

# CROPPING AFTER THE STORM



**GRDC**  
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## LESSONS AND LEARNINGS FROM FLOOD EVENTS

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**COVER:** Flood damage to grain paddocks at Kimba, SA, in February 2022.

**PHOTO:** Andrew Baldock

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# Introduction



Photo: Andrew Baldock

## “Of droughts and flooding rains...”

As Dorothea Mackellar’s famous poem makes clear, and growers everywhere know, our national climate has always been driven by cycles of drought and deluge. The usual pattern is a steady trend of drier seasons culminating in a period of drought, which breaks with a significant rain event or rainy season.

Both drought and flood arrive with varying severity, but record-breaking rain events in 2022, including in areas not typically prone to flood, have provided a unique opportunity to document and learn from the experiences of growers.

Not all floods and storms are the same. Flash flooding events can be significantly different from sustained rainfall events with multiple fronts over a longer period of time. Similarly, the local soil types and farming systems play a significant role in the impacts of flood events.

Although many flood mitigation strategies may provide a level of protection for frequently flooded areas, it would be naïve to think of any property anywhere as ‘flood proof’. It is more realistic to learn from past experience and know, when an event does occur, what to expect, how to act and how to restore full productivity in the most effective, efficient way.

People, physical assets, livestock, soils and future harvests are among the things needing to be taken into account – as is the welfare of you, your dependants and your surrounding community.

Following on from the diverse array of widespread flooding events in 2022, this booklet provides case studies of recovery in flood-affected cropping areas across South Australia and the east. With the volatility of rain events expected to increase with climate change into the future, it is important to study and understand the impacts of flooding on cropping operations – so that today’s growers can learn from the past and be prepared for the future.

# Upper Eyre Peninsula flood

21 JANUARY 2022



Photo: Andrew Baldock

# Background: Not just a summer storm

## Lessons and learnings after a year of recovery

In January 2022, the northern Eyre Peninsula (EP) region of South Australia was hit by a sudden and severe rain event, resulting in flash flooding and widespread inundation.

Grain growers in the region faced significant topsoil damage, nutrient loss, infrastructure impacts and even long-term road closures that affected delivery of repair equipment and supplies.

Two years on and, more importantly, two growing seasons later, what has been learned about returning to full productivity after damaging floods? What actions helped growers restore their paddocks and what are the lessons for responding to similar extreme rain events in the future?

## The event

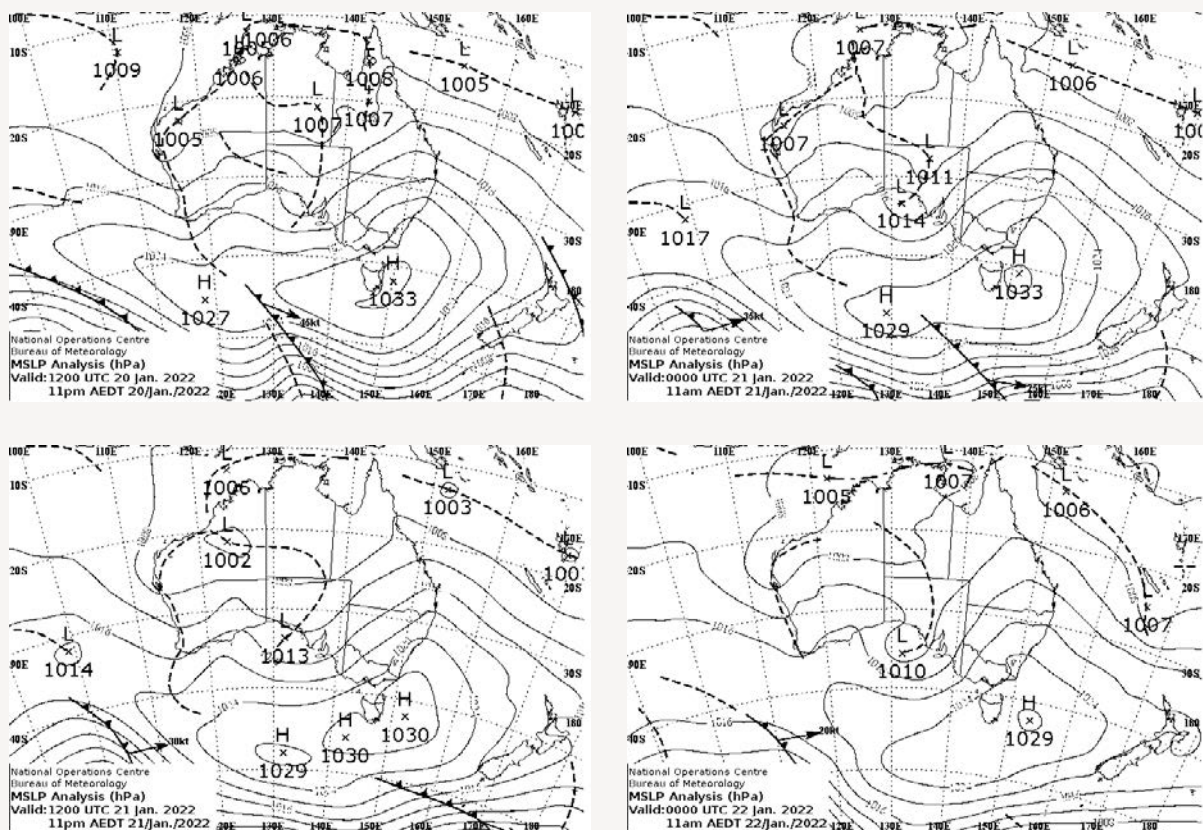
The weather system that delivered the deluge to upper EP in January 2022 did not look out of place for summer in the region. Anticyclones tracked east to the south of Australia while the annual monsoonal trough passed over the far north.

A trough line west of the Great Australian Bight looked likely to bring a typical band of summer storms.

As this trough approached the upper EP on 20 January it connected with the monsoonal trough over the Western Australian Kimberley, creating a pathway for tropical moisture to move south. At the same time, a blocking high to the south-east caused the trough to linger over the Eyre Peninsula region.

The combination resulted in unexpectedly heavy and sustained rain.

Figure 1. Australia MSLP (mean sea-level pressure) synoptic charts for 20 to 22 January 2022.



Source: Bureau of Meteorology



Photo: Andrew Baldock

Over the next few days, the trough remained stationary over central upper EP, almost on top of the Kimba district. The light, sandy soils that dominate this low-rainfall region were heavily eroded by the deluge.

In some places the water spread out and inundated whole paddocks, creating large lakes overnight. Elsewhere, fast-moving runoff cut deep gutters with a force that carried away soil, roads, fences and trees.

The rainfall totals recorded at local weather stations over the weekend of 21 January 2022 highlight the extreme nature of this rainfall event (Table 1). Some locations recorded half of their annual rainfall in a single night. Most affected locations received about half of their average *annual* rainfall in just four days, while some properties received even more.

**Table 1: Rainfall data 21 to 25 January 2022, Upper Eyre Peninsula.**

Station	Average rainfall (mm)		Event rainfall (mm)	
	January	Annual	21–22 Jan 2022*	21–25 Jan 2022
Buckleboo	23.7	297.5	160.0	213.0
Darke Peak	15.9	379.9	151.6	166.2
Kimba	19.3	348.7	164.6	201.6
Cleve (Heggaton)	18.1	346.1	93.0	122.4

Source: Bureau of Meteorology \*For the 24 hours to 9am, 22/01/22

The immediate problem for growers was recovering and managing their livestock with up to 80 per cent of their fencing damaged or destroyed. In some cases, this could only mean putting sheep into paddocks that had been earmarked for a cropping rotation and rethinking crop rotations to account for the topsoil losses.

Only then could growers turn their attention to restoring their paddocks and soils, addressing paddock access issues and repairing vital access roads, all with seeding just three months away.

# The GRDC response

## Supporting growers and guiding recovery

As reports of weather damage and flood impacts began to flow from Kimba and surrounds, it became clear to industry officers within the Department of Primary Industries and Regions (PIRSA), Grain Producers SA (GPSA) and GRDC that there was a significant need to provide support for growers in the area.

PIRSA staff, led by soils and land management officer Mary-Anne Young and working in partnership with GPSA, were able to deploy to the area within weeks to make initial assessments of the flood damage, tour affected farms and provide insights around the landscape changes to inform some immediate actions.

Representatives from GRDC accompanied GPSA and PIRSA on their visit to Kimba so they could see the damage first-hand and consult with growers on their farms.

PIRSA also deployed online information on general flood impacts and recovery strategies for South Australian growers to access.

Front-of-mind for all involved was the need to prioritise repairing the damaged paddocks in time for sowing in 12 weeks, so that a whole year's income and the upside yield potential would not be lost.

Meanwhile, GRDC was using its National Grower Network (NGN) to directly contact local growers for on-ground assessments of grower needs and to ground-truth plans for support activities.

GRDC grower relations manager – south – Courtney Ramsey says having direct contact with locals helped define the information that was most needed and the subject matter experts who should present.

“We let the growers tell us what they felt they needed and provide feedback on content ideas they may not have considered,” she says.

## Cropping After The Storm workshops

The result was a series of ‘Cropping After The Storm’ workshops for affected growers in Kimba, Cowell and Ungarra.

Thanks to the involvement of PIRSA, GPSA and local growers, these half-day workshops were held just four weeks after the weather event.

While each workshop was held at a local venue to help minimise time off the farm for attendees, Ms Ramsey says it

was important that they were in-person events and not simply delivered online.

“Along with providing useful information and access to experts, we wanted to provide a social component so people could share their experiences over the previous weeks and process the impact together.”

The workshops included advice on soil management, nitrogen budgeting, farm planning and recovery support. These topics were targeted towards successfully planting a crop and maximising the increased water-limited yield potential.

A key focus of the information was on planning and prioritising work to repair farm infrastructure and soils to support the crop. This included advice from PIRSA as well as an online presentation by Ravensthorpe, WA growers Peter and Lena Daw, who experienced a comparable 300-millimetre rainfall event on their property in 2017. The Daws shared their tips for earth moving, soil management, cropping and insurance. They also provided insights on task prioritisation, including the need to recognise work that could be left until after sowing, harvest or for subsequent years.

The task prioritisation advice was supplemented with insights into paddock restoration and soil amelioration, weed pressure and seed redistribution, changes to soil structure, potential soil constraints such as salt seeps, personal wellbeing and financial support.

Speakers included:

- Brett Masters, soils and land management consultant, PIRSA
- Ed Scott, soil scientist, Soil & Land Co.
- Andrew Ware, research agronomist, EPAG Research
- Karen Hollamby, PIRSA recovery facilitator
- Chris Fitzgerald, Rural Business Support
- Justine Major, recovery support officer (North SA), National Recovery and Resilience Agency (and local grower).

Soil scientists Brett Masters and Ed Scott spoke at length about the potential implications on nutrition following the high rainfall, soil movement and elevated soil moisture levels. Their advice focused on the depletion or loss of soluble and mobile soil nutrients including nitrogen, potassium, sulfur and trace elements. They emphasised the value of soil testing to establish nutrient levels and requirements ahead of sowing. Mr Scott also offered longer-term guidance on mapping spatial variation in paddocks and taking the opportunity to replace fencelines based on soil zones.

Research agronomist Andrew Ware outlined the risks of flood waters transporting weed seeds and of summer weed pressure in the moist soil. He also talked about decision-making for the full moisture profile and managing in-season nitrogen to maximise yield potential.





Photos: Courtney Ramsey, GRDC

## Work and wellbeing

These presentations were followed by a session on storm recovery support and rebuild planning. Speakers offered advice on looking after mental health and wellbeing, clean-up strategies, obtaining financial support and maintaining business resilience.

“Communicating with the grower network beforehand made it clear that people were processing feelings of shock, being overwhelmed by the amount of cleanup work to be done and not really knowing where to start or how to proceed,” Ms Ramsey says.

However, there was also a strong sense of excitement about the potential for the season ahead, after a series of marginal seasons.

“We deliberately made the workshops in-person events so there was a community-strengthening social aspect to the events. It gave growers a chance to get together and just talk about their shared experience.

“Hearing presenters like Peter and Lena Daw sharing their lived experience advice that it is impossible to tackle everything at once and the recovery process extends across years helped growers put things in perspective.”

Grower Andrew Baldock took time to attend the Kimba workshop and says he picked up a lot of useful information about identifying and prioritising repair work.

“The thing I found was there is just so much to do on the farm after an event like this, that you can just find yourself running around trying to tackle everything. It’s so important to stop, think and get organised,” he says. “The GRDC did a good job.”

By working with growers, partners and presenters, GRDC was also able to provide valuable advice on less visible implications of the flood, from the potential movement of residual herbicides to managing the mental health impacts of recovering from such a major event.

For Ms Ramsey, a key takeaway is how responsive the National Grower Network allowed GRDC to be.

She says it was clear that an urgent information response was needed, and the GRDC’s National Grower Network provided local contacts to quickly canvass requirements, sound out the content and provide timely advice.

‘Cropping After The Storm’ was a great reflection on the value of that two-way engagement between growers and the GRDC.

“It shows how maintaining an active National Grower Network enables GRDC to support and inform grain producers when they need us most.”



Photo: Peter and Lena Daw

## CASE STUDY

## 01

# Looking back to look forward

## SNAPSHOT

**Grower:** Peter and Lena Daw

**Location:** Ravensthorpe, WA



**Enterprises:** Cropping and sheep

**Farm size:** 3000ha

**Cropping area:** 2200ha

**Crops:** Wheat, barley, field peas, canola

**Recorded rainfall:** 10 February 2017, 200mm+ over 3 days (on top of a wet season in 2016)

**Soil(s):** Heavy cracking clays

A recurring theme among Upper EP growers who attended a GRDC ‘Cropping After The Storm’ workshop was the immense value of hearing lived experience and lessons from another, similarly impacted grower.

Peter and Lena Daw own 3000 hectares to the east of Ravensthorpe, in the Esperance Port Zone of Western Australia. On 10 February 2017, the district was hit with heavy rains that caused extensive flooding, razed farm fences, loss of livestock, eroded soils, damaged local roads and cut all four highways leading into and out of the town. Tragically, one local lost their life.

Despite all the damage and repair costs, many growers only learned their insurance did not cover flood damage after the event, while the loss of summer tourist traffic added to the impact on the region’s economy.

There were several similarities between the Ravensthorpe and Kimba events. In both cases, the floods occurred in the

middle of summer. Fence damage and soil erosion were prevalent. Recovering and containing stock (generally sheep) was the highest priority, followed by the need to address trafficability and restore cropping paddocks in the three months before seeding.

As with the Upper EP, Ravensthorpe growers found damage to local roads was a major constraint to getting in supplies for their recovery. Some used their own equipment to repair their public roads.

“Our farm is on the back of a range system, so we have undulating country with a river system running out of the ranges,” Mr Daw says.

“In addition to the rain we received, a lot of water came down the river from the hills. It washed away a fair amount of topsoil, cut some deep gutters, and deposited litter across the valley floor.”

Peter says they managed the damage by simply tackling one job at a time, starting with tasks that would give the best reward.



Photos: Peter and Lena Daw

“If there was a paddock with only one washout, we’d fix it and that would be a whole paddock repaired,” he says.

“Where the ground was too wet for machinery, we would just get on it with utes and pick up the rocks, sticks and stumps so we’d be ready to go when it firmed up.”

Several growers found obsolete one-way disc ploughs (Chamberlain ploughs) were ideal for repairing washouts in paddocks. Reverting to the older stump-jump technology helped cultivate many more paddocks in time for sowing.

Peter says a flood will always bring something that was not there before, with added consequences. “We ended up with a lot of snails and new weed species, including caltrop, which we never had before,” he says.

“Managing those problems brought added costs and we had to spend a lot of extra money on herbicides that year.”

On the other hand, the Daws took several tonnes of the washed sand from their river flats over subsequent seasons and spread it onto their paddocks as a mineral mulch, which has given them a yield benefit of about one tonne per hectare.

“That was one good thing to come out of it,” Peter says. He believes growers should be ready to make changes to meet the circumstances.

The Daws sold their 2000 ewes shortly after the event and used the proceeds to invest in a grader, materials and extra herbicide. Selling the sheep was a strategic decision that saved them having to replace 45 kilometres of lost fences and helped minimise the financial impacts of the recovery, but they have not brought livestock back into the enterprise since.

Managing the personal impacts of the flood was greatly helped by the work of their local grower group, the Ravensthorpe Agricultural Initiative Network (RAIN), of which Peter is now chair.

He says the group provided invaluable support, from staging community bonfire events where locals could share experiences and advice, to managing visits by politicians that, while time consuming, were essential for bringing government support to the district.

“You need those central organisations,” Peter says. “Generally we were just doing what needed to be done and making it up as we went along, but the work put in by RAIN and the shire council was a huge help.”

Overall, it took the Daws three years to get back their full cropping enterprise. Peter says they did nothing but repair work and essential tasks (sowing, spraying, and so on) over that time. Any other maintenance or improvements, such as rock picking, had to be delayed.

As a result, he says they are really only just catching up with everything now, seven years later.

His final advice to growers in a similar situation is to take it all one step at a time.

“Don’t panic. It’s do-able,” he says.

## Flood recovery insights from Peter Daw

Do not panic.

Take it one job at a time.

Look around and use whatever is available (e.g. the old Chamberlain ploughs).

Expect to get something you did not have before.

Do not be afraid to make changes.

## CASE STUDY

## 02

# Harris family: Getting on with the job

## SNAPSHOT

**Grower:** Tom Harris

**Location:** Cleve, SA



**Enterprises:** Wheat, barley, canola, lupins, faba beans

**Cropping area:** 3640 ha

**Recorded rainfall:** 140mm in 72 hours

**Soil(s):** Heavy clay to sandy loam

When it started raining across the northern Eyre Peninsula on 21 January 2022 grain grower Tom Harris, who farms 3600 hectares just to the west of Cleve, was not expecting serious problems from the forecast drenching.

The harvest was in and summer storms were not that unusual in the area. However, the rain that started falling on the Friday night had delivered almost 130mm into his gauges by Sunday morning. It was an extraordinary amount for a region where the mean *annual* rainfall was 375mm.

The creek that ran across Tom's home paddock changed from a dry depression into a torrent.

Another 40mm fell in the surrounding hills on Sunday, flooding across several paddocks and channelling into flows that cut deep gutters through the soil.

By the Monday, the impact of that much water in one weekend was clear, with substantial damage to the farm's dams, fences and paddocks.

"The water had run right across the middle of our main paddock," Tom says.

"The gutters were up to a metre deep and a metre across in places, while the soil and fences that had been washed off our property was all dumped onto the neighbour's farm."

Fortunately, the timing of the rain had meant there were no crop losses and, with three months before a new crop



Photo: Tom Harris



Photo: Tom Harris

Restored paddock in crop, 2023.

needed to be planted, Tom felt he had time to repair the soil damage. However, the paddocks would need to be passable for the farm's Case Patriot sprayer, which weighs approximately 19 tonnes with a full tank, in order to conduct the summer spraying program. As a result, remediation work had to begin immediately.

"We work big paddocks so fence repair was really restricted to the boundaries," Tom says.

"The real priority was fixing the gutters. We used a front-end loader and bulldozer to recontour the paddocks and compress the soil, so we could put machines across them again."

The extra moisture and soil disturbance meant there could be no let up on weed management. Volunteer cereals turned out to be more of a problem during the remaining summer months; however, no unscheduled spray applications were needed to keep the volunteers controlled.

"We had sprayed in early January and wanted to spray again in the first week of February," Tom says.

"We had to work around the gutters for that one, but we had the soil back how we wanted it by the time we sprayed again in the first week of April."

The sprayer had no trouble on the restored ground and neither did the seeding rig a few months later.

Germination rates over the refilled gutters were slightly lower than the rest of paddock and Tom says it is something they will have to watch.

Summer weeds numbers remained close to normal, although Tom noticed he has more wild oats in the crop.

"We are also monitoring soil pH pretty closely," he says.

"There was a similar rain event in February 2016 and we've noticed slightly low soil pH since then, especially in lower areas of the farm.

"We will keep monitoring that and see how the crops do this season. For now, we seem to have recovered pretty well and everything is back to normal."



Photo: Andrew Baldock

CASE STUDY

03

# Baldock family: Taking care of business

## SNAPSHOT

**Growers:** Tola Ag – Andrew, Mark and Jeff Baldock and families

**Location:** Pinkawillinie, SA



**Enterprises:** Cropping and sheep

**Farm size:** 7500ha

**Cropping area:** 6000ha

**Recorded rainfall:** 170mm to 230mm in 8 hours  
330mm over 3 days

**Soil(s):** Mallee dune and swale

**Subsequent harvest:**  
3.6t/ha cereals, 3t/ha lentils, 1.9t/ha canola

By the start of 2022, Andrew Baldock’s family was more than ready for some rain.

The Baldock farm near Kimba had been “living on just enough” since a dry spell in 2017. Then a dry 2018 set them up for their worst year ever in 2019, with wheat yields of just 300 kilograms per hectare.

The following two seasons saw slightly more rain, while strong grain prices netted better returns.

Mr Baldock expected the weather on 21 January 2022 to be one of the district’s rare but appreciated summer storms and the somewhat prolonged fall did not seem too out of place.

“The rain just kept falling steadily in the night, almost like rain in the tropics, but we didn’t think too much of it,” he says.

By morning, they had recorded 170 to 230 millimetres in their rain gauges. However, rain falling on higher ground to the

north had run off the dry soil and flooded across the family properties, taking soil and fences with it.

The water moved over the property from north to south – filling dams, cutting channels and scouring paddocks as it went. In their northern paddocks, water coming off the higher ground caused sheet erosion that was somewhat mitigated by cereal stubble cover and old roots helping to hold the topsoil together. Medic and lentil paddocks, with lower stubble, suffered more damage.

As it moved south, the district-wide run-off funnelled together into watercourses that followed dry creek beds or cut their own path. This major flow cut a swathe more than five kilometres long and up to 100 metres wide through one of the Baldocks’ properties. At one point, water backed up behind a sandy hill before punching through to the other side.

“It was about eight metres from the top of one dune to the bottom of the channel,” Mr Baldock says.



Photos: Andrew Baldock

“In the end, most of the water went right through our property and pooled in a huge lake on the neighbour’s place, leaving a largely unrepairable scour across the farm.

“We also lost about 15km of fencing, which severely impacted our grazing and cropping plan.”

Other damage included water getting into stored grain in silo bags, topsoil loss and sodicity in the exposed subsoils, large patches of soft ground, and developing salt scalds where the water had pooled.

Shortly after the flood, Mr Baldock invested some of his time in attending the local GRDC flood recovery workshop, where he picked up a lot of useful information about identifying and prioritising repair work. He thought attendance would be higher but appreciated that many people had prioritised spending the time on their farms.

“I think it would have been good to have the workshops available online so more people could access them at a convenient time, but the GRDC did a good job and it was worth going,” he says.

It was clear that a major priority across the district was seeding, which would need to be underway by late April or early May – just 100 days off. That made clearing fences and debris from the paddocks a major priority. For the Baldock family, however, recovering grain from the flooded silo bags was even more urgent.

“We had to get the bags up and the grain off the farm,” Mr Baldock says.

“Working against us was the fact that about seventy per cent of the local roads had been washed away and the paddocks were untrafficable for heavy trucks.”

To overcome these constraints, the truck drivers found a roundabout route onto the farm, adding 50km to the journey, while the farm team vacuumed dry grain from the bags into chaser bins and towed those to a suitable loading point. Approximately five per cent of the grain in each bag was too wet to recover, and filling each truck took up to four hours instead of the usual 30 minutes.

Once the dry grain had been secured, the Baldocks could finally focus on their paddocks and think about clearing fencing, filling channels, and moving topsoil back into eroded areas.

Despite all the fence damage, recovering lost stock was found to be less an issue than expected. Once the main mobs were contained, local growers simply returned each other’s sheep as they found them during regular drenching and shearing round-ups. These neighbourly exchanges continued for months.

However, Mr Baldock still found the most precious recovery commodity was time, with time management playing a key part in their disaster management.

“As a farmer, you normally complete your jobs in a seasonal cycle but when you’re confronted with everything all at once like this, you need a much more strategic, business approach,” he says.

“You need to accept that you won’t be able to do everything straight away then; rather than tearing into it, invest some time to identify and prioritise the most time-sensitive tasks and any constraints standing in the way of getting those done.

“You also need a plan carefully so you can lock in your contractors, suppliers and labour early, because everybody is going to be after the same things.”



Photo: Andrew Baldock



Photos: Andrew Baldock

“For us, the priority was organising trucks to get those silo bags emptied and figuring out how we could get the grain onto the transport. Then we could move onto repairing enough of our paddocks to put a crop in.”

Mr Baldock says growers tend to prioritise outside work over time spent in the office, when both are equally important.

“The farm is a business, and you have to take care of business,” he says.

The family accepted that repairing the farm’s roads and fences could take years. In the meantime, they still needed to prepare for each coming season by reserving time to conduct soil testing, analyse yield data and organise inputs.

In the end, the Baldocks were able to get their 2022 cropping program sown on time, with various adaptations to allow for unrepaired ground, soft patches, and updated grazing plans to cover the lost fencing.

“We had another top-up of rain in February and then a proper season break just after Easter,” Mr Baldock says.

“June and July were fairly dry, but then we had a long cool spring followed by a soft finish.

“High soil moisture and positive grain prices gave us the confidence to apply plenty of nitrogen during the growing season. As a result, we harvested up to 3.5 tonnes of wheat per hectare against a long-term average of 1.8t/ha, and up to three tonnes of lentils per hectare against an average of 700kg/ha.”

Since then, work to manage the impacts of the flood event have continued. A 4km scar snakes across the farm and Mr Baldock is not sure whether it will ever be able to support crops again.

Another significant impact has been the development of salt seeps, which render the affected areas unproductive and often cause problems with trafficability.

“We were still having trouble with machinery getting bogged near seeps during seeding for 2023, more than a year after the flood,” Mr Baldock says.

“We have had to prioritise planting perennial pasture crops such as lucerne in the affected areas, to try and keep the salt down. It is another task that takes time away from seasonal work and regular maintenance.”

For all that, the 2023 harvest showed the benefits of substantial moisture carryover, supported by late-season falls at the end of 2022.

“Despite winter 2023 being quite dry the carryover set us up for another strong season, especially on soils with good water-holding capacity,” Mr Baldock says.

“With that and good weed control over summer, we ended up harvesting about 20 per cent above our long-term average.

“It’s like the flood gave the country a big reset.”



Photos: Andrew Baldock





Photo: Paul Schaefer

## CASE STUDY

## 04

# Schaefer family: On the receiving end

## SNAPSHOT

**Grower:** Schaefer family

**Location:** Pinkawillinie, SA



**Enterprises:** Cropping, hay and sheep

**Farm size:** 4500ha

**Cropping area:** 3500ha

**Crops:** Wheat, barley, vetch, oaten hay, canola

**Recorded rainfall:** ~150mm

**Soil(s):** Dune/swale (sands, loam, clay flats)

Paul Schaefer's family farm at Pinkawillinie was at the bottom of the flood flows around Kimba, meaning a lot of the water and soil running off the farms and high ground further east ended up on his property.

He says the water was obviously moving more slowly by the time it entered their property, so the amount of damage and soil erosion was less. Instead, the Schaefers faced thick blankets of stubble and litter from paddocks upstream, numerous inundated areas and, most significantly, the sudden appearance of a large lake where the run-off stopped.

"We didn't know where to start," Mr Schaefer says.

"In the end, we just started where it was dry enough for us to get onto a paddock."

They began by addressing the litter patches that were too thick to sow through. Those were burnt off, with the thick and slightly damp material fuelling a slow and relatively cool burn that did not affect the underlying paddock.

Next, they looked at areas of erosion.

"There were areas up to 200 metres wide where the water had washed away the topsoil and left a hard, lumpy subsoil. It was obvious that seed planted directly into this layer would not get good soil contact, so a deep ripper was used to make it more friable. While the ripper could reach depths of 500 millimetres, only the top few centimetres of soil was broken up in this way."

Photos: Paul Schaefer



The amount of soil recovery justified purchasing a second-hand scraper, which the Schaefer used to move topsoil back onto eroded areas and re-establish a uniform profile. Both the ripper and scraper played a role in repairing paddocks and smoothing out wheel ruts cut into the soft ground, once it had dried and hardened up.

Meanwhile, there was a huge amount of spraying work to do alongside the paddock clean-up and seeding preparation, which was tackled with a “we can only do what we can do” philosophy.

For example, they could only get a sprayer onto less than half of one 100ha paddock, so they closed it off and left it fallow for the season. Instead of repairing eroded channels that ran through other paddocks, they simply changed the sowing direction to run parallel to the damage and planted up to the edges of the scar.

“In all, there were only a few hundred hectares we couldn’t recover in time for seeding,” Mr Schaefer says. “It was a loss, but not that bad in relation to the whole program.”

They planted most of their wheat paddocks to Scepter<sup>®</sup>, with some certified Calibre<sup>®</sup> seed that was already on-farm. Barley paddocks were planted with Spartacus CL<sup>®</sup> and Compass<sup>®</sup> and, given the conditions, the Schaefer opportunistically planted canola for the first time since 2017.

One concern was the amount of nitrogen that appeared to have been lost from the system. Soil testing in the area found very little nitrogen remaining, although yield data showed the success of fertiliser applications and the possibility that more N had remained in the soil than expected. One theory is that plentiful soil moisture supported high rates of mineralisation, using residual N held deeper in the soil profile.

“The flooding in 2021 meant we could afford to be confident with our fertiliser investments, which was a nice change from previous years,” Mr Schaefer says.

Soil moisture readings were still high at harvest and subsoil moisture remained positive over the following summer. This carryover moisture supported crops through a fairly dry 2022 season, until a wet finish replenished moisture levels again.

With so much moisture around, however, weeds were a persistent problem – especially ryegrass, which had been under control before the flooding. As areas of standing water evaporated, ryegrass would emerge while the ground was still too soft to support a sprayer. The Schaefer tried using a bike-mounted sprayer but even that sunk into the mud.

In the end, they burned off the worst-affected areas and used pre-emergent herbicide at the highest label rate to control regrowth. Even then, some areas had to be left for a double break and planted with hay in order to out-compete and control the ryegrass.

Two major problems took several years to resolve.



Photo: Paul Schaefer



Photo: Paul Schaefer

The first was a huge sand deposition that the water had carried onto the property from neighbouring farms. By Mr Schaefer's estimation, it originally covered about 15 hectares at depths of up to two metres.

"It was a really soft, fine sand like dry clay, with absolutely no organic content in it," he says.

"It was as dry as a chip on top but it held its moisture underneath, so as soon as we scraped the surface off it would still be really wet underneath. If we tried to drive on it the wheels would break through that dry surface layer and just suck in and stop – kind of like quicksand!"

The only option was to remove the edges of the deposit with a scraper as they dried out, then wait for the newly exposed areas to dry. In the summer of 2022, the Schaefer family let weeds colonise the area and draw extra moisture out from the subsurface. This proved quite effective and by autumn 2023, they were able to drive on the pile with a light tractor and cultivator. The remaining weeds were gathered and burned.

"We put the scraper over it in time for seeding in 2023 and managed to sow most of it, except for one soft patch where we could only use a spreader to throw seed and fertiliser across the top," Mr Schaefer says.

"That worked quite well and we got a small crop off it, then continued with scraping and spreading out the sand over the summers."

The other significant issue was the lake created by all the water that ended its run on the property. Mr Schaefer estimates it was 1200m long by 800m wide when it formed. He paddled a kayak out to the centre and measured a depth of 5.5m.

The 'shoreline' retreated by about 100 metres over the following 12 months. Relatively low rainfall through winter 2022 saw the water retreat even further and, by the beginning of the 2023-24 summer, the water level was low enough to walk through.

Returning the inundated land to production was a cautious but largely successful exercise. Risks to consider included managing salt crystallisation as the water retreated, anaerobic soils and nutrient loss.

Rather than salt, however, the Schaefer family only had to contend with dry algae forming at the edges, with subsequent weed emergence showing the soil had retained or regained some oxygen.

By using weeds to help drive down the water table, salt formation was avoided while more carbon and oxygen was returned to the soil. Despite testing showing the ground could be marginal, Mr Schaefer planted the recovered land to canola in 2022 and successfully harvested a crop. The lake area should be fully returned to production five years after it was flooded.

"As a once-in-a-lifetime event it was all pretty exciting, if I'm honest," Mr Schaefer says.

"As a family we love water skiing and spending time on the Murray. Instead of driving five hours to the Riverland we've had a couple of years where we could swim and ski right here on the farm – so I'm definitely not complaining!"

The rest of the farm has recovered well. A wet harvest period at the end of 2022 topped up moisture levels after a dry growing season, and Mr Schaefer feels the moisture carried through to support the 2023 crop. Interestingly, frost impacted yields in 2023 but not in the areas where water had run through, despite those being the lowest ground. The reason was not entirely clear but, where frost damage was avoided, the 2023 crop was once again very good.

"There are still visible signs of where the water ran, such as soil discolouration, but the farm is definitely coming back to normal," Mr Schaefer says.

"The soil composition under the sand deposition has probably been permanently changed but, apart from that, we are on track to be fully recovered by the five-year mark."



Photo: P. Schaefer

## CASE STUDY

## 05

# Ed Scott: Measuring impacts, informing actions

## Soil science perspective

Soil advisor Ed Scott is amazed by how the 2022 Upper Eyre Peninsula flood event impacted local soils, how those impacts have flowed through into harvest yields and, in particular, how resilient the landscape has been considering the ferocity of the flood.

“Behind the visible erosion and inundation, there is a lot going on in the soil right down to a molecular level,” he says. “It’s all part of the continuum of seasons. Nothing happens in isolation in farming.”

Mr Scott explains that drought years can place growers and soils under substantial pressure, with reduced incomes and confidence often leading to reduced inputs. While the smaller harvests also remove fewer nutrients, wetter years bring a risk of the residual nutrients leaching or there being inadequate nutrition to capitalise on the increased water availability.

Substantial rain events can rapidly leach mobile nutrients such as nitrogen, sulfur and potassium, especially in sandy soils. Soil erosion can also strip away non-mobile nutrients, including any residual phosphorus.

The physical variation in flooding around Kimba resulted in differing impacts between farms and even within properties.

Some paddocks had a lot of water move across them quite quickly, taking wide areas of topsoil with it. As the flow moved further south it started forming into channels and cutting gutters. Additionally, local roads and train lines sometimes

blocked the flow, leading to high-energy water movements once the water broke through those barriers.

Further along, the flow started to slow and spread out, depositing all the soil and sand it had picked up earlier.

Finally, at the bottom of the flood there were areas where the water came to rest, resulting in long-term inundation and large depositions of sand.

“Underlying the different flood behaviours was a range of different soil types including dune and swale sands, sand over clay and sandy loams,” Mr Scott says.

“This resulted in a complex interplay between water, soil and nutrients. Each grower’s post-flood soil nutrient needs were significantly influenced by things like their pre-flood fertiliser program, their soil types and how those respond to heavy rain, and whether they lost or gained soil in the flood transport.”

If more time had been available before sowing, Mr Scott says an army of soil samplers could have worked around Kimba for months to provide each farm with precise information about the true impact on their soil nutrition. However, with seeding just 100 days away, growers could not afford to wait.

“Getting access to paddocks, clearing out rubbish and fence wire, fixing up roads and all the associated logistics work took priority, so soil analysis often didn’t happen until after seeding and re-setting severe erosion had to wait until the following summer when wet areas became more accessible,” he says.

“Once the 2022 crops were sown and growing well, growers had more time to think about feeding them with top-up nitrogen applications.”

Ultimately, soil nutrient deficiencies turned out to be less critical than any intense post-flood soil testing might have predicted. Inputs of major nutrients – nitrogen, phosphorus and sulfur – were addressed through a relatively standard approach, which generally proved to be sufficient.

Many paddocks yielded over a tonne per hectare above their long-term average and strong grain prices further helped to offset the extra costs for fuel and fertiliser.

Mr Scott admits he had been worried about nutrient levels going into the season with such wet soils, particularly keeping soluble nutrients such as nitrogen and sulfur in the system. As it happened moisture availability and nutrient mobility was able to support the crop right through to harvest, especially with top-up rain at the start of summer.

“It was both surprising and good that we didn’t see the level of N deficiency we expected,” he says. “Everything came together nicely with regards to soil moisture and N mineralisation.

“Even where growers sowed into sand depositions, they usually did strike a germination with the underlying moisture, and those roots grew down into the old topsoil where they could access nutrients.”

Mr Scott now expects growers in other areas could see similar outcomes after a flood event, with some soils holding more nutrients than expected while others may be significantly depleted.

“With so many contributing factors across soil types and textures, water movement, paddock history, there will inevitably be some surprises,” he says.

While harvest data told one side of that story around Kimba, there was additional evidence under the ground.

Post-harvest soil pits revealed surprisingly good root development, which showed that that key nutrients had remained in the topsoil. This highlighted the value of stubble retention and organic matter reserves for protecting topsoil structure and chemistry.

“Normally, we see a nutrient-rich top layer and then a more nutrient-depleted subsurface layer which holds the moisture,” Mr Scott says.

“I thought those strata might have been reversed by the influence of the water, but the crops still were able to access the full profile of nutrition as well as the moisture.”

A good post-flood harvest cannot be celebrated in isolation, Mr Scott cautions, and points to the considerations that need to be carried forward from year to year.

“Good mineralisation and a big crop take a lot of nutrients out of the soil,” he says. “It’s important to make sure nutrient replacement is adequate to keep up – especially if continued high soil moisture combines with good weather to drive another strong harvest, as happened around Kimba in 2023.”

Another long-term issue that literally resurfaced after the Kimba event was salinity. This also had links back to the dry seasons that preceded the flood. Salinity had been increasing

in the area due to shallow rain events bringing salt to the surface and then evaporating.

A deeper wet can mobilise these surface salts and move from further down the soil profile. However, temporary inundation of low points can leave salt deposits at the surface when the water evaporates. Salt will not only appear at the low points in a paddock either. Perched water tables that accumulate within dunes can spread to the sides and evaporate, forming salt seeps high up on the slopes.

Mr Scott says salt deposits and seeps are not inevitable and growers can encourage dissolved salt to retreat with the water table.

“The problem isn’t just the water or the salt, but the evaporation,” he says. “It is essential to reinstate some form of soil cover over areas that have lost it, to keep any surface evaporation to a minimum. You can use broken hay bales, straw, stubble, sand or anything else that is available.”

Around Kimba, some growers also had to contend with areas that remained under water for more than a year. These covered several hectares in some cases and the water’s slow retreat raised the potential for issues that run far deeper than salt accumulation around the edges.

“With the soil being subject to anaerobic conditions for so long, it loses biodiversity, nutrients and structure,” Mr Scott says.

“After more than two years of immersion in stagnant water, growers have to expect soil constraints and issues around how to return these areas to productivity.

“Unfortunately, it’s all still a bit of an unknown and we can only wait to get in there and see.”

However, he says growers should pay close attention to the soil structure in any areas that have been soaked or inundated. While wet soils create obvious problems with trafficability immediately after the rain, soils that have previously been opened up through deep ripping or tillage can be especially challenging for vehicles. These can be more vulnerable to settling and re-compaction, leading to hard-set surface scars and significant resistance to plant growth.

Following any flood, there will be learnings as to how the farm soils settle and whether they become more compact or prone to hard-setting.

Mr Scott says an important part of post-flood soil science is establishing these resettling behaviours and helping growers identify where soil needs to be opened up again as soon as the cropping program allows.

“It’s critical to have this kind of soil structure strategy in place, so crops can continue to access the moisture and nutrients they need in drier conditions.

“It’s another potential legacy issue that will be driven by how the soil performs following a wet period.

“Nothing happens in isolation in farming.”

A yabby crosses a flooded paddock at Corowa during late spring 2022.



# NSW flood

DECEMBER 2021 – OCTOBER 2022



Photo: Warrembool Pastoral Pty Ltd



Photo: Roy Hamilton

## CASE STUDY

## 06

# Roy Hamilton: Manage the time, not the water

## SNAPSHOT

**Grower:** Roy Hamilton

**Location:** Rand, NSW



**Enterprises:**

Wheat, triticale, barley, canola, wheat, faba beans, canola, vetch (five-year rotation with two non-cereals (legume, oilseed))

**Farm size:**

4400ha

**Recorded rainfall:**

330mm over 6 weeks (September/October 2022)  
Average annual rainfall: 450mm  
Average growing season rainfall: 280mm

**Soil(s):**

Variable red and grey clays to red loam

Roy Hamilton knows that he farms on a floodplain. That, along with some 50 years of experience on the land, sees him relatively well-prepared for periodic flood events.

His property at Rand, 60 kilometres north-west of Albury, is part of a system that drains a lot of the NSW lower south-west slopes, and excess rain on the hills will flow slowly but inexorably out across the flats.

“It’s some of the best farmland in the world, but they forgot to put a slope on it,” he jokes.

Mr Hamilton has seen regular flood events but believes flooding through the spring of 2022 was the longest period of continual inundation that he has experienced. In total, the area was under water for nine weeks, from September until December.

“On this country it is not necessarily the individual flood event but the length of the flood season,” he says.

“In 2022 we were underwater for 63 days straight in total. Billabong Creek reached flood height in early September and didn’t change for months. Once the creek floods the water won’t drain back, it just spreads out across the land until it can find somewhere else to go.”

While open drains and coordinated levee systems work well across the district, flooding is a natural feature of the landscape and Mr Hamilton says local growers need to accept it.

Only about a quarter of the Hamilton property is not vulnerable to flooding, so the extent and timing was particularly impactful. It meant that the bulk of the season’s investments in seed and fertiliser had already been made, with only finishing and harvest to go.





Photos: Roy Hamilton

“It’s just poorly drained country so you have to expect that floods will happen and you will not be able to harvest all of your crop in those seasons,” he says.

“When I was young they used to say you couldn’t crop out here at all. It was grazing country and people only took up cropping here when sheep profitability fell away in the 1980s.

“It can be difficult country to crop on, especially when you’re starting out. With land values being so high, if a farm is highly geared with debt there can be a lot of pressure to harvest a crop every year.

“You need to take a longer view.”

As an example, Mr Hamilton explains that 2016 was a flood year which was followed by challenging dry seasons in 2018 and 2019. Good rains returned for 2020 and 2021, providing yields that boosted his balance sheet going into 2022. When the floods came in the spring of 2022, he felt comfortable that he could get through and recoup some of his losses in the following year.

He understands that for younger growers and operators with low equity, the limited capacity for loss-making seasons means their business is more at risk.

“It’s really hard to be in a business cycle where you’re just getting going and the season knocks you back,” he says.

“It’s very tough for contractors with depreciating assets. Farmland continues to appreciate after a flood season but if we lose contractors to other industries due to a run of bad years, then our industry loses that capacity and it won’t there when we need it for the good seasons.”

Mr Hamilton notes that long events such as floods and droughts can be depressing, especially when they are combined with a sense of isolation and the continuing financial pressures.

“Farmers are always wanting to be doing something, but there is only so much you can do before and during a flood event. You just have to wait for the water to go down,” he says.

“If you’re not careful, you can end up in a mental loop of worrying about your potential losses, how you’ll manage all the logistical problems, and so on.

“Don’t be too hard on yourself.”

To get through difficult seasons, Mr Hamilton recommends focusing on the things you can manage and then taking the opportunity to work on other projects that you can still do.

“It’s not easy but try and think of it as an opportunity. A flood or drought gives you extra time for those other jobs,” he says.

“Things happen quite slowly so, once the peak has passed, take your family and your dogs and get away from it all for a couple of days. Or go and do something else in your shed or your workshop. Sometimes there just isn’t anything more you can do on your farm.”

He also emphasises that another productive way to use the time is by looking out for friends and neighbours, especially the ones who aren’t answering their phone.

“Sometimes the best way to help yourself is to help someone else,” Mr Hamilton says. “You are all going through the same thing, so it is good to talk about it.

“Look out for those vulnerable people who need a hand and focus on what you can control, rather than worrying about problems you can’t solve while the paddocks are underwater.

“Again, it is hard, but it isn’t going to matter in five years so don’t stress for too long now. I have and it doesn’t work!

“Instead, focus on your family, your mates and your health and then everything falls into place.”

CASE STUDY  
**07**

# Roger Bolte: Looking beyond the losses

## SNAPSHOT

**Grower:** Roger Bolte

**Enterprises:** Cropping – wheat, vetch

**Location:** West Wyalong, NSW

**Farm size:** 6000ha

**Cropping area:** 6000ha

**Recorded rainfall:** 1200mm+ during 2022 (preceded by 250mm+ in December 2021)

**Soil(s):** Predominantly heavier red, brown and grey clays. Some lighter loam pockets



West Wyalong grain producer Roger Bolte does not mince words about the big wet his farm experienced in 2022.

“It was our biggest loss year ever,” he says.

His land is relatively flat and slow draining, with generally heavy clay soils and connections to two significant catchments. When it rains on the higher ground, the water inevitably flows across the district.

However, Mr Bolte has observed important changes over recent years.

“We have noticed with road developments and the town of West Wyalong being up above us, we’re getting our water much faster than we used to,” he says.

“It used to be that if there was 75 or 100 millimetres of rain, we knew we’d have a flood and it would take three or four days to get to us. Now the water arrives after about 24 hours and it comes through deeper and faster than it used to.”

He says growers on the flat country have no option but to maintain stop banks and open drains to try and manage the flooding and guide the water along established flow paths.

However, those precautions can only do so much and the weather in 2022 overwhelmed them all.

“It was a very frustrating and mentally taxing year,” Mr Bolte says. “Every cropping decision seemed to be the wrong one. We would have been much better off financially if we’d decided, right back in January, to just go away for 12 months and not put a crop in at all.”



Photos: Roger Bolte

The 2021 season had been highly productive and the farm was in the process of bringing in a ‘magnificent’ harvest when the rain began. More than 250mm fell over the end of the cropping sequence, leaving paddocks waterlogged and most of the grain downgraded due to dampness. That weather culminated in significant flooding during January 2022.

“We had country on our main property that we just couldn’t get onto for a long time,” Mr Bolte says.

Generally, the area’s clay soils handle being inundated very well and, over a normal summer, they will crack open, dry out, and repair themselves. The soils are also non-leaching, so potassium and phosphorus usually stay in place. Under sustained heavy flooding, however, the subsoil can become de-oxygenated and compacted, taking several years to return to full productivity.

As a result of those factors, the harvest following a flood can be somewhat unpredictable.

As the initial flood subsided at the end of January 2022, Mr Bolte thought they could be heading into another good season. By April, the soil had dried out enough to get the paddocks sown (using a disc seeder) and the moisture profile was still full.

Then a second flooding event washed most of the seed out and the Boltes were forced to buy replacement seed and fertiliser so they could sow the crop again. The farm was flooded for a third time during the winter, but the crop survived and grew strongly.

“We had a pretty good crop up until about October, when we got another 200mm of rain in under two weeks and everything went back underwater,” Mr Bolte says.

“With so much moisture around, we had maxed out our fertiliser and chemical inputs at very high prices, plus we’d spent a huge amount of money on ag planes because we couldn’t physically get onto a lot of the country.

“We had crops right on that point of flowering and we’d thrown everything at them – then we just couldn’t get out to harvest and we lost about 80 per cent of it all.”

Adding to the frustration, it took until March 2023 to bring in what remained. By then, however, Mr Bolte had made the critical strategic decision to look beyond the flood and focus on setting the farm up for the following season.

The Boltes knew their soil nitrogen would have been significantly reduced by the floods and their large harvest in 2021. So they planned to apply urea before sowing instead of waiting for the crop to get started.



Photo: Roger Bolte

They also realised controlling summer weeds would be a priority due to seed transport in the water. With very little stock in the area, Bathurst burr, devil’s claw, spiny burr grass and other species are generally introduced through flood events.

Being large, fast-growing summer plants, controlling them is essential for conserving soil moisture and nutrients.

Mr Bolte moved quickly to organise planes for crop-topping and controlling weeds through summer, so they would not get a chance to set seed.

“As we got into October 2022 we knew we’d had massive losses in our program so we just made that conscious decision to try and make 2023 the best year possible,” he says.

“It set us up well for the season and we didn’t have the heavy weed burden that was seen on some neighbouring properties, where they’d been less proactive.”

In the end, 2023 was still a tough year that Mr Bolte says they only just got through. However, where some nearby farms harvested a 1 to 1.5t/ha wheat crop, the Bolte farm brought in 4.5 to 5t/ha.

“It was all down to looking past the flood and making those key management decisions,” Mr Bolte says.

“You’ve got to know when to say ‘enough is enough’ and bite the bullet, rather than continuing to try and hold back the tide.”

CASE STUDY  
**08**

# James Moore: Prioritising for recovery



Photos: James Moore

## SNAPSHOT

**Grower:** James Moore

**Location:** Walgett, NSW



**Enterprises:** Cropping (cereals, pulses), irrigated cotton, cattle

**Farm size:** 3800ha

**Cropping area:** 1600ha

**Soil(s):** Grey vertosol

James Moore was close to harvesting his grain crops when the 2022 floods reached his property.

“We knew it was going to flood, it was moving down the Barwon and Namoi River systems from further north and east of us. We had maybe ten days’ warning,” he says.

Once the water arrived it still took 10 days for the flood to peak, then a further 20 days for the water to recede enough for four-wheel-drive access to the property.

“We were actually quite lucky, if you can call it that, with the timing. The wheat hadn’t quite finished haying off and it stood up remarkably well to the flood waters.”

However, it still took them until February 2023 to finally finish the harvest as the soil was so wet that any subsequent rain caused them to lose access to the paddocks and caused further damage to the harvest machinery.

With his cereal crops, Mr Moore counts himself fortunate to have only lost about 280 tonnes of wheat. He was not so lucky when it came to his chickpea crop, with only about 20 per cent able to be harvested. The irrigation side of his farm

faced significant crop losses, with a breach in a levee causing some 60 hectares of cotton to be flooded.

The property is between two river systems, with the Namoi to the south and the Barwon to the north. Additionally, the Pian Creek runs through his property, so he has faced his fair share of floods over time and made changes to the farm to be better prepared.

“We don’t run sheep anymore,” he says. “I took sheep out of the system about 20 years ago for a few reasons, but they can be challenging in a flood. Cattle are easier to move and tend not to walk into floodwaters, so they’re a better fit for our property in flood times.”

The big difference in 2022 was the severity and extent of the flooding event.

“Every flood event is quite different for us, with two major river systems converging,” Mr Moore says.

“Various parts of my property have been flooded before, but the amount of water coming down the rivers in 2022 was just too much and it caused a lot of damage.”



Photo: James Moore

He says waiting was one of the worst aspects of the whole situation. “It can be quite harrowing when you know there’s a flood coming and you’ve got crop ready to harvest,” he says.

“You prepare where you can, working areas that could be at risk and moving livestock to areas that should be out of water.”

“Once the flood had arrived and we could see what was damaged, at least we knew what we needed to do. From a mental point of view, that is quite a turning point.”

The farm lost 18 kilometres of fencing, roads, levees and some shed contents were damaged – all of which led to a massive recovery job list.

“The key thing for me was to prioritise,” Mr Moore says. “I looked at all the jobs that needed doing and decided which ones would get us back into production. Anything impeding production came first.”

After the immediate work of repairing roads, beginning harvest and replanting cotton, Mr Moore spent the following 12 months fitting repair work around the ongoing farm operations.

“We just kept coming back to those jobs we could put off. For example, 2023 was quite dry so we hadn’t been running a lot of stock, which let us get through the fencing work throughout the year.”

One key change made as the result of the floods was to buy an excavator.

“I had been putting it off for too long, because I could always get a contractor in to do the work,” Mr Moore says.

“Except, of course, when it’s flooding and it’s really time critical, I couldn’t physically get anyone in. Now I have my own excavator and we can get straight into recovery without being reliant on contractors”

“It also gives me a lot more scope to protect my property for future floods.”

Another hidden benefit was that Mr Moore suspects nutrients were carried onto his property from further upstream.

“We have good alluvial soils and I suspect the floods dispersed nutrients.”

Weeds were a different story. There has been a noticeable increase in both feathertop Rhodes grass and fleabane since the floods, along with an increase in weed numbers across the irrigated paddocks from breached levee banks. Mr Moore has also observed a lot of coolabah and black box trees germinating at the peak water line.

Despite his 2022 experiences, Mr Moore remains somewhat philosophical about flooding overall.

“I wouldn’t want to stop floods coming across the country here,” he says.

“I try to look at the big picture and, on my farm, while it’s definitely a problem in the short term, flooding can be a positive in the longer term. It’s part of the natural system.

“It’s certainly better than drought. With a flood you know it’s going to last maybe four to six weeks, but you never know how long a drought will last.”



Photo: James Moore



The Blatchford family's sheds, workman's cottage and grain storage underwater in 2022.

CASE STUDY

# 09 Penny Blatchford: Accepting available support

## SNAPSHOT

**Grower:** Penny Blatchford

**Location:** Gurley, NSW



**Enterprises:** Dryland cropping – Wheat, barley, chickpeas and cotton

**Rainfall:** Five floods between March 2021 and September 2022

**Soil(s):** Black vertisol



Penny Blatchford (left) with her husband Robert (right) and British flood-affected growers Victoria and Richard Walmsley.

As Gurley grower Penny Blatchford watched floodwaters arrive on her property in September 2022, the closest example she could use to describe what it looked like was a tsunami.

“It was simply devastating,” she says.

After years of drought, much of her family’s property along the Gurley Creek had no ground cover when their first flooding event occurred in March 2021. It was not too long after that flood before the next one came.

“We could never get in and fix the first soil erosion,” she says. “We had six flooding events over the 18 months between March 2021 and September 2022, and each flood created more erosion, more water pathways through our property.

“The erosion scars were wider, and deeper, than two cars stacked on top of one another.”

While no strangers to floods, living along a creek line, the repeated flooding events were the worst the Blatchfords had ever seen.

“On our last property along the creek we have a workshop, a workman’s cottage and significant grain storage,” she says.

“We’d never had water in our workshop before 2021, but now it’s been flooded five or six times.”

The family had significant contour banks in place before the floods, but the severity and frequency of the flooding events rendered them ineffective. Ms Blatchford was left feeling as though no amount of contouring or earthworks could have held back the amounts of water they endured on multiple occasions within a matter of months.

What made the greatest difference after the floods was success with grant applications to help them get back on their feet.

“After years of drought we didn’t have the funds to repair the damage, so the grants were a lifeline for us,” Ms Blatchford says.



Water channelling through paddocks.

“There were parts of our property that hadn’t generated any income in four years. The crops failed in that first dry year and then we left the paddocks fallow through the drought, then they got flooded in the fourth year.

“The grants allowed us to complete the repairs we needed to do to access our property and get cropping again.”

The grant funds were used to protect and repair infrastructure, hire a worker to help with disposal and cleaning up, and install new concrete and gravel to strengthen the farm’s roads and work areas.

Immediately after the floods, much of their property was inaccessible for heavy machinery. Even after the paddocks became trafficable again, they required significant renovation before they could be planted.

“Most of the topsoil was gone, replaced by silt,” Ms Blatchford says.



Erosion caused by back-to-back floods.

Photos: Penny Blatchford

Photo: Penny Blatchford

Photo: Penny Blatchford



Sprayer bogged while trying to control weeds after the floods.

“To add insult to injury there wasn’t even any increase in soil moisture. The water moved so fast that it didn’t soak in.”

A dry period over the summer of 2023-24 finally provided an opportunity to perform earthworks, three years after the damage started. However, Ms Blatchford says the job still is not complete.

“There’s still a lot of work to do and the workman’s cottage still isn’t fit to house a family,” she says. “With all the financial losses, it will take us 10 years to get back to where we were before the drought and the floods.”

In order to better manage their cashflow, the Blatchfords have taken a strategic approach to planting crops since the floods. For example, they doubled the area they usually plant to cotton immediately after the flooding stopped, even though they would have to forgo a wheat crop for 2023.

This allowed them to generate income sooner and take advantage of higher cotton prices, despite playing havoc with their long-term rotation plans.

“It meant we had no paddocks suitable for cotton in the 2023-24 season, so there’ll be no further income from those paddocks for the next 12 months – but it still helped us to get through the worst,” Ms Blatchford says.

“We have had to balance and compromise and be careful of every dollar. We really need a few good seasons before we get the next challenge.

“We feel lucky that big cotton was quite successful, and we’re feeling optimistic about this 2024 season. We’ve planted a lot of chickpeas to capitalise on the higher prices, so hopefully we’re on the right track to recovery.”

Ms Blatchford says growers facing a similar situation should apply for any available grants.

“Some people might feel like they don’t want to take money, but you don’t get it and just put it in the bank. The thing to think about is that grant money all gets spent in the local community – it’s paying wages and contractors and helps to keep the town functioning.”

She also says if you do not know how to apply, you should reach out to those who are able to help, such as accountants or government support agencies.

“I hope the government realises the grants they gave out really did make a difference, both to us as growers and to our local community. They were so helpful for making it through.”



Photo: Penny Blatchford



## CASE STUDY

## 10

# Bruce Watson: Looking beyond the losses

## SNAPSHOT

**Grower:** Bruce Watson

**Location:** Parkes, NSW



**Enterprises:** Winter cropping – winter cereals, pulses, oilseeds  
Summer cropping – sorghum, mungbeans

**Farm size:** 4500ha

**Cropping area:** 4000ha

**Recorded rainfall:** 490mm (August to November 2022)

**Soil(s):** Red brown earth, sandy loam, grey vertosols

For Parkes district farmer Bruce Watson, the floods in 2022 were unlike anything he or his family had seen since they bought the property in 1901.

The Watsons' Parkes-based grain business uses zero till and controlled traffic farming systems to produce a mixture of winter cereals, pulses and oilseeds, along with summer sorghum and mungbeans. The farm received 100 millimetres of rain in August, 100mm in September, then another 100mm in October, meaning their profile was well and truly full.

"In November we had another 60mm rainfall event, which started causing havoc, and then 10 days later we had on 130mm on top," Mr Watson says.

"The family has been here since 1901 and we'd never seen anything like it. Water went places we hadn't even thought of. It was flowing and rushing through the property."

The high flood levels, which lasted four days, caused significant damage by wiping out boundary fences, eroding roads and scouring paddocks.

Generally, the erosion was less severe where the soil had been somewhat protected by standing crops, although one area that should have been protected by its eight-tonne standing wheat stubble from 2021 was totally wiped out.

Paddocks were also badly scoured where the double disc planter had been recently used planting the Watsons' sorghum.

"Following the flood, it took us a while to be able to get back onto the paddocks, but we really wanted to get our ground cover back," Mr Watson says.

"We had to start with some work to level out the paddocks and offset the country. Then we needed to generate some tilth so we could plant back into it to re-establish groundcover to limit the possibility of erosion over summer.



Photos: Bruce Watson

“We ended up planting sorghum and following the harvest of that crop in June 2023, planted vetch with a focus on rebuilding the soil biology, given the topsoil losses. The sorghum harvest ended up being about two tonnes per hectare.”

As they headed into autumn seeding the following year (2023), the Watsons felt the need to fully evaluate their farming systems and overall approach. Ultimately, they recommitted themselves to their no-till and controlled-traffic systems and focused on making good agronomic decisions for the right reasons.

“The 2023 growing season was exceptionally poor due to a lack of growing season rainfall and frosts which impacted flowering pulse crops, but we stuck to our rotation program,” Mr Watson says.

The Watson family did take learnings from their flood experience and have made changes to their machinery fleet and other infrastructure, such as harvest storage and roads.

“On our country, especially in wet years as you go into winter, the reality is that bigger kit will still get bogged even with controlled-traffic farming and we have very small windows to execute paddock operations,” Mr Watson says. “It can make timely seeding and spraying really difficult.

“We get a plane in where we can, but that’s not always possible if there is high demand or sensitive crops nearby, so we made the decision to buy a second planter and boom spray. It’s a large capital expenditure and might not be for everyone, but we’ve decided to carry this on our balance sheet. Additional operational efficiency has also been achieved in seasons where things like double crop opportunities present themselves following the summer crop harvest in April/May.

“Rainfall at Parkes can be chaotic. We had 600mm of rain between November 2023 and June 2024, and we wouldn’t have got a full crop in this year without the second planter, so it has been a good decision for us and we can get more done within our tight variety and trafficability windows.”

One major surprise from the flood was the amount of dirt and sediment that was moved with the overland flow. This had a significant impact at harvest as the equipment was not set up for such a challenge. Mr Watson remembers huge clouds of

dust coming from the back of the header grain samples with very high levels of dirt and sediment.

“We set up a blowing system to help move the dust off but the sample was still pretty dirty,” he says.

“All we could do was be upfront and transparent with our buyers about the situation, and they were fairly comfortable with that.

“We’re now setting up on-farm grain storage with a cleaning system so we could take care of it ourselves in future. “

The loss and damage to infrastructure has also led to some rethinking. The Watsons lost a lot of fencing and some had to be replaced while others did not. Replacing boundary fences where the adjoining neighbours ran livestock was a priority.

Mr Watson says that replacing the fences also involved significant work to grade off the old fencelines, as the dirt that had accumulated along the existing fences had acted like small levy banks and stopped or diverted the flow of water across their paddocks.

They have also reconsidered their road alignments, especially around infrastructure, and how they manage drainage. In some areas, a laser bucket was used to set gradients and gravel was brought in to better form up the farm roads.

“Grants from the NSW Government were an excellent support that helped us get back on track with our fencing, on-farm roads and farming infrastructure repair,” Mr Watson says.

The overall strategy for farm drainage remains a work in progress, as the Watsons are aware that it will be critical as they move forward and experience more high-impact rainfall events.

Mr Watson notes that their controlled-traffic tramlines do help with drainage and access, but making greater use of topography mapping may be important for future flood mitigation.

“Our land is relatively flat so excess water might pond, but it normally has enough fall to flow.

“So far we have really just worked to rebound from the floods in 2022 in the past two years.”

## CASE STUDY

## 11

# Warrembool Pty Ltd: Plan, learn, repeat

## SNAPSHOT

**Growers:** Warrembool Pty Ltd

**Location:** Corowa, NSW

**Enterprises:**

Mixed farming – Cropping (wheat and canola), sheep (Merino and prime lamb), cattle

**Soil(s):** Three main soil types:

- red chromosols/kurosols (red loam topsoils, duplex to medium to heavy clay subsoils) on the slightly higher elevations
- grey vertisols (medium to heavy clays, usually sodic) on the natural floodplain areas
- yellow kurosols (deeper, sand topsoils over clay subsoils). Alluvial deposits usually forming higher undulations in the landscape



For the team at Warrembool Pty Ltd, managing the 2022 flood involved a combination of proactive and reactive actions.

The 2022 event was not the first time the property had experienced flooding. However, that year's flood stood out as one of the most extreme, with 360 millimetres of rain falling onto a full soil profile over the late spring period.

Ed Cay, who manages grain marketing for Warrembool, says that the area is naturally prone to localised flooding and waterlogging, with waterlogging that impacts crop yield a more common occurrence.

“Our landscape is relatively flat with intermittent creeks and wetlands,” he says.

“In the 2022 flood, we found the water was mostly slow moving. It filled up all the natural water bodies, which are typical of the area, then we started to see more rapid

changes as the natural capacity of the landscape was exceeded.

“The impact was really caused by the sheer volume of rain that fell over a relatively short amount of time.”

Mr Cay says some paddocks were largely unaffected one day and then flooded the next. Floods in 2016 provided the most recent ‘high water marks’, which meant the team was able to predict which areas the water would move into as each natural levee bank was exceeded.

The flood impacted a range of management decisions by making many ground-based paddock operations such as spreading, spraying, windrowing and harvest a challenge, if not impossible.

“The water made a mess of our controlled-traffic lines and bogging became a frustratingly, regular occurrence for our contractor,” Mr Cay says.



Photos: Warrembool Pty Ltd

“We left significant tracks in the paddocks and suffered a lot of damage to our internal roads.”

The crop losses were also significant in terms of both yield and quality. The yield losses were dependent on soil type. The red soils with slightly higher elevations fared best while the grey soils saw many total wipeouts. Some areas were left at harvest and it was not until months later that vehicles could attempt to salvage what they could.

Heavy rainfall throughout the year caused an ongoing series of considerations and management decisions. For example, the dilemma of using more urea to maximise yield potential but not wasting nitrogen on crops that could ultimately die with more rainfall. The risk of losing any excess nitrogen into the environment was also an important consideration.

Mr Cay says there was also ongoing communication that was driven well by general manager Charles Cay and operations manager Owen Smith. They linked the on-farm team, family members, the bank and contractors – ensuring all understood what the management approach was.

“The business uses our neighbour Beau Longmire (Longmire Pty Ltd) for contracted, in-field operations,” he says.

“They are crucial to the business and provide a very professional service. They have invested in machinery to better cope with trafficability issues, and when it looked like the season was going to get wet, Beau was very proactive, investing in things like dual wheels for the windrower, putting tracks on the header and storing an inventory of parts that would help him cope with weather related issues.

“Beau also subcontracted more headers and invested in harvest logistics to help shorten the harvest window. This was critical to helping us get crop off and minimise crop damage.”

In the year after the flood, the Warrembool team used the stored soil moisture to set up a good year and were well positioned when the winter of 2023 became dry. Mr Cay says the strategy helped carry the crop through a drier winter to more favourable spring conditions. The yield benefit of the stored soil moisture helped offset the losses from flooding in the previous year before.

“Owen had to manage serious weed pressure,” he says. “Areas where crops had failed due to the waterlogging were very susceptible to weed growth, particularly with annual rye grass, which seemed to benefit from the reduced competition.

“Areas we couldn’t get on and spray also saw high weed burdens develop.”

All through the flooded season, the management team kept up good communication about potential issues and focused on getting any crops they could save through to harvest, then getting the harvested grain properly stored.

“At the same time, we had to manage accessing and out-turning stored grain from previous years to meet our contractual obligations,” Mr Cay says.

In hindsight, 2022 turned into a huge learning year for the Warrembool team, with valuable lessons in flood planning and recovery.

“The management team will be able to use the information we gained from that flooding experience to build our resilience and decision-making for future flood events,” Mr Cay says.

“For example, we are now more confident about getting grain into, and out of, storage thanks to the new infrastructure investments we’ve made.”

Mr Cay also remembers the stresses staff and everyone else connected to the business felt. “Obviously, there are financial and decision pressures on those who are trying to manage the business at a time when impacts outside of your control are going from bad to worse.

“At the coalface, there are also pressures on those carrying-out operations. The people trying to conduct our in-field operations had an incredibly stressful time with continually getting bogged and the frustration of stop-start operations,” he says.

“Wet weather also placed huge pressure on animal health. Dealing with adverse livestock conditions can be very emotionally draining for staff.”

For the management team, recognising those diverse stresses and supporting people in and around the business is now a key element of managing extreme weather events.

“The emotional stress of facing the unknown can be very hard. In the end, you can only control what you can control, and you can only deal with the rest when it comes,” Mr Cay says.

“Mapping-out various scenarios based on objective data helps to make disaster management a numbers problem

rather than an emotional problem.”

On a positive note, he adds that another valuable learning from 2022 was to take time to enjoy some of the better aspects of the flood.

“The birdlife and wetland ecosystems were spectacular,” he says. “We had waterbirds as far as the eye could see, and the waterways were teeming with frogs and animals.”

Mr Cay points out that general manager Charles Cay and operations manager Owen Smith bear the greatest weight of business management decisions during extreme weather conditions.

“The pressures are immense. However, both remained positive and philosophical throughout. It is an admirable trait

when dealing with tough conditions.”

“Both are big believers in perspective. Charles has an amazing ability to look after the team and business. I remember when he pointed out that kids don’t always understand the financial pressures caused by a flood event. It was important for families to shield them from those stresses and share in the excitement of the incredible natural processes taking place. It is a good reminder.

“For Owen, he is quick to point out that there are always people worse off than you, whether that’s inside or outside of agriculture. He is a believer in looking after the team and keeping everything in perspective.”

Ultimately, Mr Cay takes a long view. “The volatility in seasonal conditions can be your enemy one year and your friend the next,” he says. “This is a long game!”

## The Warrembool team’s strategies to mitigate future floods

**Land use:** Paddocks that are prone to flooding are used for the livestock enterprises as risk mitigation.

**Long-term soil management:** A long-term gypsum program is used to help profile drainage on sodic soils. EM38 zoning maps have been used to target soil amelioration.

**Infrastructure:** From its learnings, the Warrembool team was ready with in-field and infrastructure works, which were completed by seeding 2023. They invested in better internal roads and access to infrastructure, specifically to improve trafficability around grain and machinery storage infrastructure. They use wheel track renovators, earthworks on internal roads and table drains.

**GPS landscaping:** A GPS-guided bucket is used to landscape waterlog-prone areas to help improve drainage. It works to encourage natural, in-field water flows with the least amount of disruption to the natural landscape. Water that naturally moves very slowly over cropping paddocks into creeks, wetlands and revegetation zones is encouraged to move slightly faster to prevent waterlogging damage to crops. It does not prevent damage in extreme flooding years; however, it reduces the yield damage in years affected by waterlogging and small, localised flooding. In the very wet years, there is nothing that can be done – the natural landscape lends itself to slow-moving or stagnant, widespread bodies of water.

**Use of aircraft:** Use of aircraft for crop inputs when trafficability becomes impractical.

**Contractor support:** Use a contractor who is trusted and has the right gear for wet weather.

**Zoning:** Store information that will assist with decisions in the future. Zone areas based on yield maps, NDVI images and Google Earth images. This helps to sort the cropping areas into likelihood of damage under different

waterlogging/flooding conditions – knowing where the ‘high water mark’ is under different flooding scenarios.

This data assists with:

- knowing where to focus efforts and inputs on good areas;
- better understanding of breaking the cropping areas into risk zones for input decisions;
- having more comfort in minimum production capabilities if looking at forward contracting physical grain; and
- better forecasting of cashflow and financial budgeting.

**Map areas that performed well** even in the really wet conditions and capitalise on these zones.

**Dead areas are dead.** Focus on the good areas and put yourself in the best possible position to capitalise on the good moisture.

**Plan:** Make sure your farming systems program is planned. For example, have fungicide applications planned for a date, know which fungicides have residual activity, ensure compliance, and manage nitrogen applications carefully.

**Financial planning:** Prepare financial forecasts early and keep communication lines open with the bank. This includes careful planning of the budget versus actual costs; keeping up good communication between the bank, the accountant and the team; and using forecasts to point out ramifications for the following years.

**Summer weed control:** Ensure good summer weed control and green bridge management after the flood to retain as much soil moisture as possible.

**Safety first:** Ensure toolbox talks around safety are focused on topics relevant to the conditions. This includes reminders to not drive into water of unknown depth and following floodwater advice from the authorities. Also cover safe practices and precautions for recovering bogged machinery, infection risks from mosquitoes, and more.



Photo: Darren Eather

CASE STUDY

# 12

## Darren Eather: The price of fertile soils

### SNAPSHOT

**Grower:** Darren Eather

**Location:** Narrabri, NSW



**Enterprises:** Cropping – cereals, canola, pulses, sorghum, corn and cotton

**Farm size:** 6000ha

**Cropping area:** 5000ha

**Recorded rainfall:** Three flood events in 2022

**Soil(s):** Cracking clay soils away from the river. Alluvial loams nearer the river



Photo: Darren Eather

As a seasoned veteran of a lifetime of floods, Darren Eather is all too familiar with flood damage.

“We have been here all my life and multiple generations before me,” he says.

“Flooding is part and parcel of farming here along the Namoi. We live near the river and we get a bit better crop than other growers most years because our soils are more fertile, but we also accept the fact that every now and then it gets washed away.”

Mr Eather’s family made the decision to remove livestock from its farming system and focus on cropping after significant floods in 1998.

“There were more problems with livestock compared to crops,” he says.

“You have to worry about keeping them safe around the water, about keeping them dry, keeping them fed... Crops you can just leave, livestock you can’t.”

Unlike many growers in NSW, the 2022 floods were not unusually severe for the Eathers, although there was still a lot of damage.

“The 2022 floods were certainly not the worst we’ve ever seen,” Mr Eather says.

“We had three events, all driven by water coming down the river system from the Gunnedah and Tamworth areas.

It generally takes 24 to 72 hours for water to make its way to the Eather farm after heavy rains further up the Namoi catchment.

“In 2022 we had one flood, then another four weeks later, then six weeks after that one we had a third event.”

Fences and internal roads were severely damaged, and about 20 per cent of the winter crops were lost after the floodwater caused such severe lodging that they were impossible to cut.



Photo: Darren Eather

“We did try to harvest, but it was a waste of time,” Mr Eather says. “The canola looked like it was a good crop, but the paddock was full of logs and flood debris and we just had to leave it. And any crops that didn’t get flooded out still ended up being too wet to harvest.”

Even for a grower with plenty of flood experience, Mr Eather says the sudden loss from a flood can be a challenge to cope with.

“Floods can be a bit of a kick in the guts, to lose what was going to be a good crop and have such a lot of recovery work to do,” he says.

“Then the following year, 2023, ended up being very dry so we went straight from one extreme to the other.”

While Mr Eather had hoped for an upside in terms of stored soil moisture for his 2023 crop, the dry conditions meant he did not see much benefit at all.

In the long run, he says floods are something his farm business accounts for by taking a long-term view – similar to the way many growers consider drought conditions.

“It’s just part of farming here,” he says.

“We can’t do much about it and there are a lot of benefits to farming along the river.

“I guess I’d rather deal with flooding sometimes than poorer soil all the time.”



Photo: Richard Wright

## CASE STUDY

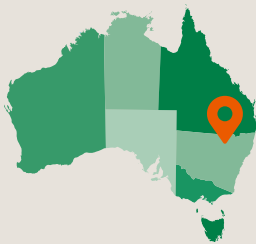
## 13

# Richard Wright: Prepared as can be

## SNAPSHOT

**Grower:** Richard Wright

**Location:** Merah North, NSW



**Enterprises:** Dryland and irrigated cropping

**Farm size:** 4800ha

**Cropping area:** 4800ha

**Soil(s):** Grey cracking clays

Richard Wright farms along the Namoi River in Merah North, with a series of interconnected waterholes across his property that run together when the river floods.

“We would usually expect a major flood every five to 10 years, in terms of ones that cause a fair bit of damage,” he says. “In 2021 and 2022 we had two major floods in just two years.”

Mr Wright has strategies in place to mitigate flood damage, including rock and gravel bases to minimise undermining of farm structures and roads, along with well-constructed levee banks for his irrigated paddocks.

During August and September 2021, the Wrights experienced four weeks of flooding, followed by another 10 weeks of flooding in September and October 2022.

“During those 10 weeks we could only get to town briefly by land three times. The rest of the time we were completely isolated,” he says.

Because the flooding came down the Namoi after heavy rainfall further upstream, Mr Wright and his team had advance notice that trouble was on its way.

“We had about four days to prepare for the flooding,” he says. “We focused on loading up on essentials like food, fuel, seed





and chemicals we thought we might need while we were cut off from town.

“We also made sure to move all our machinery out of any vulnerable areas.”

An essential help during the waiting period, and after the flood hit, was having access to real-time water level data from the Water NSW daily river report. It meant they knew what was heading their way and when.

Once the flood arrived and the farm was isolated, Mr Wright was lucky to have his own plane for transport.

“We are fortunate to be able to look after ourselves out here,” he says. “The SES could deliver food where people were really stuck, but luckily I didn’t have to use their support as I could fly into town as required.

“I was also able to stock up for staff and neighbouring farms. It was nice to be able to deliver some groceries and essentials, or to be able to help take staff and neighbours to medical or other appointments.”

Mr Wright also had to consider the needs of his employees. “The isolation made life tough for my staff and their families. The employees and I all had plenty of work to do, but some of our team had family members who couldn’t get into town for their work, so it was difficult for them and the whole community.”

The Wright farm lost much of its dryland crop in 2021 and 2022, with about 90 per cent going underwater and only about half recovering to a point where it could be harvested.

After the extended flood in 2022, harvest was started as soon as machinery could access the paddocks, which was still approximately a month later than usual.

On top of everything else, machinery wear and tear was worse than expected.

“We had a lot of issues caused by having to drive through the mud and water all the time. We went through brakes, clutches, steering and a diff or two – all within just a few months,” Mr Wright says.



Photos: Richard Wright



His agronomic program was also affected by the flood, with an increase in existing weeds and new weeds being transport down the catchment, including feathertop Rhodes Grass.

“We had to do more summer spraying to try and keep the weeds under control. We didn’t even get a yield benefit from the extra flood and all the weed spraying, because it stopped raining at the end of summer – leaving us with a very poor start to autumn.”

Meanwhile, the costs and repair work continue.

Mr Wright and his team are still working on recovering from their double flood seasons, including making repairs to the farm’s levees, roads and rock and gravel bases so they will be ready for the next one.



School bus run in boats.

Photo: Andrew Watson

## CASE STUDY

## 14

# Andrew Watson: Managing and balancing the risk

## SNAPSHOT

**Grower:** Andrew Watson

**Location:** Boggabri, NSW



**Enterprises:** Cropping – wheat, canola, irrigated corn plus cattle

**Farm size:** 2500ha

**Cropping area:** 1800ha

**Recorded rainfall:** 591mm average

**Soil(s):** Alluvial cracking clays

The river flats of Andrew Watson’s Boggabri property are flooded about once every seven years on average, with some areas on higher ground that are flooded every 10 to 15 years.

To deal with this elevated flood risk, Mr Watson uses licensed flood management banks to protect key assets plus single-wire fencing and drop fences to make repairs easier. He also takes flooding into account when planning his crop rotations.

“We might plant lower-value crops in the more susceptible areas, as we know there’s that one-in-seven risk of them being flooded,” he says.

He also plans his grazing strategies with a view to floods.

“When we move the cattle into the river flats we’ll always think about their route to safety in case there’s a flood, and we make sure we have hay and fodder reserves on-hand.”

In 2022, heavy rain from late winter led to a high and extended flood event – the highest floods since the 1970s.

Mr Watson used the Water NSW WaterInsights online tool to watch river levels and monitor the flood progression, while liaising with growers upstream and downstream of his property to communicate water levels.

“We were talking to guys upstream who were able to give us real-time information about what they were seeing, and we



Flood water flowing through irrigation land with canola ready to harvest.



A cotton field underwater.

Photos: Andrew Watson

were also able to pay it forward to those downstream and keep them updated too,” Mr Watson says.

“We had to move the cattle. In fact, we trucked them to another property through one metre of floodwater before it got even worse,” he says.

He dropped the drop-fences and waited, knowing there was nothing else he could do to prepare.

The scale of the event meant the Watsons lost a fair percentage of their crop, including 50 per cent of their dryland cotton and about 30 per cent of their winter grains.

“Anything under one metre of water was no good, but where the water was lower than that we didn’t do too badly,” he says.

“Those shallow-flooded crops recovered and the quality wasn’t too bad, although we still lost a bit of yield.”

A lot of fencing required repairs, validating the decision to invest in simple single-wire fences.

From an agronomic standpoint, there was a significant loss of nitrogen as a result of the waterlogging, along with an increase in weeds. Noogoora burr and Lippia were problem species that required a lot of extra effort to control.

“The Lippia has been a big, ongoing problem and we can’t control it with grazing, so we’ve had to take some of our land out of grazing and put it under crops just to control the Lippia,” Mr Watson says.

The floods also hampered revegetation and land stabilisation efforts. Some 1300 trees had been planted along the riverbank during 2022, but up to 80 per cent died as a result of the flooding.

“The timing was atrocious when it came to those little trees,” he says.

However, 2023 turned out to be even worse – delivering another eight flood events.

He has now replanted his revegetation project three more times and says about 80 per cent of the current group are still alive, although now an increase in cockatoo and kangaroo numbers is making it difficult for the trees to grow past their guards as they keep getting their tops chewed off.

Regardless, Mr Watson sees floods as both a blessing and a curse.

“Thanks to our soil types, a flood generally leaves us with a full soil moisture profile so we can plant crops and put out fertiliser with confidence,” he says.

“In 2023, with those eight floods, we lost half our dryland crops but the other half gave us our highest yield ever, so overall the whole enterprise performance was average.”

He says one key to his success is using a mix of enterprises to balance the risk.

“We have an investment model where we split the risk. We have some flood-free areas, we have some grazing, and we have some irrigation. That way we get the good with the bad.”

Mr Watson says wet and dry seasons are inevitable for the farm, and he just plays the ball that is in front of him.

“However, I’ve now had to buy a boat so I can be sure of getting the kids to school!” he says.



Photo: Steve Henley

## CASE STUDY

## 15

# Steve Henley: Long-lasting challenges

## SNAPSHOT

**Grower:** Steve Henley

**Location:** Ungarie, NSW



**Enterprises:** Cropping – wheat and barley

**Livestock:** Sheep & Cattle

**Farm size:** 5000ha

**Cropping area:** 5000ha

**Rainfall:** 912mm in 2022  
(compared with 425mm average)

**Soil(s):** Red loam

Ungarie grower Steve Henley experienced near continuous rain throughout late 2022, receiving close to the region's entire average annual rainfall in less than three months.

"We had an astonishing 365mm of rain within 75 days from August until November, with 212mm falling in October alone," he says.

"The ground was absolutely saturated from the October rain and, just as we thought it was drying out, we had another 38mm in mid-November.

"It was devastating," Mr Henley recalls. "The crops were ripe and ready to be harvested."

Accessing the paddocks to harvest the crop became impossible, with water running past the property for months. "Heavy machinery just couldn't get on the paddocks."

It was not just paddocks where Mr Henley struggled with access. Trafficability on the local public roads was creating just as many problems.

"Several of our local roads were closed, and even where the roads were open we were seeing our grain trucks get bogged," he says.

"We had to run chase bins for unknown kilometres to find ground solid enough for the grain trucks.

"It was so frustrating as we'd had an excellent crop, we just couldn't get it out of the paddock and onto a truck."



Photos: Steve Henley

The extended rain started after the Henleys had applied all their planned inputs. Even during those wet months, the family continued to spend on the crop because the wet conditions appeared to be in their favour.

“Leading into harvest, we used aeroplanes to apply fertiliser, fungicides, herbicides and insecticides,” Mr Henley says.

“We wanted to make the most of the rainfall. But because it just kept raining, we couldn’t get in and harvest so the money ended up being wasted. The crop was rotting away in the water.”

Where the flooding was less severe Mr Henley was able to harvest crop that was downgraded, while the worst areas were not harvested. The initial strategy was to harvest the dry areas and save as much of the crop as possible that way. However, the conditions turned out to be far more challenging than expected.

“As we got down onto the flat areas where the flooding had receded, we were bogging machinery 20 or 30 times a day,” Mr Henley says.

“Despite the incredible frustration, we just had to keep on trying because when we weren’t bogged, we were recovering income for our business.

“We had one employee on a four-wheel-drive tractor pulling machines out of bogs all day every day, for weeks on end – right through harvest.”

Mr Henley says the light at the end of the tunnel was the effect the soil moisture would have on the following year’s crop. Unlike some of the regions where the 2022 floods were sudden and the soil was unable to absorb much of the water, in Ungarie the constant and prolonged rainfall meant the soil water profile was filled before the crop went underwater.

“The one redeeming feature of those floods was it enabled us to get a good crop the following year,” Mr Henley says.

“In 2023 we had no spring rain at all, so we really relied on that stored moisture to get a crop.”

While 2022’s rain and harvest was long-lasting, the recovery process has also been long and challenging, with problems caused by trafficability, weed loads and ongoing stress.

“To this day, almost two years later, some of our paddocks haven’t recovered,” Mr Henley says.

“Because we couldn’t get in and spray the weeds that came up over the following summer, we’re still having trouble getting those infestations under control in some areas.

“We couldn’t spray glyphosate from a plane, for example, so the weeds were basically able to run wild until the paddocks dried out. By that time they had set seed and the problem had really taken hold.

“It’s meant we’ve had to spend a lot more money on weed control, and it’s also compromised our rotations.”

The money that was spent on a failed crop has also caused long-term pain, as input prices were at an all-time high.

“All that investment was made to bring on a potentially high-yielding, high-returning crop. The inability to recover it has been mentally and financially devastating,” Mr Henley says.

Finally, the 2024 seasonal outlook and talk of another La Nina year has Mr Henley feeling somewhat concerned. “Let’s just say the memories are still fresh,” he says.

The family is hoping a repeat remains unlikely, based on their own rainfall data that goes back to the 1940s and shows that the 2022 season was the wettest on record.

While suggesting there is not a lot that can be done to better prepare for another flood event, Mr Henley suggests one change he would consider is direct heading rather than windrowing, to allow the crop to stand above the water.

In the meantime, he is waiting to see what the weather brings.

## Conclusions

# Key lessons

### No two floods are the same

While the 2022 Upper Eyre Peninsula flood event was not unique, it was a very different event from the inundation experienced across NSW later that year and the ‘slow motion’ calamity as record water flows moved down through the lower Murray during December and January.

Every flood event is influenced by weather, terrain and the preceding seasons.

### Prioritise people, livestock and productivity

Flood damage is usually overwhelming. Expect to be overwhelmed at first.

As you take in the extent of the impact on your farm, build up a list of what needs to be done and then prioritise the tasks:

- **First** – make sure people are safe and, once everyone is physically safe, remember to also ensure everyone’s mental wellbeing (including your own).
- **Next** – check that your stock are safe, contained (if possible) and have access to fodder and drinking water.
- **Then** – start working through physical infrastructure using risk factors and water levels to guide what you can tackle to return your farm to safe, sustainable productivity. It is important to prioritise the operational aspects that are most likely to make money; for example, getting access to paddocks to ensure timely crop management.

### You will not do everything in a year

Flood recovery takes time. It is important to appreciate that you cannot do everything at once, you cannot do everything first, and you will almost certainly not get everything you want done in the first year.

That’s why task prioritisation is so important – but it is just as important to be realistic about what you can achieve.

Look for ways to work around or with the circumstances to take pressure off yourself.

Allow two or three years to get everything back to ‘normal’, and you will be able to work at a more sustainable pace.

### Offer – and accept – help

Your family, farm workers and neighbours are your greatest support network. While government organisations will usually provide support after a disaster, locals are already on the scene and have a much better appreciation of what is needed.

Prioritising your tasks will help you manage your time so you can provide support where it is needed.

You also need to be ready to ask for help when you need it – and that includes talking about what you went through with people who went through it too.

### Anticipate the risks

Despite adding valuable moisture, flooding can degrade your soil system. Be prepared for:

- depleted nutrients – especially mobile (soluble) ions such as nitrogen, calcium, sulfur. Use soil testing to plan a fertiliser program for soil replenishment;
- salinity – dissolved salts will rise with the water table and crystallise as the water retreats. Take all steps to minimise evaporation from the soil;
- lost soil structure and compaction – light soils and soils that have been tilled or ripped are more prone to settling and compaction after saturation. Monitor soil structure and have a plan to restore structure; and
- wheel ruts – damage to soft ground can make paddocks difficult to work when the surface soil hardens. Ruts and tracks may need to be ripped, chained or rolled for spraying and seeding.

### Appreciate the benefits

Every flood is an extraordinary event. As floods in Australia often follow a period of drought, the event can be sudden, strong and damaging. Try to see past the immediate loss and damage to appreciate your country as it resets and replenishes. Keep your long-term focus on the lift in productivity that may result, often from a peak in the season immediately following.

“There is more money in mud than dust”

# Further reading

## PIRSA flood advice

Floods can cause significant erosion damage in paddocks, leaving gullies, gutters, sheet-eroded areas, soil deposits and damage to tracks and dams. It can leave debris such as washed-away fences, tree branches and crop stubbles. In some areas, water from floods can lie in pools and lagoons for months.

While the damage can be quite severe, it is limited to where the flood occurred so might represent only a small proportion of the total property area.

Before undertaking any erosion repair works:

- Wait for areas to dry out – which could be weeks or months.
- Clean up debris where fences or access tracks need to be restored (watch out for snakes in debris after a summer flood).
- Re-establish 'priority' fences but consider if this is an opportunity to redesign paddock layout.
- Restore tracks to enable movement of farm machinery to all parts of paddocks.
- Focus on managing unaffected areas for cropping and grazing to maintain whole-property productivity.

Take time to consider the location, severity and extent of erosion damage before rushing in to repair it. Earthworks can be expensive compared with the productivity returns from restored areas.

Some options are:

- Leave it untouched.
- Fence off damaged areas and plant to perennial species such as trees for shelter and shade or saltbush for fodder.
- Use tillage machinery to level off shallow erosion (to 20cm depth).
- Fill and level gutters up to 50cm depth with a road grader.
- Deeper gullies require skilled earthmoving operators to stabilise them efficiently and effectively.

**[pir.sa.gov.au/emergencies\\_and\\_recovery/storms\\_and\\_floods](http://pir.sa.gov.au/emergencies_and_recovery/storms_and_floods)**

