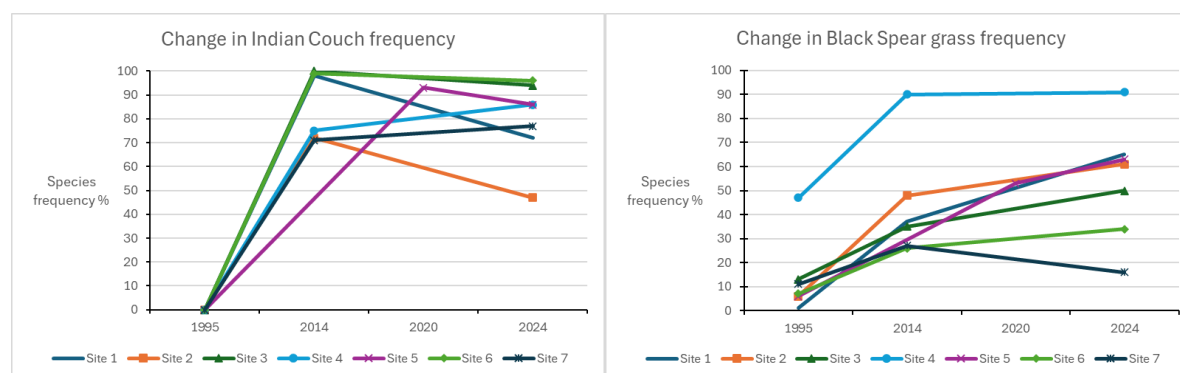


Figure 2: The change in frequency of Indian couch and Black Spear grass across seven sites on the same land type/pasture community with a maximum distance of approximately 80km between sites.

In 1995 Indian couch was not detected at any site but they all experienced a rapid increase by 2014 (or 2020 for site 5) and then all but two declined in frequency again between 2014 and 2024. Similarly Black spear grass increased at all sites between 1995 and 2014/2020 and maintained this increase in all except one site between 2014 and 2024. Similar patterns across these properties which varied in management systems suggest that seasonal conditions are an important factor in the spread of Indian couch.

Discussion

Sustaining Relationships

A fundamental component of DPI's delivery of extension services to the grazing industry, is placing the grazier at the centre of the activity and working *with* them to build capacity (Williams et.al, 2020). The installation of permanent monitoring sites on-property helps relate the science that QDPI does, to the grazier's own circumstances and decision-making. During the 2024 round of surveys, each visit was preceded by a conversation with the grazier discussing the site. Invaluable context for the site was given by the grazier during these conversations, such as history of fire, sown pasture species, and infrastructure development. Often the conversation would expand to include wider property and industry themes. On many occasions the grazier could recall the officers who installed the sites. These conversations were particularly beneficial for new extension and technical officers. Not only did they provide historical context, but also indicated to DPI officers what issues were important and what events may have been formative to the grazier's land management practices.

Industry capacity

The follow up report also provides an opportunity to continue and expand the relationship – allowing DPI staff to provide feedback on how sites have changed, place the results in a wider regional context and share the experiences of other graziers. Sometimes this can provide confirmation for a grazier that their management systems are achieving desired land condition outcomes. It can also initiate further discussion and an introduction to the range of DPI extension services. Customised support can follow, which addresses the multiple aspects of managing a beef business while building as broader professional relationship.

QGraze sites provide a sustained reason for ongoing, meaningful engagement between DPI staff and graziers. This interaction helps preserve and transfer corporate knowledge, ensuring that valuable expertise and historical context are not lost amidst staff movements, changes in ownership or generational transitions. DPI investment in this multi decade engagement enhances trust and promotes informed decision-making, ultimately supporting the long-term resilience and productivity of land management practices.

Conclusion

QGraze has provided a unique opportunity to objectively track changes in Queensland's grazing lands spanning multiple decades. Monitoring these sites has developed the technical skills of QDPI staff and given new officers the chance to connect with multiple generations of the grazing community. Effective agricultural extension is built on valued, trusted relationships – QGraze offers the chance to further develop these relationships and support practice change.

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