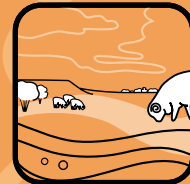


managing
pastoral country
sub-program



Insights



Case studies on how
woolgrowers are successfully
managing pastoral country
for profit and sustainability



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Introduction and Acknowledgements

Wool production in the pastoral country of inland Australia is writ large in the national consciousness, through song and story, history and legend. More Australians know the chorus of *"Waltzing Matilda"* than the national anthem and Banjo Paterson's lyrics (written on a sheep station in the Queensland pastoral zone) are undeniably connected to the wool industry in the rangelands. However, romantic notions aside, few Australians actually live in the pastoral country, few have even visited, few know much about its landscapes and environments nor understand the challenges of operating a sustainable business in the rangelands based on wool. This is the subject matter of the Pastoral Sub-program of the Land, Water & Wool research and development program.

The unique character of the pastoral zone is the rationale for a separate sub-program in Land, Water & Wool. Pastoral zone properties are bigger, dryer and more reliant on native vegetation systems than any other group of woolgrowers in Australia. The average woolgrowing property in the pastoral zone is about six times as big as the national average and produces twice as much wool (in kilograms). This coupled with the small population means that a few people have to manage a lot of livestock over vast areas of country.

The rainfall of the rangelands is notoriously low and unreliable with a commensurate effect on productivity, which is often measured in hectares per sheep rather than sheep per hectare. The complex tasks of stock and fodder management are particularly crucial in the pastoral zone, because mistakes are much harder to fix and the country much slower to recover than in the 'inside' country with its higher rainfall.

For the most part, it is *native* vegetation systems that sustain the wool industry in the pastoral zone. These systems are unique and remain some of the largest and most intact of native vegetation types left in Australia. In this regard, the biodiversity value of the pastoral zone is immense.

I'd like to acknowledge the role of Dr Barry White in the formation of the Pastoral Sub-program. During his time as co-ordinator of Land & Water Australia's *Climate Variability in Agriculture* program, Barry sponsored and encouraged Dr Greg McKeon and colleagues to publish a seminal chronicle of

the rangelands called *"Pasture Degradation and Recovery in Australia's Rangelands: Learning from History"*. The work analyses the eight great degradation episodes in the Australian rangelands over the past 200 years. The authors conclude that one of the four components necessary to prevent degradation of the grazing resource should be *"an alert system based on climatic understanding, ecosystem response and resource monitoring which provides warning before damage occurs rather than a retrospective analysis after the event"*.

The elements of this conclusion – alert systems, monitoring, understanding the responsiveness of the land – feature strongly in the projects selected by Land, Water & Wool for the Pastoral Sub-program under Barry's leadership.

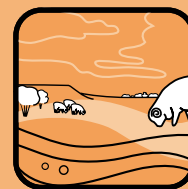
QUICK STATS:

Australia's woolgrowing pastoral zone:

- Covers one fifth of the continent;
- Produces 12% of the \$ value of Australian wool; and is managed by 1,700 woolgrowers (or about 6% of Australia's woolgrowers).
- Wool makes up 14% of the \$ value of agriculture in rangelands economies but in some pastoral shires makes up over 60% of the local agricultural economy.

Five projects were supported by the Pastoral Sub-program that spanned the breadth of the woolgrowing pastoral districts of Australia. Gary Bastin and Dr Craig James at CSIRO Sustainable Ecosystems in Alice Springs assisted South Australian pastoralists to take advantage of satellite imagery in pastoral management (Project code CSE27). Dr Terry Beutel and team from Queensland Department of Primary Industries & Fisheries

managing pastoral country sub-program



(DPI&F) at Charleville developed a simple scheme for woolgrowers to monitor land condition in the Mitchell grasslands and mulga woodlands of western Queensland (QPI56). Dr Ron Hacker from the New South Wales Department of Primary Industries investigated the uses and limitations of stocking rate tools in western New South Wales (DAN23).

David Phelps, Lyndal Rolfe and Ian Houston from Qld DPI&F at Longreach worked on recovery strategies for Mitchell grass in Queensland (MLA2). Dr Alec Holm developed a drought alert system called '*Critical Decisions on Stocking Rate*' for use in the Western Australian southern rangelands (AMH3). The enthusiasm, knowledge, experience and commitment to the rangelands of all the research teams was impressive.

I'd like to thank all of the woolgrowers who were involved in the Pastoral Sub-program projects. Their participation has been essential to ensuring the Sub-program remains focussed on and relevant to the key audience of the research – other woolgrowers. Special thanks to the woolgrowers who appear in this case study booklet – Carol and David, Kathryn and Rob, Graham and Cathy, Mac and Jenne, and Alan and Krys.

They have generously opened their businesses, properties and lives to be a part of this publication. I hope you enjoy reading their stories and are infected by their passion for operating successful, profitable and environmentally sympathetic wool-based businesses in the pastoral zone.

Andrew Lawson
Managing Pastoral Country
Sub-program Co-ordinator
September 2006



PHOTO COURTESY OF ROBERT HASSETT, QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES AND FISHERIES

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Mac Drysdale leans on a moisture probe while examining Mitchell grass on Perola Park.

Case 1

A new generation, a new challenge at Augathella

Mac and Jenne Drysdale, *Perola Park*,
Augathella, Queensland



PHOTO BY DAVID PHELPS, COPYRIGHT QUEENSLAND DPI&F

Business Profile

LOCATION: 700km north-west of Brisbane

AREA: 14,170 ha

RAINFALL: Average rainfall is 470mm.
Average of past five years is 305mm.

ENTERPRISES:

- Running 4,000 breeding ewes, Merino and Merino Dohne-cross.
- Average micron is 19.5 for adult sheep, cutting 4.5kg/head.
- Merino cross sheep produced to accredited Organic standards.

LANDFORM: 91 per cent of the property is native pasture, mostly Mitchell grass based. Remainder is Buffel based.

Key points:

- The Drysdals are aiming to reduce the number of sheep per hectare but dramatically increase the value of production per hectare by value adding through branding and selling certified organic produce.
- *Perola Park* is accredited to the Australian Certified Organic Standard.
- The Drysdale's Merino-Dohne cross lambs are sold for in excess of \$100 per head to organic meat processors
- Running less stock means less stress on the grazing system, which is Mitchell grass-based
- Mitchell grass pastures are in an apparent unexplained decline throughout southern and central Queensland
- The Drysdals are taking part in Queensland-wide research to investigate the Mitchell grass decline

"It is clear we could not continue putting pressure on our grazing system and remain viable. It's not so much about production per hectare; it's the value of the production."

Mitchell grass in decline

For four generations, the Drysdale family has been growing wool at Augathella in Queensland and faced many challenges along the way.

One of the most recent and potentially dramatic is a seemingly unexplained decline in Mitchell grass pastures, the basis of the Drysdale family's and a great deal of southern and central Queensland's livestock production.

But in true Drysdale fashion, Mac and Jenne Drysdale of *Perola Park* are not taking a backward step. Like many families who rely on Mitchell Grass and its associated ecosystems for wool, sheep and beef production, the Drysdals are concerned about the decline of Mitchell grass and its impact on their business and the natural environment that underpins it.

As such, the Drysdals are part of a front-line research project to look at the economic impact and recovery for this important plant community.

Research underpinning productivity

The Mitchell grass research project (funded by Meat & Livestock Australia with support from the national Land, Water & Wool Managing Pastoral Country initiative) is headed by principal scientist David Phelps from the Queensland Department of Primary Industries, Longreach.



The research was instigated following reports of a noticeable decline in Mitchell grass, which is a vital component of many grazing systems throughout central and western Queensland. The project is putting together the pieces of the puzzle to determine if Mitchell Grass decline stems from prolonged drought, disease, die-back, management regimes, natural plant life cycles or a combination of all of these factors.

For Mac and Jenne, the Mitchell grass research is providing invaluable information on the management of this important pasture species which covers 330,000 square kilometres in Queensland.

Bouncing back from drought

The Drysdales' first concern about Mitchell grass at *Perola Park* was in 2003 when there was virtually no response from the Mitchell grass following substantial February rains.

"I had heard David Phelps knew of the problem and through funding, he and his staff were soon looking at the situation in more detail," Mac said.

Since then, David and his staff have been working hard throughout a vast area to gain a much more accurate assessment of Mitchell grass in Queensland. The project includes holding information days on farm and distributing information packs.

Mac says the Mitchell grass project is already, and will be (the project is due for completion in April 2007) of significant value.

"The real value is that it focuses your attention on your resource and the productivity of your land. It's an important honing of your skills that is imperative to the long-term viability of grazing."

Changing times

The Drysdales have made many other changes to the management of *Perola Park* to improve efficiencies. One of the most apparent is a change in the breeding of the sheep flock.

The century-old Merino base flock is now being infused with the meatier, South African Dohne (a South African Merino), with the aim of producing ewes that will turn off a fast maturing prime lamb.

Mac says that the Dohne was introduced to the flock two years ago and this October will see the first of the progeny joined to meat breed sires.

"Being in an arid region, the quick maturing physiology of the Dohne will enable us to turn off a lamb with less stress on the grazing system."

The Drysdales have taken several other important steps to ensure the maximum value is gained from their stock, including gaining accredited organic status to supply their lamb to the domestic and export markets.

"There is a strong demand for organic meat and we are currently supplying processors. We will soon be processing at our own abattoir and marketing the lamb under our own label," Mac added.

"In dollar terms, in the past we would have been happy with \$40 per lamb, but now we are selling lambs for in excess of \$100 per head and with our own processing we will improve on this. In a retail sense, an organic lamb on the shelf of a supermarket can reach \$450 a head at the moment."

It took the Drysdales three years to gain *Perola Park's* certified organic status but they had been working towards minimal chemical input on the sheep for many years. The value of clean, healthy and resilient rangelands also adds to the bottom line for an organic operation.

Mac says the selection of the flock has been based on objective measurement for 25 years, resulting in a 30 per cent increase in lambing percentage, a reduction of wool fineness of two microns and significantly reducing the need for jetting sheep due to sheep becoming plainer skinned.

"We started selecting sheep which had less susceptibility to fly strike 15 years ago and we have not had to jet sheep for a decade. And this year was the first time in three years that we dipped sheep. There are products at our disposal if the need arises and we can still retain the organic status."

But the organic status will not be of great value if there is no pasture for the sheep to graze. Hence Mac emphasises the need to fully understand *Perola Park's* grazing system and his readiness to be involved with the Mitchell grass project (he is on the steering committee for the project.)

DPI's David Phelps added that the energy and enthusiasm of the Drysdales and other producers involved in the project is a huge asset to the research.

A new focus

Currently the Drysdale run 4,000 breeding Merino and Merino Dohne-cross ewes, their progeny, and 160 Hereford Charbray-cross cows on 14,170 hectares.

It is obvious that Mac and Jenne keep an open mind when it comes to farm management and readily seek out information and research that is relevant to their property.

Mac believes that farm management practices must be constantly reviewed as, in some cases, what was relevant a decade ago may not be appropriate for future agricultural production.

"Conventional wisdom of 20 years ago was that *Perola Park* could carry 12,000 sheep. But following successive dry years, an increase in the variability of the seasons and the decline of Mitchell grass, we believe the key to our future is in knowing as much as possible about our grazing system, running less stock and value adding.

"Gone are the days of running 12,000 sheep. It is clear we could not continue putting pressure on our grazing system and remain viable. We need to give the country time to recover and get back into full production again in terms of native species. It's not so much about production per hectare; it's the value of the production.

"Overriding those factors is the unknown of climate change. We just can't rely on having an average to good season all the time to ensure the land and stock don't suffer."

David Phelps says while the dry conditions of the past five or six years in Queensland have undoubtedly contributed to the decline in Mitchell grass, the project is relying on input and experience from growers such as the Drydales to make the information as relevant as user-friendly as possible.

"The project is aimed at producing a meaningful management tool that will help growers better cope with the next drought and hopefully improve productivity through better management of resources."

Mac believes that farm management practices must be constantly reviewed as, in some cases, what was relevant a decade ago may not be appropriate for future agricultural production.

The science behind the story

Mitchell grasslands represent 19 percent of Queensland's native pasture area and support more than 40 percent of the State's Merino sheep flock and 10 per cent of the beef cattle herd.

This project, *Mitchell grass death in Queensland: extent, economic impact and potential for recovery*, was instigated following the 2001-04 drought when large areas of Mitchell grass tussocks died due to extended moisture stress and possibly over grazing. The most severely affected area is the Central West of Queensland.

Nearly 5,000 field assessments have resulted in a better understanding of the extent of Mitchell grass 'dieback' and work is now focussing on management to achieve better production and resilience to drought. The role of burning, grazing management and other treatments are also being tested.

Importantly an information kit for graziers and their advisors has been developed which recommends strategies such as wet season spelling, delayed re-stocking and reduced stock numbers for restoring pastures to good condition and maximising productivity as soon as possible. Contact DPI&F for a copy of this kit (contact details at the bottom of this page).

A preliminary analysis of the relationship between rainfall, grazing and burning regimes on the survival of Mitchell grass tussocks and pastures has been undertaken and a rapid assessment procedure for use by landholders established.

Key findings arising from the research include:

- Economic modelling estimates that, for four shires in Central West Queensland, loss of production could climb as high as \$15 million a year due to the decline in land condition associated with Mitchell grass death.
- Soil seed bank samples collected and analysed have revealed low levels of Mitchell grass seed present, which suggests that recovery from the latest drought will be slow.
- Anecdotal evidence suggests that fire and grazing management affect Mitchell grass growth after drought but this is still under investigation.

For more information contact
David Phelps, Department of Primary
Industries and Fisheries, Queensland Telephone
07 4658 4444 or visit the Land, Water & Wool
website: www.landwaterwool.gov.au



Kathryn and Rob Mitchell

Case 2

No gambling allowed at Barnong Station

Rob and Kathryn Mitchell, *Barnong Station*, Yalgoo, Western Australia



PHOTO COURTESY OF EVAN COLLIS

Business Profile

LOCATION: 500 km north of Perth, Western Australia

AREA: 130,000 ha

RAINFALL: 275mm

ENTERPRISES: Running 5,500 Merino sheep

LANDFORM: Rangeland country comprising native vegetation and shrub land

Key points:

- *Barnong Station* is home to a recently introduced rotational grazing system for 5,500 Merino sheep.
- Making informed decisions, especially about stocking rates in dry seasons is vital to the success of the grazing system.
- The Mitchell's have embraced research based on actual farm data to help accurately predict appropriate stocking rates for the prevailing conditions.
- Spelling the rangeland country is paramount to the property's long-term future

Remaining productive and viable

Grazing stock can be tricky on marginal rangeland country at the best of times. Throw in a prolonged drought and rotational grazing on 130,000 hectares and it becomes even more daunting.

However at *Barnong Station*, south-west of Yalgoo in the southern Murchison region of Western Australia, Rob and Kathryn Mitchell have embraced these challenges and are pulling out all stops to ensure their century-old property remains productive and viable for years to come.

For Rob and Kathryn, it's a matter of making informed decisions, not gambling, to ensure they are getting the most from their stock and taking care of the environment at the same time.

For Rob and Kathryn, it's a matter of making informed decisions, not gambling, to ensure they are getting the most from their stock and taking care of the environment at the same time.

During the 2002 drought the Mitchells were forced to reduce their sheep numbers by half.

"The key issue that the drought highlighted was a gradual decline in the condition of the rangeland that was in turn reducing our production levels," Kathryn says.

"More and more we were noticing a lack of resilience in the grazing system, that is, the pasture fell away much more quickly in dry seasons that it would have decades ago. We also felt there had been a loss of palatable plant life from the system, especially the plants that are high in digestibility and organic matter – the important ones for the stock."

A better grazing system

So five years ago, armed with a detailed history of weather and production records from *Barnong Station*, Rob and Kathryn set about finding solutions, in particular, introducing a better grazing system that included spelling paddocks.

"We needed a system that took into account the demands of different land forms, the seasons and the nutrient requirements of the stock. In the pastoral zone it's not just a case 'let's go and re-sow', we had to find a method that takes care of the rangeland," Kathryn says.



PHOTOS COURTESY OF KATHRYN MITCHELL

Above: Merino ewes with Dorper lambs.

Insert: One of the monitoring sites on Barnong Station

Initially the Mitchells sought as much advice and information as possible from a variety of sources, including the WA Department of Agriculture and Food and several specialists and experts in rangeland grazing management.

Enter Dr Alec Holm, who was starting a research project to investigate better decision making methods for pastoral woolgrowers with support from the national Land, Water & Wool Managing Pastoral Country initiative. The project aimed to develop a software package that combined weather data and on-farm production records to predict stocking rates to match the seasonal conditions.

Objective data to assist with decision-making

As the Mitchells have extensive on-farm records, their data was utilised by Alec for his research. Kathryn says that a prediction model such as Alec's would be exceptionally helpful to farm management. It provides them with a definitive series of time phases to make critical management decisions, based on seasonal modelling and a host of other factors.

"It is very difficult to make informed decisions when you are farming 130,000 hectares. I have been here since 1983 and there are parts of the property I still have not seen! So the more information we have to support our thinking, the better.

"It makes such a difference to have the support of accurate data, especially when it presents options in black and white. For example, making a decision to de-stock can be emotional, and more often than not, you are thinking 'it will be better next week'. Objective data can greatly reduce the drama of that decision making process."

Rob and Kathryn provided Alec with data that included stock numbers, lambing percentages, wool cuts and rainfall over many years. This data was used to test and validate the project's prediction model.

"We plotted the Mitchell's historical stocking rates with National Oceanic and Atmospheric Administration satellite data to establish benchmarks or threshold points that we believed highlighted instances where crucial decisions to de-stock were not made," Alec says.

"The Mitchells then reviewed this information to see how it matched their real life experiences and provided feedback, which in turn resulted in refinements to the prediction model."

Alec added that the Mitchells were ideal partners in the research work.

"Rob and Kathryn are keenly aware of the impacts of timely decisions on both stock and country. They were already using a decision support system and a computer to store data which made it easier for them to see what the project was trying to achieve and to understand the theory.

“It makes such a difference to have the support of accurate data, especially when it presents options in black and white. For example, making a decision to de-stock can be emotional, and more often than not, you are thinking ‘it will be better next week’. Objective data can greatly reduce the drama of that decision making process.”

“I applaud their efforts, as sheep producing pastoralists in WA continue to do it tough through inevitable dry times, increasing costs of production without corresponding increases in returns, problems of attracting labour and by the low productivity of the natural resource.”

Alec’s project is now complete and he is now seeking further funding to commercialise his work. That can’t come soon enough for Rob and Kathryn.

“It will be extremely useful as you can tailor the package to your own property. The research has great potential and the information is very user friendly. We could see it being utilised by groups such as Departments of Agriculture, which could in turn use the software to issue localised warnings for example,” Kathryn says.

Future challenges

Another weapon the Mitchells will have against future challenges is a newly designed rotational grazing system.

While not a part of the Land, Water & Wool research project, Kathryn says the rotational grazing was introduced about 18 months ago and although persistent dry conditions have hampered its progress, the Mitchells are determined to see it come to fruition.

“We believe rotational grazing will tie in well with our other aims, such as being able to rest country and better match our stocking rate to the season.

“It seemed logistically difficult to start with on such a large scale, but we are fortunate to have a property that is well fenced and well divided.

“The biggest problem is keeping water to the stock but we are always working on that including the use of temporary yards, which also helps with other husbandry aspects. We hope it will result in more flexibility and the ability to work efficiently and in balance with the rangeland.”

The science behind the story

In the booklet published by Dr Alec Holm’s Land, Water & Wool project, *Informing Decisions of Pastoral Woolgrowers for Country and Profit*, the following opening quote provides compelling reading regarding the drought from 1936-42 in relation to the historic property Lander Station:

‘By now (1926) Lander was carrying 50,000 sheep and 5,000 cattle. It was Mr Bush’s ambition that Lander should carry 80,000 sheep. During 1936 only 260 points of rain was recorded at Lander and sheep began to die.

‘Every year the rain was more spasmodic and each year stock losses grew...in 1938 only 13,225 sheep were left. The drought dragged on and in 1942 all that remained of the Lander flock was 6,220 sheep.

‘... never again did it (Lander) carry such numbers.’

McDonald, 1991, p23-24.

In 2006, improved understanding of the impact of climate variability and the capacity to identify key management ‘triggers’ within season have resulted in Land, Water & Wool research drawing together different branches of experience, science and technology to help pastoralists make hard decisions at the right time in the inevitable adverse years.

Working closely with Rob and Kathryn Mitchell at *Barnong Station*, Dr Alec Holm considered stocking rates and their impact on the environment and production - how poor stocking rate decisions during drought, for example, can lead to long-term irrecoverable damage to the vegetation system which is likely to have been the case on *Lander* in the early to mid-1900s.

In particular this project focused on woolgrowers’ decisions during dry seasons on the basis that it is these decisions that have the greatest impact on natural resources and sheep performance.

Using specific property information, which can be adapted to make use of regional climate data or satellite information, a drought alert system has been developed. This computer-based system assists pastoralists see relationships between stocking rate, inherent property factors and dry seasons and environmental degradation so they can make the right stocking rate decisions at the time, from season to season.

The computer-based system – “Critical Decisions on Stocking Rate” (CDSR) comprises three key modules:

1. Fixed and variable factors pre-disposing a property to drought;
2. Seasonal analysis module by which seasonal conditions are assessed via the internet every two weeks and combined with other property data to produce graphs on stocking rate and seasonal conditions at the key decision date; and
3. An assessment module.

For more information contact
Alexander Holm & Associates,
Telephone: 08 9335 9939 or visit
the Land, Water & Wool website:
www.landwaterwool.gov.au



Graham and Cathy Finlayson on Bokhara Plains

Case 3

Divide and conquer

Graham and Cathy Finlayson, *Bokhara Plains*,
Brewarrina, NSW



PHOTO: THE LAND

Business Profile

LOCATION: 34 km from Brewarrina, north-west NSW

AREA: 6,830 ha

RAINFALL: 400 mm

ENTERPRISES:

- 4,000-5,000 DSE of grazing, usually sheep, but also some cattle as markets dictate. Sheep ventures tend to be based on Merino ewes joined to terminal sires. A White Dorper breeding program was underway before de-stocking for the 2005-2006 drought.
- The property is in its second year of a three year organic accreditation process, leading to potentially higher premiums for livestock products.
- Farm stay built in and around the shearers' quarters.
- They are part of the inaugural Enterprise Based Conservation (EBC) scheme initiated by West2000Plus in 2003.
- Remote share trading is also being investigated as an additional source of income.

LANDFORM AND SOIL TYPES: Black soil along the Birrie and Bokhara rivers at each end of the property, lightening off to bladder saltbush, Mitchell grass and claypan country in between.

Key Points

- Enterprise has been willingly destocked three times in seven years to spare the land grazing pressure during drought.
- Management aims to bring erosion-scalded country back into productivity and increase quality and quantity of ground cover.
- Focus is on increasing animal impact on hard bare ground to provide a seed bed for any plant able to grow there.

Keeping an open mind and a positive outlook are central to management in the pastoral zone, Graham believes. He wants to be continually learning, so that every crisis becomes, in hindsight, an opportunity to gain a deeper understanding of the landscape and his role in its management.

- Plant population densities are maintained and in some areas improving, despite a string of tough seasons.
- Graham awarded the NSW Farmers Association 2005 Young Farmer of the Year.

The enterprise

Graham and Cathy Finlayson took up *Bokhara Plains*, formerly part of a family partnership, in 1999. The size of the property, 6,830 ha, isn't considered enough to make a living from, and both Graham and Cathy took off-farm work to make ends meet. As a string of tough seasons hit, they recognised that the wool, sheepmeat and beef enterprises that they depended on would not support them.

They converted the property's shearers' quarters into farmstay accommodation and began taking guests, mainly business travellers to Brewarrina, 34 km away. Extra accommodation has been added, providing space for parties of up to 20. At the time of writing, with the station fully destocked, the farmstay provides their primary income, reflecting their strong focus on improved natural resource management within a highly variable climate.

Meeting the challenges

The Finlaysons had a good introduction to life at *Bokhara Plains*: in 1999, the year they took it up, the property received 630 mm of rain, 250 mm over the long-term average. In 2000, they again received 650 mm of rain and trucked off 3,000 crossbred lambs. But from there it was a rapid slide to 2002, when they received just 138 mm for the year. In subsequent years they have either been in drought, or not far from it.

A strong believer in the Holistic Management (HM) principles advocated by African land management consultant Allan Savory, and a graduate of Resource Consulting Services' (RCS) Grazing For Profit school, Graham early on decided the land was the asset he need to focus on – not the stock that many graziers emphasise.

In the climatic see-saw of the past seven years, this approach has seen *Bokhara Plains* fully destocked three times - including all the foundation stock of a fledgling White Dorper breeding enterprise.

To implement the short graze-long rest principles advocated by HM and RCS, the Finlaysons' have spent about \$50,000 in fencing to divide *Bokhara Plains*'s original six paddocks into about 30; and an additional \$110,000 on a watering system to service the new paddock plan. Funding accessed through their involvement with the EBC project helped them to plan the development.

New directions

Much of Graham's management is aimed at increasing groundcover and healing the claypan erosion scalds scattered across the property.

Counting only growing plants, and not litter, Graham estimates that he has about 20-40 per cent groundcover. He is aiming for 70 per cent. If he can get one more palatable plant growing between existing plants, he believes, he can double his production – not just because of plant biomass, but because extra groundcover is the best way of dramatically cutting the high run-off and evaporation rate of rainfall.

He is now "walking a fine line" between conservative stocking to preserve the grazing resource, and putting on enough stock to churn and dung the soil toward higher fertility. Achieving the balance is a matter of determining how much animal pressure can be applied to different vegetation types over a few days, and how many weeks or months rest will then be needed to allow the vegetation to fully recover.

While western NSW graziers have long been using machinery to pond claypans and create a seedbed, Graham has adopted the HM philosophy of using concentrated animal numbers to break up claypan surfaces with their hooves, and to add fertility through dung and urine. This involves using fencing to hold larger mobs of stock in a certain area to create beneficial herd impact and allowing the country to then have the necessary long rest periods to promote the native perennial grasses back into the system. Graze periods of a few days to a week allows rest of pastures for up to six months twice a year, every year.

Graham doesn't care what then grows on the scald: even a copper burr can drive a taproot through the hardpan, providing a place for water penetration, and shield an area of the soil from erosion. Less palatable early succession species are essential in the process of healing the land and the good species will follow, he believes.

All management on *Bokhara Plains* is done with the next generation in mind – in this case, the Finlaysons' daughter Harriet. That's been a primary reason for the property to work towards organic accreditation. They are now in their second year of a three-year accreditation process to be certified, and then will consider themselves "Organic grass producers" and base their production system around that.

Destocking for drought

Graham has completely de-stocked the property three times in response to drought. It was twice financially effective; the third time he was obliged to sell sheep for less than he bought them. However, he has no regrets. Every de-stocking has brought the relief that comes with relieving pressure on the land, and the worry of throwing money into stock feed.

To de-stock effectively, Graham says, he needs to forget about hoping for rain and other emotional issues, and instead pick a date on which to sell if it hasn't rained. Actual stocking pressure is measured monthly in order to pre-empt a downturn in the season long before the condition of the land and stock decline. Once the stock are gone, he feels free to concentrate on other management issues, including complementary sources of income.

To de-stock effectively, Graham says, he needs to forget about hoping for rain and other emotional issues, and instead pick a date on which to sell if it hasn't rained.

The bottom line

In the past six years, there have been few periods of real growth on *Bokhara Plains*. Nevertheless, Graham is observing increased plant densities on lighter country, and strong germination with each rain event because rested plants have been allowed to go to seed.

He hasn't yet been able to establish any real return on his investment in fencing and water because of the tough seasons. But he believes that when he does strike a good season, the flexibility that he has in managing the landscape will quickly pay off.

A major challenge in resting the landscape lies in preserving the growing vegetation from kangaroos. Eventually, he believes one solution will be kangaroo-proof boundary fencing, but only if or when the numbers can justify the cost. The ability to close down water troughs when not used for domestic stock is also an important and very effective means of controlling pressure with the current kangaroo population.

Keeping an open mind and a positive outlook are central to management in the pastoral zone, Graham believes. He wants to be continually learning, so that every crisis becomes, in hindsight, an opportunity to gain a deeper understanding of the landscape and his role in its management.

Stocking rate decision tools in the rangelands: the science behind the story

Matching livestock numbers to available and foreseeable feed reserves is crucial to economic productivity and environmental management in the rangelands but it can be complex and challenging. The Land, Water & Wool project, *Understanding stocking rate decision tools in the rangelands*, looked at several tools and indices available to pastoralists to help them make better stocking rate decisions.

The project tested under simulated conditions the "Relative Stocking Rate" index ("DDH/100mm" i.e. Dry Sheep Equivalent Days per Hectare/100mm of rainfall over the past 12 months). It was found that while the technique has useful purposes in a grazing enterprise, as with all tools for estimating stocking rates, the index should not be pushed beyond its limits. In particular, caution should be exercised when using the index to make short-term stocking rate decisions or to predict droughts. The results of this research are currently being peer reviewed for publication.

As part of the project a new *Benchmark Index* was developed by the research team from NSW Department of Primary Industries (NSW DPI). The index uses a benchmark value (derived from long-term carrying capacity and long-term average rainfall) in conjunction with the rainfall total for the preceding 12 months as a simple means of estimating proper stocking rate for comparison with the actual current stocking rate. An important exception is where low rainfall conditions prevail (12-monthly totals less than 120-150mm depending on locations) – the *Benchmark Index*, as is the case with most indices, is unreliable in these conditions.

The Benchmark method and two other stocking rate tools (the "Glove Box Guide" method developed by NSW DPI and the "Forage Square" method) were presented to woolgrowers and others at two workshops, one of which took place on the Finlayson's *Bokhara Plains*, in western NSW. Most participants found that all three methods had the capacity to contribute to improved decision making but expressed no clear preference for one method over another.

For further information, contact Dr Ron Hacker, NSW DPI, Tel 02 6880 8002 or visit the Land, Water & Wool website: www.landwaterwool.gov.au



Carol, Fiona, Cristina and David Warwick on Holowiliena South

Case 4

Getting an overview of the land

David and Carol Warwick, *Holowiliena South*, Cradock, SA



PHOTO COURTESY OF CAROL WARWICK

Business profile

LOCATION: South-east of the Flinders Ranges, SA

AREA: 40,000 ha

RAINFALL: 220mm

ENTERPRISES: In mid-2006, after years of intermittent drought, *Holowiliena South* shored 2,600 Merinos and carried 220 head of cattle, after selling off 80 young cattle.

LANDFORM AND SOIL TYPES: Stony Hills – shallow/ fine/ loamy soil
Low Hills – shallow/ fine/ sandy/ calcareous/ loamy soils

Key Points

- User-friendly satellite imagery will become a useful tool for land management in the region.
- A tough environment, with pastoralists needing to manage rabbits and grasshoppers as well as drought.
- Conservative grazing management emphasises vegetation health.

Ah, for the rangelands life...

When David Warwick left school, he needed no career adviser to tell him what to do next: he just wanted to go back to *Holowiliena*, the family station on the plains over the hills east of Hawker.

"The land is my hobby and my work," he says. "I've got no desire to move into something else."

He took over the reins of the business from his progressive father in 1973, and enjoyed the remains of what is remembered as a freakishly wet decade. In 1980, after the South Australian government split the Warwick family's lease on *Holowiliena Station*, David took up the southern portion in the form of 40,000 ha *Holowiliena South*. He and Carol married the following year.

"When it does rain after a dry spell, I don't just bring stock back in to knock down the feed. I like to see the feed get away a bit. If you're stocked right up, you don't have feed in reserve for when it starts to get dry again."

In 1982, drought hit. By the late 1980s, they had again built up to 6,000 sheep and 100 cattle – then wool prices went into freefall. Through the past decade they have also been hit by a frustrating climatic pattern, where drought is relieved by rain, but there is no follow-up and an inevitable slump back into drought.

"The drought of 2002 was a real crunch time for us, and we still haven't really recovered," David says.

In May 2006, they shored 2,600 sheep and unloaded 80 head of younger cattle, bringing cattle numbers down to 220 head.

Drought is not the only challenge

Drought, rabbits and grasshoppers have been constant features of life for the Warwicks and their two daughters, Cristina, 20, and Fiona, 17. The inadvertent release of rabbit calicivirus in 1996 "was a godsend for us", David says, referring to the devastating rabbit populations on the plains. It was less effective in the hills, but it gave the Warwicks the break they needed to get on top of the rabbits through warren ripping.

David has been ripping since 1986, but even with the later help of Natural Heritage Trust funding shared with another 12 landholders to greatly speed up the process, he estimates he has still only ripped 30 per cent of the property.

Persistent drought doesn't make it easy to assess the effects of two decades of ripping, but David believes the results are there.

"There mightn't have been a marked improvement, but we can see regeneration of small bushes and trees where there was none before," he says.

Grasshopper plagues are less easy to address. It seems to David that every time he gets a flush of green feed, the grasshoppers descend from the skies and wipe it out. What concerns him about this pattern is that plants are not given a chance to seed.

"I think the 'hoppers have really taken their toll on the seed bank," he says.

Managing the land

David inherited from his father a legacy of small paddocks – in a region where "small" is 25 square kilometres. That's about half the usual paddock size for a Cradock station, David says, and it has given him much greater flexibility in how he manages the land. His father also built central watering points into his cut-down paddocks, allowing stock to utilise the entire paddock instead of just the area within walking distance of the trough.

Within this infrastructure, David makes a point of grazing conservatively. He runs smaller mobs than usual so that he can better manage grazing pressure, and when available feed is threatened with being flogged out – as it has repeatedly in the past decade – he begins rapidly unloading stock.

"I believe the land is our livelihood. I hate to see degraded country," he says.

"When it does rain after a dry spell, I don't just bring stock back in to knock down the feed. I like to see the feed get away a bit. If you're stocked right up, you don't have feed in reserve for when it starts to get dry again."

The eye in space

Getting a handle on just what feed resources are available is a challenge for any grazer, but particularly so for those in the vast spreads of the rangelands. That was the point of the Land, Water & Wool Managing Pastoral Country project *Wool Producers with Remote Control*, which looked at how satellite imagery might aid grazing management. Using the overview of satellite imagery, it was thought, plus the ability to indicate feed density, landholders would obtain a new and useful management tool.

Holowiliena South was one of four properties in the region chosen for a trial of the technology. At first, David was unimpressed. "The imagery showed bared areas as grassed, and grassed areas as scrub," he says.

However, with some ground-truthing and software changes, a truer picture began to emerge. And suddenly, so did the tool's potential.

"There mightn't have been a marked improvement, but we can see regeneration of small bushes and trees where there was none before".

"It's got promise as a way to monitor land condition in the longer term," says David.

"Conservation groups want to turn all this country into a national park. Pastoralists need to demonstrate that we're looking after the environment, and this might be one new tool that we can utilise to do it."

He can also see satellite imagery's potential as a drought management tool that would allow an accurate whole-of-property assessment of feed reserves on which to base decisions. For it to be useful in this situation, he believes it needs to be allied to good rainfall probability information.

But before he can see a place for it in his day-to-day management, David says, more work needs to be done.

"It has to be more cost-effective, and more easily accessed by computer. If that was the case, I could see it as a great tool for triggering decisions."

And next?

Leader of the remote sensing project, Gary Bastin at CSIRO Sustainable Ecosystems in Alice Springs, says that there is interest in the concept from participants, but in general they share the Warwicks' perspective: the technology has a lot to offer, but it is not yet in a form that they are ready to use.

"What's now required is for us to put the technology in the hands of grazing families, and help them to develop it in a way that is most useful to them," Gary says.

"They need to be comfortable that the imagery is telling them what we think it is telling them."

The next phase is to develop ways of delivering satellite imagery to pastoralists in a form they want to work with.

However it happens, Gary says, satellite imagery is likely to become popular, whether it is this generation of landholders or the next.

"It's a tool that government agencies are very comfortable using; we're just putting it in the hands of private enterprise."



PHOTO COURTESY OF CSIRO SUSTAINABLE ECOSYSTEMS

Gary Bastin, CSIRO Sustainable Ecosystems (left) working with South Australian pastoralists through the Land, Water & Wool initiative to determine the usefulness of satellite imagery in providing a timely and wide-ranging update of the status of pastures over their whole properties.

The science behind the story

The pastoral zone is characterised by huge areas and scarcity of labour. Techniques that allow pastoralists to 'see' their whole property, frequently and close to real time have potential to improve their ability to better match stock numbers to available feed. This research project, *Wool producers with remote control: new tools for whole of property management*, investigated the potential usefulness of satellite imagery with pastoralists including Carol and David Warwick at 'Holowiliena South'.

While satellite imagery is not new - the Landsat satellite has been providing imagery for over 30 years – the development of a cost-effective, timely and easy-to-use system of accessing and interpreting satellite imagery is an ongoing challenge.

The project used images from the MODIS satellite, which provides daily images of medium to low resolution at low cost. Because MODIS is relatively recent (2000) the researchers supplemented these with the longer term images from Landsat satellite (about 25 years of data).

The project team undertook a series of workshops, presentations and one-on-one training with pastoralists to determine what satellite-based information works, what doesn't, and how often and in what format this information should be presented.

Three areas of interest stand out from the pastoralists' perspective:

1. Long-term monitoring of land condition (i.e. over years and decades). For example, participants were interested in the encroachment of woody plant species or the changes around rabbit-control zones over years and even decades;
2. Regular updates to assist with in-season decision making; and
3. 'Proving' good land management to outsiders through detailed monitoring and evaluation.

The project developed a series of different layouts showing different ways of processing satellite data. These included: basic ground-cover maps; images and graphs that traced plant cover over time; and images that allow woolgrowers to track different levels of cover (low, moderate, high) over time.

Techniques for matching stocking rate to available and predicted feed resources must be used within their limitations and in conjunction with good seasonal outlook methods. Satellite images can provide information on the 'greenness' of plant cover and this is relevant on large stations to better judge the growth response following large or scattered storms. However 'greenness' is less relevant for managing feed supply in the pastoral zone where pasture is generally hayed-off for most of the year.

It was found that the technology has some limitations, including inability to distinguish some quality parameters (e.g. it can't readily distinguish perennial plants from annuals, though inferences can be made about this characteristic depending on the time of year the image is taken). The project team also found that images could give false values (e.g. soil type and rainfall just before the image was taken could affect reliability).

Satellite imagery can complement what woolgrowers see and know at ground level. Similarly, well-kept historical pastoral station records complement, calibrate and ground-truth satellite information.

For more information contact Gary Bastin, CSIRO Sustainable Ecosystems, Alice Springs, NT, Telephone: 08 8950 7137 or visit the Land, Water & Wool website: www.landwaterwool.gov.au



Krystyna and Alan Dick in the Heywood shearing Shed.

Case 5

Viability means investigating all options at Heywood

Alan and Krystyna Dick, *Heywood*,
Bollon, Queensland

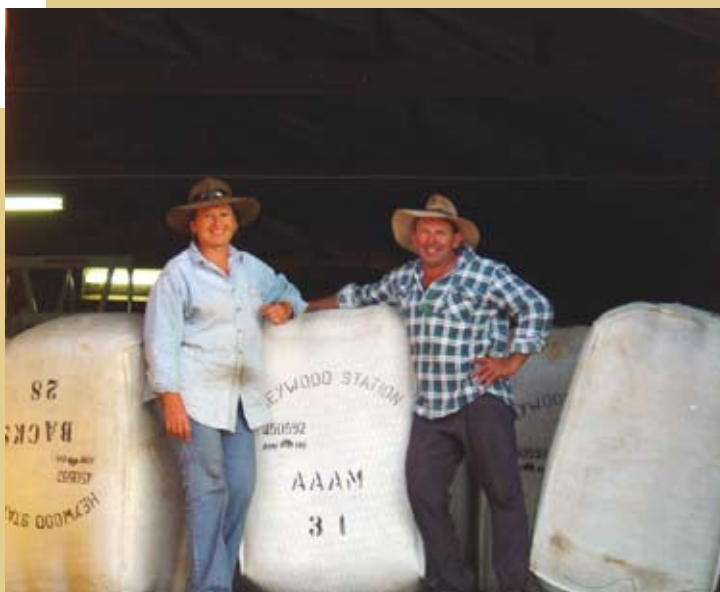


PHOTO COURTESY OF NEAL ELLIOTT

Business Profile:

LOCATION: 80 kilometres east of Cunnamulla, Western Downs, Queensland

AREA: 14,764 ha

RAINFALL: Average rainfall 400mm. 2005 rainfall was 200mm

ENTERPRISES:

- Grazing property based on native pasture
- Pastures include Mulga, Mitchell grass, Mulga oats, Bluegrass, Wandaree, Greybeard and winter herbages. Timbered with Mulga, Ironbark, Box and Kurrajong trees
- Running 3,000 breeding ewes, Merino and Merino Dohne-cross. Soon to be joined to Border Leicester rams to turn off first cross ewes to southern prime lamb breeders
- Average 20 micron for adult sheep, ewes cut 5kg and wethers 6kg/head
- Average vegetable matter (VM) for fleece is 1.2% and pieces 2.6%
- Average lambing rate is 80%

LANDFORM AND SOIL TYPES: Flat, soft red mulga country with deep soil, some spinifex sand ridges, clay pans and semi-permanent lakes.

Key points:

- The Dicks purchased and moved to *Heywood* just three-and-a-half years ago.
- Property has been in almost drought conditions since that time
- Recent changes to State land clearing laws mean the Dicks cannot develop improved pastures as per their original plan; focus now is on better managing and utilising the existing pasture base to maximise returns and keep the country as viable as possible

By learning how to accurately monitor pasture growth, or lack of it, we can adjust our stocking rates to prevent over grazing and to enable pasture to re-seed.

- Attended a Queensland Department of Primary Industries and Fisheries Grazing Land Management course in Feb 2006 to better their understanding of classing land according to its pasture cover and managing the environment based on the classing
- Have started classing paddocks already including taking photos to monitor progress.

Seeking advice

Pastoralists Alan and Krystyna Dick are not afraid to seek advice when it comes to better managing their 14,764 hectare property, *Heywood*, at Bollon in south-west Queensland.

Faced with ongoing dry conditions and a recent change to State land clearing laws, the Dicks know their future depends on looking at all their options to keep *Heywood* viable.

Having moved to *Heywood* just three-and-half years ago, Alan and Krystyna readily admit they now need to concentrate even more on pasture improvement and the maintenance of the resources they have at hand.

"The change in land clearing laws has prevented us from improving country by not allowing selective clearing of thick timber areas and sowing native grasses and buffel for pasture," Alan says.

"That means we can't increase stocking rates to the levels anticipated at the time of purchase of *Heywood*. So now the aim is to improve the existing grazing



Pastoralists and researchers monitoring pasture growth in the Mulga lands.

country while at the same time allowing paddocks to recover after grazing.”

This approach led Alan and Krystyna to recently attend a four-day *EdgeNetwork* Grazing Land Management (GLM) course, facilitated by the Queensland Department of Primary Industries and Fisheries (DPI&F).

Assessing pasture

GLM course resources, supported by the national Land, Water & Wool *Managing Pastoral Country* initiative, focus pastoralists on assessing pasture condition and then classing the pasture according to its stock carrying capacity. Depending on the condition of the pasture, land is classed as ‘A’ ‘B’ ‘C’ or ‘D’.

Alan says that while he and Krystyna were initially apprehensive to spend four days away from the property, after completing the course, they were happy they made the time.

“Attending the GLM workshop gave us a much better understanding of the soil and vegetation on our country. This was especially important being new to the district,” Alan says.

“For example, the Mulga country is a good source of high protein feed for stock in times of drought and using it properly for fodder can be the difference between completely de-stocking or just decreasing numbers.

“By learning how to accurately monitor pasture growth, or lack of it, we can adjust our stocking rates to prevent over grazing and to enable pasture to re-seed. The ABCD method will be a good tool for setting stocking rates and monitoring pasture and soil condition in the future.”

Future plans

Heywood is located about 80 kilometres east of Cunnamulla on the northern side of the Balonne highway. The 14,764 ha property comprises flat, soft red mulga country with deep soil, some spinifex sand ridges, clay pans and semi-permanent lakes.

Pastures include Mulga, Mitchell grass, Mulga oats, Bluegrass, Wandaree, Greybeard and other winter herbages, timbered with Mulga, Ironbark, Box and Kurrajong trees. The average rainfall is around 400 millimetres but due to the ongoing drought, the 2005 total was half that.

The property is currently running 3,000 sheep, with the potential to run 5,500 sheep, according to Alan.

The ewe base is Merino that has for several seasons been joined to meatier, Dohne sheep. Ewes average 5kg wool cut per head per year while wethers average 6kg. However Alan and Krystyna are planning to change to Border Leicester rams, to turn off first cross ewes into the lucrative breeder market.

Mulga Country is a good source of high protein feed for stock in times of drought.

"Our gauge of the breeder market is at Narromine in Central-West NSW, where it is not uncommon for 12-month-old first cross ewe lambs to sell for \$120. While we are realistic that we may not achieve those rates, the first cross sheep are expected to be much more profitable."

Other changes in the wind for the Dicks include a re-vamp of paddock fencing, so the sheep can better utilise the pasture available.

"We would like to make the paddocks smaller so we can better rotate the stock. This will allow the sheep to make the most of every blade of grass but also give paddocks time to recover."

Regular monitoring

Keen to be ready when a 'normal' season does arrive, Alan and Krystyna have been busy driving throughout Heywood to try out their newly-acquired assessment skills.

"We have marked out specific sites and regularly take photos to monitor progress and to make sure our classing is on track. If we can get back to roughly normal rainfall, it will be great to really put the system into practice."

The Dicks have also made sure they stay in touch with the DPI&F and other graziers that attended the GLM course.

"A follow up day is planned and as just about everybody around here is in the same boat, it is important to stay in touch, hear their feedback and their take on how they are managing the dry conditions."

Alan added that the GLM course was very well run and organised and presented in an easy to follow format.

"The GLM course covered a lot of ground, but it is all based on proven trials so it is not too hard to take in. It's a matter of going back to your property and getting on with it."



PHOTO COURTESY OF KRYSTYNA DICK

The science behind the story

The Land, Water & Wool project *Delivering a land condition framework for grazing land management education* is providing sheep producers in the Mulga zone and Mitchell grasslands of Western Queensland with the skills to implement and monitor strategies for improved environmental management. This has been achieved through the adaptation and delivery of proven management tools previously developed for the Queensland beef industry.

Drawing together field data, scientific literature and the experiences of land managers and agency staff, this project developed a new system for assessing land condition across large tracts of the Mulga and Mitchell grass bioregions.

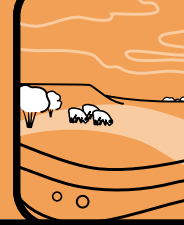
Land condition assessments were made at 80 sites in Western Queensland and expert advice came from pastoralists and agency staff. The final product of this project is a classification system based on a modified index using perennial grass basal area. The framework has been designed for producers participating in the *Grazing Land Management (GLM)* program and Stocktake courses, delivered by DPI&F.

The new framework supplements an existing system of verbal descriptors in six land zones across the Mulga and Mitchell grass bioregions. It improves on the older system because it relies on the objective measurement of perennial grass basal area (PGBA) and analysis of the 3P (perennial, palatable and productive grasses) and OP (other perennial) status.

Extension materials developed as part of the project include a manual for measuring pasture condition in Mitchell grass and Mulga land zones and a fact sheet on the value of mulga as a fodder source, both of which can also be used in programs such as *GLM* and *Stocktake*.

For more information contact
Dr Terry Beutel, DPI&F, Charleville, Queensland,
Tel. (07) 4654 4282 or visit the Land,
Water & Wool website: www.landwaterwool.gov.au

Managing Pastoral Country



There are about 1,700 woolgrowers in Australia's pastoral zone managing properties ranging from a few thousand to several hundred thousand hectares. The industry is currently under scrutiny as a result of land degradation (it is estimated that 16 per cent of pastoral land is degraded), animal welfare issues, uncontrolled pests and weeds and the negative impact of these issues on native plants and animals.

The *Managing Pastoral Country* Sub-program is working with woolgrowers to identify how pastoral country can be better managed to address these key environmental issues while maintaining productivity. The Sub-program is utilising woolgrower experience to develop test and extend management approaches that deliver enhanced profitability, productivity and positive environmental outcomes.

Encouragingly, adoption of NRM practices among woolgrowers is already high with 88 per cent saying they have undertaken NRM practices to manage their land profitably and sustainably.* In addition, sixty-one per cent of wool growers in the pastoral zone said they were interested in receiving assistance to develop a whole farm plan to incorporate NRM into their daily farm management.*

Managing Pastoral Country has information available to assist woolgrowers and their advisors with decision-making on-farm.

For further information, visit the Land, Water & Wool website www.landwaterwool.gov.au

*Land, Water & Wool Best Practice Survey 2003

"Land, Water & Wool is a joint investment between the wool industry's peak research and development body, Australian Wool Innovation Limited, and the nation's premier investor in natural resource management research, Land & Water Australia."

Further Information

The Managing Pastoral Country Sub-program of Land, Water & Wool has five major regional projects located in WA, SA, Queensland and NSW. The contacts in each State are:

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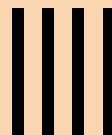
Australian Wool Innovation Limited, through Land, Water & Wool and other initiatives, is currently investing in the development of innovative R&D projects and training activities to help Australia's wool industry improve on-farm production and also the health of the land and water resources that underpin wool production businesses.

We want to hear from you! If you have an idea for cutting-edge natural resource management options and production systems, please contact us:

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