PROCEEDINGS OF THE AUSTRALIAN RANGELAND SOCIETY BIENNIAL CONFERENCE

Official publication of The Australian Rangeland Society

Form of Reference

The reference for this article should be in this general form;
Author family name, initials (year). Title. *In*: Proceedings of the nth Australian Rangeland Society Biennial Conference. Pages. (Australian Rangeland Society: Australia).
For example:
Anderson, L., van Klinken, R. D., and Shepherd, D. (2008). Aerially surveying Mesquite *(Prosopis* spp.) in the Pilbara. *In*: 'A Climate of Change in the Rangelands. Proceedings of the 15th Australian Rangeland Society Biennial Conference'. (Ed. D. Orr) 4 pages. (Australian Rangeland Society: Australia).

The Australian Rangeland Society

SUSTAINABLE GRAZING IN THE CHANNEL COUNTRY FLOODPLAINS

Andrew White

Queensland Beef Industry Institute, DPI, PO Box 519, Longreach, Qld 4730

BACKGROUND

The Channel Country of south western Queensland and north eastern South Australia is unique. Rainfall in the tropics drains into large river systems which head south for hundreds of kilometres. The three main watercourses, Cooper's Creek and the Diamantina and Georgina Rivers, pass through vast arid areas which include dune fields and extensive cracking clay plains elevated only slightly above the streams and with minimal gradients (17 cm/km). Frequently, when the flow is great enough the water overflows the banks, forming extensive braided or anastomosing channels up to 60km wide. These are the areas known as the Channel Country. These vast sheets of water reform into streams filling many lakes and lagoons before entering Lake Eyre, a journey in excess of 1,100 km. These "natural irrigation" systems are part of one of the world's most untouched arid river systems and are a significant part of one of the largest inland or endorheic drainage basins in the world.

The first description of the Channel Country was by Captain Charles Sturt in 1845. Since that time it gained early notoriety for the disastrous Burke and Wills expedition of 1860, and more recently for its environmental significance and pastoral importance. The main use of the floodplains for the past 130 years has been as prime grazing land, integral to the ambitions of the Cattle King Sir Sidney Kidman, and now an important part of the production systems of the major Australian pastoral companies.

PROJECT DETAILS

This project commenced in 1999 with the aims of: (1) documenting current and past knowledge of land management practices and environmental factors; (2) summarising all recorded information of relevance to the Channel Country; (3) investigating and recording the response of soils and vegetation to different flood pulses and; (4) determining the sustainability and suitability of current land management practices and methods of enhancing this management. In order to achieve these aims a number of strategies have commenced. Individual interviews and group discussions are being held to glean local knowledge. These will be collated and summarised in a report. A literature review is underway and will be documented. Cattle-proof exclosures have been positioned within four productive vegetation types in the floodplains of the three river systems and will be regularly monitored after each flood to record the response of the soils and vegetation and the effects of grazing.

The first half of the year 2000 has been exceptionally wet for most of the floodplains in the Channel Country. Floods of this size and duration have not been seen since 1974 when the annual discharge of Cooper's Creek near Windorah was 23,000,000 megalitres (the volume of Sydney Harbour is around 500,000 megalitres). Multiple flood pulses have passed down the rivers flooding out over the vast

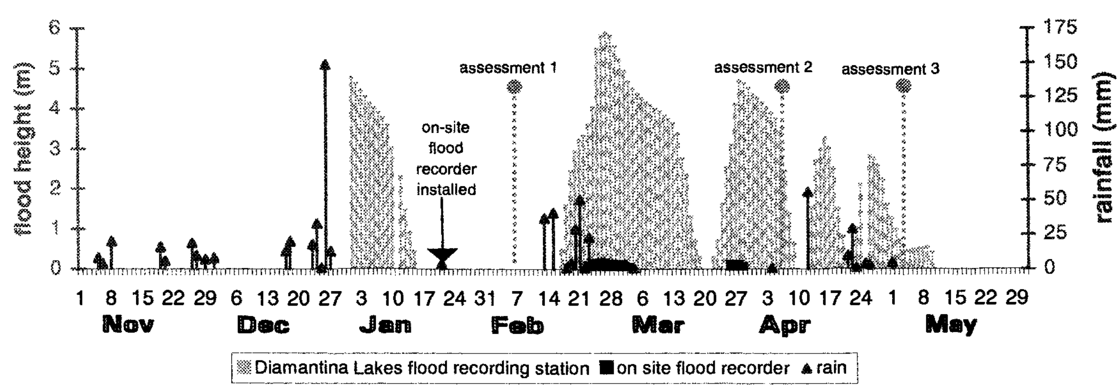

Fig 1. Rainfall, flood duration and height on the upper Diamantina River, Nov 1999 to May 2000.

cracking clay floodplains (see Fig 1) limiting access to many of the exclosures. Brighton Downs, on the northern end of the floodplains of the Diamantina River provides a good case study. The exclosure is placed on the outer edge of the floodplains in a vegetation type described as open grassland or herb plains that flood occasionally. Vegetation is seasonally very variable, depending primarily on flooding and rainfall. When there are no floods or rain the floodplains are naturally bare, with the dominant annual Flinders grass (*Iseilema* spp.) or ephemeral forbs either not germinating, being removed by grazing, or blowing away after the last flood. Figure 1 details the rainfall and floods over this growing season. The Diamantina Lakes flood data are the official flood heights in the main channel at the closest recording station, less than 50 km downstream from the site. The site flood recorder was installed in late January and details the water flooding over the actual site. The rainfall figures are from the homestead approximately 30 km to the north, and are a good representation of rainfall for the whole district.

Table 1. Soil moisture and vegetation data from the three assessments

Soil moisture levels (%) to 1 m depth										
	10 cm	20 cm	30 cm	40 cm	50 cm	60 cm	70 cm	80 cm	90 cm	100 cm
February	5.3	6.1	7.5	8.7	9.5	9.7	9.6	9.2	9.1	9.2
April	17.6	20.7	20.8	19.4	17.2	13.5	10.3	9.5	9.1	9.2
May	20.5	19.8	18.3	16	13.5	10.4	9.3	9.2	9.3	9.4

Vegetation details:			
	Total Dry matter yield	Annual grasses	Forbs
February	1437 kg/ha	1089 kg/ha, 41% moisture	348 kg/ha, 76% moisture
April	1337 kg/ha	1083 kg/ha, 65% moisture	254 kg/ha, 71% moisture
May	2103 kg/ha	1703 kg/ha, 62% moisture	400 kg/ha, 66% moisture

On site soil moisture profiles were measured at the three assessments, as were details of vegetation composition, moisture content and yield. In February the soil moisture profile increased slightly from the surface, to around 9% at 1 m depth (see Table 1). Taking into account these low soil moisture levels, and given the amount of rainfall prior to this assessment, 349 mm from November 1999 to January 2000, it is doubtful that any flood waters inundated the site before the on site flood recorder was installed. It can be taken that the vegetation response (see Table 1) is therefore from rain alone.

At the next assessment in early April, the site had been underwater for 12 days and 5 days (see Fig 1), and rainfall in February totalled 170 mm. The soil moisture had increased markedly to around 20% from the surface down to 40 cm and from here to 80 cm it dropped to around 9% (see Table 1). Yield decreased slightly to 1337 kg/ha with annual grasses still contributing 1083 kg/ha with increased moisture levels and the contribution from forbs decreasing to 250 kg/ha with similar moisture levels.

At the third assessment in early May a further 108 mm of rain had fallen. This maintained the surface soil moisture at 20%, but below here it gradually declined to 9% at 70 cm . Yield had increased to 2100 kg/ha with annual grasses contributing 1700 kg/ha and forbs 400 kg/ha, with moisture levels declining slightly from the last reading (see Table 1).

This vegetation response represents a typical summer response dominated by annual grasses. The exceptional rainfall over the November to May period of 627 mm (average for this period is around 208 mm) has been responsible for producing the response and floodwaters have extended the growth period. This is unusual as floodwaters are usually the dominant moisture source with rains supplementing the flood. Soil moisture levels above 50 cm are high going into the cooler winter months and should produce a winter response dominated by forbs. However, even with the exceptional rainfall and the site being inundated by floodwaters for 17 days, soil moisture levels below 80 cm were not significantly altered, remaining around 9%.

This data represents preliminary results from this three year DPI, NHT and MLA funded project. Future assessments over coming dry and wet periods will enhance knowledge of how the Channel Country responds and will result in better understanding and ensure improved land use.