Queensland **the Smart State**

Not just watching the grass grow:

graziers who monitor their land

Jenny Silcock and Terry Beutel




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Introduction

'This paddock was bare ground back in the '80s, now look at the Mitchell grass!'

'When we came here, there were no shrubs in this area, but they've really thickened up over the past 10 years.'

'It might look dry now, but you should have seen it in 2004 when even the gidgee was dying...'

How many times have you heard (or told) tales like these? These kinds of memories are part of the considerable body of knowledge that you will have built up about your property over many years. It is important information, and it helps to guide how you manage your country. It's just too bad that those memories aren't perfect.

This booklet is about getting those memories right - by monitoring. Monitoring is just observing and recording the state of land condition over time. As a property manager, you observe every day – weather, water points, stock, available feed, and a lot more. You observe, and then you make your decisions. This booklet will help you how to make better decisions about your biggest asset – your land – by getting your monitoring right.

So why should you go the extra step and record what you see? In this book, you'll get the answer from the horse's mouth. These are the stories of your peers - managers of working properties who made the choice to monitor their land so that they get the most from their work. Monitoring has helped them to separate myth from reality. For their efforts they now

- see more of the trends they need to know about;
- confirm good management decisions;
- identify potential problems early;
- understand how climate is affecting them; and,
- share this knowledge with the partners in their enterprises.

As the stories in this booklet show, there is no single best way to monitor. Each property has a monitoring system designed to meet the needs of it managers. They vary in their simplicity, they vary in their methods, and they vary in the information they produce. But they all share the common features of good monitoring tools – they provide a permanent and repeatable record of changes in the land that is used in management. Keep an eye out too for some thoughts from DPI&F's Grazing Land Management presenters. They'll help to highlight the best of each story.

As you read these stories, think about their relevance to you. Could you benefit from doing this? Do you want to read your land better? Which approach would suit you best? For those of you who want to give monitoring a go, we have included a guide to monitoring. Have a look at this too – it's short and sweet, but it gives you all the information and contacts you need to set up a simple, low effort monitoring system for your property.

Penny and John Taylor *Accord*, Longreach

Penny and John Taylor have owned and managed *Accord* since April 1994. They run mostly sheep on their 19 000 acres of open Mitchell grass downs, situated 60 km east of Longreach. Penny completed a Grazing Land Management course in April 2006, and believes that monitoring should become a core part of property management – just like measuring the rain gauges and checking the waters.

Starting out...

In 2002, Penny established four permanent monitoring sites on *Accord*. These sites span the length of the property, with one in each quarter of the property. All sites are easily accessible from property roads, meaning that monitoring can fit in easily with other property work. Penny deliberately selected sites in the most open, 'ashy' areas, as these are the first places to suffer in dry times.

'I chose sites on the heavy ashy country, because they are the slowest to respond so I feel that they are a better indicator of natural resource health at *Accord*'.

Penny Taylor takes a close look at one of her monitoring sites

Grand plans – but simple is better!

Penny initially planned to visit her sites monthly, to record observations. Photos were taken quarterly. Her first spreadsheet had many columns for recording different variables. However, she soon realised that such intensive and detailed measurements were 'monitoring overkill'.

'When you start, you want to put down a million things – but it needs to be simple and comprehensive. I wanted to be able to easily see trends.'

Penny now visits her sites twice a year (in March and September) and has condensed her spreadsheet to a few relevant variables, including density of major species, health of Mitchell grass, kangaroo numbers and rainfall.

'Honestly, once you've determined the key things you wish to monitor, it is a very quick process. I simply carry the camera whilst I am doing a water run, and when I get home I download the photos and record the information as ticks on a spreadsheet.....it takes less time than writing up the diary.'

Tracking trends

'You say "Oh, I've got a good memory, it was like this last year", but you tend to form a perception in your mind that is not always totally accurate. When you monitor with photos you can clearly see how long it's taking for bare areas to recover, how different species are dominant in certain seasons etc.'

While site records are valuable, Penny has found that photographs are unequalled for tracking changes over time: 'With a digital camera – one click and you have a cheap, comprehensive record, and when you compare the photos any change, even only minor ones, are easily seen.'

Since coming to *Accord* the Taylors have enjoyed some good seasons and endured many bad, like most properties. The period from

1992 – 1998 was very dry for Accord, but good rain from 1998 - 2002 allowed *Accord* to recover. During that period they were able to rehabilitate all the bare areas by changing some fences and installing additional waters. Despite destocking early, the drought since 2002 has caused large areas of Mitchell grass to die.

While the monitoring records certainly feed into management decisions, particularly in terms of adjusting stocking rates over time, Penny concedes that an interest in and love of the country is the major force behind her monitoring efforts: 'Monitoring is part of caring for *Accord* and because it is only a small property it is important that the whole 19000 acres are productive.'

A holistic approach

The Taylors see the land, environment, finances, work and family, as part of the one big picture. This outlook comes through strongly in their approach to monitoring, where Penny's ground measurements sit alongside John's property diaries and their business records. At the end of each year, Penny prints out her spreadsheet and photos, and stores them in a folder along with other property records. She feels that this adds another dimension to the knowledge that she and John are accumulating about *Accord*. Unfortunately all the *Accord* records that had been kept by earlier owners, were lost during the eighties.

'We have always kept a detailed diary at *Accord*, but reviewing changes through diary entries is a slow and inefficient process. My spreadsheets and photos summarise each year, so you are able to review several years very quickly.'

Penny has also been involved in a DPI&F project using satellite imagery to track changes in groundcover. While she has found the VegMachine™ program a fascinating addition to her monitoring, she concedes that her ultimate vision would be to have a 'one-stop package', where satellite imagery sits alongside property records and photos in a user-friendly system.

Simple, quick and rewarding

Words such as 'quick,' 'concise', 'simple', 'clear' and 'easy' come through as being vital to Penny with any monitoring system. She urges other producers to start 'small and simple - start with two sites – put two iron pegs in and just take photos twice a year.'

Penny is quick to acknowledge that monitoring on *Accord* – a relatively small, uniform property – may be easier than on larger, more diverse properties. However, even if you only have time to monitor a certain area of your property, the results will be rewarding, and your curiosity will grow.

'We all go out every day and measure our rain gauge and record it. I really believe monitoring is as simple and as important as that.'

Penny has hit the nail on the head when she says to start 'small and simple'. That will spark the interest and in time you'll see what else is important. The records will help you to plan longer term and provide warning signs for more tactical short term decisions.

Col Paton - DPI&F GLM presenter

Simon and Christine Campbell

Norwood, Blackall

Simon and Christine Campbell have been on *Norwood* for 25 years. In recent years, they have moved out of sheep and run a mix of breeding and trading cattle on their 24 000 hectares of improved buffel grass, Mitchell grass downs and frontage country along the Barcoo River.

The monitoring system

Since 1992, the Campbells have been buying a Landsat satellite image annually, towards the end of the dry season. This was an adjunct to DPI&F advice at the time which is still apt, that 85% of a property's standing dry matter is on the ground by 31 March. They mainly use this for feed budgeting, as they have become confident in the boundaries and extent of green feed from images that are built of satellite bands that give maximum green reflectance. This provides the areas of feed for budgeting. This satellite-based approach is complemented by nine long-term monitoring sites, which have been monitored since 1996. These sites provide the yield estimates to put with the areas established on the satellite images. At each site, Simon makes a quantitative estimate of yield using DPI&F photo standards, and takes a photo of the site. Using the satellite image, a Geographic Information System and these yield estimates, Simon makes a per paddock assessment of paddock total dry matter yield.

Simon Campbell out and about on Norwood

Although the Campbells are familiar with methodologies and programs such as GRASS Check, they find that grass yield is really the only parameter that directly relates to their management. Simon says 'I've got some good information out of GRASS Check, but their (methods) were very demanding of the limited time available to any manager.' Most years, the sites are visited twice – around March at the end of the growing season, when setting up feed budgets, then often again when refining their stocking and supplement regimes at the end of winter, just before protein demands of tested-pregnant cows kick in. 'We chose the sites really carefully to be representative of significant feed production systems. [Therefore] one site will let us estimate what has happened for a large portion of that land or pasture system.'

Since undertaking the Grazing Land Management course in 2006, Simon and Christine have also completed a condition assessment of each of their paddocks. He says the principles of GLM 'provided a good and simple framework for thinking about land condition and the directions of land condition.' The time series of photos from sites combined with the satellite records, provide a good overview of pasture condition and important shifts (such as regrowth, or water-point pasture degradation over time.

Why do it?

Simon says his reasons for monitoring are straightforward: 'I wanted to be able to write a feed budget in the way you write other budgets – I wanted a bit of hard data around me for big decisions'. He describes

his monitoring system as a 'framework for decision-making', allowing him to answer the fundamental questions relating to property management.

Monitoring links to productivity...

Monitoring plays a key role in Simon's pursuit of productivity on *Norwood*. Monitoring is an adjunct to overall property management, and Simon maintains that 'to have some information is better than none'. The Campbells see monitoring as a decision-making aid, which allows them to run *Norwood* at its full potential, whilst maintaining long-term land condition: 'We never make stock-related decisions without evaluating feed and using the monitoring sites.'

The photos are stored in photo albums, allowing the sites to be traced through time. Simon finds it good to look back on the photos as a means of retrospectively analysing decisions with the benefit of hindsight, and using this to inform current decisions about stocking pressure and budgets. 'The sites become a really good reference to go back... you actually sit down with the photos when times are getting tough and say "What did we do then? Did we do the right thing? What did we learn from it, so what are we going to do this time?" It sends you back quickly to assess the range of possible management options.'

Is it hard to keep up?

While their monitoring system may 'add a bit to the work', Simon and Christine feel that it is well worth the effort. 'It's very easy – you hardly even have to get off the bike!' (see photo).

Lessons learnt...

Simon says that the best advice he has to anyone considering setting up a monitoring system is 'keep it simple'. A small number of carefully selected sites and a minimum of one annual photo per site can form the cornerstone of a good property monitoring system: 'I actively sought to keep the number of sites to a minimum (and) worked really hard on picking sites which were representative of certain areas on the place.'

Motorbike monitoring

Monitoring photographs also allow you to take an objective look at changes in your land. Looking back over one series of photographs taken over 10 years, Simon is confident that there haven't been too many deleterious changes: 'I wouldn't say we've lost too many perennials over that time...' – and he has the record to prove it, to himself and others. 'It's a perspective that's better than memory... memory, by and large, is pretty floppy.'

He is confident that monitoring can deliver real benefits to land managers: 'It's worth the effort to improve your management, as efficiency of available feed utilisation is the basis of all your productivity.

Simon and Christine have developed a great practical combination of satellite technology and on-the-ground observation to balance their stock numbers and pasture. This gives them a real edge in responding quickly to seasonal changes. And including land condition information means they can be confident that their country will be in good order for years to come.

David Phelps - DPI&F GLM presenter

Robyn Adams *Stratford*, Desert Uplands

Robyn Adams and Terry Brennan bought *Stratford* in May 2001, and moved there the following year. They run breeder cattle on their 32 500 acres, which is mostly open eucalypt-spinifex woodland, but also includes some creek and swamp country and escarpments.

A suite of sites!

There are over 40 sites set up across *Stratford*, for a variety of purposes and projects. Thirty long-term carrying capacity sites were set up by DPI&F in 2004, while some sites are part of an EPA biodiversity project. Robyn has also set up some of her own sites to monitor the effects of management changes.

Robyn has visited each site either two or three times since they were set up. Monitoring rounds are done irregularly in response to seasons. It takes about two days to visit all the sites. At each site, she takes a photograph and writes down some basic notes.

Robyn stresses the importance of a flexible approach to monitoring: 'Just keep adding sites as you need them. As I fence more and more, I'll put in more sites so I can actually monitor the changes.'

Robyn Adams at Stratford *in Queensland's Desert Uplands*

Learning and feedback

For Robyn, the sites are invaluable for learning about the country and observing its changes, both seasonal and long-term. Although hours of mustering and watching the country provide her with a good idea of what's going on, 'memory just isn't that fantastic'. She finds the sites especially useful for monitoring woody vegetation dynamics, such as tree thickening and dieback: 'You think it's thickening, but it's great to have a photo to show it.'

Other sites allow Robyn to document the effect of Envirofund projects: 'To find out how land has recovered close to water and how pasture that's now close to water is going to be affected.' The monitoring record over time allows her to link land condition with grazing and rainfall. It also provides reliable feedback on decisions; for example, 'I had rested that country, and the photo sites really showed how it is coming back.'

Robyn also plans to set up other sites to monitor specific management interventions, such as controlled burns and fencing to land type: 'We're putting in water and fences now, so you really need to know how that country is responding to what you're doing to it.' She is conscious of the need to have 'control' sites for comparison: 'I've fenced off this escarpment, so I'll go and get some extra photo sites either side of it, so that I can see changes a bit more directly – so I can monitor it better.'

At the end of the day, Robyn just enjoys getting out there and having a look at the country: 'All monitoring makes you have a closer look – (it) makes you focus and get results. You learn a lot about your country while you're doing it, and about what the cattle are doing to your country.'

Proactive management

Monitoring sites can be a powerful reference tool, particularly when it comes to large

changes in management: 'Monitoring sites allow you to know what you've got and what happens when you change things.'

Robyn is able to reference rested paddocks against grazed ones, or take a photo after a long rest and track changes once grazing is resumed. In this way, monitoring and looking at photos can help to avoid over-utilisation of an area or paddock: 'I've been resting this country, so I'll use these photos as a reference site when I put the cattle back in, so I can tell "Am I starting to push it?"'.

A communication tool

As chair of the Desert Uplands Committee, Robyn is passionate about finding ways to communicate about land management issues. She sees monitoring, particularly repeat photos, as vital for this purpose:

'Photo sites are a tool for you to use to communicate with other people, be it agency people, family, anyone...I really do think it's important that enough people do it so we have a communication tool with the rest of the world.'

She also sees it as a way of showcasing sustainable grazing management:

'The Desert Uplands is 70% uncleared and it's a relatively intact ecosystem. We (graziers) actually deliver a lot of ecosystem services, but need to prove that; we need to prove that we are looking out for country and that we are monitoring...We have to justify what we do more and more, so we're going to have to have more and more sites.'

Challenges and opportunities

Robyn is quick to point out the challenges of monitoring – simply 'You never have enough time to do it'. The recent dry years have made it even harder: 'It's been hard lately with monitoring, because you think "This is a bad year, why am I measuring this? Bad again, bad again..."

However, Robyn believes that a simple monitoring system monitoring can be both effective and easy to maintain. Firstly, 'It's important to know why you want to do it and monitor the right things. If there is thickening, put in some sites. If you're going to burn, put in some sites before you burn.' On a fundamental level, 'you want all your land types covered and all the distances from water.'

Time lags and long-term value

Robyn stresses that monitoring is something you often do at a time when you don't need it. Because of this time lag, you may not realise the value of the photograph when you take it:

'You monitor in a period when you don't need it, but you need it later. Monitoring is really good when you get stuck, or when you think "has it been flogged?" or "how bad is it?", but your photos should have been taken earlier – it's no good taking it then. When you want to have the photographic reference is not when you want to take the photo.'

However, the value of monitoring photos grows exponentially over time:

'A lot of monitoring, where you think it's not important, long term it is. These sort of records become stronger over time, because it's that repetition and accumulation of data that makes them valuable.'

Robyn's commitment to monitoring on *Stratford* backs up her everyday observations and her passion for the land. She's right that while getting started with monitoring may initially seem daunting, the resulting information grows enormously in value over the longer term. Photos and data from monitoring sites also provide accurate communication information to others as required.

Jenny Milson - DPI&F GLM presenter

Dick O'Connell *Wombula/Yenloora*, Eulo

Dick and Donna O'Connell have owned *Yenloora*, south-west of Eulo, since 1984, and bought neighbouring *Wombula* in 1992. They manage their 175 000 acres of mulga, low dunefields and coolibah/gidgee channels as a single property, running a mixture of sheep and cattle.

Monitoring motivation

In 1994, over 40 monitoring sites were established across the property as part of the Safe Carrying Capacity project. About 15 additional sites were set up in 1998. Dick cites this project, combined with a Grazing for Profit course, as the major impetus behind establishing his sites. Initially, Dick concedes that he wasn't that keen on the idea of monitoring sites. He says 'The hip pocket nerve was involved and then it became interesting to me.'

At the sites...

Each site was originally marked by a blazed tree, with the photo direction noted. Now, all sites have been marked with two steel pickets, which has made the process of relocating and photographing them easier and more repeatable. As Dick says, 'You can send blind Freddy out there [to do the monitoring]'.

Dick has selected sites to represent the range of land types and management practices on the property. In particular, he has focussed on tracking areas where he has developed the country (either by clearing, sowing, blade-ploughing or pushing mulga). He intends to monitor these sites more regularly.

All sites on *Wombula* are photo sites only. It would be a much bigger job to record all sites, and Dick admits that he is put off by the complexities involved in some monitoring methods. However, he thinks that the photographic record is enhanced by broad comments or observations recorded at each site.

How often?

Sites were photographed initially in 1994, and revisited in 2005. During this round of monitoring, Dick earmarked 16 sites that he thought should be recorded every 1-2 years. In general, however, Dick believes that photographing sites every 5-10 years is generally sufficient to track how his country is changing.

However, timeframes will be different in different types of country. He concedes that by doing the sites annually it can become entrenched as a habit, rather than letting it slip: 'It's probably easier to do something annually because you can make it a habit – if you do something annually it's more likely to happen. [Otherwise] you run into this problem of "It never rains, it looks the bloody same, oh bugger it, I can't be bothered".'

'Worth a thousand words...'

Dick believes that photographs provide a simple and visual means of identifying and tracking changes: 'Data's good, but by gee you can see a lot quickly with photographs.' He speaks of the need for a factual, visual reference to be able to measure change. 'What happens now is that we can talk and you can find a person who knows a particular area, and he can tell you "it used to be open like this" and he can describe it, but in terms of really tracking changes, a visual is really handy.'

Monitoring allows him to 'track how the country's changing, what sorts of country are changing, and working out what we can do about it'.

Monitoring photos from Wombula *show the impact of season on ground cover*

Lessons learnt

The need for simplicity and a manageable number of sites have become very apparent to Dick during his years on *Wombula*. This will differ from property to property, but Dick says that '8 or 10 sites annually would be a very simple thing to set up.'

His advice to other producers who are thinking about setting up some sites is straightforward: 'Just do it, just start. Keep it simple, dead simple – even if it seems too simple.' For the O'Connells, this means two steel pegs at each site, about 10 m apart, and site numbers written on paper and stuck to a 20 L bucket at each site. He believes that one photo album per site would be the best way to store photos and make them easily accessible and comparable.

Myth versus monitoring

'It's a myth to think that you can monitor something when you're with it every day'.

Dick compares observations of his country to watching his children grow up – the changes are often so imperceptible that it's not until you see an old photo (or until someone else points it out) that you realise how much they have grown. As such, photographs allow you to see changes that your daily monitoring doesn't.

He believes it's easy to have your 'head in the sand' about how your country is going, whereas monitoring makes you take an objective look at your land and how it is changing. Although Dick drives around his property every day, it wasn't until he saw some old video footage taken in the early 1990s that he realised how much the 'green bush' (primarily hopbush and turkey bush) had thickened up.

We all used to say, "Oh the bushes have thickened up, they've done this and that", but until I looked at that video and went for a drive down that road, I hadn't realised how much they'd thickened up. It just hit me in the face that photographs, a visual record, were going to be one of the most graphic ways we could measure change and perhaps do something about it.'

A long-term view

Dick sees his monitoring as helping to 'put a big jigsaw together'. His interest in both the country and his hip pocket are behind his monitoring. 'I see myself as a grass manager more than a stock manager.' He is continually attempting to understand his country, how it changes and why, and use this knowledge in his management. He believes that long-term monitoring is pivotal in finding solutions to help arrest the decline in the productivity of mulga country: 'I enjoy the fact that it's going to help with finding solutions to the decline in this country – if you monitor and keep a record, it's going to help with eventually finding a sustainable solution and sustainable management practices.'

This photographic record and observations are a 'timeless resource', which can be passed on to his children or future owners of *Wombula*. 'My idea is that, eventually, we can see what the major changes are over a 10, 20, 30 year period. I want something that I can give to my children or the person I sell this place to and say "this is what I know about this country, and it's largely shown by these pictures". If I couldn't get it straight without those images, how the hell was I going to pass that on to someone verbally? It's impossible.'

Dick and Donna O'Connell have it all together when it comes to their monitoring system - simple, practical and informative. And Dick is right that you can't monitor something you see every day. To see the big picture on both management and seasonal changes and better grazing decisions you need to monitor.

Jane Hamilton - DPI&F GLM presenter

John Bethel *Huonfels*, Georgetown

A northern gulf enterprise

John Bethel has lived at *Huonfels* all his life, taking on full ownership in 2002. The property, situated in the northern gulf region is 36 000 hectares of mixed country, dominated by Georgetown granites with smaller, but important areas of lancewood, alluvial and red duplex soil country.

Huonfels is mainly a breeding enterprise with high grade *Bos indicus* turning off fat cattle as Jap ox, and stores mainly into the feedlots. Most turnoff is grown out on a downs block, and the business also incorporates a commercial Brahman stud and an Australian stockhorse stud.

How do you monitor?

A talk with John makes it clear that he wants to make the smartest decisions about his future that he can, and this seems to have lead him to his monitoring system. 'I wanted to be able to run a flexible stocking system and I needed objective measurements to back my decisions. It was using 'best guesses' that got us into strife in the first place. The traditional way was unsustainable and I saw that using the regional GIS capability together with GLM tools gave me the objective measurements that I needed to drive my flexible stocking system'.

John's monitoring system was installed in 2005, and uses photography and regular observations at permanently marked sites. 'We have six permanent sites currently set up with another twelve planned', he says. 'Its a straightforward layout, with two pegs about ten metres apart and aligned north – south. You take your photo from the same peg each time, pointing your camera at the other peg'.

All sites have their location recorded with a GPS, and a simple paddock sheet is filled out each time using part of the GLM toolkit to record pasture yield, the main grass and legume species, weeds and tree basal area. 'I visit the sites twice a year – at the end of the wet season and the end of the dry season', he says.

An eye to the future

One of the big mistakes people make with monitoring is to collect the information, but never use it. John has made sure the information he collects inform his decisions.

'I monitor key soil types in paddocks to get an average result across that paddock. I then use those results for my forage budgeting and to assess the trend in land condition' he says.

He has also been smart about his monitoring and involved his kids in the work. This gives them an interest in the outcome of the monitoring and a better understanding of how their country works for them. 'It has been good for the kids to see what was going on and what really drives our grazing enterprise. They've learnt that pastures are not all feed, and that different species can have different values'. Its an important experience for the next generation that will serve *Huonfels* into the future.

Huonfels has also recently participated in a trial of the VegMachine software on his property. The software gives him access to satellite measurements of ground cover across much of his property over the last 20 years, so that he can see how ground cover has changed there over that time. 'It's been an interesting experience', says John. 'In may cases you can see how a past decisions have impacted on ground cover, so you get some feedback on how well that decision worked for you. I

John Bethel of Huonfels near Georgetown

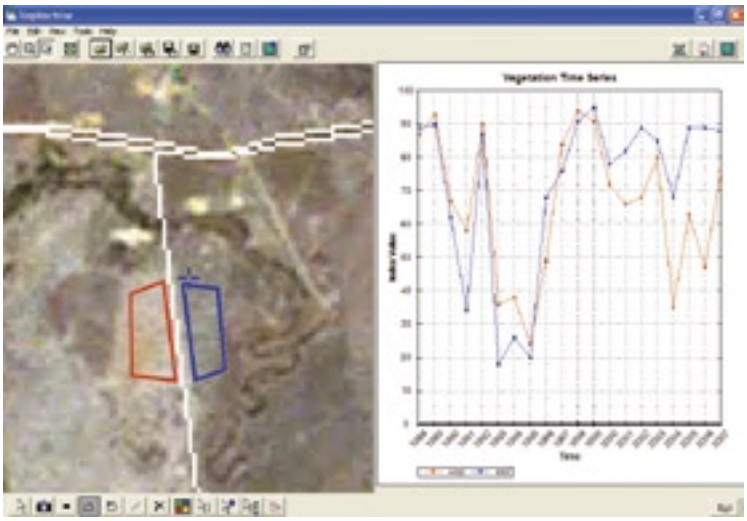
use the satellite information with my ground monitoring sites. They complement one another to give me better information for my enterprise'.

Yes - its worth the effort

John admits that monitoring twice a year is yet another commitment he has to make to his already busy enterprise. Despite this, he is clear on two points about his monitoring – it needs to be done right, and it is worth the effort.

'It can be difficult just making the time, but monitoring needs to be done with rigor so that it stands up to scrutiny. We actually stop, look into the paddock and record the things we see – perennials, annuals, weeds. If we only drove around we would only see a quantity of feed and that is misleading'.

'We now have a good idea of when feed might run out or if we have enough to make it through to the next wet season. My monitoring records are worth their weight in gold to me, and along with my fencing and water developments, my spelling and small rotational grazing program, the monitoring records are a critical part of my business'.



VegMachine™ software in action. VegMachine uses series of satellite images to measure and graph multi-decade changes in ground cover in user specified areas. This example shows how cover in the west (red) polygon declines dramatically below that in the east (blue) polygon from around 2001. While VegMachine can't explain why, these kind of insights can be combined with local manager knowledge to give important feedback on the management strategies (Note: this example not from Huonfels).

For John, understanding grazing practices and their impact on land condition was the biggest step. His monitoring helps him to recognise healthy pasture systems and to invest in infrastructure to spell and rehabilitate problem areas. Monitoring informs many of the land condition and productivity improvements on *Huonfels*.

Kev Shaw - DPI&F GLM presenter

North Australian Pastoral Company (NAPCO)

Boomarra, Cloncurry & *Monkira*, Bedourie

NAPCO background

The North Australian Pastoral Company (NAPCO) is one of Australia's largest beef producers. There are 14 NAPCO stations (plus one feedlot) across Queensland and the Northern Territory, covering about 6 million hectares. Delphine Puxty is General Manager of Corporate Development at NAPCO, and has been heavily involved in establishing and maintaining the monitoring system. Fred and Carmel Shephard have been managers on NAPCO station *Boomarra*, north of Cloncurry, since 1986, while Anthony and Deb Desreaux have been on *Monkira* in Queensland's Channel Country since 2002.

Monitoring overview

NAPCO has ground monitoring sites on every property. GRASSCheck sites were set up across NAPCO's properties a number of years ago, as part of the Safe Carrying Capacity project. Some properties had lots of sites, which were cut down to a more manageable and practical number of about 10-15 sites per property, depending on their size.

Site design

Sites were selected in representative areas of the property, and at a moderate distance from water. This allows inferences to be drawn about the 'bigger picture' of the property. NAPCO found that the GRASSCheck methodology was taking too long – managers didn't want to be out in the paddock throwing quadrats around. NAPCO now uses a modified GRASSCheck methodology, where key factors such as biomass, pasture growth phase and evidence of soil erosion are recorded on a straightforward sheet. As Delphine says, 'we're not terribly scientific'. One section of this sheet is shown opposite.

Delphine Puxty and Fred Shephard recording Boomarra *monitoring sites in 2004*

Each site consists of two steel pegs, with photos taken in the same direction each year.

In general, sites are visited once a year, at the end of the growing season in late summer/early autumn. Anthony and Deb Desreaux from *Monkira* do the sites together and, even with sites spread across the 370 000 hectare property, monitoring only takes two half-days. Deb suggests that having a manageable number of sites in accessible localities, such as along water runs, makes monitoring easier and more likely to be kept up.

Initial aims

The sites are designed to be long-term reference sites, and many have now been in for 10-12 years. The initial impetus behind setting up sites was to benchmark carrying capacity on each NAPCO property. The company also recognised the importance of long-term records to justify management approaches.

Education and understanding

However, Delphine says that value of the sites as a means of improving understanding and knowledge has become increasingly apparent: 'We want (the property managers) to interpret the data and look for trends, and make decisions from that.' Managers enjoy looking at the comparisons between years in the photos. Deb says that 'It is interesting to look back through the photos when we do the

monitoring and see the different pasture and tree growth.'

Delphine concedes that it can be difficult to get people motivated to visit sites, especially during busy and dry times ('there's no point, there's not much there to take a photo of' being a common claim). However, she points out that this is perhaps the best time to record pasture condition, and then track its subsequent recovery. She cites times when managers have skipped a site visit, only to wish the next year that they'd got that photo to document what was going on and 'keep the sequence'. At the end of the day, 'some (managers) find it really interesting, some find it a bit of a chore that they know they have to do', but NAPCO is convinced of the benefits of monitoring.

Links to management

Monitoring data does not feed directly into NAPCO management decisions, as it is very hard to generalise from a site to a whole paddock. The managers of both *Boomarra* and *Monkira* are quick to point out that management is 'not that black and white'. However, NAPCO has found that regular monitoring makes their managers even more aware of their land, and these observations improve decision-making. In this way, monitoring has a strong link with management.

Managers also keep an eye on the 'bigger picture' which is not encompassed in site monitoring, including identifying areas that appear to be more heavily grazed. This constant but 'informal' monitoring is very important, especially in paddocks with a mixture of land types. This is where Delphine thinks the 'Stocktake' methodology is very useful, because it is uses a whole-of-paddock approach.

Potential of satellite imagery

Delphine has thought a lot about how monitoring can be used more effectively: 'The scale is so huge, we can't rely solely on point data'. She is interested in the potential of satellite imagery, especially in terms of

Pasture Monitoring Assessment Sheet

3. Paddock details			
Paddock area			
Grazing system	☐ Continuous ☐ Rotational ☐ Cell ☐ Other:		
Mineral deficiencies	☐ Phosphorus ☐ Salt ☐ Sulphur ☐ Unsure ☐ Other:		
Major land types			
Main pasture species	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Main browse species	1 2 3	1 2 3	1 2 3
Rainfall last wet season	☐ above average ☐ average ☐ below average		
Paddock history (enter dates)	Burnt: Flooded:	Destocked: Restocked:	

'pin-pointing' areas that need to be looked at on the ground. With consecutive years of imagery, NAPCO will be in a position to ask managers what is going on in certain years, and work to develop strategies to deal with such changes (e.g. 'What's going on in this corner, it's dropped suddenly over the past couple of years?).

Two NAPCO properties have recently been involved in a VegMachine trial, through DPI&F's Grazing Land Management project. VegMachine uses satellite imagery to track groundcover changes in certain areas or paddocks over the past 20 years, and allows these areas to be compared to a regional average.

Passing on the knowledge

More than 10 years of monitoring data has allowed NAPCO and their managers to build up a rich understanding of each of their properties and the lands' capabilities and responses. As Anthony says, 'It's fine to say we know, but better to keep a record.' This record of pasture changes and seasonal fluctuations acquires increasing value with time, as shown by the selection of photos below, taken over a 15-year timeframe, from one of the *Boomarra* monitoring sites.

Delphine considers it extremely valuable to track pasture changes, particularly recovery due to management – 'to have some

A series of monitoring photos from Boomarra *(1997-2008)*

documentation of 'that's what it used to look like, now look at it'.

In particular, the photos have proved important in retaining property knowledge for new managers. Anthony points out that 'These days, managers are not staying in one spot for much time, so knowledge and skills are not being built up – they're not going to see the range of seasons.' As a result, new managers are going to rely on information from past records. This to Anthony is perhaps the most valuable part of monitoring: 'If someone comes after us, we can show them the photos and what the country can look like in different seasons.' Carmel Shepherd reinforces this vision: 'I think it will be interesting and useful as a long-term reference.'

It is great that NAPCO regularly monitors their pasture. Monitoring needs to tie in with the management work loads and NAPCO have done a great job of designing a monitoring program that is simple and meets the busy demands of land managers. Monitoring needs to be consistent too – another feature of the work NAPCO are doing.

Caroline Sandral - DPI&F GLM presenter

You can do it too

So now you've read the stories of managers who manage with the benefit of good monitoring. Interested in trying your hand? Here is quick guide to monitoring that you can try. It's a simple monitoring system based on photographs and some basic records of what you observe at each site.

1. What do you want to know?

What do you want to learn from your monitoring? This is important because it will determine where you put your monitoring sites. Focus on what you are interested in and what is important to your enterprise. Your questions might include:

- Is the condition of this paddock changing?
- Is my management affecting ground cover?
- Are trees and shrubs increasing in my grassland?
- What impact has a fire had on my grasses?

2. Pick your sites

Selecting sites is easy. All you have to do is select places that are typical of the area you were asking questions about in step 1. So for example, if your question is about a particular paddock, pick an area that has typical grazing pressure, tree cover, pasture etc for that paddock.

If you want to understand the impact of something that has had a localised effect like fire (or paddock resting, different livestock etc) then you will need two sites. Place one where the impact occurred (i.e. an area typical the burnt area) and the other in similar country nearby that was not burnt. You can then compare the results from the two sites to assess the impact of the fire.

The number of sites you use is up to you. Its probably better to set up a small number, maybe half a dozen to start with. This will be easier to maintain over a number of years, and you'll get a lot more from five sites you record annually for five years than 25 sites you set up and never visit again.

3. Photos and more

The old adage 'a picture is worth a thousand words' certainly rings true in the world of monitoring. The simplest form of monitoring is a photo accompanied by some basic observations to help you interpret the photographic record later on. That's what we recommend you start with here.

Appendix 1 shows you the layout of a Stocktake monitoring site and how to photograph it. We recommend this method. It is based on sites marked by two permanent posts, with the posts ensuring you photograph exactly the same area each time. Be consistent about the season you photograph in. Either the end of the growing (April) or dry season (September) is a good time depending on the questions you are trying to answer.

The observations you make at the time you take the photo should relate to your questions. They can relate to the current condition of the area (abundance 3P grasses, weed abundance, ABCD land condition rating etc), or the circumstances that may influence that condition (e.g. rainfall, stocking rates, fire history, new dams and fences). Remember though to be consistent and make the same observations at each site. It will make comparisons much more easy.

4. Hang onto your records

Monitoring records have a habit of getting misplaced, so get this stuff organised. Store the photo and the observations you made with it together. A 'monitoring folder' (paper or on your computer) is worth setting up. Remember monitoring is long term, if you're going to be using these photos in 10 years, you'll need to know where they are.

5. Use it or lose it

You didn't do this work to fill a folder, so make sure you use the records you take. Each time you have a new set of photos, compare them to your old ones. The key here is to ask those questions of your monitoring. Are things changing as much as you expect? If not, what are the surprises? Is there anything in your notes that can help explain what you see? The more you do this, the more likely you are to get answers, and make better management decisions.

6. Persevere

The rangelands of western Queensland can change very slowly, and you probably won't see many changes for the first few years. But even small changes can have big long term impacts on your enterprise (think of the beginning of tree thickening or pasture recovery), and the slower these changes are, the more likely that monitoring will be the first indicator to tell you whether those feathers you are looking at belong to feather duster or a rooster! The point is to persevere like the people you have read about here, and you will enjoy the benefits.

For more information

There are plenty of people who can help you get started. If you want more information you can contact DPI&F on 13 25 23 and ask to speak to someone about either Grazing Land Management or Stocktake workshops. Both will teach you more about the best way to monitor your property.

Alternatively, you can contact your regional natural resource management group. These groups can also provide advice on monitoring as well as providing a range of resources for property monitoring and management. Contact information is given below.

Desert Channels Queensland
PO Box 601 Longreach Qld 4730
Phone: 4658 0600
Email: admin@dcq.org.au

Desert Uplands Build-up and Development Strategy Committee
PO Box 310 Barcaldine Qld 4725
Phone: 1800 007 807

Northern Gulf Resource Management Group
PO Box 63, Georgetown Queensland 4871.
Phone: 4062 1330
Email: ngrmg@bigpond.com

South West Natural Resource Management
66 Galatea Street Charleville Qld 4470
Phone: 4654 7382
Email: swnrm@southwestnrm.org.au

Southern Gulf Catchments
PO Box 2211 Mount Isa Qld 4825
Phone: 1800 676 242
Email: admin@southerngulf.com.au

Appendix 1
Stocktake photo monitoring (© DPI&F 2004)

TAKING PHOTOS

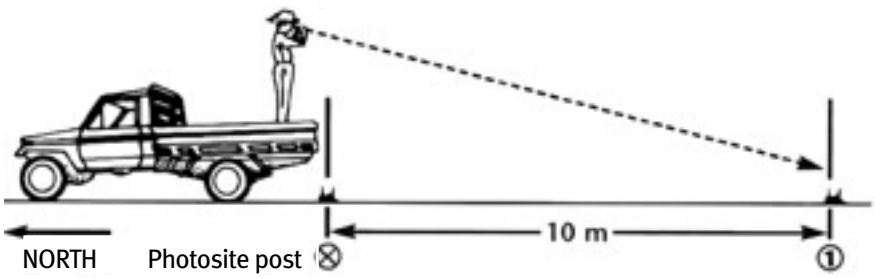
Photos should be taken every time you do a land type condition assessment. The best photos are taken on a clear day with the sun behind you, between 9am and 3pm with colour print film or digital camera. Two photos are taken at each photo point; a trayback photo and a landscape photo. Photos taken from the trayback of a ute, looking down into the pasture, visually capture soil, pasture and forage condition. Landscape orientated photos pick up the general condition of the site, showing major changes in shrub and tree populations.

Some graziers like to write the site name and date on a small sign for inclusion in photographs. A small chalkboard or whiteboard is suitable for this. Cameras that print the date on the photograph may also help with record keeping.

Photos should either be scanned and stored in the database, or, kept in plastic holders with the monitoring record.

The trayback photo

1. Park your vehicle beside the photosite post and stand on the back with the camera so you are looking south.
2. Position the **base** of the post (numbered 1 in the figure below) in the middle of the viewfinder, focus on the pasture, make sure the picture is level and take the photo.



An alternative to standing on the back of a ute is to stand on a small stepladder or drum to take the photo.

The landscape photo

1. Stand on the ground close to the photosite post (don't get it in the photo) and line it up with post 1 (see figure below). Position the **top** of post 1 in the top of the viewfinder, focus on infinity, make sure the picture is level and take the photo.