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## Case Study

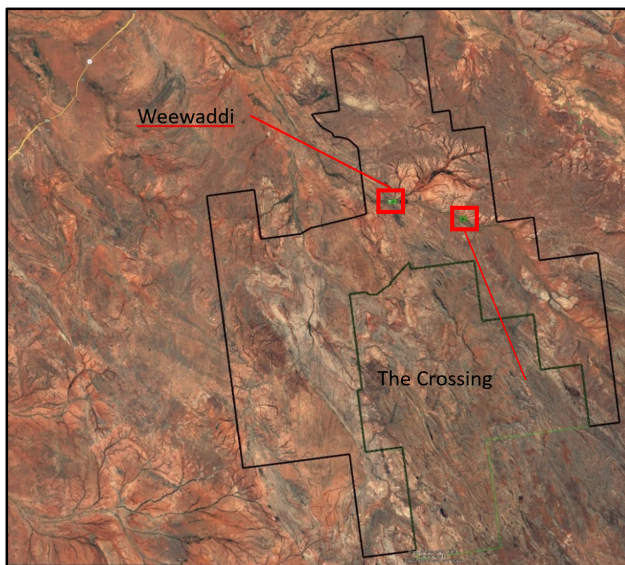
# Glenflorrie Biodiversity Survey

A biodiversity survey was conducted on Glenflorrie Station as part of Rangelands NRM's 'Fast tracking WA and NT to align with nutritional feed base mapping technology advancements at a national level' supported by the Northern Hub and SW WA Hub in a cross-hub collaboration and funded by the Future Drought Fund. It was a pilot survey to determine if the method used would be practical for pastoral stations in Western Australia and consequently across the nation.

Biodiversity is and always will be an important component in any pastoral business. A healthy and ecologically balanced ecosystem will provide the means for good livestock productivity, tourism and consequently profitability.

Furthermore, it is now in the forefront of the global agenda and with emerging legislation on biodiversity certificates, may provide an additional income for pastoral businesses. Thus, the need for biodiversity surveys to be undertaken is dramatically increasing.

The Rangelands NRM Team, Sarah Jeffery, Quinton Clasen and flora expert Russell Shaw, teamed up with Australia Producers Consortium (APC) drone expert Steve Ewings and senior Zoologist consultant Samantha Lostrom. The wealth and depth of knowledge of the team collectively, enabled an in-depth biodiversity survey to be undertaken.



## Glenflorrie Station overview

Glenflorrie Station is a pastoral lease that operates as a cattle station. It is located east of Exmouth, about 147 kilometres south of Pannawonica and 175 kilometres west of Paraburdoo in the Pilbara region of Western Australia. The property occupies an area of approximately 197,000 hectares.

The survey focused on two 50 hectare sites, Weewaddi and The Crossing, each, containing subplots. Both sites lie predominantly on Wannery Creek, a River Land System with narrow, seasonally active flood plains supporting acacias and eucalypt woodlands and tall shrub-lands, sometimes with tussock grasses or spinifex.

## Drones in Surveys

Chief pilot, Steve undertook planned drone flights and used the opportunity for training Rangelands NRM staff. The drone mapped the entirety of both the 50 hectare sites, and to gather more intense data also flew the individual subplots at a few centimeters of accuracy. The resulting data was analysed and maps produced.

This suite of flights undertaken, ensured valuable baseline data was collected that could be precisely replicated in the future. When overlaid and tied-in with the on-ground flora and flora survey it provides the land owners with greater insights and important baseline information about the biodiversity values of these areas. Drones in surveys

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Through the use of drone software, a 3D image of the surveyed area can be produced. Figure 1 below from Weewaddi shows the amount of detail that can be gained from such images. The ability to do this over time, gives an amazing monitoring tool, whilst also giving a visual insight into the landscapes' topography.

Drone software can also be used to determine vegetation cover, tree canopy and bare ground and the percentage of each across the flight areas (Figure 2). This provides valuable baseline data, for when the areas are resurveyed and monitoring how the health of the landscape is tracking over time.



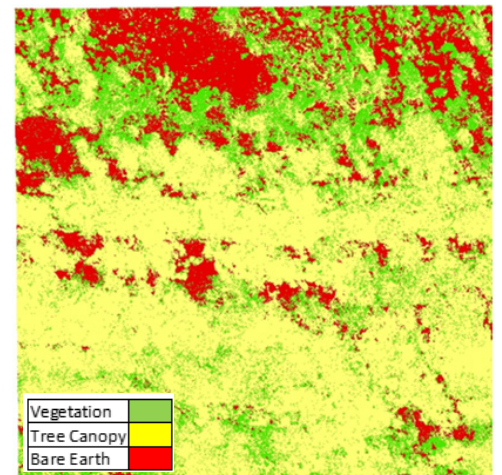
*The Crossing – 50ha (orthomosaic map produced from the drone flight)*



*Weewaddi – 50ha (orthomosaic map produced from the drone flight)*



*Figure 1: Weewaddi 3D view compiled through drone software*



*Figure 2 & 3: Weewaddi landcover compiled through drone software*

## Habitats surveyed

Sam's fauna expertise gave an incredible insight into species diversity and density and habitat health within the surveyed areas. An overview of the surveyed sites is as follows:

### Drainage lines

The drainage lines supported defined channels with a rocky substrate of mixed river stones bordered by large, old trees, bordered by margins of open woodlands over tussock grasses which may seasonally flood. This habitat is of particular importance for fauna due to:

- The tendency to hold water for part or all of the year in otherwise dry conditions, providing an important resource for all vertebrate fauna, specifically fish and amphibians.
- An abundance of deep leaf litter, large woody debris piles and increased lower vegetation cover providing complex habitat which shelters a range of reptiles and mammals.
- Large trees with hollows and dense stands of vegetation, providing important roosting and nesting habitat for a range of birds from small passerines to large raptors.

Large, old Melaleuca and Eucalyptus trees were present at both Weewaddi and The Crossing, which may serve as perching, roosting or nesting habitat for raptors. Furthermore, additional shelter for small fauna such as geckos and skinks would be found underneath the abundance of Melaleuca peeling bark.

*Photo 1 - Major drainage surrounding woodland at Weewaddi.*

*Photo 2 - Permanent water at The Crossing.*



*Photo 3 & 4 - Low stony hill outcrop spine at Weewaddi.*

### Low stony hills

The low stony hill habitat was only present in Weewaddi. This habitat was characterised by a high cover of densely packed rocky substrate leading up low hills to a spine of outcropping along the crest. One of the major resources this habitat would provide is rocky crevices. While outcropping was relatively limited compared to the broader surrounds, it still contained cracks which may be used by small mammals and reptiles for shelter.

### Snakewood

Snakewood stony plain habitat was only present at the Crossing. The habitat was characterised by sparse vegetation cover in all storeys dominated by Snakewood (*Acacia xiphophylla*) and *Triodia*, on relatively level plains with a high cover of small Fauna identified



*Photo 5 & 6 - Snakewood stony plain at The Crossing*

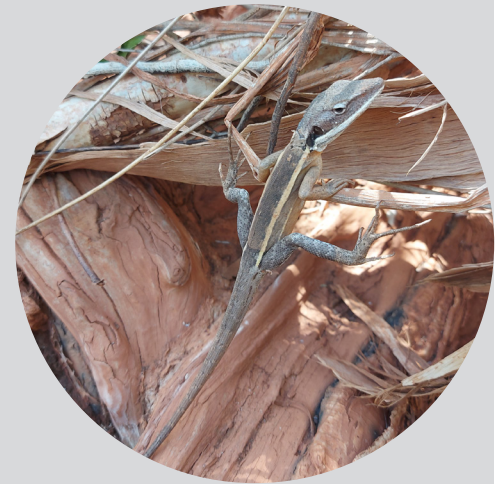
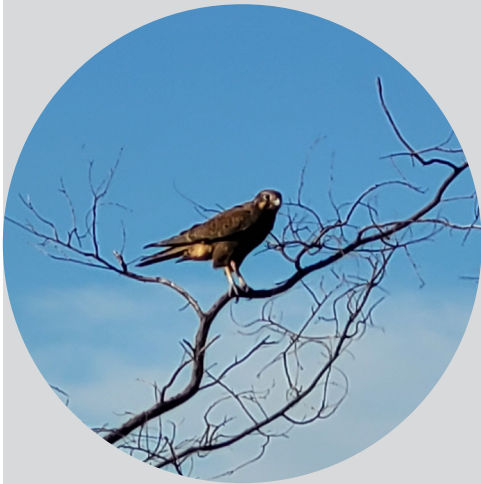
## Fauna Identified

### Birds

A total of 24 species represented by 604 seen individuals and approximately 146 heard individuals were recorded whilst undertaking bird censuses at Weewaddi and The Crossing. The most recorded were Budgerigar and the Zebra Finch, which are generalist flocking birds present in a range of habitats. Regular sightings of raptors including the Brown falcon (*Falco berigora*), Whistling kite (*Haliastur spenurus*) and Wedge-tailed eagles (*Aquila audax*) were recorded.

### Reptiles, Mammals and Fish

Targeted plot searches over short, timed periods detected 8 species of reptiles, mammals and fish across both Weewaddi and The Crossing. Three reptile species were recorded during the survey: drainage line specialist *Gowidon longigostris* at The Crossing, *Ctenophorus saxatilis* again at The Crossing and *Ctenophorus caudicinctus* at Weewaddi. The drainage line supports populations of spangled perch (*Leiopotherapon macrolepis*) and Rainbowfish (*Melanotaenia australis*) due to a permanent water source available year-round.



*Photo 7 - Brown falcon at The Crossing*

*Photo 8 - Ctenophorus caudicinctus at The Crossing*

*Photo 9 - Gowidon longigostris at The Crossing. Photo credit Samantha Lostrom*

## Insights and Takeaways

### So what did we find out from the survey from a landscape perspective?

All plots surveyed at sites of interest contained habitats in relatively good condition, being long unburnt, and not showing signs of erosion or poor vegetation health or cover. There was some areas of minor degradation, but across the whole property the landowners are proactive in adjusting their grazing strategies that will increase habitat, biodiversity values and overall health and resiliency of the landscape. This includes fine tuning grazing to encourage the highly nutritious and biodiverse native grasses to flourish and better compete with non-natives like buffel grass.

The habitats with the greatest likelihood of supporting a high biodiversity are major drainage line areas, particularly at The Crossing. It has permanent water with native fish and fringing tall woodlands and plains that supports a diverse community of birds

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### So what did we find out from the survey from a replicable/scalable perspective?

Drones on their own can't provide the information required for a comprehensive biodiversity survey. However, they do add value to the overall survey by mapping vegetation cover and capturing features with pinpoint accuracy that are difficult to record in traditional on-ground surveys.

To gain a comprehensive survey, like what was done here at Glenflorrie, flora and fauna experts are required for identification and ground truthing.

### But is this survey scaleable across stations?

Due to the intensity of the survey, no it is not scalable across entire stations. However, this type of approach that compliments traditional surveys with remote sensing technologies could certainly play an important part in biodiversity monitoring on any station. Particularly if the small, surveyed areas are evenly spread across the station and provide a good representative sample of what exists. Rangelands NRM are keeping abreast of and looking at viable ways that land owners may better realise biodiversity values on their property.

### Where is this type of survey suited to?

The type and comprehensiveness of the survey completed at Glenflorrie is ideal for areas that the pastoralist is passionate about, has a conservation value or a special place where there is generational affiliation. This allows over time the area to be monitored and documented for each generation to see how the areas are changing.

It is also suited to high productivity areas. By conducting this type of survey over your high productive areas, you will see how the area is performing, good, bad or stabilising and this will ultimately inform your management decisions for that area.

Finally, it could be used as a bases for getting a snapshot of some of your land systems. Due to the intensity of the survey, it would only be a snapshot of areas within land systems, but it is repeatable over time.

*This case study was prepared by Sarah Jeffery, with information from reports produced by Russell Shaw, Rangelands NRM, Steve Ewings, APC and Samantha Lostrom, Senior Zoologist consultant.*

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