# Recovery, Restoration and Resilience in Mulga and Channel Country

A GrazingFutures Case Study

## Background

An 83,000 hectare property located in the Thargomindah area of the Bulloo Shire spans across both Thargomindah Mulga Lands and Channel Country Bioregions. The soft mulga country is managed as a grazing enterprise, currently stocking 10,000 head of sheep and 1500 head of cattle. Historically, floodplain sections produced some of the best pasture on the property, however following years of low rainfall, productivity had reduced dramatically.

## Overview

Following years of low rainfall, sections of the property were experiencing significant degradation. The land manager, who wishes to remain anonymous, commented “We had 3 years in a row of only 4 inches (10 cm) of rain each year. Even though we are only a 10-inch rainfall area you can’t really survive on that”.

Drought, grazing pressure, and erosion have resulted in a loss of grazing area and further erosion in flood plain country that has turned former high quality native grassland/flood out areas to dry arid land that washes away in big rain events. Over time with loss of groundcover due to total grazing pressure, increasingly extreme weather events and drought, the natural surface, channels and overland water flows have been disrupted and erosion is destabilising floodplains and channels. Despite the installation of exclusion fencing 2 years ago, overall grazing pressure has not been reduced largely owing to grazing by native fauna and scalding and the formation of significant erosion features has resulted in continued pasture losses.

The erosion has resulted in a channel forming through the landscape. Overland flow from rainfall travels at a greater speed in a narrow channel rather than dissipating across the ground, which would allow the water to soak into soils. The reduction in water retention pasture to grow, and in turn holding soils in place protecting them from wind and water erosion.

“We realised that this country wasn’t doing what it used to do in terms of stocking rates. Step one was the exclusion fence to get control over total grazing pressure, but we still must get it all (the flood plain) back functioning (and productive) again”.

The land manager attended the Avondale Landscape Restoration Field Day (a GrazingFutures funded event) and found the day extremely informative. The landholder initially attended the day to learn more about the outcomes that the other land manager had achieved through utilising direct action techniques for pasture rehabilitation and drought resilience. While the content of the presentation on the day was not suited to their own operation, the land manager learned that similar methods more suited to their property would be a definite step in the right direction.

## Methods Used

The land manager commented that seeing just how much high production country was disappearing and not coming back when it rained was the trigger for change. Planning for changes started after attending the GrazingFutures Avondale landscape restoration field day on 23 August 2019. Shortly after this event and following on from the land manager’s active expression of interest in rejuvenation and resilience works, Southern Queensland Landscapes staff visited the property in December 2019 to discuss the possibility for involvement in a pasture-rejuvenation and erosion-control project.

During this visit two sites were identified to be of most concern. These trial sites covered 202 hectares and 526 hectares respectively, totalling 728 hectares. It was decided that it would be best to utilise timber windrows and contour banks to slow the velocity of overland flows and enable a greater level of infiltration to support re-establishment of groundcover.

The property visit resulted in the development of a multifaceted plan to rehabilitate the two trial sites. The approaches for each site and rationale behind application of each approach are outlined below.

*Trial Site 1 - Construction of Two Leaky Weirs Across 202 Hectares*

The site was identified as a good candidate for this approach with easy and safe access to the site to gain control of unnatural fast flow and loss of soil and nutrients. Installation of leaky weirs on this site was anticipated to be incredibly low-cost with an expected high return on investment. Leaky weirs only need to lift water approximately 15cm on the flat or 30cm where some erosion had started in choke points and could be formed up using a mix of onsite previously pushed mulga, or local stone.

It was identified that the land manger had access to a D6 dozer with 20ft stick rake (suitable if using timber), and a 6-tonne tip truck and loader (suitable if using stone). Access to plant and equipment onsite, along with onsite and local materials availability, meant that the only additional inputs the land manager required to undertake the works was use of a laser level and additional technical advice. The technical advice sought was assistance in developing the leaky weir designs and placement. To achieve maximum success from the placement and design of the leaky weirs, they needed to successfully slow the exit flow of water long enough for the floodplain to fill, and for native vegetation to re-establish.

In its current damaged state, the floodplain drains in about 6 hours following either a large or small flood. The land manager recalled that photos taken following the last good season showed that the flat had managed to grass up and slow the flow (of water) naturally. The slowed water ran clear as sediment was trapped in grass, and the floodplain took a week to drain instead of 6 hours.

The timber weirs began construction in February 2021, with five timber weirs completed on the property thus far. It is estimated that these works will have a beneficial impact on between 1416 and 1619 hectares of land. Livestock are still kept away from the affected areas to encourage restoration and limit damage to banks.

*Trial Site 2 – Low Profile Contour Banks Across 526 Hectares*

The second trial site is much larger than the first, and a laser level was used to determine slope and to assess whether the site was suitable for installation of leaky weirs. Site assessment determined that the choke points on the natural steps were not high enough for any leaky weirs, and so a draft plan was developed to form up some low-profile contour banks. The low-profile contour banks were designed to run off the top of the centre drain point, on the level contour, and to the outside of the floodplain. The land manager hired a grader to do this work, and in June 2021 construction of the low-profile contour banks began. During the months of June and July 2021 over 20 low-profile contour banks have been installed on the property.

The costs for constructing leaky weirs and contour banks can vary greatly, depending on the land type, construct, and available machinery. The works undertaken on this property range from 6.5 cents to $30 per meter for earthwork banks. Approximately $14,000 of project funding was provided by Southern Queensland Landscapes to kick-start the work, with most of the additional investment made by the land manager themselves, including their own time, fuel and labour.

## Results

**Figure 1: Local landholders pictured with Southern Queensland Landscapes representatives adjacent to timber weirs, 21/02/2020**

Pictured above in Figure 1 is Southern Queensland Landscapes Project Officer Glenn Landsberg talking with local landholders about the timber weirs and their expected impact of the installation of the weirs. At this this time, the LCAT1 land score for the area was 10/100.

**Figure 2: Timber weirs slowing the overland flow, 23/11/2020**

[1] LCAT – Land Condition Assessment Tool (*Department of Environment and Science, 2022*)

As a comparison, following a few rain events, Figure 2 shows a section of the weir on the 23rd of November 2020. The impact of the weir is still relatively localised at this point in time but still has improved the area's LCAT land score, increasing it to 19/100. The land manager confirmed that the percentage cover of pasture in the area at this time was already notably higher than previously and persisted longer than pre-weir.

Figure 3 depicts the same section of weir in late February 2022, with a drastic increase in ground cover, compared to when first constructed. The benefits of the slowed overland flow are clear in this picture and have spread beyond the localised area. At this time the LCAT score had increased dramatically, measured at 94/100. The land manager also noted that in addition to the increase in pasture cover, pasture tended to persist longer following rainfall events when compared to pasture persistence prior to the installation of the weirs.

**Figure 3: Pasture cover was demonstrably improved following the installation of the timber weirs, as seen in late February 2022**

Following the installation of the weirs, the land manager estimated the water from heavier rainfall events persisted in the improved areas for over 48 hours, compared to the estimated 6 hours prior to the installation of the weirs. This slowing of the overland flow results in improved soil infiltration, reduced erosion, and improved pasture growth. As the landholder puts it “we’re going to be slower going into drought and getting out much quicker” due to being better able to retain and gain pasture with limited rain.

Currently stocking rates on the trial sites is kept low and grazing limited to maximise rehabilitation success. Limited grazing around the timber windrows and contour banks aims to promote continued pasture re-establishment as well as prevent stock damaging the works. Since the floodplain was historically some of the best pasture on the property, they will likely be able to return to sustaining higher stocking rates in the coming years.

Overall, sheep, cattle and native birds have been positively impacted by the improvements. Sheep and cattle have benefitted in that, with ongoing management and appropriate stock rotation, livestock will have more sustainable pasture to graze. It is anticipated that, with time, the works will improve the stocking rates of the whole property and improve the condition of the land and the stock. An added benefit of the work has been that the improved condition of the area has also encouraged the return of some native bird species that had noticeably declined during the dry periods due to the degradation of their natural habitat.

The overall cost of the work has been relatively low in comparison to the realised gain in condition and anticipated long term productivity of the improved areas. Given that the area was not productive prior to the works being undertaken, the works have not negatively impacted on production while the land is being restored. The cost to the land manager to undertake the works were limited to the running costs of the land manager's loader, the cost of grader hire and the time required to undertake the laser leveling and surveying. The land manager has commented that the only recurring cost identified thus far include the costs associated with using the grader to repair damage caused by big rain and flood events. The land manager also commented that the repair works also give them an opportunity to improve the banks or correct any flaws identified as they see how the water still moves across the land.

The land manager commented that once the water was slowed, it opened the opportunity to continue to slow the flow with similar leaky weirs for many kilometres of further floodplain downstream. The land manager now has a large-scale fencing program complete, enabling total ongoing management of grazing pressure to prevent floodplains being stripped of vegetation again once revegetated.

**Conclusion**

The land manager comments that while it is too early to say if there has been any kind of economic data or other measurable results on the benefits, but overall, there has been a definite increase in pasture cover persistence. Whilst the results of the work are not evident to drivers by, it can be seen on satellite imagery, and the results seen by the land manager on-ground have them eager to do more and wishing they had started sooner.

"I've got a lot better understanding (since attending the Avondale landscape restoration field day and follow up) as why it probably wasn't functioning as well as it used to, because suddenly an area where water use to flood (now has) a little erosion feature (that) can drain it out in no time flat. Often small works (such as a short contour bank in front of an erosion feature) can make a big difference" – Land manager.

The works undertaken as a result of attending the GrazingFutures Landscape Restoration field day have contributed towards improved grazing business resilience, drought recovery and preparedness through the positive impacts on pasture growth and sustainability. In addition to the benefits seen on the study site, the land manager reports that upstream neighbouring properties have also started construction of contour banks after seeing the success of this and another property at the field day. The works have resulted in a reduction in silt build-up in waterways and a reduction in soil loss even following smaller rainfall events owing to the increase in groundcover and subsequent increase in soil stability. The success of this project has also prompted the land manager to consider undertaking additional fencing work to enable better implementation of their rotational grazing routine, which will further improve pasture management on their high production country. These measures being undertaken by land managers across the landscape ensures that livestock businesses are more able to mitigate some of the impacts of drought through healthier, more persistent ground cover, and better able to bounce back financially when times are good.

*Created by Lucas Mackie and Leanne Stevens, Southern Queensland Landscapes, May 2022*