

# UNLOCKING THE VALUE OF NATURE: WESTERN AUSTRALIAN STUDY REGION FINDINGS



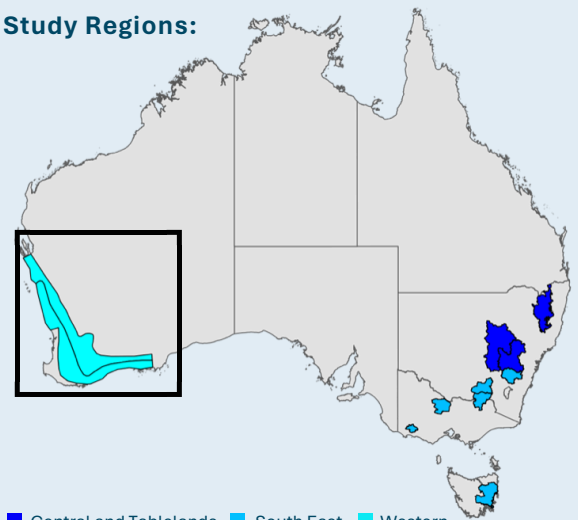
***Farming for the Future* is a world-leading research and change activation program. It was initiated by the Macdoch Foundation in 2021 in response to the increasing urgency for agriculture to play an active role as a nature-based solution to climate change and biodiversity loss whilst continuing to produce high quality food and fibre.**

*Farming for the Future's* Livestock Pilot Program was funded by philanthropy, Meat & Livestock Australia and Australian Wool Innovation, and undertaken in collaboration with Australian producers and their trusted advisors between 2022 and 2024. It aimed to produce the first national-scale evidence base linking on-farm natural capital to business performance.

*Farming for the Future's* Livestock Pilot Program surveyed 130 livestock businesses in selected broadacre farming regions of NSW, Victoria, Tasmania and Western Australia. It collected fine scale natural capital information alongside detailed financial and production data via remote sensing, expert ecological observations and producer interviews. The resulting dataset is the largest of its kind in the world and reveals insights into the role natural capital can play in supporting the productivity, profitability and resilience of Australian producers.

In this document we summarise findings from *Farming for the Future's* Livestock Pilot Program, as they relate to the Western Australian study region. This region was focused in the south-west of Western Australia (Fig1). We surveyed a total of 16 farms in the Western Australia, with farms ranging in size from 541 ha to 5208 ha (mean farm size 2700 ha). We collected farm-scale production and financial data for the 5-year period from 2017 – 2022.

## Pilot Study Regions:



Region: ■ Central and Tablelands ■ South East ■ Western

Figure1: Farming for the Future's Western Australian study region.

## Natural Capital Farm Business relationships in the Western Australian study region

We have used statistical techniques to isolate the effect of natural capital (as distinct from other potential effects associated with rainfall, land capability and farm management and other factors) on farm business performance.

We test for the effect of natural capital using five different natural capital metrics: *Proximity*, *Ground cover*, *Forage condition*, *Ecological condition*, and *Aggregation*. A sixth natural capital metric, *Connectivity*, was explored in other study regions, but was not available for Western Australia. We measure farm business performance using four key indicators: production efficiency, livestock gross margin, earnings before interest and tax (EBIT) and resilience. Links to documents containing additional details on how each of these were calculated are provided on the final page of this document.

The heatmap below shows all statistically significant natural capital-business performance relationships identified from our analysis of farms in the Western Australian study region. Of the 20 natural capital - business performance relationships tested, 8 were positive (with strong or moderate statistical evidence), 7 were non-linear (i.e. they could be positive or negative at different natural capital levels), and only 1 was negative (with strong statistical evidence; Figure 2).

NATURAL CAPITAL METRICS	BUSINESS PERFORMANCE INDICATORS			
	PRODUCTION EFFICIENCY	LIVESTOCK GROSS MARGIN	EBIT	RESILIENCE
PROXIMITY	<0.001	0.001	<0.001	<0.001
GROUND COVER		0.001	<0.001	<0.001
FORAGE CONDITION	<0.001	<0.001		<0.001
ECOLOGICAL CONDITION	<0.001	<0.001		0.002
AGGREGATION		<0.001	<0.001	<0.001
	Moderate or strong statistical evidence for a positive relationship at p<0.05			
	Weak statistical evidence for a positive relationship at p<0.1			
	Statistical evidence of a non-linear relationship			
	Weak statistical evidence for a negative relationship at p<0.1			
	Moderate or strong statistical evidence for a negative relationship at p<0.05			

Figure 2: Summary of natural capital – farm business performance relationships. Figures are p values showing statistical significance level. Blank squares are cases where no relationship was detected between natural capital metrics and farm performance indicators.

The positive relationships between natural capital and farm productivity, profitability and resilience reported by *Farming for the Future's* Livestock Pilot Program point to specific situations where natural capital investment may help producers to achieve their business objectives. Details of most impactful relationships for each of the business performance indicators are detailed in the following pages. Note that Gross Margin and EBIT are discussed together for the Western Australian region, as these two business performance indicators showed very similar relationships with natural capital in this study region.

It is important to note that the sample sizes analysed for the Western Australian study region to date are small; more information and additional analyses would be required to establish causal relationships. All relationships presented in this document should be discussed with an experienced farm advisor to assist with interpretation of the *Farming for the Future* research findings and implementation of any natural capital management changes. A list of farm advisors and accountants who have participated in the *Farming for the Future* program is provided on the final page of this document.



## NATURAL CAPITAL FOR PRODUCTION EFFICIENCY

### What is production efficiency?

Production efficiency is a comparative measure of how efficiently an enterprise produces output, using its inputs, compared to other similar enterprises. It can be thought of as the ratio of output produced to inputs used. Production efficiency calculations relate exclusively to the livestock enterprise operations of participating farm businesses.

### Which elements of natural capital support production efficiency?

The natural capital element that had the greatest impact on livestock production efficiency in the Western Australian region was **Proximity**.

Proximity measures how close native and exotic trees are located to production areas. A value of 1 would see nearly all areas of production within 10m of tree cover. A value of 0 would see most areas of production more than 200m from tree cover.

Moving from the lowest to the highest Proximity scores observed on farms in the Western Australian study region was associated with an increase in production efficiency of +40%.

Other natural capital indicators that were positively associated with production efficiency in the Western Australian region are: **Forage condition** and **Ecological condition**.

### What might be driving this relationship?

The closer trees are to production areas, the more likely you are to gain benefits to farm production such as shade and shelter for livestock, micro-climate regulation, and pollination and pest predation services from beneficial species.

### How can I improve my Proximity score?

Proximity values could be increased through strategically placing native or exotic plantings within production areas, or through natural tree regeneration to increase the footprint of tree cover over time.

#### PRODUCTION EFFICIENCY AND PROXIMITY

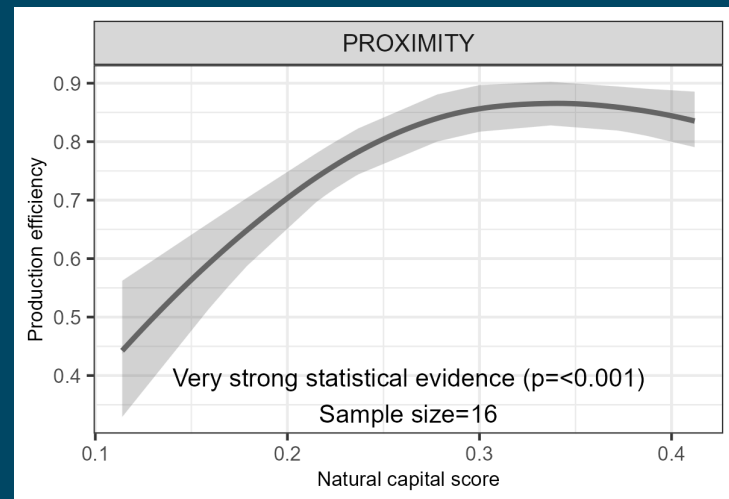


Figure 3: Western Australia study region relationships between Production efficiency margin and Proximity.



## NATURAL CAPITAL FOR LIVESTOCK GROSS MARGIN AND EBIT

### What is Gross margin?

Gross margin is a measure of variable profit for a particular activity, enterprise, or business. It does not include fixed costs or costs associated with farm infrastructure. In these reports, gross margin calculations relate exclusively to the livestock enterprise operations of participating farm businesses. In our analyses, we present gross margin on a per hectare basis (per hectare of livestock area).

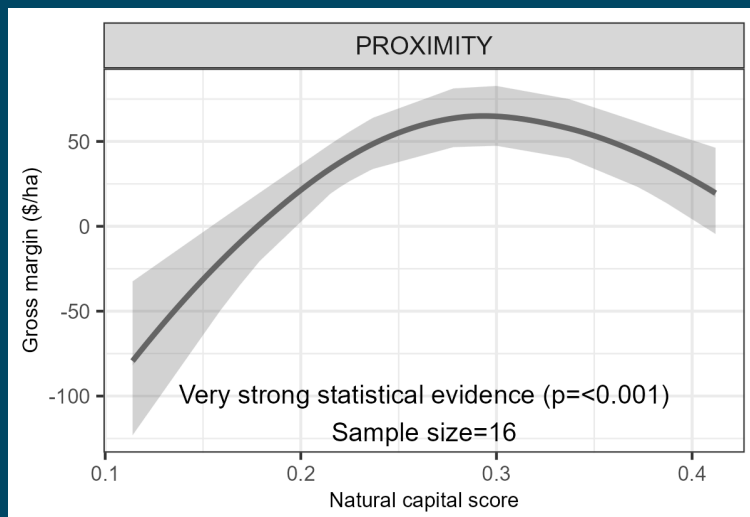
### What is EBIT?

EBIT = Earnings Before Interest and Tax. EBIT is a measure of whole farm profit. It includes all farm income, variable and fixed costs, and depreciation / amortisation of farm infrastructure. EBIT refers to earnings across the whole farm business, not just the livestock enterprise.

### Which elements of natural capital support gross margin and EBIT?

The natural capital element that had the greatest impact on livestock gross margin and EBIT in the Western Australian region was Proximity (Figures 4 and 5).

**GROSS MARGIN AND PROXIMITY**



**EBIT AND PROXIMITY**

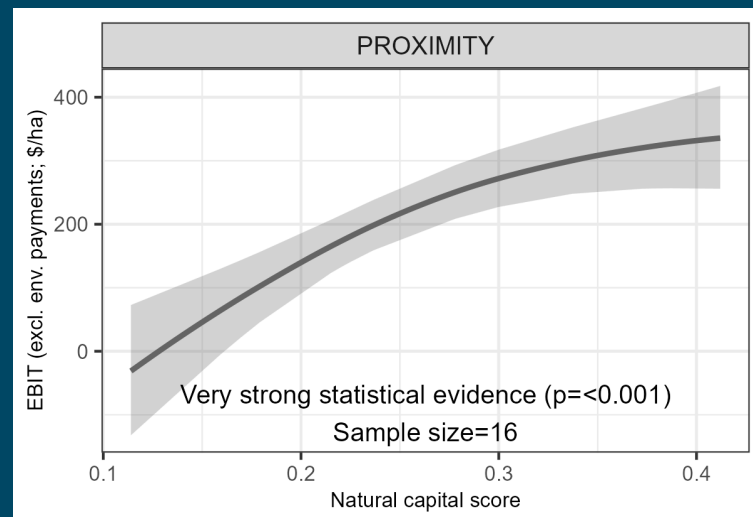


Figure 4: Western Australian study region relationships between gross margin and Proximity

Figure 5: Western Australian study region relationships between EBIT and proximity

The relationship between gross margin and Proximity was non-linear: improving Proximity was associated with improved gross margin up to a point (Proximity score of ~0.3), but further improvements to Proximity came as a trade-off with a farm's financial performance. Moving from the lowest to the optimal Proximity scores observed on farms in the Western Australian study region was associated with an increase in gross margin of +\$100 per ha.

Moving from the lowest to the highest Proximity scores observed for this region was associated with an increase in EBIT of more than \$200 per ha.

Other natural capital indicators that were positively associated with gross margin and EBIT in the Western Australian region are: Forage Condition and Ground Cover (for gross margin) and Aggregation (for EBIT).

### What might be driving this relationship?

The closer trees are to production areas, the more likely you are to gain benefits to farm production such as shade and shelter for livestock, micro-climate regulation, and pollination and pest predation services from beneficial species.

### How can I improve my Proximity score?

Proximity values could be increased through strategically placing native or exotic plantings within production areas, or through natural tree regeneration to increase the footprint of tree cover over time.

### Other considerations

There was strong evidence that **Ecological condition** may have a negative relationship with livestock production gross margin for farms in the Western Australian study region.

## NATURAL CAPITAL FOR RESILIENCE

### What is resilience?

Resilience is financial performance relative to variation in rainfall. This is calculated based on EBIT values. We developed a resilience metric that reports on financial performance relative to underlying variability in rainfall using the equation:

$$\text{Resilience} = 1/\text{standard deviation (EBIT)} / \text{standard deviation (rainfall)} * \text{performance decile}$$

The performance decile was rated from 1 (lowest decile EBIT for the relevant year) to 10 (highest decile EBIT for the relevant year). This term accounts for the relative performance of a farm in different years. For example, EBIT of \$300 ha may represent above-average performance in a drought year but below-average performance in a good season. Our resilience metric was averaged across all years of the time series and scaled between 1 and 100 (with 100 being most resilient).

### Which elements of natural capital support resilience?

The natural capital element that had the greatest impact on livestock gross margin in the Western Australian region was **Ecological Condition**.

Ecological Condition indicates how much or how little our farming landscapes have changed from their original (reference) condition (where a value of 1 = reference condition, 0 = completely modified).

Moving from the lowest to the highest Ecological Condition scores observed on farms in the Western Australian region was associated with an increase in Resilience of +4.

### What might be driving this relationship?

Ecological Condition is a strong predictor of native plant diversity, and native ecosystems can provide many benefits to farm production including habitat for beneficial species (such as pollinators and pest predators) and maintaining genetic diversity which can help with landscape resilience.

### How can I improve my Ecological Condition score?

A farm's Ecological Condition score is generated by measuring the extent of canopy cover, the ratio of native to exotic plants and shrubs and the extent of their cover, and evidence of tree regeneration. These metrics are then compared to the reference condition for the original biome (forest, woodland, shrubland, grassland) of the landscape.

Depending on the original biome of an area, Ecological Condition values could be increased over time with diverse environmental plantings, natural tree and shrub regeneration and changes to ground layer native grass and forb diversity.

### Other considerations

The observed negative relationship between Ecological Condition and gross margin should be taken into consideration before improving Ecological Condition to improve Resilience. Other natural capital measures (Aggregation, Proximity, Ground Cover, Forage Condition) had significant but complex (non-linear) relationships with Resilience

### RESILIENCE AND ECOLOGICAL CONDITION

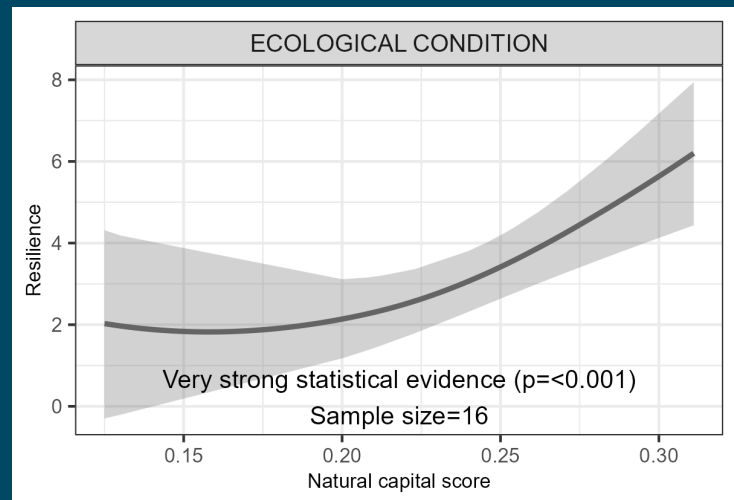


Figure 5: Western Australian study region relationships between resilience and ground cover

## NEXT STEPS

Over the next five years, *Farming for the Future* aims to secure funding to enable it to expand its research activities to apply to other types of agriculture and include farm enterprises across all Australian states and territories. This will enable the creation of a dataset that is representative of the breadth of farm operation types, sizes, and locations across the Australian landscape, and help build a financially prosperous, climate-resilient agriculture sector for Australia. In addition, it will:

- develop more efficient research methods to quantify natural capital at scale;
- create an 'accessible dataset' to enable partners to generate 'actionable insights' for economic decision-making on farms;
- create a new impact measurement framework to guide the next stage of implementation;
- continue advocacy to ensure that farmers have fair and equitable access to natural capital data;
- map the path towards building the first nationally-significant data repository and passive data collection system for future sustainability and legacy.

## OTHER RESOURCES

*Farming for the Future* publishes its findings and related reports as linked below on its webpage:

[Farmingforthefuture.org.au/resources](https://farmingforthefuture.org.au/resources)

✓ [Farming for the Future program summary](#)

✓ [Example Natural Capital Farm Report](#)

✓ [Initial livestock pilot findings](#)

✓ [Natural Capital Methods paper](#)

[Our peer-reviewed research publication can be found in the link below](#)

✓ [Agricultural Systems Vol 231 Jan 2026](#)





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