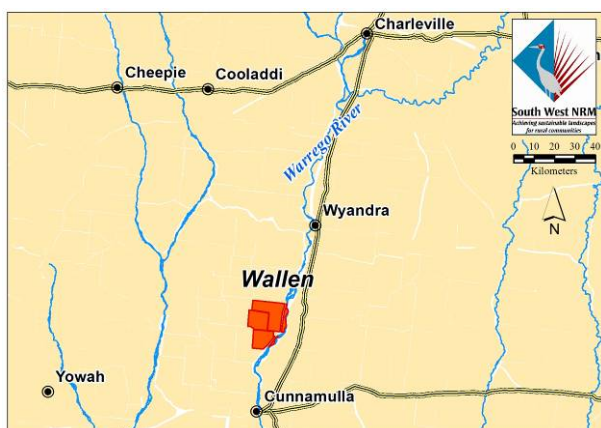


Case study: Managing water and grazing in Warrego floodplain and mulga country

Over several decades, Andrew and Kathy Schmidt of 'Wallen', on the Warrego River north of Cunnamulla, have invested in complementary strategies to manage water and animals in their grazing enterprise. By increasing their control of flowing water and livestock habits, benefits have occurred for sustainable production, biodiversity and the condition of riverine and other wetland systems.

Wallen on the Warrego

The Wallen lease* covers 31,280ha and is situated between Cunnamulla and Wyandra, immediately west of the Warrego River. It includes floodplain (river frontage and floodways) with deep cracking clay as well as uplands with red soil and some rocky jump-ups.



Red country, occupying around 60% of Wallen, mainly supports mulga and poplar box, whereas gidgee occurs in the fringing run-on areas. Around 25% of Wallen is blacksoil, supporting Mitchell grass and Queensland bluegrass. Other features add diversity: river red gums, coolibahs and melaleucas in the river channels; Callitris native pine on lowland sandy patches and some yapunyah on the southern flats.

Rainfall at Wallen averages 378mm per year, but during the 5 years from 2007-2011 annual rainfall was mostly above average (355-801mm) and 2012 had a very good start. Years of drought with less than 100mm have occurred, for example, only 88mm fell in 1 year of the early 2000s.

* Grazing Homestead Perpetual Lease



Permanent waterhole, Warrego River; a previous drinking place for numerous sheep and cattle.

The grazing enterprise

Livestock grazing began at Wallen in the 1870s and the original homestead was built in the following decade. Only cattle were run at first, then high numbers of sheep. Due to overgrazing, the land condition was poor by the mid-20th century.

Andrew ('Bean') Schmidt and wife Kathy took over Wallen in 1979. Andrew grew up in the local area and consequently had a well developed understanding of the country and its challenges.

Their present grazing enterprise, in the context of a run of good years, includes 5400-6000 head of Merino sheep and 800 head of cattle. Sheep breeding is for harvesting of wool and selling sheep at 'cast for age'¹; cattle are bred and fattened. Feral goats are also a harvested resource.

¹ Cast for age means sheep are cast out of the flock, typically at 5-6 years of age depending on lambing rates. Sheep can also be cast out of the flock if they have poor quality wool or other undesirable traits.

Stock are run on a semi-rotational grazing basis; this provides the country its best chance to respond to seasonal changes. Stock numbers are adjusted according to seasons and land condition.

The Schmidts employ additional workers for shearing, crutching and mustering for short periods. In total, this is equivalent to about 1 person for 5 months each year.

Wetlands and biodiversity

The Warrego River is the dominant wetland feature at Wallen, forming its eastern edge. There are permanent waterholes in the main channel, notably near the airstrip, at a gazetted reserve and in the south-east corner of Wallen.

The river flows nearly every year. Andrew recalls:

'The biggest flood at Wallen was in 1990 and major floods in the last 3 years 2010, 2011 and 2012 have been among the top 10 ever recorded at Wallen.'



Depressions with Queensland bluebush and native tussock grasses on the Wallen floodplain may be inundated by major floods of the Warrego River.

Secondary channels, shallow floodways and temporary marshes occur across the floodplain country. They become inundated, for weeks or months at best, when major floods rise above the Warrego's main channel (certainly not every year). After intense rain events at Wallen, creeks deliver water from the gently sloped red country to the floodplain edge, continuing into frontage creeks and filling small depressions. Water persists in several depressions due to constructed inflow drains and retention banks. The Brumby Creek system in the western part of Wallen delivers floodwater to the Paroo River rather than to the Warrego.

Channels and floodways are densely to sparsely timbered and, under favourable conditions, tall tussocks of umbrella canegrass *Leptochloa digitaria* and Warrego summer grass *Paspalidium jubiflorum* may be prevalent. Cockey's lucerne and other native forbs are valuable livestock feed. Treeless swamps are vegetated with low shrubs of lignum *Muehlenbeckia florulenta*,

Queensland bluebush *Chenopodium auricomum*, seasonal thickets of budda pea *Aeschynomene indica*, dense swards of short sedge *Eleocharis plana* and/or tussock grasses.

As yet, no systematic studies of all flora and fauna on Wallen have been conducted but preliminary work indicates substantial biodiversity is present. Over 80 bird species have been recorded and likely well over 100 occur. Brolgas nest in the swamps; Major Mitchell Cockatoos inhabit mulga; Black-breasted Buzzards patrol the river and plain; and occasionally hundreds of Flock Bronzewing pigeons visit the Mitchell grasslands.

Monitoring plots were set up by the Department of Primary Industries in the 1980s in bare upland country at Wallen. These have informed Andrew and Kathy about patterns of vegetation recovery after drought, once grazing animals have been excluded by fences.

Strategies for natural resource management on Wallen

In mid-2012, Wallen was in good shape due to extensive ground cover, often 100%, in the frontage and river country and there was useful stock feed among the mulga trees. This reflected a run of good rain/flood years as well as the results of Andrew and Kathy's strategies for land and resource management. But in the past, the blacksoil plains have sometimes been bare.

Andrew and Kathy Schmidt have applied several integrated strategies over the past 33 years to optimise production and land condition on Wallen.

A major focus has been on changing the habits of sheep. Andrew explains:

'We aim to divert them from areas that they tend to habitually overuse and mix them into multiple paddocks to reduce overall impact on ground cover.'

The Schmidts intend to fence all their creeks and waterways to alleviate grazing pressure on sweeter pastures; this work is about 60% complete. Presently, Wallen has 9 major paddocks and 5 holding paddocks; more paddocks will be subdivided.

The other major strategy has been to stabilise soil and thus ground cover by reducing erosion and siltation. Simple, small-scale interventions to slow and spread water that otherwise scours, have been applied in red country. And river banks erode less in floods if ground cover and other vegetation are protected from grazing.

Andrew spends significant amounts of time baiting pigs, foxes and wild dogs; wild dogs are an escalating problem in the Mulga Lands. Weeds, notably Noogoora burr (in the riparian zone), occur but are not a primary concern.



Warrego flood channel on Wallen, with dense cover of native tussock grasses.

Bore capping project

Grazing in Wallen's red country was enhanced in the mid 1930s by sinking of 2 artesian bores. Water flowed continuously into a 60km network of open bore drains. However, the system was inefficient: Andrew explains this further:

'There was about 90% water loss from the drains [due to evaporation and infiltration] and water escaping the drains led to formation of erosion gullies. Also, it cost about 1 month of work every year to remove silt and weeds from the drains.'

Drains were cleared laboriously by dragging a 'delver'², a purpose-built piece of machinery.

Based on long experience, Andrew developed a basic philosophy for water and grazing in the Mulga Lands:

'Once you get control of your water, you can control your land.'

This was implemented in 2 steps. First, in 1989, the western bore was capped as a self-funded initiative and some piping was installed.



Stock grazing in newly fenced paddock

In 1996-97 the eastern bore was capped under the Great Artesian Basin Sustainability Initiative (GABSI). The drains were shut down and water was piped from the bore to several mulga paddocks, through a network of poly pipes and new watering points.

Importantly, having a new watering system was a prerequisite to fencing out the riparian zones. Stock had previously depended heavily on drinking from the river, where they were difficult to muster and damaged the banks. And the sheep overgrazed the nearby frontage pasture, especially in the windward south-eastern corners of paddocks.

Although the cost-benefit for enhancing mulga country was considered lower than for the more productive frontage country, the plan was to control water and improve the sustainability of all of the paddocks.



The eastern capped bore. Piping of Wallen's bore water to new watering points facilitated projects to exclude stock from damaged natural waterholes.

Riparian fencing projects

Andrew and Kathy continued fencing out the Warrego River once the bore capping and piping was partly completed. The riparian zone needed a chance to recover after many decades of stock concentration.

Under the River Reach program of the former Natural Heritage Trust, funds were secured to assist with 2 fencing projects along the river. Some fencing costs were self funded. Fencing of about 2km of main river channel and adjacent floodways near the airstrip was completed in 2002. A similar length was fenced out at the 'Reserve waterhole' in 2006 and alternative watering points were established on the floodplain grassland well away from the river. About 3 km of poly pipes were connected to the previously established bore-fed network.

The Schmidt's also received an Envirofund grant to fence out parts of Brumby Creek, in mulga in the west of Wallen. Work is planned to begin in 2013.

² A delver is an arrow shaped blade plough that was used to clear bore drains of debris.



Fencing to exclude stock from degraded riparian country has enhanced recovery of native grasses.

Water spreading project

The most recent resource management project at Wallen was established to control water flow on gentle but erodible slopes and restore ground cover of upland pasture grasses. Andrew explained the concept:

'By constructing low banks that follow the contours of the slope, we can temporarily trap and spread water from heavy rain events and increase grass cover.'

Down-slope flow would be slowed and the erosive effect of rushing water would be reduced.

Andrew targeted Ridge Paddock, a holding paddock for shearing, where hard ground had become unproductive and eroded through historical overgrazing and was overgrown with turkey bush (see box below) and serpentine bush. An area of around 60ha was selected for a trial, where fencing had been enhanced to control grazing pressure. With less stock and ferals watering near or adjacent to the contour banks, particularly in the early stages, the water spreading project was expected to deliver best possible outcomes such as increased infiltration.

Green turkey bush

Green turkey bush *Eremophila gilesii* is a native plant that has become a woody weed for graziers in the Mulga Lands, extending over more than 1 million ha in the Warrego and Paroo catchments. Increased density of stands of turkey bush is considered to be an indirect consequence of overgrazing that occurred many years ago when sheep numbers were very high. Although turkey bush may be browsed by livestock during prolonged drought, dense stands exclude pasture grasses that are preferred for grazing enterprises. Biological control by grasshoppers was considered by industry researchers in the 1970s but was found to be unsuitable. However, reduction of run-off and increased infiltration of rainfall seems to halt or reverse the spread and thickening of turkey bush stands, by giving better growing conditions for native pasture grasses.



Low banks following contours across erosion prone upland are designed to slow and spread flowing water and promote the return of palatable grasses.

Experience was drawn from a field day at a 2010 Rangelands Conference and work at Wallen started in September 2011. Eight banks from 400 to 1200m in length were constructed using a bulldozer and grader. Andrew used a hand-held laser leveller to maintain accuracy in alignment of the banks, especially around obstacles, to ensure even water spreading. Minor adjustments were made to the structures after observation of the water spreading system in action.



Untreated areas with high cover of turkey bush and other woody plants, to the exclusion of grasses.

Funding from South West NRM helped kick-start the project and will cover about 15% of overall costs. Two additional, larger sites in the mid-north of Wallen have been targeted for treatment under this project.

To evaluate the effectiveness and outcomes of the project, South West NRM has helped Andrew and Kathy collect baseline data beforehand, perform monitoring and interpret and report on the results. Monitoring will determine ground cover response, presence of pasture species, biodiversity, and production benefits on the project site. Methods include use of transects and photo points, measurement of standing dry mass, use of grazing charts and stocktake monitoring. Monitoring

also has been set up in other paddocks, to enable comparisons across the property.

Erosion control project

In Riverside Paddock, erosion gullies run from some of the hard mulga country into the 'run-on' zone where the upland and the floodplain meet. Formerly, overflowing bore drains were a major cause of the gullies, which perpetuated loss of soil and ground cover.

With 50% funding support from an Envirofund grant, Andrew has constructed banks to spread water sideways and enhance pasture grasses immediately up-slope and in the beds of the former gullies. Non-native, self-sown buffel grass has been effective as a colonising grass, stabilising the soil soon after intervention.



Buffel grass taking hold in the bed of an erosion gully that has been blocked by a cross bank.

Benefits for production and wetlands

Achieving benefits both for the business and for wetlands is a balancing act in this part of the world as it takes time to fully realise benefits. Some of the projects for natural resource management at Wallen have already shown tangible benefits whereas the benefits of other projects will be most evident in the longer term.

Overall, the suite of projects undertaken by Andrew and Kathy has cumulatively achieved savings on time and labour for the business enterprises at Wallen. Andrew advises:

'Vastly more efficient use of bore water and delivery to more watering points has helped grazing production and sustainability by redistributing and reducing grazing impacts on ground cover.'



Stock have been fenced out of the 'airstrip waterhole'; control of stock access will eventually extend to the entire Warrego River frontage at Wallen.

In the river country, greater control including exclusion of stock is leading to better ground cover, return of perennial native grasses and easier mustering. The waterholes and other riverine wetlands will be less subjected to bank erosion and sediment infill and water quality should be enhanced, due to the improved ground cover.

In the red soil country, increased grass cover immediately behind the water spreading contour banks and in the beds of erosion gullies ensures less erosion than in previous decades. By reducing the unnatural domination of turkey bush, the original diversity of the country is gradually restored. With greater feed availability and soil stabilisation, a more productive grazing enterprise is achieved. As water spreading does not reduce overall total run-off volumes, adjacent waterways won't suffer significantly from a lack of water that might negatively impact a range of wetland values.



Eleocharis sedge swamp in the run-on zone between upland and floodplain; erosion control achieved in the local catchment reduces siltation of wetlands and rivers.

Direct benefits for biodiversity include return or increase of native grassland species such as curly Mitchell grass and Queensland bluegrass on blacksoil

country and mulga Mitchell grass in upland red country. This in turn improves the habitat on Wallen for grassland birds such as button-quail and bustards and for predators such as Spotted Harrier.

Cost-benefit analysis

The range of land management projects undertaken at Wallen over the past 3 decades have sought to improve stock management and ground cover. These improvements have led to improved profitability and an overall ease of property management (see Table 1).

The total cost of implementing the projects is \$400,000 has been outlaid to deliver the projects over the 30-year period³.

Bore capping and water distribution

Capping of the bores and providing stock with better access to water is saving about \$14,000 per year of labour and \$1250 per year in machinery repairs and maintenance.

A reduction of contaminants in the wool from sheep not having to access creeks and gullies for water has improved wool clip quality with the price per bale increasing by 10%.

Fencing projects

The suite of fencing projects has impacted the bottom line in a number of ways. The main impact has been a 50% reduction per year in mustering costs, previously mustering required aircraft and the use of several contractors. As stock are now concentrated around watering points the majority of mustering is now able to be handled by the Schmidt's.

The lambing rates have increased from 3-5% due to access to cleaner water and the improvement in sheep behaviour.

Fencing out large gullies and sections of the Warrego River including fencing of the dams has reduced stock injuries and death by 5 per year.

Feral animal management has improved as the fenced dams and other watering points allow a more targeted baiting program.

Table 1: Benefits from undertaking the water and fencing projects at Wallen

Project	Benefits	Quantifiable benefits	Notes
Bore capping and water trough projects	<ul style="list-style-type: none"> Reduced labour requirement Reduced bore drain maintenance Reduced machinery repair costs Cleaner wool clip 	<ul style="list-style-type: none"> \$14,000 per year in contract labour saved \$1250 per year saved in machinery costs Price per bale increased by 10% 	<p>Reduction of up to 70 days of contract labour required for maintenance of bore drains</p> <p>Machinery costs (FORM) includes fuel at \$1.50 litre and 10% reduction in oil and repair costs</p> <p>Reduced contaminants in wool clip due to stock not having to access creeks for water.</p>
Fencing projects	<ul style="list-style-type: none"> Reduced stock injuries/deaths Improved lambing rates Better mustering efficiency Improved feral animal management (targeted baiting) Improved ground cover management 	<ul style="list-style-type: none"> Stock deaths reduced by 5 per year Lambing rates increase of 3-5% Mustering costs reduced by 50% per year 	<p>Fewer animals becoming trapped/bogged or sustaining injuries</p> <p>Lambing rates improve from better paddock layouts, shelter, improved ewe health, feral animal management etc.</p> <p>Mustering more efficient as stock now concentrated around water points</p>

³ Project costs over the 30-year period have been accounted for by compounding past benefits and costs to present monetary values.

Conclusions

With time, careful planning of complementary management actions and working with regional NRM staff, land condition can be improved markedly in the Warrego floodplain and mulga country.

Andrew Schmidt advises:

'Focus on grass cover first, before other land improvements, because pasture sustains the farm business which in turn enables all land management to be undertaken.'

'Even where condition is initially poor, assume something will grow in your country and that prices will get better!'

Improvement of land condition contributes to better condition of creeks/rivers and other wetlands, and their biodiversity, in highly variable landscapes.

Acknowledgments

The generous cooperation and support of Andrew and Kathy Schmidt is gratefully acknowledged. Neil Judd, Julie Frousheger, Victoria Haig, Tom Judge and other staff of South West NRM assisted with planning, materials, advice and site visits.



The Queensland Wetlands Program supports projects and activities that result in long-term benefits to the sustainable management, wise use and protection of wetlands in Queensland. The tools developed by the Program help wetlands landholders, managers and decision makers in government and industry. The Program is a joint initiative of the Australian and Queensland governments.

Contact wetlands@ehp.qld.gov.au
or visit www.wetlandinfo.ehp.qld.gov.au

QWP/2012/04 (updated 2013)