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# NORTHERN TERRITORY CARRYING CAPACITY PROJECT

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## ABSTRACT

Inadequate knowledge of carrying capacity is a major factor inhibiting sustainable resource use and development within the pastoral industry in the Northern Territory. To address this issue, the Department of Primary Industry, Fisheries and Mines, with support from the Tropical Savannas CRC, has developed a Territory wide project to provide objective information on pasture productivity of important land types. The project combines the methodology of Swiftsynd, an abbreviated version of the methods used in the GUNSYND project (McKeon *et al* 1988) and the calibration of the GRASP pasture growth model (Littleboy and McKeon 1997).

In the future, pastoralists from these regions will be able to apply these pasture growth models with the confidence that they have been calibrated using data from their specific regions and land systems. The models will then allow properties to better estimate their potential carrying capacities for better economic and environmental outcomes.

## INTRODUCTION

Awareness of rangeland management within the pastoral industry is increasing in the Northern Territory as pastoralists look at new ways to increase productivity while maintaining sustainability. Determining safe carrying capacities can provide pastoralists with information to create better long - term management decisions

The process of calculating carrying capacities begins with the data collected from Swiftsynd sites on various land systems and types across the regions. This data is then used to calibrate the GRASP pasture growth model using historical rainfall data. This provides pasture growth model outputs, which can then be applied to different rainfall zones and land conditions.

Until now, the only other available models for the Northern Territory have been calibrated for the Victoria River District (VRD). Results from that study have shown useful correlations between modelled and actual growth (Cobiac 1997). While successful in the VRD, investigations using these models in different regions had poor results (Anders 2003). This has led to the development of the Northern Territory Carrying Capacity Project.

The project covers three pastoral areas within the Northern Territory, the Sturt Plateau south of Katherine, the Barkly region near Tennant Creek and the Alice Springs region. These regions were chosen, as they are all significant pastoral production areas currently undergoing development, as well as being geographically, climatically and ecologically different.

## **METHODOLOGY**

Sites were mostly selected according to landsystems. Each region selected landsystems that were generally widespread, of significant pastoral production value and represented different pasture and soil types. The Sturt Plateau landsystems being investigated represent 74% of the total region. The Alice Springs and Barkly regions are much larger and contain many different landsystems and have focussed their sites on the most widespread and productive areas.

The sites are 30m x 30m exclosures and are completely stock and kangaroo proof. Data is collected within these exclosures four times per year (known as 'harvests') for two entire growing seasons. Data that is collected includes grass yields, soil moisture, daily rainfall, detached plant material and plant nutrient contents. Each harvest aims to capture a unique growth stage including initial growth flush from stored reserves, peak nitrogen uptake during flowering, maximum standing biomass where nitrogen becomes limiting and natural pasture detachment (Cobiac 2001). At the end of 2006 we will have some complete data sets ready for the calibration using the GRASP pasture growth model.

## **KEY LEARNINGS**

Each region is climatically and geographically unique and therefore the methodology had to be modified for different areas. Some of the modifications include harvesting after significant rainfall events in the Alice Springs region to capture the flush of growth associated with annual and seasonal pasture plants in that area. In the Sturt Plateau and Barkly regions, heavy late wet season rainfall has delayed harvests, which prevented the capturing of significant growth stages. These issues have become unavoidable and overcome by modifying the methodology to ensure that accurate, full datasets are completed. This has involved changes including increased number of harvests per year or extending project time to three years.

At the end of 2006 there will be complete data sets ready for the calibration process using the GRASP pasture growth model. Once the model has been calibrated for each region they can be applied to properties in the regions. A major user of this data will be participants in the Grazing Land Management workshop, which relies on these tables to assist producers to calculate safe long term carrying capacities for their properties.

## **REFERENCES**

- Anders, R (2003) Investigation the safe carrying capacity across different landsystems of the Sturt Plateau, Northern Territory. B.Ag.Sc (Hons) thesis, University of Queensland.
- Cobiac, M.D (2001) Primary Productivity of important native pasture grazing lands in the Victoria River District of the Northern Territory. B.App.Sc (Ag) Masters Thesis, Adelaide University.
- Day, K.A and Philp, M.W. (1997) Appendix 3 Swiftsynd Methodology for Final Report DAQ-124A: Evaluating the risk of pasture and land degradation in native pastures in Queensland. RIRDC.