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Future Drought Fund

Southern Rangelands Revitalisation Program

Darren & Kim Cousens at Hillview Station

Repairing eroded landscapes and revitalising vegetation with low-disturbance infrastructure

August 2025

Acknowledgments

This case study was co-prepared by the Department of Primary and Regional Development (DPIRD) and Soils for Life as part of the Southern Rangelands Revitalisation Program (SRRP), jointly funded through the Australian Government's Future Drought Fund and the WA State Government's Climate Resilience Fund.

The program started in 2021 and aims to support pastoralists to investigate and implement long-term solutions for on-station improvements in rangeland condition, land productivity and livestock management in WA's southern rangelands.

We acknowledge that the contents of this document do not necessarily reflect the views of contributors.

Front image: Rehabilitation in the Belele land system. Image source: DPIRD.

For further information, visit the DPIRD website and search 'Southern Rangelands Revitalisation Program'.

For further information visit **dpird.wa.gov.au/southern-rangelands-revitalisation-program**

For more information on Soils for Life email **info@soilsforlife.org.au** or visit **soilsforlife.org.au**

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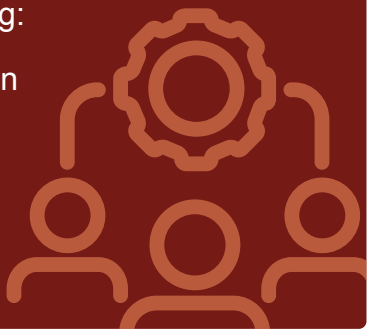
Contents

About the case study series

This case study is part of a series that showcases 7 pastoralists in Western Australia who have participated in the Southern Rangelands Revitalisation Program (SRRP) run through the WA Department of Primary Industries and Regional Development (DPIRD), funded by the Australian Government's Future Drought Fund – Resilient Soils and Landscape program and the WA State Government's Climate Resilience Fund.

The Southern Rangelands Revitalisation Program aims to support pastoralists to investigate and implement long-term solutions for on-station improvements to land productivity and livestock management in WA's southern rangelands. This program takes a systems approach to rangelands revitalisation involving:

- the regeneration of palatable, productive, perennial vegetation
- landscape function and hydration restoration
- total grazing pressure control
- livestock management.



The program provides support to pastoralists to learn as a community through organised group meetings with like-minded pastoralists, funding to access expertise and training, and grant funding for revitalisation projects.

The 7 pastoralists in the case study series received training and specialist support in the first phase of the program, and were then successful in applying for funding for an on-ground revitalisation project.

Soils for Life has prepared each case study in collaboration with DPIRD and the pastoralists. Each pastoralist story provides an insight into their unique rangeland environment and context, challenges and motivations, and ways they are adapting and innovating to build resilience. The case study has a focus on practices implemented through the SRRP, but provides context about each pastoralist's broader management approach.

Station facts

Location
Yugunga-Nya Country, Meekatharra, WA

Climate
Hot dry summer, cold winter

Average annual rainfall
247 mm[1]

Agro-ecological region
Arid[2]

Property size
149,000 ha

Elevation
500 m

Social structure
Family operated pastoral lease

Enterprise type
Santa Gertrudis x droughtmaster cattle breeding and tree carbon

Landscape
Mulga shrublands in the southern rangelands[3]

Soils
Hardpan wash plains and sandplains (with some stony plains, hills, salt lakes and mesas) on granite and gneiss of the Yilgarn Craton with red-brown hardpan shallow loams, red shallow loams, red loamy earths and red sands[3]

Land systems
Belele and Sherwood[4]

1 Sourced from pastoralist and **SILO**.
2 Agro-ecological region is determined according to **Outback Australia - the rangelands**. Extreme variability of rainfall is a defining feature of southern rangelands and has a significant impact on the challenges and solutions being explored in the SRRP.
3 Sourced from **Natural Resource Information, WA DPIRD**.
4 Land systems of the SRRP project area. Sourced from the Rangelands baseline surveys - Western Australia.

SRRP project highlights

Goals and approaches

- Rejuvenating groundcover, both annual and perennial grasses, to mitigate erosion, slow water flow, increase infiltration and support drought resilience
- Managing total grazing pressure, reducing stocking rates and matching grazing pressure to feed on offer, including early destocking during drought
- Revitalising and protecting washed out Belele land system on the property through revegetation and low-disturbance erosion mitigation
- Increasing biodiversity

Practices implemented

- Sandbag buoys to slow the flow of water and capture/germinate seed
- Native vegetation nurseries to replenish washed out seed banks
- Satellite technology to support grazing management and vegetation monitoring

Initial insights

- Early signs of moisture retention and vegetation recruitment around sandbags installed through the SRRP project
- Nurseries built as part of the SRRP project are not yet complete, but signs of vegetation germination in the area following recent rainfall events indicates high likelihood of success
- Nurseries have been prepared for future monitoring, including recording baseline measurements of species counts and feed on offer, installing rain gauges and setting up satellite monitoring
- Darren and Kim thoroughly enjoyed the opportunity to engage with other pastoralists and learn from one another as part of the project.

> We have some really good country here. That's not what I've got to save. It’s poorer country that I've got to try to turn into good country.
>
> **Darren Cousens**

Meet Darren and Kim

Darren and Kim Cousens own and operate Hillview Station, 68 km southeast of Meekatharra, WA, as equal partners of a 'regenerative cattle enterprise'. The Cousens breed Santa Gertrudas x droughtmaster cattle on the 149,000 ha property, 44,000 ha of which is included in a tree carbon project.

After leaving their jobs and selling their home and small property in 2011, Darren and Kim made the big decision to purchase the station and become pastoralists. Darren says, 'There's been all these seeds that have been sown through my whole life that I always wanted to come to a station,' and while others suggested he should 'just go and manage one', he was adamant that he wanted the opportunity to take ownership of the decisions being made, and hopefully the rewards that come with that.

When they purchased Hillview Station, it had clear signs of overgrazing from its historic operation as a sheep station. The 48 water points across the station were set up for sheep and were therefore not large enough to sustain cattle. The station was also divided into 4 paddocks, which Darren says is not a 'practical way to run these operations' given the erratic rainfall patterns across the station, noting that incoming rain does not mean that it rains everywhere. For example, in one rainfall event, some windmill rain gauges may record 60 mm, while others receive only 5 mm.

Sitting in the mulga shrublands of Western Australia's southern rangelands, Hillview Station is a 'total mosaic' of 28 different land systems that together form hardpan wash plains and sandplains with red loams and sands. The property has a cap rock layer that varies across the whole station, from being on the surface in some places to 1.5 m deep in others. Common vegetation species include mulga (*Acacia aneura*), saltbush (*Atriplex* spp.), bluebush (*Maireana sedifolia*) and soft wanderrie grass (*Thyridolepis multiculmis*). Not all of the property is suitable for grazing though, with paddocks containing unpalatable species such as spinifex (*Triodia* spp.) hosting wildlife such as kangaroos and emus. At the moment, Darren and Kim are focusing on repairing the Belele land system on the western side of the property; this part of the property, which typically consists of hardpan wash plains and low sandy banks with mulga (*A. aneura*) and woollybutt grasses (*Eragrostis eriopoda*), is now nearly bare after it was largely eroded and stripped of its grasses following a large rain event further up in the catchment.

Sustainable management of a fragile landscape

Darren and Kim decided from the start that they would graze cattle because they are less vulnerable to predation by wild dogs[5] and perform well in drought conditions.

5 In WA wild dogs are defined as dingoes, dingo/dog hybrids and feral domesticated dogs.

They started with brahman, but switched early on to breeding Santa Gertrudis x droughtmaster because they are able to handle the hot conditions and are more attractive to the domestic market. After 5 or so years, Darren and Kim realised 'how fragile this country was'. They could see the condition of other cattle in their region on stations with high numbers of stock in degraded landscapes and they realised they 'had to look after the country' to be successful.

The Cousens decided that from then on, they needed to be more intentional about their decision-making and landscape management. Darren says, 'It was many months of discussions across the dining room table on what we were doing and where we were going.' With a goal 'to breed cattle that sell for top dollar while doing minimal impact to the country,' they decided that the first step was to improve the genetics of their herd so they could carry less stock while also producing a better product. They put scales on all of their crushes and collected data on 13 traits, such as calving rates, to identify and remove non-performing cattle from their herd. They now have 600 breeders, but ideally they would like to drop back to about 400 total, which they see as an ideal target for balancing income with grazing pressure should the quality of the cattle they breed yield high enough returns.

Despite being more expensive, a switch from using fixed wing aircraft to helicopters for mustering helped Darren and Kim improve their management of grazing pressure. Helicopters offer a more agile method for mustering phantom herds, which in one case brought in 480 head of cattle from an area where they only identified 300 using the fixed wing aircraft. Numbers such as these can have considerable impact on the landscape when their grazing is unmanaged.

The station's internal fencing has been removed in places and gates have been opened up; instead Darren and Kim use a 6 km radius around each of the 48 water points to estimate grazing areas. For the most part, the radius of each water point overlaps with at least 2 others, so 'if we think they're overgrazing one, we will shut that water down and move the cattle to a better area'. They also have trap yards across the property to be able to move cattle to new non-adjacent water points, if needed, where feed is more abundant.

Darren and Kim are constantly adapting their grazing to match the local conditions. Given that neither of them grew up in this country, Darren says they've 'had to train ourselves on what this country can do and what kind of fodder it has on it, because it's totally different to what we knew'. In 2021, they approached Rangelands NRM to support their application for the National Landcare Program's Smart Farms Small Grant to work with Cibo Labs and 12 other southern rangelands pastoralists to collect ground truthing data for Cibo Labs' PastureKey service, which provides weekly satellite imagery and data on feed on offer. Since then, Darren and Kim have used a combination of the satellite data from that project, remotely transmitted data from rain gauges across the property and cattle weight gain measurements to inform where they move their cattle. Darren and Kim are 'trying to get a pretty good data set across the whole station on what we can maintain to the feed on offer and how we can actually keep feed in the bank, so to speak, so that we have a backup' in dry conditions. While the Cousens aim to protect vegetation growth and increase recruitment across the landscape by strategically moving their cattle at least every 4 months, they are also implementing projects that directly target landscape structure and function to help build back its resilience.

Southern Rangelands Revitalisation Project on Hillview Station

The Southern Rangelands Revitalisation Program (SRRP) aims to support pastoralists to investigate and implement long-term solutions for on-station improvements to land productivity and livestock management in WA's southern rangelands.

Motivations and goals

Darren and Kim's revitalisation vision is: '*We are interested and passionate about the regeneration of palatable, productive and perennial vegetation with rigorous management of total grazing pressure to avoid overgrazing the key perennials, grasses and groundcover. In addition to the improved rainfall infiltration rate provided by increased ground cover, we are interested in landscape function improvement and hydration restoration through the mediation of water flow through the station.*'

In particular, they wanted to build landscape resilience by laying sandbag buoys in the Belele land system under the advice of Hugh Pringle and constructing 2 new native seed nurseries to slow the flow of water, protect the landscape from erosion and help re-establish native perennial vegetation on Hillview Station. They hope that together these outcomes will revitalise the degraded landscape, increase their station's resilience and ultimately protect their station rangelands as a grazing resource.

Darren and Kim joined the SRRP because they saw the value of participating in a program in which pastoralists developed their own projects based on what they identified were the greatest needs for revitalising their properties, rather than being told which practices to implement. Darren says it was also one of the first opportunities for them to actually work with other pastoralists in the region, and for all participants to both give and receive support and to exchange ideas and equipment.

> 'You know, the exchange that's going on between all of us, on where we're at and what we're doing and what we're achieving, you know, it's been the main reason that I got on board on this project.'

The focus of their project was to rehabilitate the Belele land system on the western part of their property because the area has been 'stripped bare and might as well be just a

paved road'. Darren has observed that the rainfall patterns on Hillview Station have shifted over the years, with southwest fronts in the winter being replaced by cyclonic rain-bearing depressions that can settle in. But if the cyclones come in hard and fast, he says, there is a high likelihood of erosion, especially because their property lies in the middle of a catchment that collects in the lakes in a property to their south. In 2007, one rainfall event dropped 174 mm in 4 hours on the station to their north, which 'washed clean' the Belele landscape to the west of their homestead, effectively removing all of the groundcover vegetation and exposing the landscape to further erosion.

Darren and Kim have identified 2 mechanisms for repairing the Belele land system: implementing low-disturbance earthworks that slow the flow of water and encourage vegetation growth, and building vegetation nurseries to replenish the natural seedbank and encourage the recruitment of perennial grasses. Using the buoys to slow the flow of water across the landscape can protect against the eroding forces of rushing water, while also creating depressions in the soil where water pools and seeds germinate. By reducing erosion, there is greater opportunity for vegetation to establish, which will further protect the landscape from heavy rainfall events. This vegetation could also provide forage for cattle if it establishes well enough to be grazed. Critical to this process is the successful germination of the soil seedbank, which has been washed away from large rainfall events, but which Darren and Kim are aiming to replenish through natural dispersion and hand spreading of seed cultivated from protected vegetation nurseries.

Practices implemented

Hugh Pringle station visit

Darren and Kim engaged with landscape ecologist and Ecosystem Management Understanding (EMU) specialist Hugh Pringle to advise on the implementation of the practices. When Hugh visited Hillview Station he helped Darren and Kim better understand water movement and management across the landscape. Their specific interest was the Belele land system, where Hugh provided guidance on low-disturbance methods for landscape rehabilitation and erosion mitigation, which led to the final decision to construct sandbag buoys. Darren and Kim used their knowledge of the landscape in conjunction with what they learned from Hugh to trial a different arrangement of sand bags in addition to the arrangement Hugh suggested and also to select a second nursery site outside of the Belele land system.

Sand bag buoys to slow the flow of water

Darren and Kim have constructed sand bag buoys across the landscape, which consist of 25 sandbags laid in the shape of 'fish scales' (Hugh Pringle's recommendation) or semi-circles (Darren's trial method) that span approximately 12 m. The sandbags create a semi-permeable barrier to runoff that also collects small pools of water to increase germination of the seedbank. They are currently focusing their efforts in an area of approximately 200 m x 50 m.

Working together they fill the 25 hessian bags, which takes about an hour and a half, using soil from an old dam that has similar soil types to the landscape in which they are building the buoys. Following Hugh's advice, they use a small rotary hoe to cut 2 lines 300 mm wide and 30 mm deep through the soil to 'fluff up

the dirt' to make it 'soft enough for seeds to catch in and grow'. They then sit the sandbags upright so the sand falls towards one end of the bag, and lay them down so the heavy end of one bag overlaps with the unfilled end of the previous bag. Darren notes that after a bit of experimentation, they realised that it didn't matter whether the bags were sitting on the front or back lip of the rotary hoe cut line because they have already started seeing vegetation germinating on either side of the sandbags. It is more important, he says, to make sure to use the hoe at all of the buoys, after seeing poorer germination rates around a buoy that was built when their rotary hoe was inoperable.

The Cousens decided to stay away from interventions with earthmoving equipment, such as building contours using a grader, out of concern for the stability of the remaining vegetation. Darren says that more intensive earthworks are suitable for 'where you've got nothing there. But we've got heavy mulga in this Belele system, and I just did not want to put a machine in there and knock out what's already there.' One reason for this is because Darren and Kim have noticed that with heavy dew, the drip zone of the mulga trees acts as a nursery for the grasses, so knocking those trees down for earthworks would both directly and indirectly interfere with their goals for protecting and revitalising the vegetation in this fragile landscape.

Images 1 and 2 Darren uses a rotary hoe to cut 2 lines in the soil (left) before laying 25 sandbags to create a semi-circle buoy (right). Source: Darren Cousens

> Those trees, to me, are the biggest band-aid this country's got.
>
> **Darren Cousens**

Another low-disturbance option for the buoys that Darren considered was the use of large tyres, but with heavy rainfall events, Darren says he has seen cases where the tyres push water faster around them or otherwise the soil underneath them has eroded. Instead, they tried to 'think outside of the square with what we've seen over all the stations that we'd looked at over the years, and…what's worked and what didn't'. The hessian bags they use tend to break down after approximately 6 months of direct sunlight, but they 'set like concrete' so the sandbag contents remain there and continue functioning as intended until they are washed away from a large rainfall event. Darren notes that the purpose of this technique was never to stop the damage from large storms, but rather to capture water from 20–30 mm rainfall events. Darren and Kim have learned, however, that it is not a good idea to fill sandbags in advance: they once spent hours in the heat filling 100 sandbags, only for them to deteriorate in the sunlight in the back of a trailer before they were able to lay them down in the project area. They do note, however, that a positive of using hessian bags compared to plastic is that the deterioration does not leave plastics floating around in the environment.

One of the main benefits of sandbags is that they naturally contain seeds that have accumulated on the edge of the dam that they use for fill. They originally thought they would have to pierce the bags with a pitchfork and drop seed into the bags, but they have found that because hessian is a natural material, the seeds have germinated and sprouted straight through the bags or otherwise popped up as the bags have deteriorated. Cattle have been kept out of the area to help with recovery, but Darren has seen kangaroos grazing fresh plant growth that followed a rain event, which may affect regeneration.

The biggest challenge associated with this approach is the sheer amount of labor it takes to implement. It is incredibly strenuous work to fill and lift 30 kg sand bags, especially when the temperature regularly hits 45°C in summer. While they have a system set up with Kim as the 'shovel operator' using a funnel to fill the bags and Darren as the heavy lifter, Darren says it is incredibly hard work, though he thinks the process will pay off.

Native vegetation nurseries

Darren and Kim are also constructing 2 perennial vegetation nurseries on their property. The nurseries serve as protected areas in which perennial grasses can re-establish from the natural seedbank in an environment where grazing can be controlled.

> 'The idea is to harvest [the seed] and put it back into the areas that we're trying to revegetate.'

Darren and Kim's goal is to harvest the seed from the nurseries and spread it in areas that they are targeting for repair, including but not limited to the Belele land system. The species they are most interested in cultivating are those that are or used to be present in the landscape, including woollybutt grass (*E. eriopoda*), cotton bush (*Ptilotus obovatus*) and speargrass (*Austrostipa* spp.). David says, 'The areas include some established wanderrie grasses and mulga, which we are hoping will provide the seed to rejuvenate the pastures and groundcovers that when established, will slow the water across the exclosure area.'

Darren has selected 2 locations for the new grass nurseries on the property. The first nursery sits in the Belele land system to directly target revegetation in the surrounding area. While Darren was originally meant to select the second site with Hugh Pringle, COVID restrictions meant Darren had to trust his knowledge of his landscape and select the placement on his own. He decided to build the nursery in a scalded area sitting in the middle of a healthy landscape with well-established grasses and forbs, and he is interested to see how this second nursery plays out because one corner of the nursery is a different land system than the rest of the enclosure. When Hugh was able to visit, he provided guidance on rehydration plans for the nurseries.

The grass nurseries are 100 m x 100 m (1 ha) and are positioned on roads so Darren and Kim can bring in trucks and pulse graze cattle on the vegetation once it has established. At the moment, the posts for the nurseries have been erected, but Darren is still working on installing the fencing. The original design used 1 m heavy duty chicken wire with a string of barbed wire at 1.2 m, but Darren has changed the fencing type following a chance encounter with others implementing similar projects. After stumbling across a webinar on a seed bank project in NSW, Darren called the project officer and 'the first question I asked her was, what did you get wrong?' She said the main challenge was that the fencing wasn't tall enough and that kangaroos were able to jump straight over the fence to graze the establishing vegetation, so Darren has adapted his plans to now use 1.5 m Waratah exclusion fencing with a barbed wire at 1.7 m. The exclusion fence will make sure kangaroos, rabbits and cattle can't graze the vegetation in the nursery, and will help inform Darren and Kim about whether they should invest in more extensive rabbit control on the station.

The main challenge he is now facing is how to install the fencing. Conscious of the fragility of the landscape, Darren 'didn't want to run through the country with my loader and clear a great big road' around the nurseries. Instead, he has weaved the nursery boundaries through the trees. The placement of the fence lines, combined with the height of the wire and the weight of the 500 m wire rolls, makes erecting the fencing a very strenuous and difficult task. While his 'engineering background is now at work designing a little trailer that I can sit the roll on and put behind my Suzuki Sierra and weave through the trees to thread the wire,' Darren is still struggling to find labour to help him, which he says is 'pretty scarce on the ground'.

Initial insights

Monitoring feed with satellite data

Darren and Kim are using weekly satellite data on feed on offer to manage feed budgeting on the project area and across the whole station. This will help inform their grazing strategy to reduce grazing pressure in areas of lower productivity and track their progress in transforming the landscape.

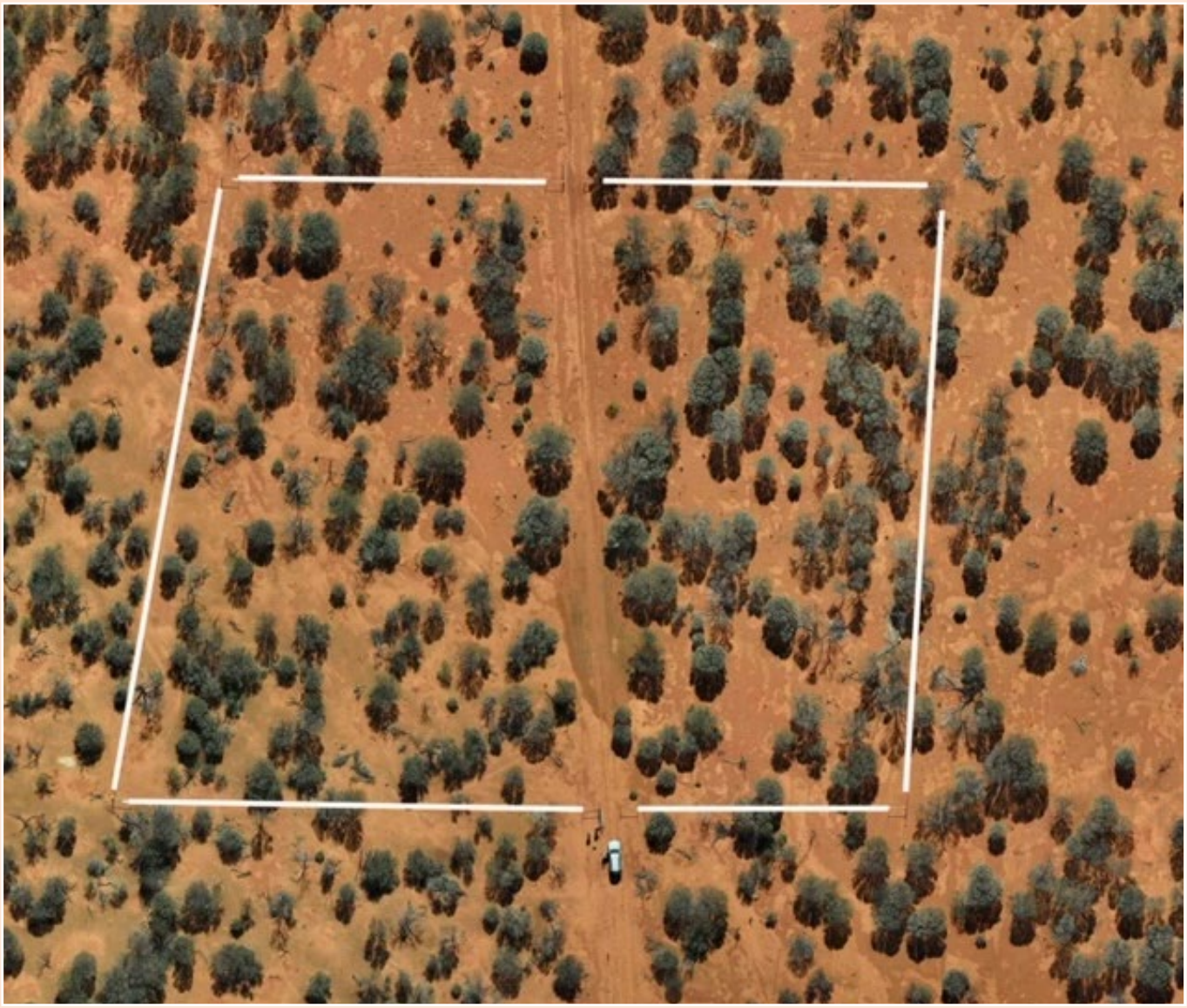


Image 3 Layout of the 100 m x 100 m perennial vegetation nursery located in the Belele land system. Source: Darren Cousens

Vegetation growth around the sandbags

Darren and Kim are feeling encouraged by the initial results from the sandbag buoys. Following rainfall this year, they have started to see mosses and lichens develop on the ground, which indicates that their effort to trap moisture in the soil is paying off. And even though the ground dries up fairly quickly, they have seen cotton bush (*P. obovatus*) and wind grass (*Aristida contorta*) germinating around the sandbags, which Darren says are 'the type of things that are going to hold this country together'.

They haven't yet seen any woollybutt grass (*E. eriopoda*) germinate yet, which is the main grass they are hoping to regrow in the landscape, but overall, they said the results 'have been quite phenomenal to see'.

'It's more labor intensive than I expected, but the results have more than paid me back than what I've put in in sweat and tears.'

Image 4 Signs of vegetation growth around a sandbag buoy and through the hessian bags approximately 3 months after installation and following a cumulative 60 mm of rainfall. Source: Darren Cousens

Monitoring vegetation in nurseries

While the vegetation in the nurseries hasn't yet fully established, Darren feels 'verified on where I chose [to build them], because it is now nearly 100% grass in the area of the nursery, even though I've never seen grass there in all the years that I drive past it on my mill run. Just because it got good rain for once.' This early outcome has been an affirmative experience for Darren: 'It's vindication of what I know about the country. I actually know if you had water, it works.'

Both nurseries have been set up for long term monitoring. They have been fitted with rain gauges, so Darren and Kim can keep track of exactly how much rain falls in each. And in the early stages of the project, they recorded which species existed in the nursery areas to create a baseline for tracking the species that they've encouraged to return to the system. They have also loaded the locations into their satellite data service, so they can quantify the vegetation growth in each nursery in real time.

Valuable engagement with other pastoralists in the project

Darren and Kim have enjoyed being involved in the SRRP, particularly when it came to engaging with other pastoralists. Even though they all work in different land systems, which has led to a bit of questioning between them regarding their varying approaches and methods for transforming the landscape, Darren says the engagement with peers, rather than consultants, has been incredibly valuable overall. In particular, connecting with other pastoralists has given Darren some new ideas to experiment with. One pastoralist suggested laying hay on top of the disturbed soil to encourage regrowth of native species, while another has recommended laying branches in front of the sandbags to further slow the flow of water before it reaches the barrier. So the next trip out to his project area, Darren says, 'I took my saber saw and any branch that touched my ute, I cut off and threw down…and hopefully, you know, down the track it'll all come together.'

The program has also given the Cousens the push to really think about what they could do that's different. For example, Darren doesn't think that they would have gone down the sandbag route had they not had the program to support their ideas, and instead would have used a grader. Darren is now looking forward to 'playing around' with sandbag buoys in other areas of the property.

> 'The one thing that I'm most happy about the project is it's actually brought pastoralists together that are like-minded, so we've been able to swap so many ideas on what people have tried or what people are doing…on what's worked for them.'

Image 5 SRRP pastoralists gather at Hillview Station for a program field day. Source: DPIRD

Next steps

Darren and Kim's next step is to scale up their sandbag buoys. They've purchased a larger rotary hoe, and they plan to revisit the project area to further 'churn a bit deeper and keep it going'. And with the better rainfall they've had this past year, they have started to see erosion in other parts of the property, so they are adapting this practice to work for those areas. Darren sees this as a huge benefit of this technique; if he sees signs of erosion, he can fill sandbags and address the issue within a few hours, rather than starting the massive process of putting the front-end loader on the float and driving the truck out for just a small area of concern. And despite the strenuous work involved in filling the bags and the impermanence of the structure, Darren says, 'If it stops that erosion from moving back 2 m, it's achieved what it's had to achieve.'

> 'It's just evolving. These sandbags are so versatile in what you can do…we just try everything and see what works.'

Darren and Kim are excited to continue watching how their landscape resilience evolves following the project, given they've already 'brought back what wasn't there, and we provided an area that hopefully will encourage it to spread'. Darren realises the work to transform the landscape will never be finished, but still sees immense value in the way they treat the landscape for both themselves and for the future: 'I'm not gonna live long enough to get this place to where I want it to be. But…my view is if I don't start, then someone else is a lot of years behind where I am.'

Image 6 Rehabilitation in the Belele land system

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