

# finalreport

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## Northern Grazing Systems Project Development

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### **Abstract**

MLA initiated this project as part of the Northern Grazing Systems (NGS) projects which aim to increase adoption of innovative best-practice grazing management by beef producers throughout northern Australia.

This initial development of work in Phase 1 of NGS is complete. Initially, an analysis of the grazing systems in northern Australia was undertaken to determine what activities were required to develop this project. Three major components identified were 1) synthesis of relevant scientific information on stocking rate, spelling, fire and intensity of infrastructure development, 2) regional assessment of current best practices and property profiles, and 3) a bio-economic framework combining the biophysical model GRASP and an economic analysis tool. Draft schedules (attached) covering these components have been developed for DPI&F (the regional assessments and bio-economic framework) and with CSIRO (synthesis component).

The success of MLA in gaining funding under Caring for Our Country has expanded the original plans under Phase 1 of NGS. This meant some changes to those plans developed late in 2008.

### Executive Summary

Past research has improved our knowledge of the management and impact of key factors in grazing land management, including control of grazing distribution, management of stocking rate, wet season spelling, and fire. While there are still significant knowledge gaps, addressing these on a case by case basis is not likely to be the most effective investment of limited R, D&E resources. Rather, a more targeted and effective investment in research, demonstration, and extension activities is likely to occur from a coordinated approach that seeks:

- To gain the full value of past and recent investments in grazing trials and other R&D through its systems analysis and integration, targeted at addressing key management questions.
- To identify the best mix of practices for an enterprise, within a particular area and production system, based on bioeconomic modelling and consultation with producers and other specialists.
- To demonstrate the 'current best bet' combinations of practices in each region through use of 'implementation' sites on-property.
- To develop the 'future best bet' combinations of practices in each region through use of 'field testing' sites on-property.

To do this, a new project, the Northern Grazing Systems (NGS) project, will be developed in collaboration with QDPI&F, NT DPI, DAFWA and CSIRO, as well as in cooperation with regional NRM groups and AgForward. Phase 1 of NGS involves analysis and synthesis of existing information and will continue till June 2010. Phase 2 will take the recommendations from Phase 1 and implement RD&E projects to fill the gaps identified. Over a period of up to 10 years, the whole NGS project will pursue analysis of completed research, bioeconomic modelling, and field studies to identify, test and demonstrate production systems that increase profitability, improve pasture condition, and reduce erosion for beef enterprises across northern Australia (Queensland, NT, and northern WA).

This project development work had a number of objectives:

- Develop a full proposal for the Northern Grazing Systems project;
- Form and meet with a core project team;
- Conduct a preliminary analysis of the system;
- Assist MLA to liaise with regional NRM groups and AgForward;
- Assist MLA to develop proposals seeking additional funding; and
- Assess the suitability of existing tools for analysing completed research and for bio-economic modelling.

A major output of this project was the development of a proposal that was submitted to Caring for Our Country (by MLA) and which was successful. This value-added to the work originally planned as part of Phase 1 of NGS. Draft schedules to undertake Phase 1 of NGS have been developed (see Appendices).

The systems analysis undertaken as part of this study highlighted a number of shortcomings in the currently-available tools. The GRASP model has been widely tested and widely applied throughout Australia. It is the obvious choice to use for the majority of the biophysical modelling that needs to be done within this project. However there are some enhancements required for this model to provide the necessary information for this project. These enhancements include:

- a daily/monthly algorithm for determining pasture condition (basal area, per cent perennial grasses);
- a daily/monthly algorithm for determining animal liveweight gain; and
- a woody plant growth model to stimulate dynamics over a 20 to 30 year period (most likely at an annual time step).

## Northern Grazing Systems Project Development

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The work to be completed under Phase 1 will provide landholders in northern Australia with up-to-date information on scientific issues surrounding stocking rate, fire, infrastructure development and spelling. It will consider the interactions and trade-offs, and identify cost-effective grazing land management strategies for:

- improving animal production and economic performance;
- improving and maintaining land condition (especially vegetation, but also some consideration of soil health and water quality issues); and
- improving risk management in relation to climate variability.

Phase 1 of NGS is achievable, although the timeframes imposed by the Caring for Our Country project are somewhat tighter than originally envisaged. However, the linkage between industry and government funding (State and Commonwealth) will ensure that the NGS project has a high probability of being relevant to landholders and of being completed. Every effort should be made to commence Phase 1 as soon as possible.

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### 1 Background

This project is part of the Northern Grazing Systems (NGS) project which aims to increase adoption of innovative best-practice grazing management by beef producers throughout Queensland, Northern Territory and the Kimberley and Pilbara regions of Western Australia. These practices have potential to benefit up to 3 million square km of northern Australia.

This project will improve understanding of interactions and trade-offs, and identify cost-effective grazing land management strategies for:

- improving animal production and economic performance;
- improving and maintaining land condition (vegetation, soil health and water quality); and
- improving risk management in relation to climate variability.

The importance of infrastructure development (fencing, waters), stocking rate management, pasture spelling, and prescribed burning have been demonstrated at various field study sites. However, we are unable to predict how variations and combinations of these practices will affect the productive capacity and resource condition of grazing land in particular situations. In addition, the economic and practical implications of implementing these strategies at an enterprise scale are often unclear. This is limiting the rate of adoption of practices to improve grazing and fire management across northern Australia.

In combination, the NGS project (it's pedantic, but phases and projects seem to be used interchangeably?) will integrate, enhance and extend key findings and knowledge generated from completed grazing and fire research funded by MLA and other research organisations across northern Australia.

### 2 Project Objectives

The objectives as listed in the project schedule were:

1. Develop a full proposal for the Northern Grazing Systems project;
2. Form and meet with a core project team;
3. Conduct a preliminary analysis of the system;
4. Assist MLA to liaise with regional NRM groups and AgForward;
5. Assist MLA to develop proposals seeking additional funding; and
6. Assess the suitability of existing tools for analysing completed research and for bio-economic modelling.

### 3 Methodology

The key steps in developing the project plan for Phase 1 of NGS included:

- A systems analysis of the grazing systems of northern Australia to identify key components that needed to be undertaken as a basis for the whole NGS project. This was largely completed by MLA before the commencement of the current project, and was used as a starting point for the work reported here. The main elements were to improve understanding of interactions and trade-offs, and identify cost-effective grazing land management strategies for: improving animal production and economic performance; improving and maintaining land

condition (vegetation, soil health and water quality); and improving risk management in relation to climate variability. These outcomes were to be used to evaluate the importance of infrastructure development (fencing, waters), stocking rate management, pasture spelling, and prescribed burning.

- A program logic process was completed to ensure that the outcomes would be achieved from the specific tasks/projects undertaken in Phase 1. (This was reported and presented in the Milestone 2 report).
- The tasks to be undertaken in Phase 1 were identified in a series of workshops with MLA and managers from relevant state agencies and CSIRO in Qld, NT and WA. During these workshops, the details of the tasks/projects were developed. This had two important outcomes. Firstly, it ensured that the final tasks/projects were well-considered and soundly based. Equally as important was the shared understanding that emerged between MLA and the main proponent leaders in Phase 1 of NGS.

It was a challenge to keep all those with a potential interest/involvement informed of progress without losing their interest as various details were discussed/argued back and forth as the scope and extent of Phase 1 was developed.

## 4 Results and Discussion

The main products of this preliminary project were project schedules covering the work to be done in Phase 1 of NGS (Appendix 2 and 3).

For each objective, comments are provided on what was achieved.

### 4.1 Develop a full proposal

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This initial development of work in Phase 1 of NGS is complete. Initially, an analysis of the grazing systems in northern Australia was undertaken to determine what activities were required to develop this project. Three major components identified were 1) synthesis of relevant scientific information on stocking rate, spelling, fire and intensity of infrastructure development, 2) regional assessment of current best practices and property profiles, and 3) a bio-economic framework combining the biophysical model GRASP and an economic analysis tool.

There are extensive linkages between the three components of this project. The synthesis project will provide information upon which to develop rules and relationships to build into the bio-economic modelling framework. The framework will assist in the development of information on best management practices (as derived from the synthesis of existing information) by providing an analysis of the impact of those management practices on pasture and animal productivity, soil loss and water quality, and economic performance at the property level. The regional assessment will inform what modelling should be done and will provide feedback on the outcomes of both the synthesis and the modelling work.

### 4.2 Form and meet with a core project team

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A core team has been formed. This comprises two people representing MLA (Dr Rodd Dyer and Dr Mick Quirk), one from CSIRO (Dr John McIvor) and two from DPI and F (Dr Joe Scanlan for bio-economic modelling; Dr Lester Pahl for regional assessment). Most of the key contributors (including N MacLeod CSIRO; Dr Peter Johnston DPI&F; Phil Holmes Consultant; Dr Steven Bray DPI&F) met in Brisbane on the 10th of November 2008. At this meeting, a general outline of the Northern Grazing Systems Project was presented and discussed. There was agreement on the general thrust of the project and support for the further development of project details, including the development of schedules and contracts.

A full team meeting will be held in Brisbane on 16/17<sup>th</sup> February with key members of all three components of the project. A draft program (developed by Dr Mick Quirk) is attached.

### **4.3 Conduct a preliminary analysis of the system**

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A preliminary analysis of the system under consideration as well as the tools available highlighted a number of shortcomings. The GRASP model has been widely tested and widely applied throughout Australia. It is the obvious choice to use for the majority of the biophysical modelling that needs to be done within this project. However, there are some enhancements required for this model to provide the necessary information for this project. These enhancements include:

- a daily/monthly algorithm for determining pasture condition (basal area, per cent perennial grasses);
- a daily/monthly algorithm for determining animal liveweight gain; and
- a woody plant growth model to stimulate dynamics over a 20 to 30 year period (most likely at an annual time step). A draft framework of this component has been completed and will be parameterised (in conjunction with Dr S Bray) against data from the TRAPS sites established by DPI&F.

The changes to GRASP will necessitate changes to the ENTERPRISE economic model. This relates to the variation in the annual liveweight gain that is used in ENTERPRISE. Instead of a single figure, simulations will give a different liveweight gain for each differently managed part of a property. N MacLeod has indicated that these new inputs can be accounted for in alterations to the economic model.

Dr Greg McKeon has indicated his willingness to contribute to the development of the GRASP model to include the above enhancements, as these will contribute to his existing projects.

### **4.4 Assist MLA to liaise with regional NRM groups and AgForward**

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There has been little direct liaison with regional NRM groups or AgForward to date. Dr Scanlan met with the Fitzroy Basin Association in late November on related matters and discussed this project at that time. There are similarities between the general approaches for the two projects, although they have quite different outcomes.

The VRD, Mitchell grasslands of Qld and NT, and the Burdekin/Fitzroy regions have been identified as being the key areas in which to test the bio-economic modelling framework. Groups of people in these regions will be involved in determining what management systems should be evaluated and then will review the results of the modelling analysis.

### **4.5 Assist MLA to develop proposals seeking additional funding**

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MLA's application to Caring for Our Country was successful. This has expanded the scope of the initial project, primarily by expanding the number of regions to five – Burdekin/Fitzroy, Maranoa/Balonne, Mitchell grassland of western Qld, Mitchell grassland of NT, and VRD/East Kimberley areas in NT/WA. There has been a proposal forwarded to the Commonwealth government seeking funding for climate change-related aspects that would build on the project being developed as Phase 1 of NGS.

### **4.6 Assess the suitability of existing tools**

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A scan of the tools that may contribute to this project identified 16 different models with some relevance. As indicated above, the GRASP model appears to be the most logical for biophysical modelling of pastures across northern Australia, having already been used for similar activities for many years. Although other tools/models may be suitable, they have not had extensive use



in northern Australia and they would require substantial development work to deliver what is necessary in this project.

Within the economic analysis field, only two models were identified as being candidates. These were: Enterprise and Breedcow/Dynama. In their present forms, neither of these is entirely suitable. Discussions have commenced with Neil MacLeod to see if the Enterprise model can be modified to except data from more than one paddock and/or more than one time per year.

## **5 Success in Achieving Objectives**

The objectives of this 'preparatory' project were met. The collaborative approach whereby MLA, CSIRO and state agencies worked together to finalise the plan for Phase 1 went smoothly, and resulted in a good understanding of the future project by all parties and the development of sound proposals.

## **6 Impact on Meat and Livestock Industry – now & in five years time**

The key impact will come from the completion of Phase 1 of NGS. This will provide new insights into current literature and will provide economic analyses of various management options within five regions. Gaps that require research will be identified and these will be examined in Phase 2 of NGS through research and on-site demonstrations.

## **7 Conclusions and Recommendations**

Phase 1 of NGS should commence as soon as possible. Given the tight timeframes from Caring for Our Country (to which Phase1 of NGS contributes), work needs to commence at the earliest possible time.

The joint approach in developing the proposals for Phase 1 should be considered as a template for future projects, although there may be cases where this is not appropriate. The input of Dr Rodd Dyer and Dr Mick Quirk was critical to the success in conducting and completing this project.

## 8 Appendices

### 8.1 Appendix 1 - Agenda for first whole-of-team meeting

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Team meeting – 16-17 February 2009

#### AGENDA

	<b>Start</b>	<b>Finish</b>	<b>Topic/activity</b>	<b>Who</b>
<b>Mon 16 Feb</b>	12:15	13:00	<b>Lunch</b>	
	13:00	13:15	Welcome and workshop objectives	Rodd Dyer
	13:15	14:00	NGS - what is it all about?; Phase One; how everything fits together etc	Mick Quirk
	14:00	14:30	Synthesis overview	John McIvor
	14:30	15:00	BEM overview	Joe Scanlan
	15:00	15:30	<b>Smoko</b>	
	15:30	16:00	Reg Assessment overview	Lester Pahl
	16:00	16:30	How does Enterprise work?	Neil McLeod
	16:30	17:00	Other topics of general relevance	
<b>Evening</b>	18:30		<b>Dinner</b>	
<b>Tues 17 Feb</b>	8:15	8:30	<b>Coffee</b>	
	8:30	10:30	Component workshops: methods, clarification, planning	All
	10:30	11:00	<b>Smoko</b>	
	11:00	13:00	Component workshops: action plans; reporting	All
	13:00	13:45	<b>Lunch</b>	
	13:45	15:00	Report back	All
	15:00	15:15	<b>Smoko</b>	
	15:15	16:30	Other issues	All
16:30	17:00	Sum-up and close	Rodd Dyer	