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## **Providing a diversity of management to achieve a greater plant diversity**

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A bit of background and explanation of where we live, Wyndham is a 12,500ha property on the Anabranch River in Western NSW about 200km south of Broken Hill; we graze sheep and cattle as well as from time to time opportunistically crop some of our floodplain country. I'm a fourth generation landholder in the area, my parents live on another property about 20km away and we help them with the running of their property when required.

Kelly and I came from a culture of "conservative set stocking" (putting the amount of stock in a paddock that the area can run conservatively year in year out) and our focus was clearly on making sure that we look after the health and well being of the animal (as that is the only way we make money?). We ran purely merino sheep and considered ourselves "good producers" as we produced a very nice animal and fibre, we drenched when required, jetted as required etc. The outcome of this was a landscape that was declining in health every way you measured it, us working 6-7 days a week and at the end of the year receiving very little money, this was a major driver to change.

Since our area was settled the landscape had probably "lost" 80% of its carrying capacity, what a great opportunity there was to rehabilitate the wonderful landscape and have not only more produce, healthier produce.

One of the many things that I'm not good at is giving up, so armed with a decent lot of perseverance and no money we set about trying to find a way forward.

We have been using a rotational grazing system at Wyndham since late 2001, in that time we have increased our paddock numbers from 8 to 23 (looking to double that again) and improved our rotational system significantly in that time. Currently we have 3 mobs of stock, all about 2,000+dse's. To make sure that we are on the right track we monitor our stocking rate as well as our vegetation, which of course relates to our carrying capacity. As you can see from the graph below (Fig.1) we are improving on matching our stocking rate to our carrying capacity.

### **Management Strategies**

Our philosophy for managing the land is to work in harmony with Mother Nature rather than against her and that in the production of our beautiful produce we must make sure that the land consistently improves. So to achieve this we have a system of strict/flexible rotational grazing that involves different livestock species and densities as well as rest, we provide a diversity of management to achieve a diversity of plants. We also strive to use as little chemical as possible so that we enhance the natural predators/defenses that are available to our stock (and plants) to keep them healthy. Our attitude is that everything that happens on our place is our concern; weeds are plants with a story and it is up to us to interpret that, animal health is a dietary problem and again we need to change our management. In 2001 we set ourselves a target of trebling our carrying capacity in 30 years (4000dse to 12000dse), after 10 years we have doubled our carrying capacity so we need to reassess our target as it is obviously too low.

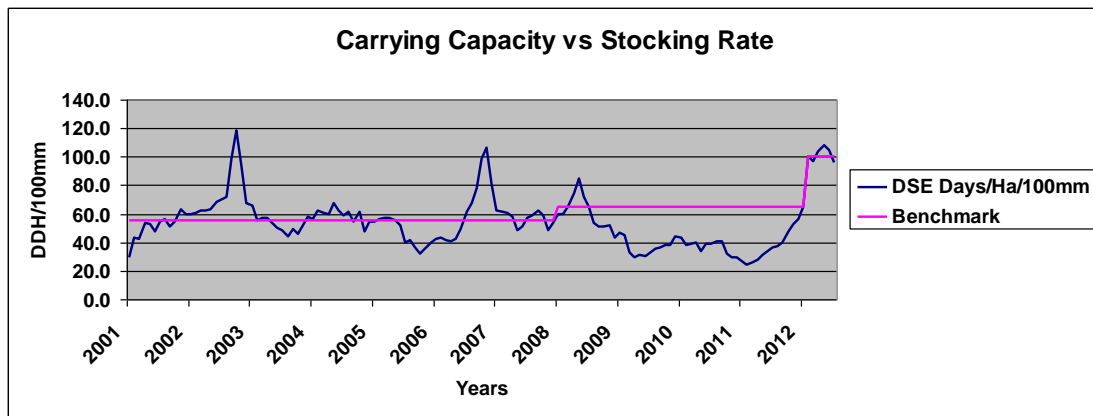


Fig. 1

We started keeping a “grazing chart” in 2001 as a way to help measure and guide us to improve our water use efficiency. This also allows us to budget our grass to make future stocking decisions as well as helping us with communication to our key business partners why we make the decisions that we do. This is also part of the different language that we use to describe our business, we don’t talk about livestock run per hectare as this doesn’t take the rainfall into account.

Add to this in March 2009 Peter Jessop helped us to set up 4 monitoring points across Wyndham that can be simply assessed and so since then they have been done by us annually.

The monitoring sites were established with the following objectives in mind:

1. Increase animal production from historical numbers by increasing the biomass and density of palatable perennial plants, specifically perennial grasses.
2. Capture and retain scarce resources such as nutrients and moisture from a more stable and productive landscape.
3. Simple to do!!

### Monitoring site layout and land types

The monitoring sites are fixed sites where a photograph is taken. A permanent marker, a star picket, indicates from where the photograph should be re-taken in subsequent years. The sites also have a permanent 100 m transect from which percentage ground cover, plant density measurements, species composition and soil features are taken at 10m intervals from a 50 x 100cm quadrant allowing objective comparisons to be made over time.

Land types represented at monitoring sites: 1) Chenopod shrublands with either pearl bluebush (*Mairena sedifolia*) or black bluebush (*M. pyramidata*) with an understorey of spear grass (*Austrostipa variabilis*), other mainly annual grasses, copper burrs (*Sclerolaena* spp.) and forbs. 2) Gently undulating sand plains with loamy red and brown texture-contrast soils with or without scattered black bluebush, spear grass, annual grasses and forbs.

We only have 4 years results which as you can see is only a short period of time and not enough really to draw too many conclusions from, it is also longer than most projects go for under the current funding system.

Site No.	Ground Cover (Plant & litter)			
	2009	2010	2011	2012
1	15%	13%	26%	26%
2	18%	17%	26%	47%
3	15%	4%	26%	28%
4	19%	5%	35%	25%

**Fig. 2**

We only measure plant & litter cover, not total ground cover, including cryptogram and rocks as that is more about conserving what we have, as we have said we aren't happy with what we have so why would we want to conserve it?

The next table (Fig.3) looks at the yield of the paddocks which to us is the amount of dry matter per hectare that our stock have eaten. There is certainly a large variation consistently the first 2 sites have had a much higher yield. Which is possibly related to the species diversity, which in turn you could say is related to the higher rainfall, that is all speculation though.

Site No.	Yield Kg/Ha				Av. Species count			
	2009	2010	2011	2012	2009	2010	2011	2012
1	176	250.1	421.8	412.5	7	10	13	9
2	137.5	165.4	324.9	484	14	11	13	8
3	88	63.1	93.1	242	6	6	9	6
4	74.8	157.5	78.8	74.8	7	3	7	5

**Fig.3**

Site No.	Rainfall				Rest period prior to monitoring			
	2009	2010	2011	2012	2009	2010	2011	2012
1	174	219	753	436	48 Days	22 Days	7 Days	26 Days
2	174	219	753	436	30 Days	19 Days	51 Days	0 Days
3	147	206	630	346	31 Days	41 Days	80 Days	60 Days
4	147	206	630	346	93 Days	9 Days	128 Days	165 Days

**Fig.4**

The table above (Fig. 4) just shows the rainfall for the 12 months prior to monitoring and also the number of days rest that each paddock has had previous to monitoring. These numbers help to put the species diversity and groundcover results into perspective

### **Data analysis and results**

Data from 2009-2012 was analysed using Pearson's Product Moment Correlation Coefficient to determine whether any significant relationships ( $P < 0.05$ ) could be identified in the data from across all sites and at individual sites.

- Predictably there was a significant relationship between the amount of ground cover and rainfall.
- Ground cover was composed of a high number of individuals from the same species not a variety of species.
- Most variance (95%) across sites and seasons can be explained by the abundance of a small number of fast growing short lived species of bottle washers (*Enneapogon avenaceus*), grey copperburr (*Sclerolaena diacantha*) and spear grass.

### **Conclusions (from the monitoring sites)**

- There was no indication that perennial grasses were increasing, current species are however "opportunistic perennials", better than pure annuals
- Four years of data collection in this case was not long enough to separate seasonal variation from stock induced changes to the vegetation. Except for the dicotyledons which appear to favour long rest periods. Although, in time the monitoring sites will become more informative.
- The photographs and data highlight the importance of monitoring sites to show and record seasonal changes in vegetation. After favourable rain there was widespread germination of ephemeral, annual and in this case short lived perennial sub shrubs.
- Monitoring could not determine whether there were any long term stock induced changes to plant composition or ground cover.