

Hidden Vale Tails

– HIDDEN VALE WILDLIFE CENTRE NEWSLETTER –



Photo credit: © WWF-Australia / Patrick Hamilton

From hard work to high tech

Undertaking conservation projects at-scale usually requires a lot of time and resources. Innovations in research techniques and the use of technology is enabling the team at Hidden Vale to cover more ground than ever before.

As pictured (above), in a collaboration with the World Wildlife Fund for Nature, Australia, the Australian Government and Dendra Systems, we recently employed hi-tech drones to spread millions of seeds in just a few hours to plant a koala corridor.

Drones are also used to locate koalas in treetops by picking up the animals' heat signature.

This edition of *Hidden Vale Tails* includes a focus on our habitat restoration work, and how we are using innovative methods and technology to help with research, teaching and conservation efforts.

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The Hidden Vale Wildlife Centre is a collaboration between the Turner Family Foundation and The University of Queensland into the study and research of native ecosystems and wildlife.

Further information is available at turnerfamilyfoundation.com.au and hiddenvalewildlife.uq.edu.au





The story of erosion

Image: Erosion following major rainfall event in March 2022

This story began around 25 million years ago during the Miocene Epoch in the Tertiary Period.

South-east Queensland had numerous horizontal lava flows, mainly of basalt, which erupted to gradually build a complex and elongated volcano. These basalt lava flows moved slowly, due to a low viscosity, and tended to flow large distances to form gently sloping shield volcanoes (as opposed to classical steep sided peaks like Mt Fuji).

The Main Range and Little Liverpool Range shields formed part of a wider area of volcanic activity spreading northwards past Toowoomba and Kingaroy. Other volcanoes of similar age include Mt Barney and the much larger Tweed Volcano, with the remains forming the Lamington Plateau and Border Ranges. The Main Range volcano is believed to have spread as far east as Kalbar – Boonah, and north-east to Rosewood.

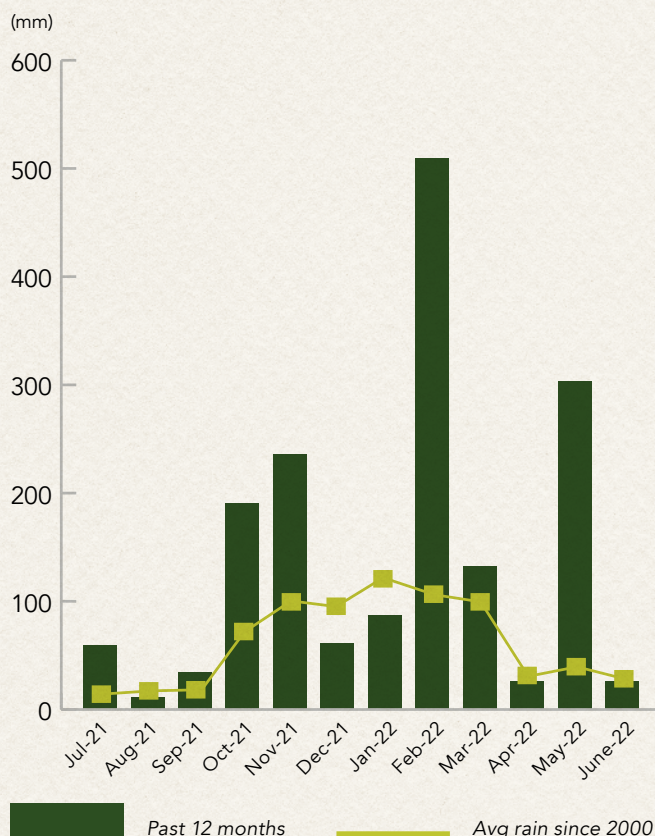
Most lava flows were basalt, but some trachyte and local rhyolite flows erupted to the south. Over the following millions of years, these lava flows eroded to expose the older sedimentary rocks and soils underneath. You see this with Hidden Vale's soil profile. The property has basalt hills and slopes with alluvial creek and lowland areas and then large areas of sedimentary sandstone soils.

It's these sandstone soils that are highly sodic (acidic) and susceptible to erosion. Sodic soils have a sodium content over 6% and easily disperse when exposed to water. When mixed with water, sodic soils 'dissolve' and lose structure. Another feature is that where surface water is allowed to pond, soils can be susceptible to softening and potential tunnelling where soil permeability is variable.

This sodic soil structure and Hidden Vale's topography increases susceptibility to erosion. The velocity of surface water increases as slope increases. This, combined with chemical weathering associated with dispersity and sodicity, can result in gully erosion during significant rainfall events. Runoff water is also highly likely to be 'cloudy' where soils are dispersive and/or sodic, with sediment being carried downstream.

The first half of 2022 has seen repeated large rain events, with Hidden Vale recording over 1,086mm to 30 June. Traditionally, the average rainfall at Hidden Vale is 742mm per annum. During the past 12 months, the property received over 1,681mm with several large rain events recording more than 100mm.

RAINFALL AT HIDDEN VALE



The above graph shows the past 12 months of rain at Hidden Vale, from July 2021 to June 2022 (bar), and the monthly average rainfall since 2000 (light green line).



Image: Porous Check Dam

The consequence of these rain events is erosion on a scale not seen in decades.

Erosion is an issue for landholders and every downstream ecosystem. It impacts the immediate area as well as habitat and water systems for platypus, fish and other animals.

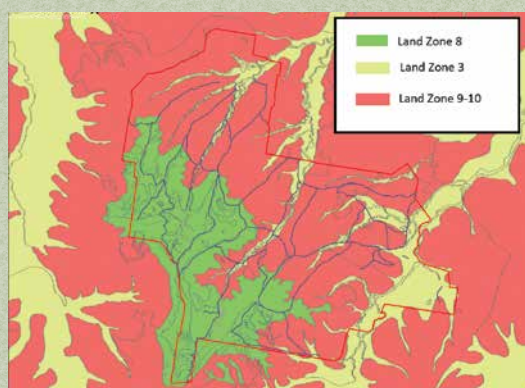
Prevention is definitely the best cure. Pictured above is a porous check dam. This structure is made of fallen branches and acts to slow the water down by impeding the flow.

Erosion repair projects are underway at Hidden Vale. At the large erosion head wall event (main picture on previous page), an innovative product described as concrete mats will be used to stabilise the soil and allow water to pass over without causing any further erosion.

Healthy Land and Water recently conducted an erosion workshop at Hidden Vale. Over 30 people attended to learn about various erosion repair methods. It's this sharing of knowledge and methods which can help land managers to achieve the best outcomes possible.

Scan the QR code below to explore more information on repairing erosion on properties and some unique restoration methods.

Figure 1: Hidden Vale Land Zone Map. Refer to Land Zone Definitions link for further information.



FURTHER INFORMATION

Click or scan to open link

**Land Zone
Definitions**



Sodic Soil



**Erosion manual
download**



WATCH

Click or scan to open link

**Farm Erosion Control
Using Concrete Mats
– Tim Thompson**



**Concrete Erosion
Mat Vs Flood
– Tim Thompson**





Hidden Vale's war on weeds

How do you weed 4,560 hectares? That is the question posed to Turner Family Foundation Ecological Restoration Officer Danyel Wolff on a daily basis.

Hidden Vale presents a number of challenges for ecological management, from the property's fragile soil profile (as described on page 2), through to managing and ultimately eradicating the introduced weeds that can overtake and kill an ecosystem.

Danyel has developed a weeding plan with the goal of reducing the impact of introduced plant species on habitat quality, biodiversity, and improving the visitor experience across the Hidden Vale property. There are two principle strategies to achieving this goal.

The first strategy is to locate and eradicate weeds classified as Weeds of National Significance (WONS) and those listed as restricted/prohibited in Queensland by the Department of Agriculture and Fisheries. These weeds include Chinese elm (*Celtis sinensis*), mysore thorn (*Caesalpinia decapetala*) and cats claw (*Dolichandra unguis-cat*). To date, 22 species of weeds have been identified at Hidden Vale. If left untreated, these weeds can alter and ultimately irreversibly change local ecosystems.

The second strategy is to manage the abundance of weeds that have become established in the region and on the property, such as lantana (*Lantana camara*) and fireweed (*Senecio madagascariensis*). The aim is to contain the spread of these weeds and ultimately reduce the area impacted.

The first objective of weed management is to break the seed cycle. This means killing the plant before it is able to develop viable seed, then repeatedly treating the infestation to ensure no new seed is created. Seed viability for some species can last for several years. Once an infestation has been initially treated, there must be an ongoing commitment to return to that location to kill any new seedlings that have germinated in the following years.

Initial treatment of mature weeds can be described as primary treatment. This is usually the most labour and resource intensive stage. Follow-up or secondary treatment involves killing new seedlings as they appear. Secondary treatment may need to occur more than once in a single year depending on rainfall and the weed species. Effective secondary treatment means the soil seed bank is diminished and, consequently, the amount of time and resources expended on the infestation will decline over time.

FAST FACTS:

4,560

HECTARES

22

WEED SPECIES

4,160

HOURS OF WEEDING
IN SIX MONTHS

On Hidden Vale, many of the high-risk species are found within close proximity to creek lines. This is because conditions in these riparian areas favour germination and growth. Water in drainage lines is also a strong vector for weed seed dispersal. Weed control is often focused in the drainage lines for the following reasons:

- The abundance of high-risk species is greater in these areas.
- The health of weed species and the ability to disperse is greater within creek systems.
- Native species of plants within the riparian vegetation are unique to that zone and are not widespread across the property. This makes them more vulnerable to the impacts of a dominant weed species.
- There is a reduced potential of erosion and increased stream bank stability with the establishment of healthy native vegetation. Stream bank collapse can be observed where native vegetation has been replaced by dominant shallow-rooted weed species.
- Dense weed infestations along creek lines can also impede wildlife movement and access to other habitat.
- The removal of dense weed infestations along creek lines can enable easier access into other areas of the property.



Images: Hidden Vale's weed warriors in action

High-risk plants located outside the immediate riparian areas are also targeted. This applies to isolated infestations which have not yet established and are easily treated. Treatment of these infestations is often opportunistic. It is only through chance, or if identified by other people, that the location is recorded.

Unfortunately, heavy rain during the past year has caused weeds to flourish on the property. In the first six months of 2022, our team undertook over 4,160 hours of weeding activities on the property. This effort needs to be increased to start making inroads against this ever-growing weed threat.

Figure 2 (below) shows the extent of the priority weed areas. The two most pervasive weeds are mysore thorn (*Caesalpinia decapetala*) and Chinese elm (*Celtis sinensis*).

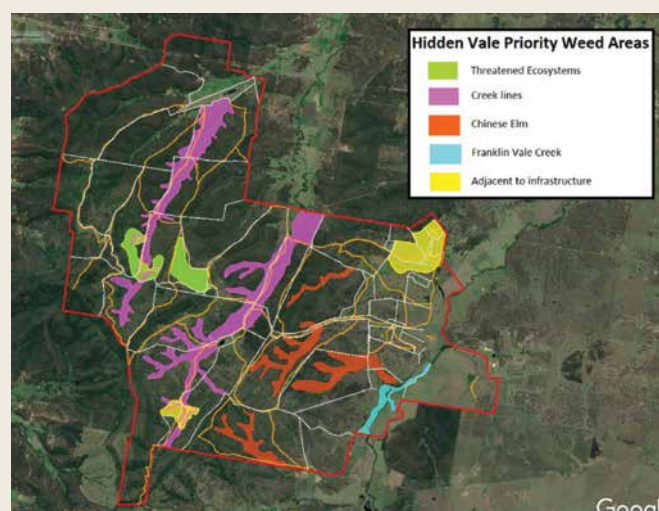


Figure 2: Priority weeding areas on Hidden Vale

Mysore thorn is native to Japan and was brought to Australia as a hedge plant. It grows 2–4 metres high and can outcompete and smother native species, and provide habitat for feral animals. Its seeds can last over 10 years in the soil. This weed grows in such dense concentrations that one of the only effective means of treatment for large mature infestations is to cut into the weed's base using a

brush cutter with metal blades (as pictured above) so the trunk can be cut through near the ground and then the exposed flesh pasted with poison. It's a difficult, back-breaking task that needs to be repeated to achieve the final result.

Chinese celtis was introduced to Australia as an ornamental shade tree. It has invaded south-east Queensland waterways and creek banks and produces thousands of seeds each year. These seeds are distributed by birds and flying foxes, and by water currents. Growing 10–15 metres tall, the trees smother natives and take root in creek banks. While the seed viability is two years, you cannot simply poison these trees, or chop them down. Their root structure will compromise creek banks such that when they die, their large canopy disappears and the area underneath the canopy will be exposed to sunlight, offering new weed species an opportunity to emerge. To kill a Chinese elm, you must plant shade tolerant native species underneath the canopy in years one and two, and then look to poison the tree in year three.

Weeding is often an arduous task, especially in Summer. But Danyel Wolff says that there is nothing more rewarding than looking at a restored ecosystem knowing that it was your hard work that brought back a natural system.

"Patience, dedication and boots on the ground is the key to winning the war on weeds," says Danyel.

Weeds are an increasing threat to native habitats and biosecurity. Scan the QR code to learn more by looking at the Weed Spotter Network webpage – an initiative between the Queensland Herbarium and the Department of Agriculture and Fisheries. It serves to educate on how to treat weeds and the emerging threats and occurrences in an area.



Winter updates: Hidden Vale Wildlife Centre



Image: Greater bilby at Hidden Vale Research Centre

BILBIES

We now have a breeding pair of bilbies, with Mick and Violet being introduced to one another late in June. The purpose of breeding bilbies at the Hidden Vale Wildlife Centre is to supply animals to the Species Recovery Group, for distribution to the Currawinya National Park reintroduction program and other partnered reintroduction projects across Australia. Scan the QR code to watch what happens when Mick and Violet get together for the first time.



MAHOGANY GLIDERS

Two mahogany gliders were recently brought to the Centre. They include returning patron, Lawes, and his nest mate, Abby. They are not a breeding pair due to their ages (10 and 12 years respectively). They will get to live out their finest days at the Centre under the care of our wonderful husbandry team. Mahogany gliders are recognised as an Endangered species nationally and are restricted to small, fragmented habitat in north Queensland. They remain under threat due to land clearing and feral predators.

RUFIOUS BETTONGS

Our beautiful female bettong, Piper, has been with us since April 2021 and has had two joeys. The first, named Djida (an Indigenous name meaning 'little wild goose') has been happily weaned to make room for Yindi (meaning 'Sun'). Both are growing up happy and healthy, keeping our husbandry team on their toes.

CHILDREN'S PYTHON

We recently acquired our first snake, Kaa (named from the Jungle Book character), a young Children's python (formerly known as Stimson's python). He has joined our reptilian gang in the Hidden Vale Interpretation Centre. He can usually be seen hiding in his little rock house underneath the heat lamp. Kaa has been brought to the centre to help educate guests, and for students to develop husbandry techniques.

KOALA PROJECT

Now in its fifth year, our Koala Project has seen almost all of our monitored population of koalas vaccinated against chlamydia. We have received permits for a limited number of koalas to be translocated and released on Hidden Vale. These koalas needed relocating due to poor habitat conditions where they were found in heavily built-up areas, at risk of injury due to vehicles and dogs, or were orphaned. Up to 20 koalas will be introduced to their new homes in a slow process including soft release enclosures where we can assess their behaviour and health in their new environment.



Researcher Profile – Rylie

Pan Xin Lei (Rylie), 25, was born and raised in Singapore. In this interview, we find out about her research project at Hidden Vale.

Hi, I'm Rylie. I hold a Diploma in Business, majoring in hospitality and tourism management which led to me interning at the Singapore Zoo under park operations and guest relations. At the end of my internship, I secured a position as a part-time zoo keeper and then a full-time contract under the herpetology team. That's where my passion for wildlife ignited. I decided to pursue a wildlife degree in Australia when my contract ended.

I recently graduated with a Bachelor of Wildlife Science from UQ, and am doing my Bachelor of Science (Honours), majoring in Environment and Sustainability, at the University of Southern Queensland.

Tell us about your research project with the rufous bettong?

Foxes and cats tend to hunt prey weighing 35g–5.5kg (critical weight range), causing a drastic decline in species populations within that critical weight range. Predator-proof fences are used to protect declining native fauna. Within fenced areas, overpopulation is an issue with species that have adapted well to the predator-free environment. Another issue is prey naivety of reserve animals leaving the fenced area since they have been sheltered from introduced predators for a considerably long time.

The objective of the Hidden Vale research is to test bidirectional gateway designs that encourage target species use, in this case rufous bettongs (*Aepyprymnus rufescens*), while preventing or discouraging introduced predators from using them.

Why is this research important?

The idea of bidirectional gateways is to allow natural dispersal of species and wild individuals to seek refuge within fenced areas freely, without human intervention. It is unique as, unlike traditional fenced areas, this design

also aims to allow a controlled predator density to exist within, to maintain a level of wariness in the prey species.

What are the implications for other species and/or for wildlife conservation?

If successful with captive and wild bettongs, these bidirectional gateway designs can be implemented in the field to test usage with prototype safe havens, trialled with other species, such as bilbies, potoroos, and other threatened or endangered bettong species. The gateways can hopefully also be customised to species-specific behaviours (e.g. digging vs hopping) to encourage usage. The goal is for species within fenced reserves to disperse naturally and eventually be able to establish viable populations that are not overly naïve to predators outside the fences.

What has surprised you about the bettongs and/or their predators?

The biggest surprise for me was how bettongs gather nesting material such as grass and twigs using their prehensile tail and carry the material to their nest site. It is fascinating as we generally associate "tails" with balance and for locomotion. Before starting the Honours project, I knew that feral animals were a major problem to the native fauna however, after going in-depth and assessing the damage through published literature, the sheer number of native fauna lost daily still astounds me. It is disheartening to know that free ranging domestic cats are part of the problem.

How has being at Hidden Vale assisted in being able to conduct this research?

Being at Hidden Vale has given me the opportunity to connect with people who are experienced field scientists, academics and industry professionals to fine tune the research. It is a comfort to me that if I have questions and need advice regarding the bettongs, I am able to confidently rely on the husbandry staff that work alongside the animals daily. The facilities (aviaries), some materials and tools needed for the research are provided by Hidden Vale, making it much easier for me to set up for testing. I have been able to get jobs done efficiently with the help and understanding of the staff at Hidden Vale, who are cooperative with the needs of the ongoing research.

Farewell Vere

We recently farewelled chief veterinarian Vere Nicolson. We were fortunate to have had Vere with us for the past 18 months. Our students and researchers have benefited greatly from his guidance, practice and experience.



Out & About

VC TOUR

We love having guests at the Hidden Vale Wildlife Centre. Recently, The University of Queensland Vice Chancellor Professor Deborah Terry AO made a visit. (Image courtesy of Anjanette Hudson, for The University of Queensland.)



WORKSHOP ON CAPTIVE BREEDING AND FENCED AREAS FOR MAMMAL CONSERVATION

We recently hosted experts from around the nation for an ex-situ conservation workshop, supported by UQ Centre for Biodiversity and Conservation Science and the IUCN Australasian Marsupial and Monotreme Species Specialist Group. Over two days, students and staff heard from experts from zoos, state government agencies, universities and various conservation organisations, as well as our own experts. A collaborative workshop session addressed the most urgent priorities for captive breeding to conserve Australian mammals at high risk of extinction. The workshop will be a catalyst for new national collaborations and roles for the Hidden Vale Research Station.



OXFORD GUEST

In June, the Hidden Vale Wildlife Centre team had the honour of a presentation by Professor Tim Coulson on large species predators. Titled "Why big, fierce animals are good for the planet", the presentation was part of our Lunch & Learn series. Scan the QR code to watch the lecture.



KOALA CHAMPIONS

You would never know from visiting Battery World Enoggera that there are people fitting electrical mods and cool camping gear to vehicles of people who care passionately for the wilderness and use these products to get closer to wildlife.

Jared Clarke and the team at Battery World recently contributed to developing a set of mobile koala tracking trailers at Hidden Vale Wildlife Centre. We use the trailers to locate koalas in places that are difficult to access. Each trailer is equipped with a 13 metre antennae, solar power system and Lora Wan radio receiver with cellular connectivity to the internet.

Not only did Jared ensure we had a first-class installation, he also donated heavy duty deep cycle batteries and the wiring needed to hook everything up. A heartfelt thanks to Jared and his team, along with Mark Phelps, of Phelps Vale Constructions, who designed and built the antennae and solar panels.

HIDDEN VALE CONSERVATION TOP UP SCHOLARSHIPS

Turner Family Foundation research support funding encompasses top-up scholarships of \$7,000 per year for three years for PhD students. Applications for top-up scholarships close 31 December, 2022. Scan the QR code for details.



INTERNAL RESEARCH FUNDING SCHEME

As part of the Turner Family Foundation's ongoing commitment to fostering high impact research in the Hidden Vale Project, funding is provided to support postgraduate research projects. This funding is made available to current Hidden Vale research students and staff only and is for equipment, fieldwork expenses, laboratory analyses, conference attendance and specialist training. Contact Hidden Vale Deputy Academic Director A/Prof Diana Fisher (d.fisher@uq.edu.au) for more information.



If you would like to support our work, scan or click the QR code to make a tax deductible donation. All funds go to on-the-ground projects supporting the ecological restoration activities being undertaken by the Turner Family Foundation.



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