A diary of a new bore

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Abstract

This poster is a case study on the changes in pasture yield, cover and defoliation after the establishment of a new bore. This case study is part of a larger, long-term stocking rate and wet season pasture spelling trial currently being conducted on the Barkly Tablelands in the Northern Territory. The trial bores have had pasture species, yield and cover data collected annually since 2011 at 13 points along a transect line out to 5000 m from each bore.

The development of a piosphere is becoming apparent, with grazing impacts observed out to 1000 m from the new bore. Average ground cover from 2011 to 2014 has almost halved and average pasture yields have declined between 1000-2000 kg/ha along the transect line. As expected, defoliation scores have increased. A contributing factor to the significant declines over a short period of time was a below average 2012/13 wet season and an average 2013/14 wet season. Long-term sustainable stocking rates are practiced on this property, however it has become apparent how rapidly pasture yield and cover can decline in new grazing areas in years with lower rainfall. The next aspect of investigation for this trial would be to implement a wet season spell at the new bore to determine if pasture and land condition impacts can be reversed.

Introduction

The true impact of grazing on native pastures can be somewhat masked if the land has been open to grazing for a long period of time. By monitoring pastures newly opened up to livestock by the addition of a watering point, a clearer understanding of grazing impacts and possible methods to maintain good land condition can be realised.

This case study is part of a larger, long-term stocking rate and wet season pasture spelling trial currently being conducted on the Barkly Tablelands in the Northern Territory. The larger trial is investigating grazing around three different aged bores, the first drilled in 1910, the second in 2004 and the third (the new bore) drilled in 2010. These three bores have had pasture composition, yield, ground cover and defoliation data collected annually since 2011 at 13 points along a transect line out to 5000 m from each bore. This case study focusses on the newest bore, highlighting the development of a piosphere by looking at the changes in pasture yield, ground cover and defoliation along the transect line over time.

Methods

The paddock is primarily composed of black cracking clays, defined as 'Barkly1' land system (Christian *et al.* 1954), with some pebbly red soil outcrops. Dominant pasture species include *Astrebla* spp*., Aristida latifolia, Iseilema* spp*. and Panicum laevinode*.

A transect has been established originating at the bore and going out 5000 m. Sampling is done at 100 m, 250 m, 500 m, 750 m, 1000 m, 1500 m, 2000 m, 2500 m, 3000 m, 3500 m, 4000 m, 4500 m and 5000 m. Ten quadrats are sampled at each distance, five perpendicular to the left and right of the waypoint. At each quadrat, visual estimates of pasture yield, species composition, ground cover

and defoliation score are made using the BOTANAL method (Tothill *et al.* 1992). Pasture data has been collected annually between May and July, commencing in 2011.

Data was analysed using repeated measures ANOVA.

Results

The average long term annual rainfall for this station is approximately 397 mm and typically falls between November and April. Fig. 1 shows the rainfall received for the past five wet seasons with 2012/13 being a particularly poor year. The Bureau of Meteorology defines the official wet season start date as "day one of the first 14 day period after September 1st that receives ≥50 mm of rainfall" (Lo *et al*. 2008), hence the range of wet season dates in Fig. 1.

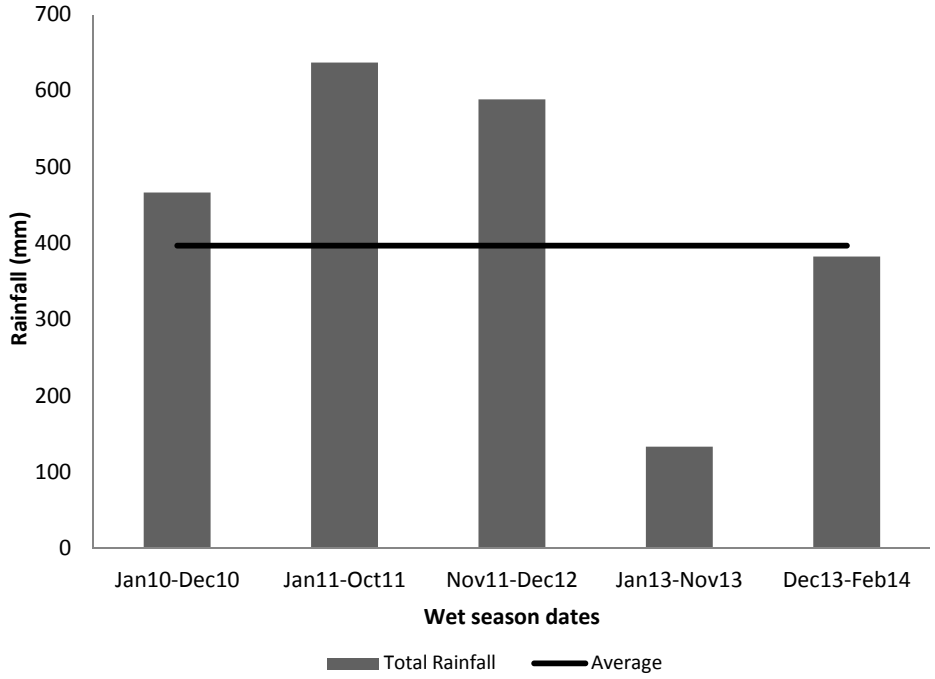

Fig. 1. Total annual rainfall (mm) calculated for wet season start date to wet season start date and average long term annual rainfall.

Large changes in mean pasture yield did not become apparent until 2013, when yields along the transect line were 1000-2000 kg/ha lower than that observed in 2011 and 2012 (

Fig. 2). The emerging development of a grazing gradient can be seen in 2014 yield, where it appears a grazing gradient is developing up to 1000 m from the bore. Changes in soil type are attributed to the lower mean yields seen at 3500 m and 5000 m (

Fig. 2).

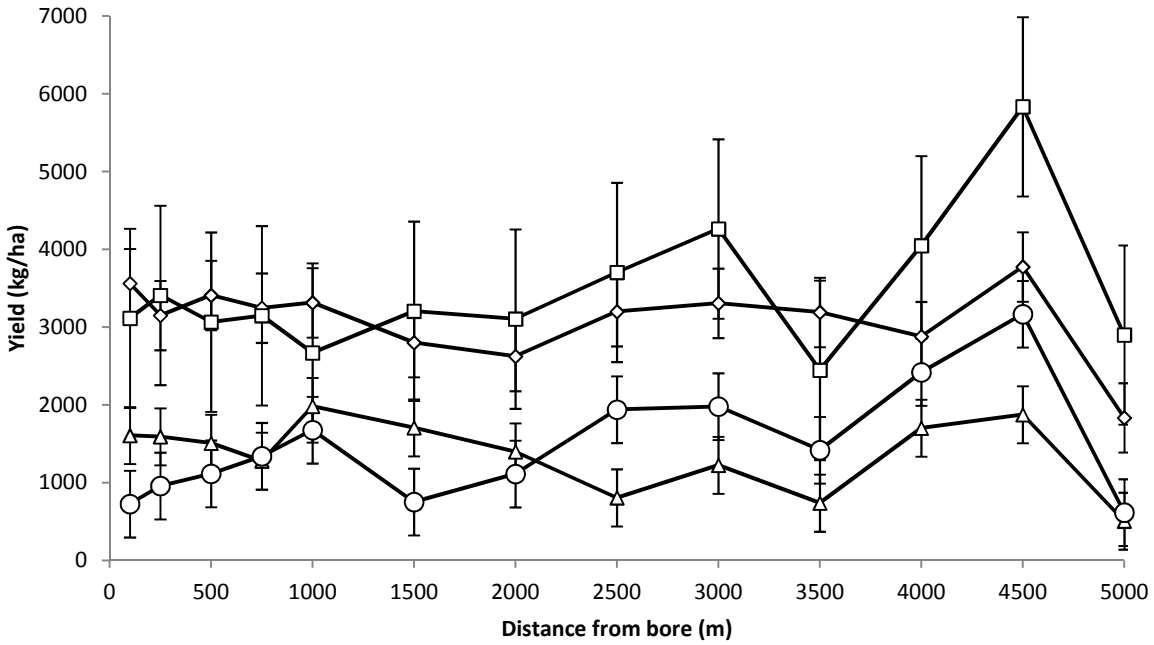

Fig. 2. Mean pasture yield with increasing distance from the bore from 2011 to 2014 (±95% confidence interval). ◊ 2011, □ 2012, △ 2013, ○ 2014.

Mean ground cover has declined between 30-40% from 2011 to 2014 along the transect line with mean cover ranging between 64-91% in 2011, to its lowest in 2013 when mean cover ranged between 16-60% (Fig. 3). With higher rainfall in the 2013/14 wet season, mean cover increased with ranges recorded between 36-67%. The emergence of a cover gradient out to 1000 m can be seen as early as 2012 (Fig. 3).

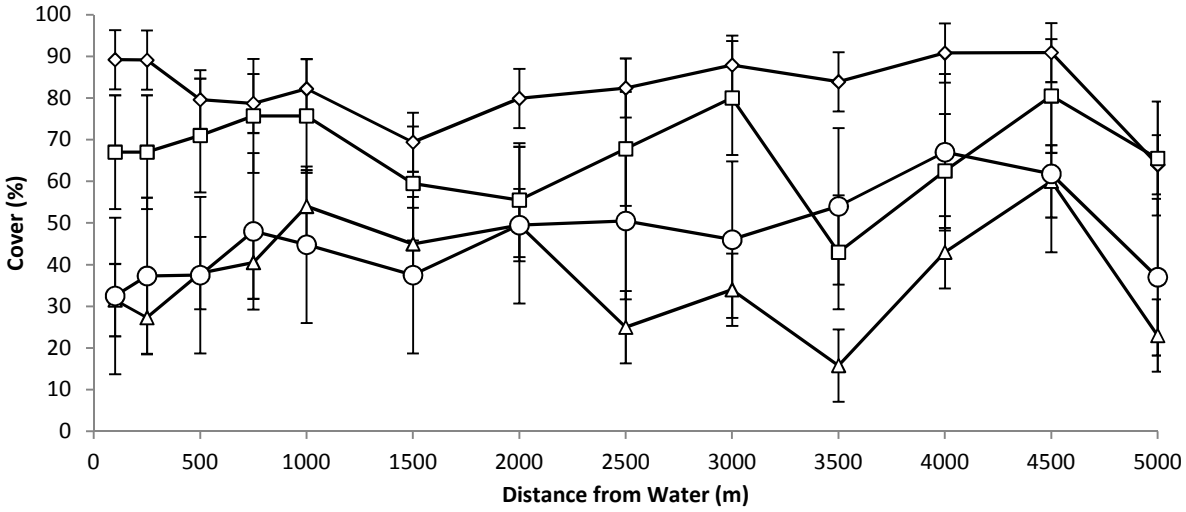

Fig. 3. Mean ground cover (%) with increasing distance from the bore from 2011 to 2014 (±95% confidence interval). ◊ 2011, □ 2012, 2013, ○ 2014.

Defoliation scores at the commencement of the trial were low, with only 0-5% defoliation recorded along the transect in 2011. Defoliation increased in 2012 where ranges of 6-50% were recorded within 250 m from water. 2012 defoliation then declined to 0-5% with increasing distance from the bore. Defoliation scores in 2013 were higher than previous years however showed no clear pattern of decreasing defoliation with increasing distance from the bore. Defoliation scores in 2014 exhibited

a decline with increasing distance from the bore, with high defoliation scores (up to 75%) observed close to the bore and low scores further away (0-25%).

Discussion

Mean pasture yields at the new bore from 2011 to 2014 have declined between 1000-2000 kg/ha and mean ground cover has almost halved along the transect line. As expected, defoliation scores have increased, however some reduction in defoliation was seen in 2014. A contributing factor to the significant declines in yield and cover over a short period of time has been lower rainfall in the past two years. The 2012/13 wet season rainfall was well below average at 134 mm and the 2013/14 wet season was about average at 383 mm.

The development of a piosphere is becoming apparent within 1000 m of the bore with clear declines in yield and cover. The lower yields and cover observed at 3500 and 5000 m from water are most likely due to soil type than over grazing. At these locations there are pebbly rises with lighter soils that do not grow perennial *Astrebla* spp. These rises are dominated by annual species that are less persistent within the environment.

Long-term sustainable stocking rates are practiced on this property, however it has become apparent how rapidly pasture yield and cover can decline in new grazing areas in years with poor rainfall. The slight improvement in mean yield, cover and defoliation between 2013 and 2014, likely caused by higher rainfall, could indicate that improved pasture and land condition is achievable under reduced pasture utilisation rates. In addition, due to the short period of time that this bore has been grazed for, improved pasture growth may be seen close to the water due to higher soil fertility from cattle camping around the bore and the likelihood that the desirable pasture species seeds are still viable within the soil (Thrash & Derry, 1999).

The next aspect of investigation for this trial would be to implement a wet season spell at the new bore to determine if the recent pasture and land condition impacts observed can be reversed.

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