Pastures and Livestock Productivity –
Pastures Pathway Small Project Fund

Managing Run Country to Increase the Productivity of Perennial Pastures

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FINAL EVALUATION REPORT

15 August 2022

Report by Graeme Hand, Hand for the Land & Celia Leverton, Regenerative Agriculture Network Tasmania

Contents

Summary

This project was developed to improve the health and productivity of run country in Tasmania. The hypothesis of the project was that run country paddocks would have lower landscape function and lower intrinsic, self-supporting productivity than production paddocks.

The evidence obtained showed that this was not true. Most of the run country paddocks measured had higher landscape function than production paddocks.

The measurements of the biological and landscape function of the areas showed that generally the run country was healthier than the production country. It had higher nutrient cycling, water infiltration and soil surface stability. This was not what was anticipated by the farmers or project managers.

The farms that were monitored proved to have higher landscape function than most grazing properties in South Eastern Australia (pers comms Graeme Hand).

Introduction

This project was developed by the Regenerative Agriculture Network Tasmania, in consultation with Graeme Hand (Hand for the Land), to improve the health and productivity of run country in Tasmania.

The hypothesis of the project was that run country paddocks would have lower landscape function than production paddocks.

The focus of the project was on measuring landscape function on both representative production areas and run country areas to determine at what stage each of these areas would be environmentally self-supporting.

In line with the goal of the funding round to identify the barriers to farmers in building their knowledge and skills in managing perennial pastures, this document has been produced to provide a snapshot of how some farmers are maintaining good health in their run country – to provide case studies, including data.

Methodology

The following evidence was collected:

- Full Landscape Function Analysis, including:
  - Soil cover
  - Perennial grass basal area
  - Litter cover, origin and degree of decomposition,
  - Soil surface roughness
  - Soil crust brokenness
  - Erosion type and severity
  - Soil surface resistance to disturbance
  - Vegetation surveys

- Biological monitoring surveys to be used as an ongoing management monitoring tool by the farmers, including:
  - Soil surface condition
  - Level of decomposing litter on the soil surface
  - Presence of annuals
  - Evidence of insects or animals
  - Distance to the nearest perennial grass plant
  - Distance to the nearest mature perennial grass plant

Landscape Function Analysis (LFA) is an in-the-field, indicator-based procedure that allows rapid assessment of how well a landscape works as a biophysical system. The rapid conversion of raw field data into useful information is a key design feature. This enables restoration planners and practitioners to understand the effect of disturbances and their drivers, so that appropriate techniques can be devised and implemented to attain restoration goals. The same procedure can be used to monitor restoration progress, once significant and relevant milestones are identified that can be monitored over time.

David J Tongway, CSIRO

David Tongway & Norman Hindley (2004) Landscape function analysis: a system for monitoring rangeland function, African Journal of Range & Forage Science, 21:2, 109-113, DOI: 10.2989/10220110409485841

Landscape Function Analysis measures the functional diversity of the soil surface ie water infiltration, soil surface stability and nutrient cycling. These factors impact the effectiveness of rainfall and irrigation, degree of erosion and nutrient availability

Measured Indicators of Landscape Function

Stability	Water infiltration	Nutrient cycling	Soil surface assessment indicators	Soil process
			Soil cover	Protect the soil & reduces compacting & erosional force of raindrop impact on the soil surface
			Basal cover of perennial grass	Surrogate for root biomass & contribution of below ground biomass to soil processes
			Litter cover, origin & degree of decomposition	Strongly related to carbon, nitrogen and other minerals in the surface soil layer
			Cryptogam cover	Stabilise the soil surface & indicate plant available nutrients in the soil surface layer
			Crust broken-ness	Broken, brittle crusts are unstable & prone to erosion. Smooth crusts are less vulnerable
			Erosion type and severity	Accelerated erosion caused by the interaction of management and climate
			Deposited materials	Litter and other material transported provide resources & may form productive alluvial fans
			Soil surface roughness (microtopography)	Soil surface depressions and perennial grass density facilitate water and resource retention
			Surface resistance to disturbance	Ease of soil surface disturbance relates to resistance to erosion & conversely water capture or run-off
			Slake test	Assesses the stability of soil aggregates & their water erosion potential

Findings

Social findings:

- The landowners on the properties engaged with this project were passionate about preserving the natural values of their run country. They were committed and proactive in managing the native grasslands to increase the landscape function of the areas by fencing, judiciously including and excluding stock, engaging with outside experts to monitor land health and running trials to test ideas.

Environmental findings:

- The evidence gathered in this project, combined with the management descriptions provides a guide to improving large areas of Tasmania and run country for stability, water infiltration, and nutrient cycling.

Profitability findings:

- One property owner was using the value of his natural assets to market his wool to provide another income stream to the farm business. He estimated it contributed around 30% of the farm income.
- One property owner was developing farm accommodation to take advantage of the extensive grasslands, run country and coastal views to gain an additional income stream. While it was acknowledged reducing the size of the runs would make for easier management of the grasslands, it was not an economic proposition. Temporary electric fencing was discussed, but the risk on entangling kangaroos has paused the idea.

Project Challenges

- Run country farmers were on the whole very conservative about outsiders examining their native grass runs.

- Covid stopped the project for a long period.

- The co-design aspect of the project didn't gel with farmers due to the parameters of the project being unfamiliar to them. They needed more guidance and some boundaries set around the proposal. The process of codesigning was extremely time consuming, created uncertainty and almost paralysis on the part of the farmers.

- Some of the run country sites were clearly outperforming the improved paddocks for ground cover and landscape function.

- One of the farmers pulled out 18 months into the already delayed project, requiring another farm to be sourced and made the planned trials unfeasible time-wise.

- In sown pasture situations, paddocks are reduced in size to accommodate appropriate stock density and pasture utilisation to increase the functioning of the landscape. This proved cost and physically prohibitive on the large runs.

Recommendations

- The case studies highlighted that these two properties had been better managed than most, but still have room for positive change in the production areas. Project participants will be provided with detailed individual reports with possible corrective actions to improve the land health, in both their production paddocks and run country paddocks.

- Follow up the report with a phone call to landholders.

- Media campaign – case studies, outcomes of the project, and a feature on the merits, features, benefits of native grasslands.

- Seek further funding to research how to increase basal area and decomposing litter.

“Kingston”, Conara

Owned by Simon Cameron

Data Collection by Graeme Hand & Celia Leverton, 1 July 2022

Property Background

Simon Cameron deeply cares about the land on which he farms. He describes it as an isolated, tough block, with short seasons and high natural values.

“Kingston” carries just under the district stocking rate. Simon acknowledges that he is sometimes over stocked, due to the difficulty in breeding back up in better seasons to regain the bloodlines of his merino sheep.

Simon sells direct to an Italian wool mill, and demand for his superfine merino wool outstrips the farm’s capacity to supply. For this reason, there are times when Simon feels the pressure to keep extra sheep on, when he should be reducing numbers to maintain adequate ground cover, due to the season conditions. Selling directly to a mill requires that wool quality is very consistent, and therefore nutrition and sheep health must be also. This consistency requires good and careful land management.

When the stocking rate has been lifted in the past, supplementary feeding has brought in weeds. Sheep are rotated around the property based on animal and land health.

Simon is keenly interested in increasing the health of the native grasslands and facilitating regeneration of trees on “Kingston”. He fenced areas around eucalypt grandpa trees 12-15 years ago, but natural regeneration didn’t happen, so young tree seedlings were planted and protected from browsing.

Biological & Landscape Function Analysis

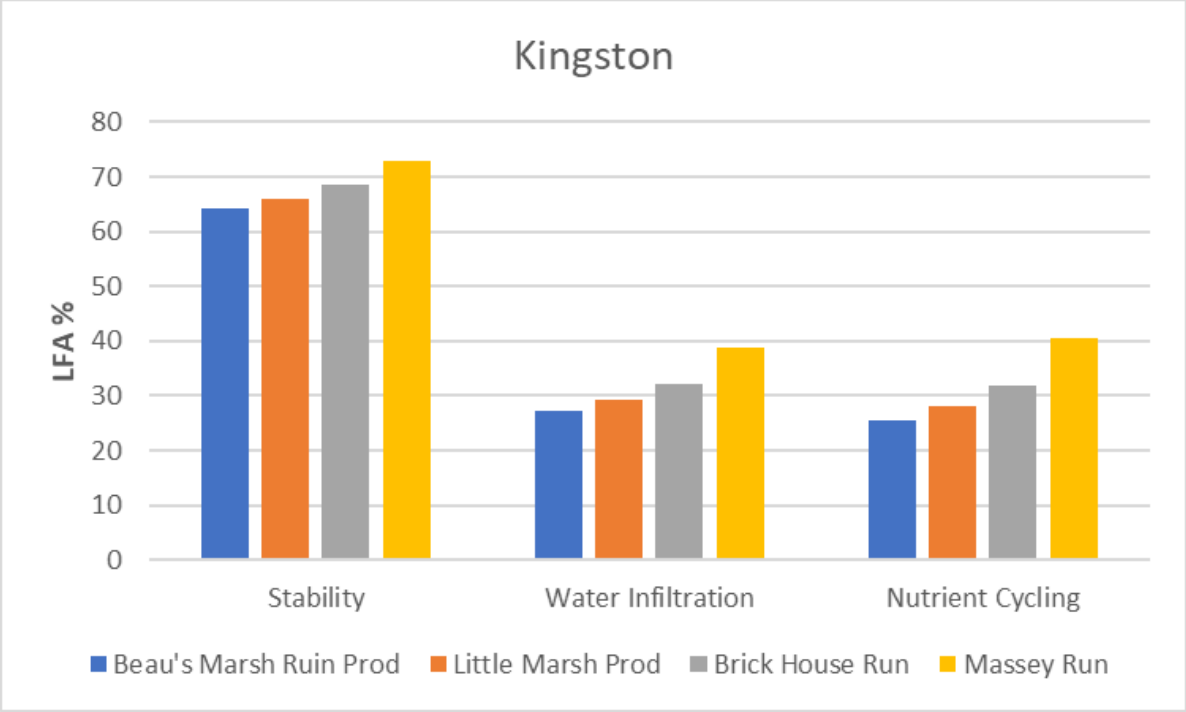
Data was collected on four areas on “Kingston”.

1. Two Production paddock sites
    - Little Marsh
    - Beau’s Marsh

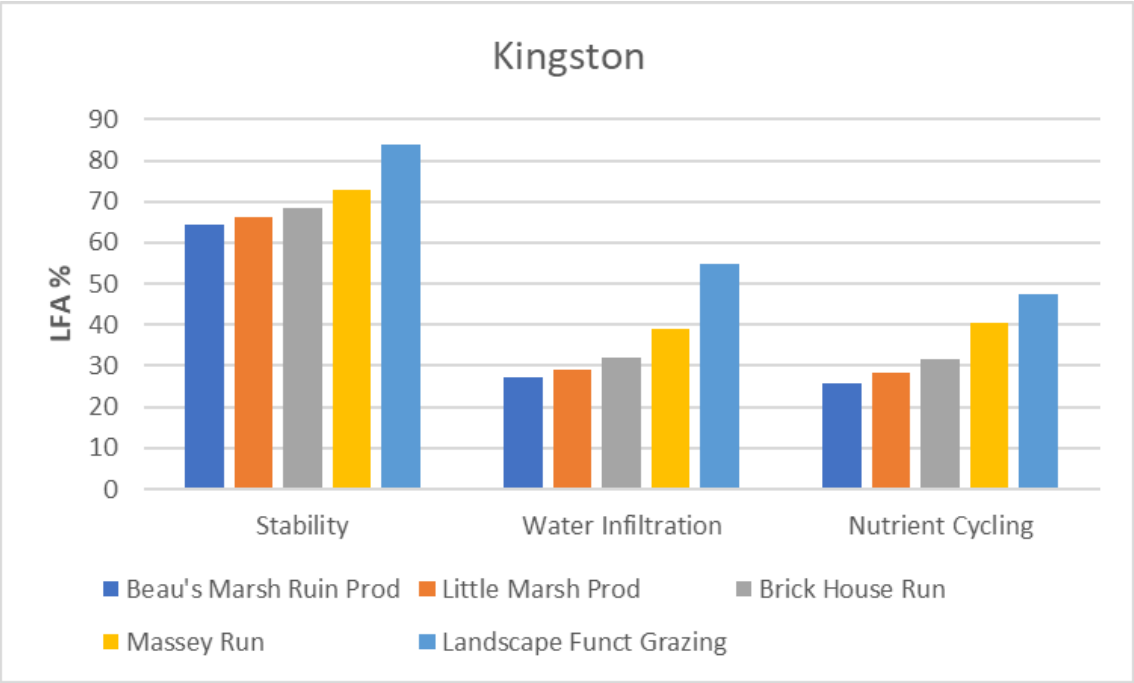
2. Two Run Country sites
    - Masseys Run
    - Brick House Ruin Run

Summary of Data Collected

Landscape Function by Paddock



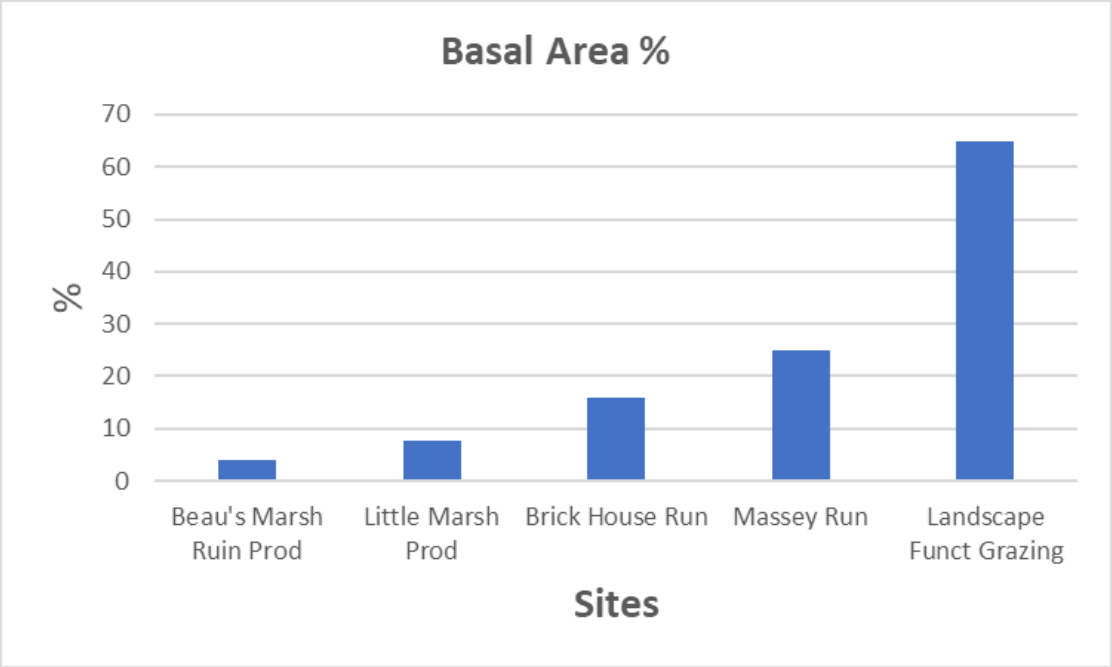
Landscape Function including Target



Analysis of Landscape Function Analysis Data

- These results confirm that Kingston is being managed at a level much higher than typical grazing management.
- Measured run country had higher stability, water infiltration and nutrient cycling than the measured production country.

Basal Area of Perennial Plants as a Percentage of Ground Cover



Analysis of Basal Area Data

- Typical results worldwide for basal area %, is less than 10% (Allan Savory pers com with Graeme Hand)
- Brick House Ruin Run and Massey Run are being managed for perennial basal area at a level higher than 10%

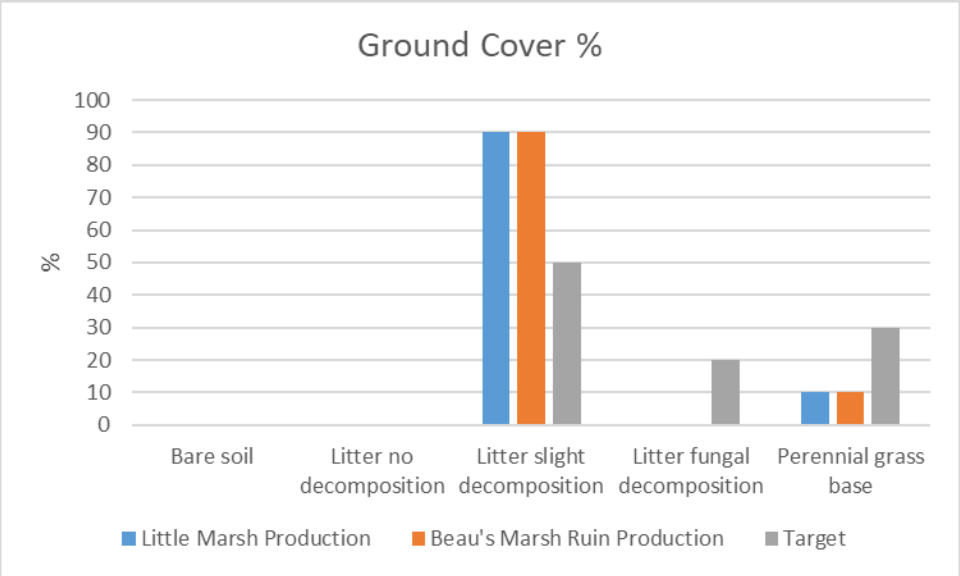
"Kingston" Production Areas

The measurements taken in the Landscape Function Analysis were:

1. Composition of Ground Cover
2. Condition of Soil Surface
3. Distance to the Nearest Perennial Grass
4. Spread of the Age of Grass
5. Evidence of annual plants, soil movement & insects/animals

The results of the Landscape Function Analysis, and the ensuing corrective action are as follows:

1. Composition of Ground Cover



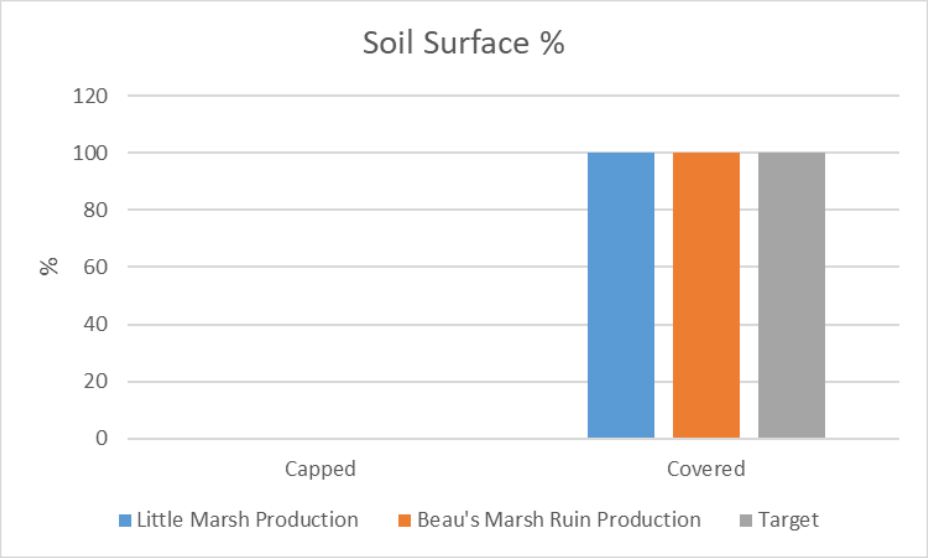
Little Marsh Production

- Low in perennial grass basal area. This is usually from pasture recoveries (between grazing events) being too short and stock density too low.

Beau's Marsh Production

- Low in perennial grass basal area. This is usually from pasture recoveries (between grazing events) being too short and stock density too low.

2. Condition of the Soil Surface



Little Marsh (production paddock)

- Good ground cover.

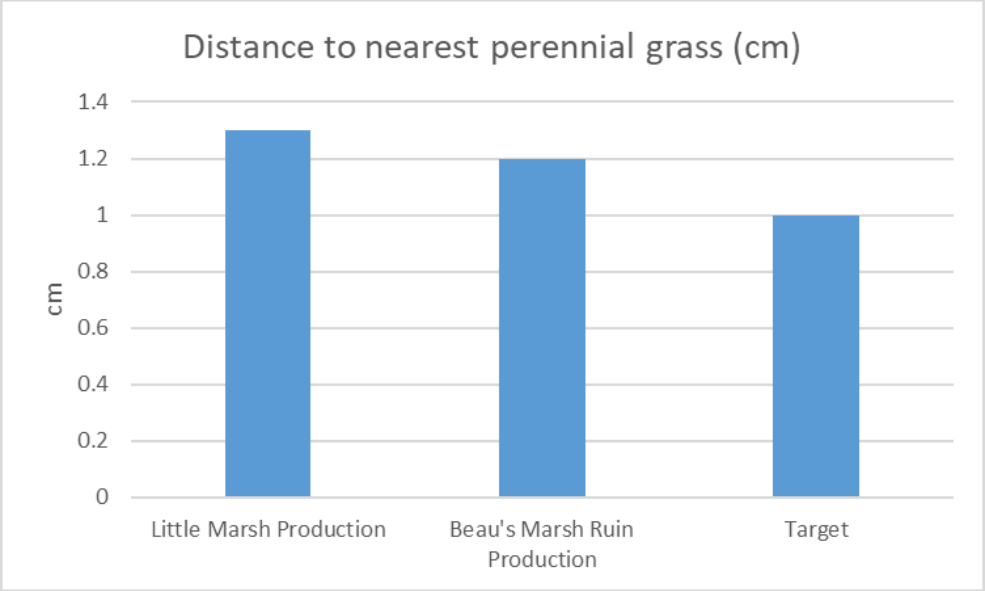
Beau's Marsh (production paddock)

- Good ground cover.

Little Marsh (production paddock)

Beau's Marsh (production paddock)

3. Distance to the nearest Perennial Grass



Little Marsh (production paddock)

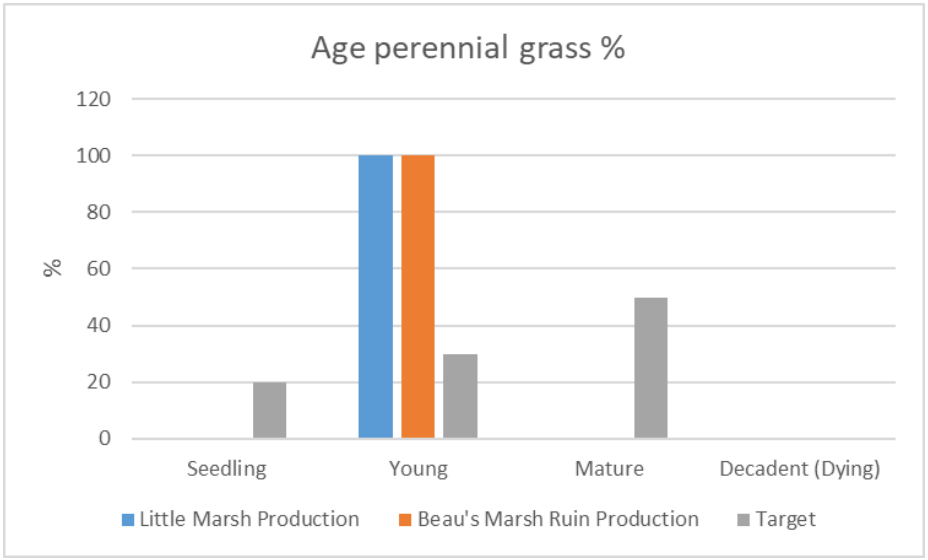
- Distance to nearest perennial grass was good, but could be improved with longer recoveries and higher stock density.

Beau's Marsh (production paddock)

- Distance to nearest perennial grass was good, but could be improved with longer recoveries and higher stock density.

Little Marsh (production paddock)

4. Spread of the Age of Grass



Little Marsh (production paddock)

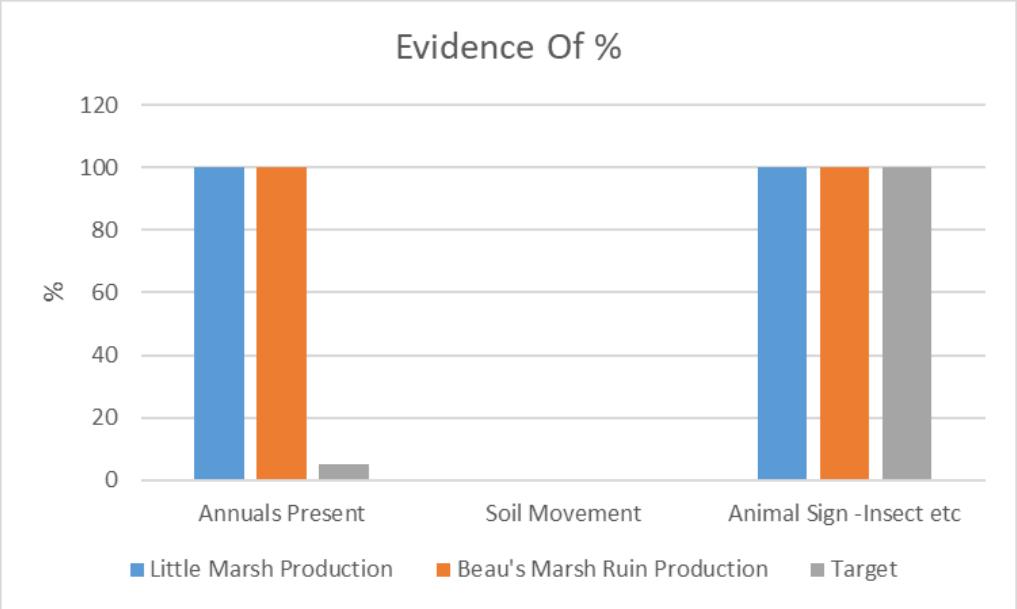
- The area was lacking new perennial grass seedlings. This is usually from low stock density. An absence of mature perennial grass plants is usually from grass recoveries being too short.

Beau's Marsh (production paddock)

- The area was lacking new perennial grass seedlings. This is usually from low stock density. An absence of mature perennial grass plants is usually from grass recoveries being too short.

Beau's Marsh (production paddock)

5. Evidence of Annual plants, Soil movement & Insects/Animals



Little Marsh (production paddock)

- There were excessive annuals, but excellent soil stability demonstrated by no soil movement. There was a very healthy level of insect and animal activity indicators. Excessive annuals are present when the grass recoveries are too short.

Beau's Marsh (production paddock)

- There were excessive annuals, but excellent soil stability demonstrated by no soil movement. There was a very healthy level of insect and animal activity indicators. Excessive annuals are present when the grass recoveries are too short.

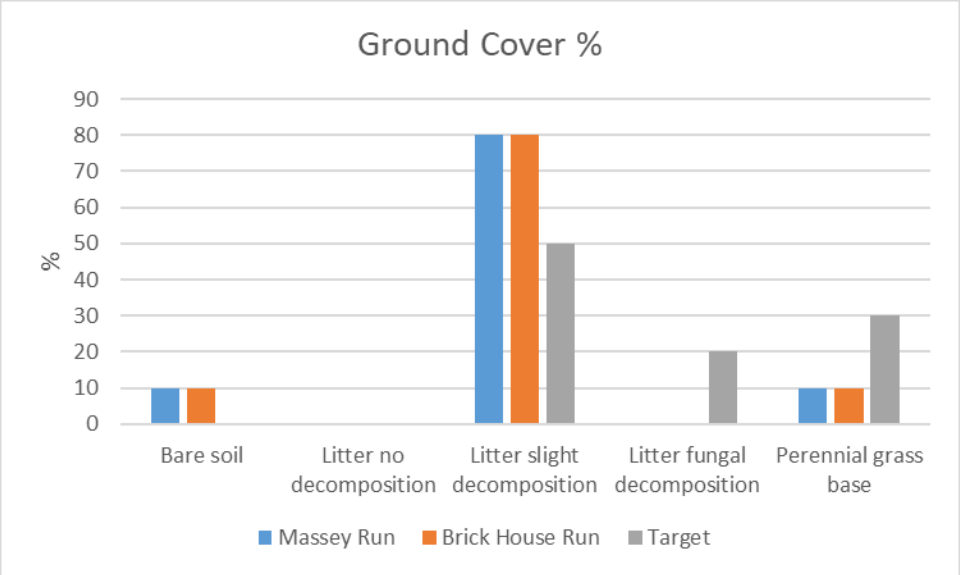
“Kingston” Run Country Areas

The measurements taken in the Landscape Function Analysis were:

1. Composition of Ground Cover
2. Condition of Soil Surface
3. Distance to the Nearest Perennial Grass
4. Spread of the Age of Grass
5. Evidence of annual plants, soil movement & insects/animals

The results of the Landscape Function Analysis, and the ensuing corrective action are as follows:

1. Composition of Ground Cover



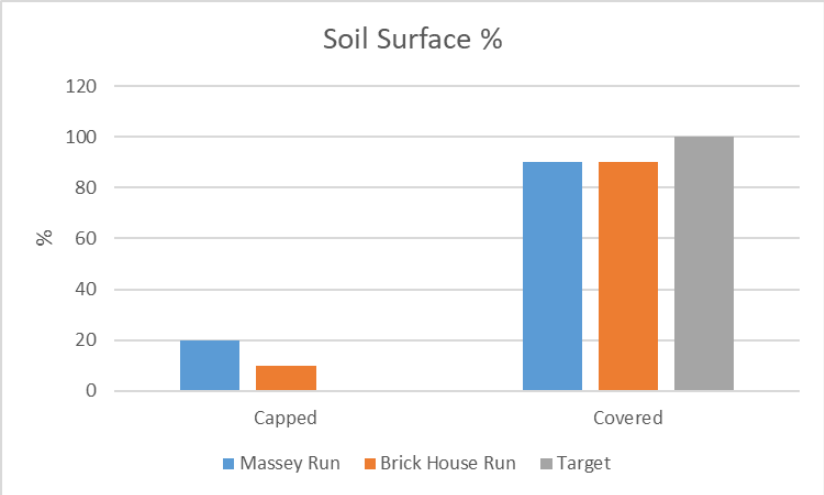
Massey Run

- This paddock was low in litter and perennial grass basal area. This is usually from grass recoveries being too short, and the stock density too low.

Brick House Ruins Run

- This paddock was low in litter and perennial grass basal area. This is usually from grass recoveries being too short, and the stock density too low.

2. Condition of Soil Surface



Massey Run

- Masseys Run was slightly low in ground cover with capping of the soil surface, indicating it could have been bare previously. These results are usually from grass recoveries too short and stock density too low.

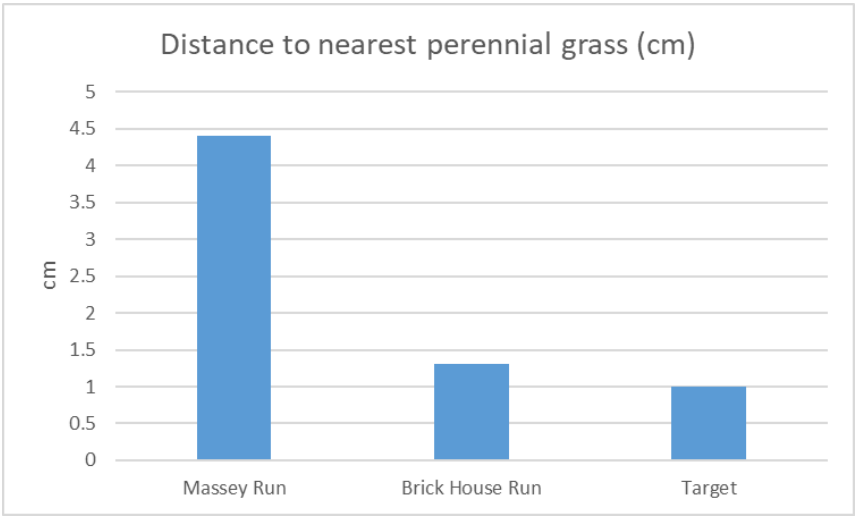
Brick House Ruins Run

- Brick House Ruins Run was slightly low in ground cover with capping of the soil surface, indicating it could have been bare previously. These results are usually from grass recoveries too short and stock density too low.

Massey Run

Brick House Ruins Run

3. Distance to the Nearest Perennial Grass



Massey Run

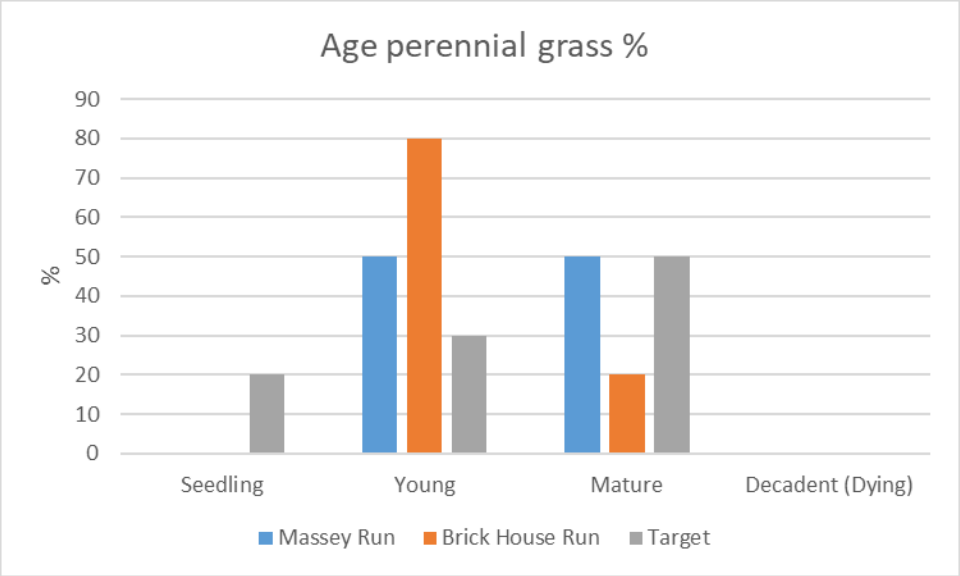
- The plant spacing was slightly high. This is usually from stock density being is too low.

Brick House Ruins Run

- Excellent plant spacing.

Massey Run – Simon described this run as needing a cool burn as he wasn't able to get the stock density to reduce the dry vegetative matter

4. Spread of the Age of Grass



Massey Run

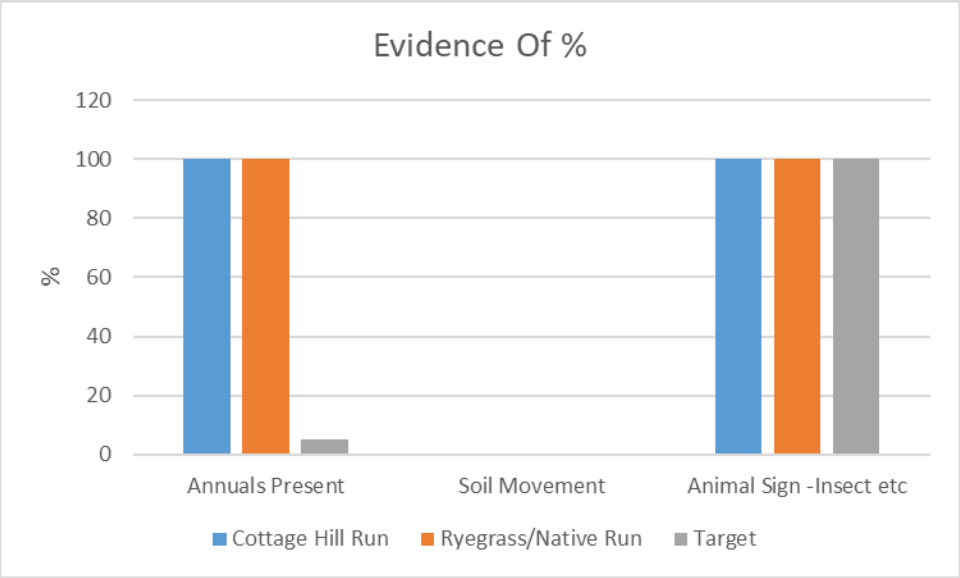
- There was a good age distribution between young and mature perennial grass plants, but there were few seedlings. This is usually from recoveries too short and / or stock density too low.

Brick House Ruins Run

- There was a good age distribution between young and mature perennial grass plants, but there were few seedlings. This is usually from recoveries too short and / or stock density too low.

Brick House Ruins Run

5. Evidence of Annual plants, Soil movement & Insects/Animals



Massey Run

- There were excessive annuals, but no evidence of soil movement and good indicators of insect and animal activity. Excessive annuals are usually a result of grass recoveries being too short.

Brick House Ruins Run

- There were excessive annuals, but no evidence of soil movement and good indicators of insect and animal activity. Excessive annuals are usually a result of grass recoveries being too short

“Okehampton”, Triabunna

Owned by Cape Herbert Pty Ltd

Data Collection by Graeme Hand & Celia Leverton, 29 June 2022

Property Background

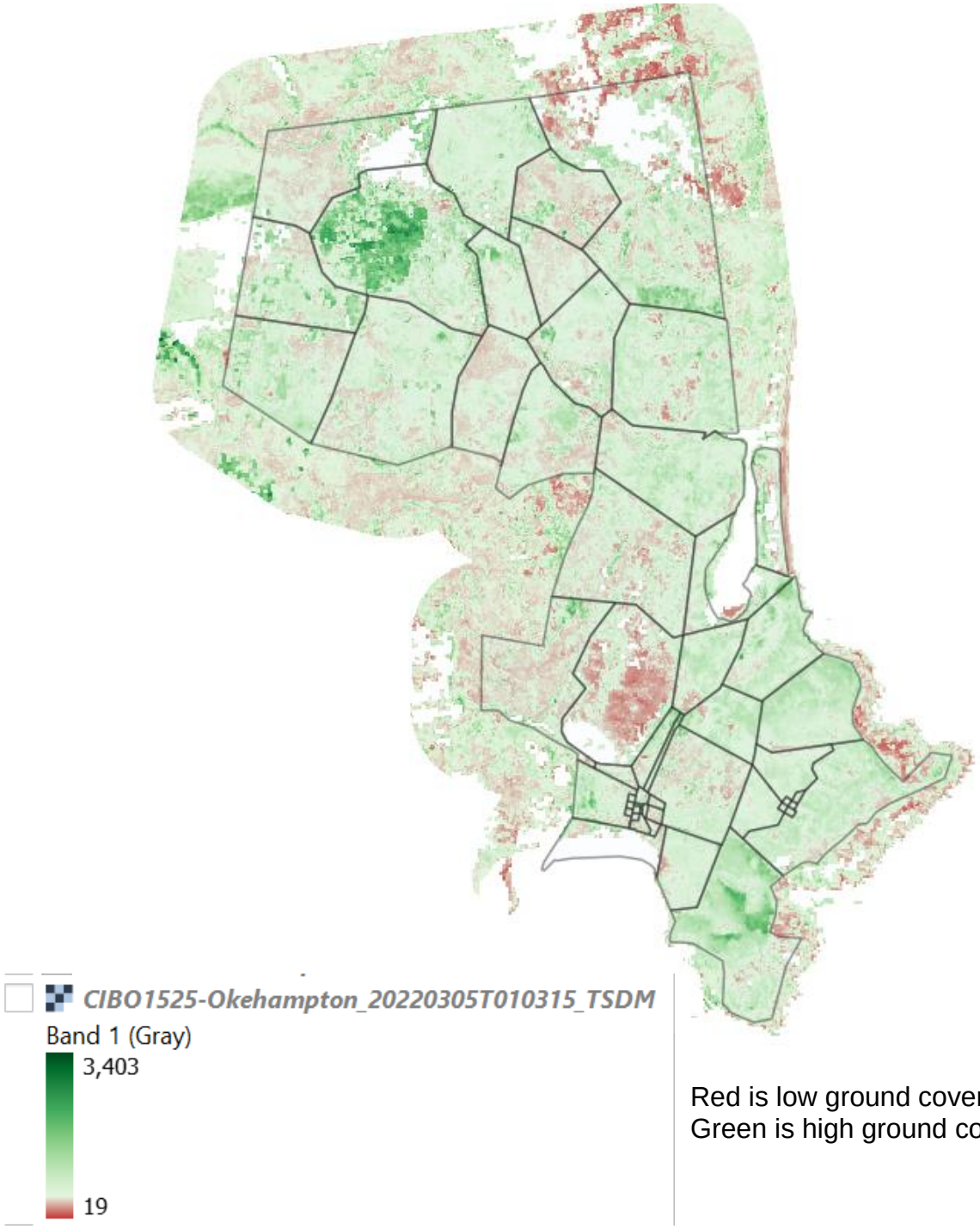
“Okehampton” has been owned by Cape Herbert Pty Ltd for the last 4-5 years.

Prior to this, the property was set stocked in both the production areas and run country. The run country was previously viewed as having no natural value and was resown with non-native grasses wherever possible. Only the rocky out crops have remained intact with native grasses.

Given the degraded state of much of the run country, the family business has prioritised to conserve and increase the health of the remnants.

Some of the areas have been identified as being threatened plant communities under the State Vegetation Communities project. The runs were assessed by Louise Gilfedder, retired consultant. Ecologist consultant, Kerry Bridle has designed a fencing plant to control grazing.

Satellite view of "Okehampton" demonstrating ground cover



Red is low ground cover.
Green is high ground cover

Summary of Data Collected

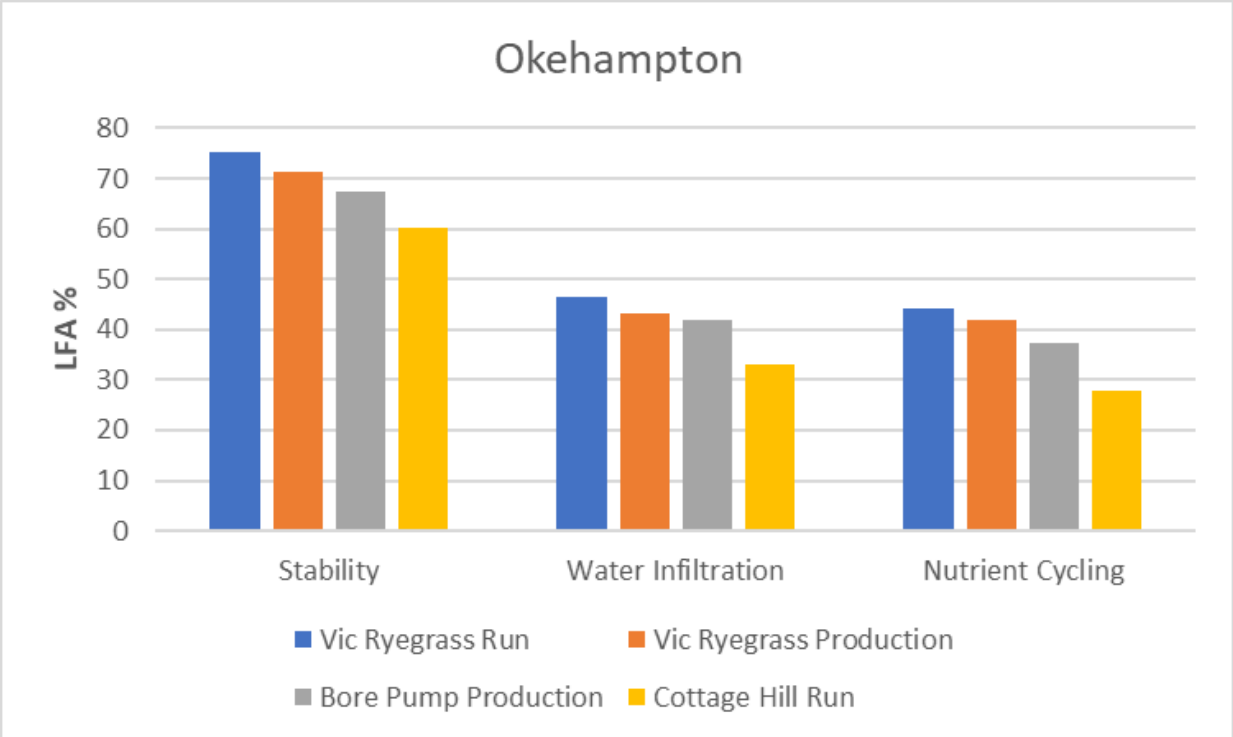
Data was collected on four areas on “Okehampton”, near Triabunna, Tasmania

1. Two production areas
    - Bore Pump Paddock
    - Vic Ryegrass Paddock
2. Two run areas
    - Cottage Hill Run
    - Ryegrass Native Run

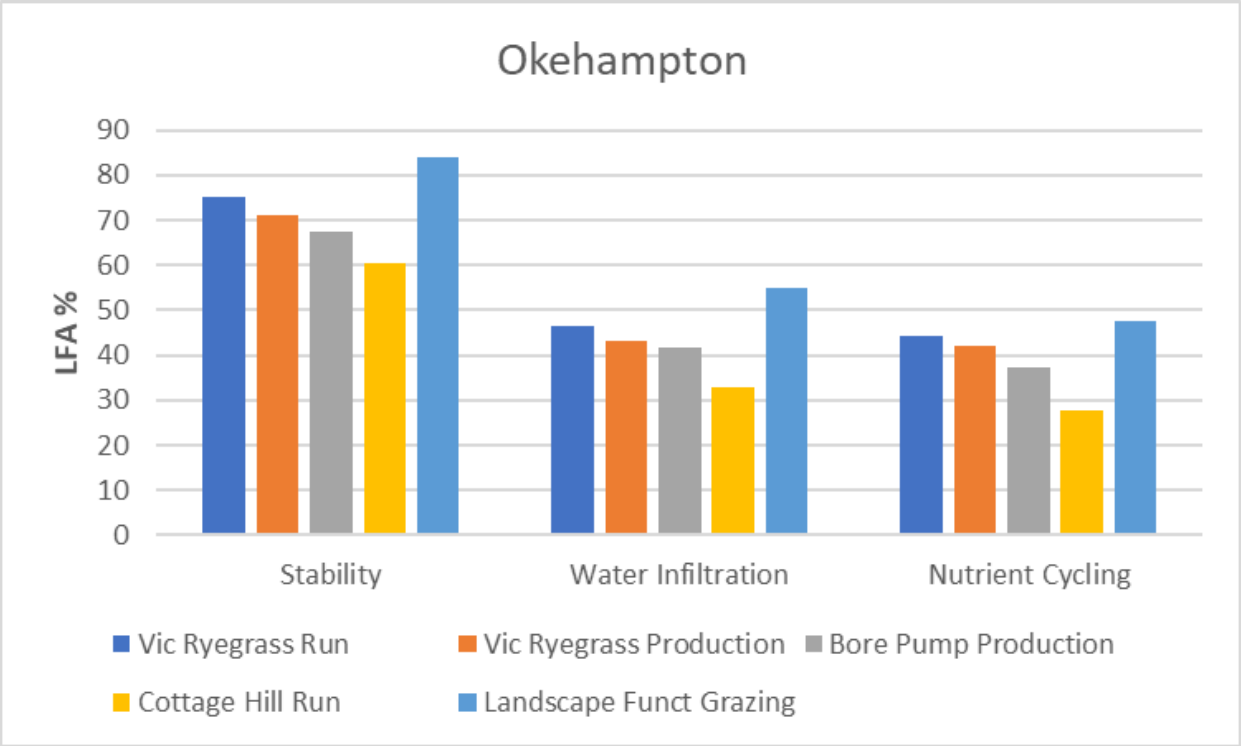
The measurements taken in the Landscape Function Analysis were:

1. Composition of Ground Cover
2. Condition of Soil Surface
3. Distance to the Nearest Perennial Grass
4. Spread of the Age of Grass
5. Evidence of annual plants, soil movement & insects/animals

Landscape Function by Paddock



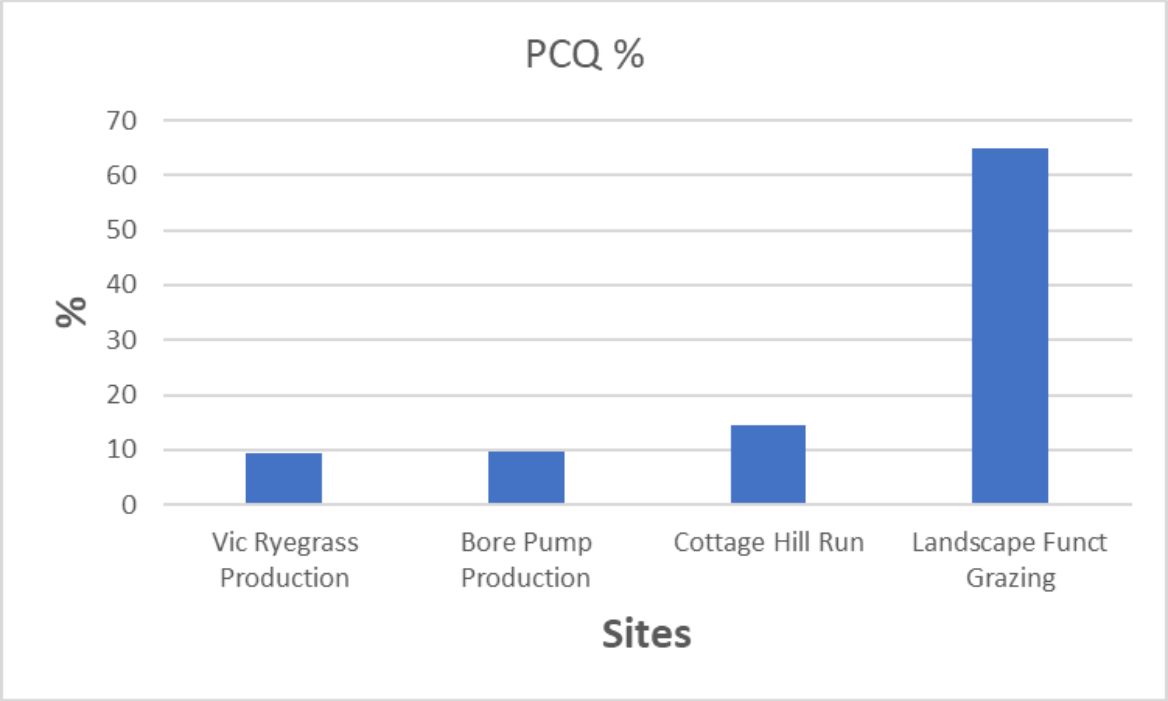
Landscape Function including Target



Analysis of Landscape Function Analysis Data

- These results confirm that Okehampton is being managed at a level much higher than typical grazing management.

Basal Area of Perennial Plants as a Percentage of Ground Cover



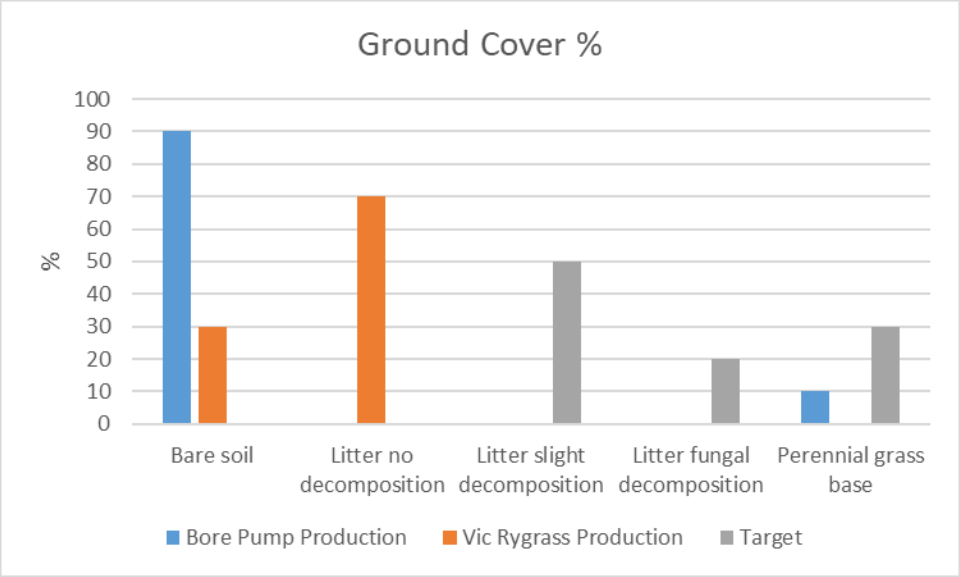
Analysis of Basal Area Data

- Typical results worldwide for basal area % is less than 10% (Allan Savory pers com)
- Cottage Hill and Ryegrass Native Run are being managed for perennial basal area at a level higher

“Okehampton” Production Areas

The results of the Landscape Function Analysis, and the ensuing corrective action are as follows:

1. Composition of Ground Cover



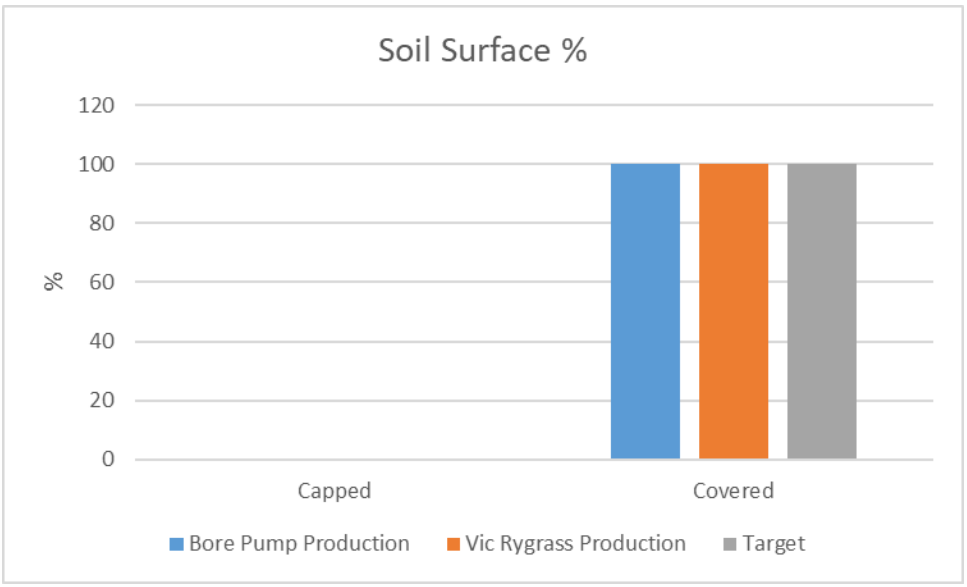
Bore Pump Production

- This paddock was low in decomposing litter on the soil surface, and had sparse perennial grass basal area. This is from grass recovery periods between grazing events being too short and stock density during grazings being too low.

Vic Ryegrass Production

- This paddock was low in decomposing litter on the soil surface, and had sparse perennial grass basal area. This is from grass recovery periods between grazing events being too short and stock density during grazings being too low.The

2. Condition of Soil Surface



Bore Pump Production

- Good ground cover.

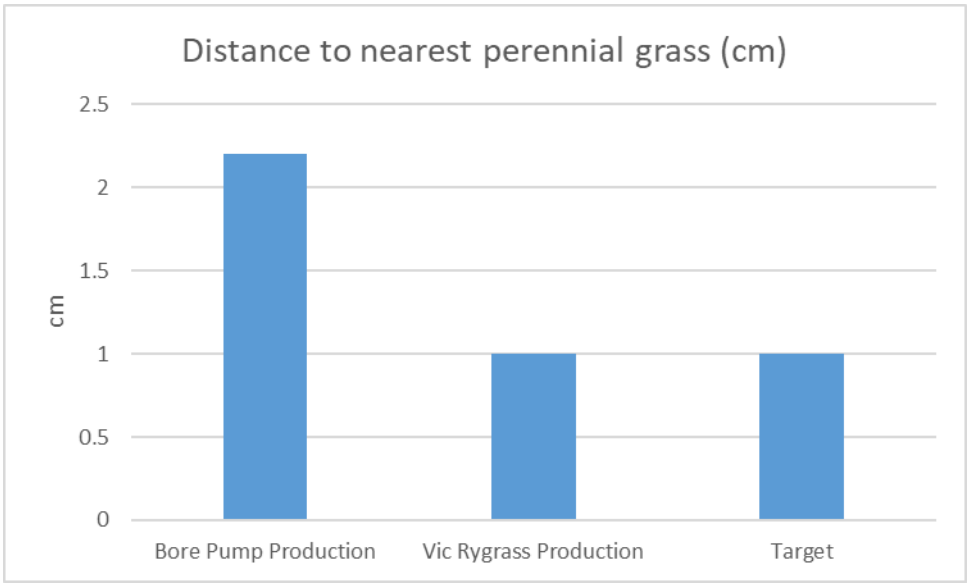
Vic Ryegrass Production

- Good ground cover.

Bore Pump (production paddock)

Vic Ryegrass (production paddock)

3. Distance to the Nearest Perennial Grass



Bore Pump Production

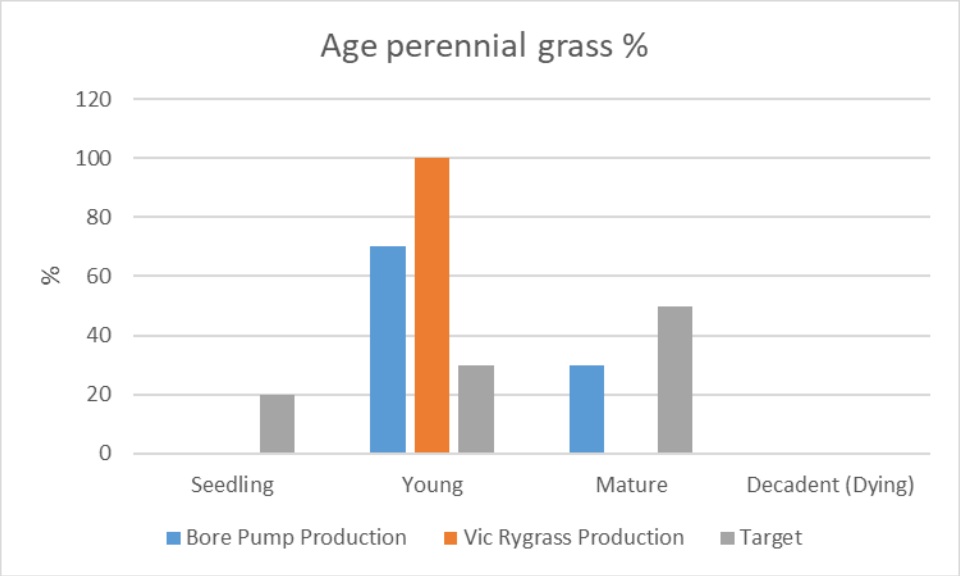
- The distance to nearest perennial grass was good, but could be improved with longer grass recoveries between grazing events, and higher stock density during the grazing.

Vic Ryegrass Production

- Distance to nearest perennial grass was excellent.

Bore Pump (production paddock)

4. Spread of the Age of Grass



Bore Pump Production

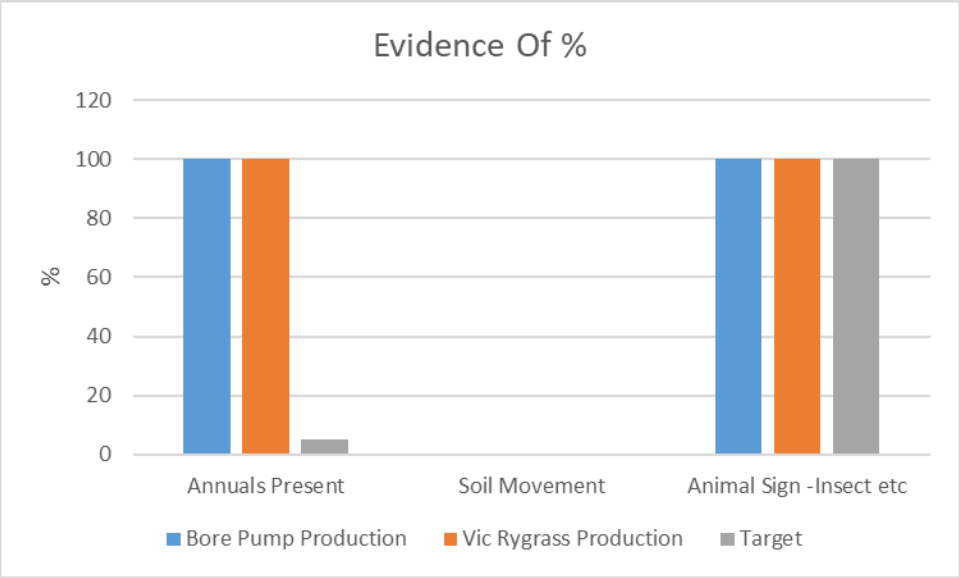
- There was a lack of perennial grass seedlings on this site. This is from low stock density and mature perennial grass plants from recoveries too short.??
- There was a good age distribution between young and mature perennial grass plants, but there were few seedlings. This is usually from recoveries too short and / or stock density too low.

Vic Ryegrass Production

- There was a lack of perennial grass seedlings on this site. This is from low stock density and mature perennial grass plants from recoveries too short.??

Vic Ryegrass (production paddock)

5. Evidence of Annual plants, Soil movement & Insects/Animals



Bore Pump Production

- There were excessive annuals, but no evidence of soil movement and good indicators of insect and animal activity. Excessive annuals are usually a result of grass recoveries being too short.

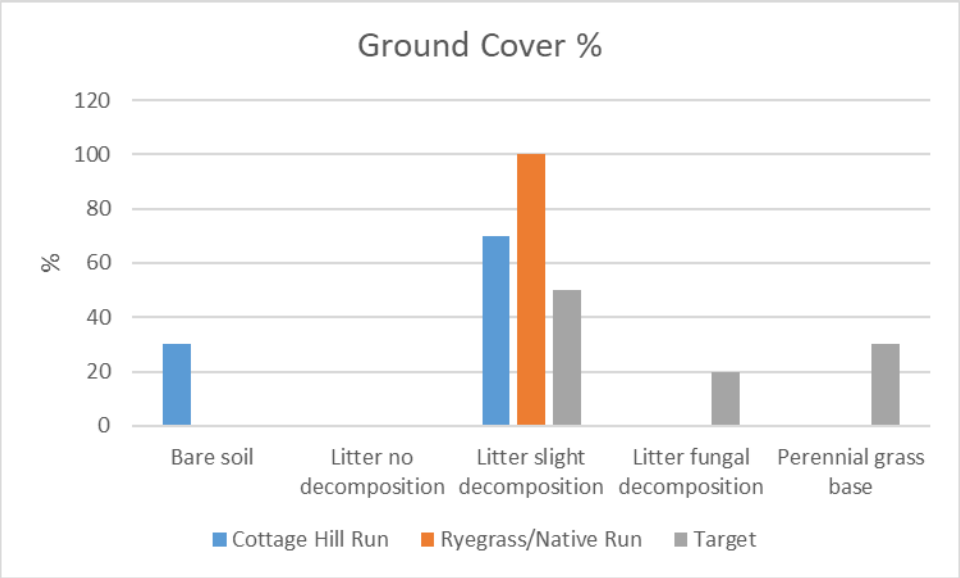
Vic Ryegrass Production

- There were excessive annuals, but no evidence of soil movement and good indicators of insect and animal activity. Excessive annuals are usually a result of grass recoveries being too short.

“Okehampton” Run Country Areas

The results of the Landscape Function Analysis, and the ensuing corrective action are as follows:

1. Composition of Ground Cover



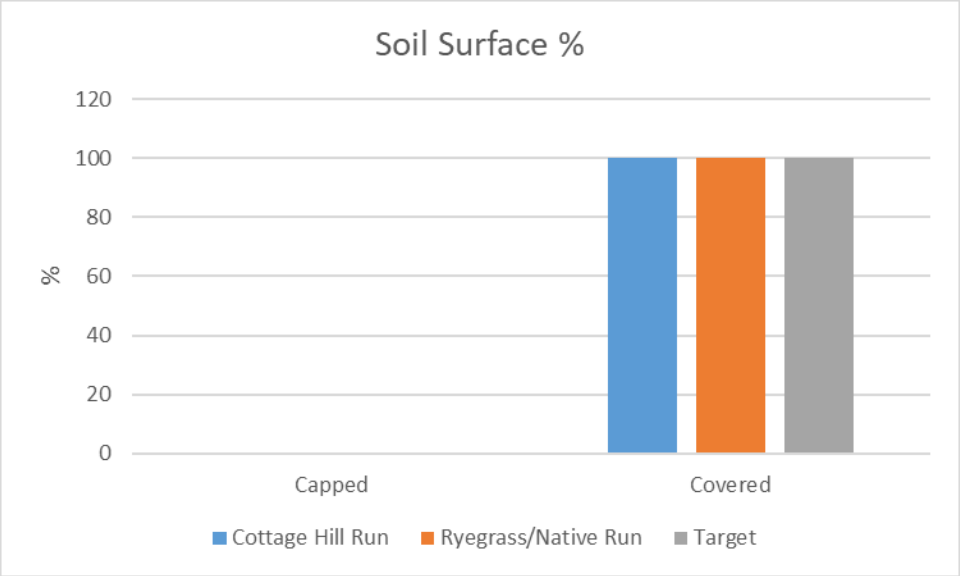
Cottage Hill Run

- This paddock was low in decomposing litter on the soil surface, and had small perennial grass basal areas. This is usually a result of grass recovery periods between grazing events being too short, and the stock density during grazing being too low.

Ryegrass Native Run

- This paddock had low coverage with perennial grass basal area. This is usually a result of grass recovery periods between grazing events being too short, and the stock density during grazing being too low.

2. Condition of Soil Surface



Cottage Hill Run

- Excellent ground cover.

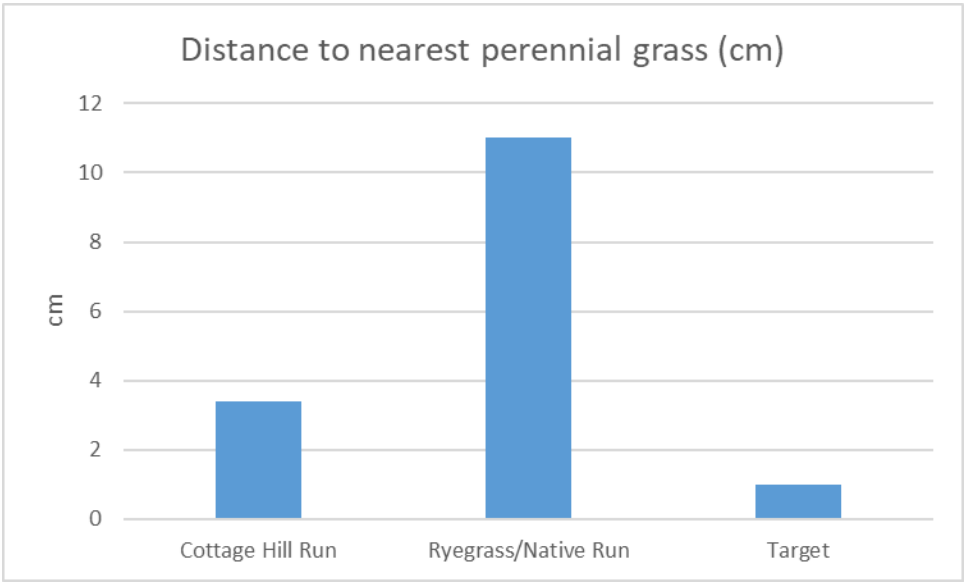
Ryegrass Native Run

- Excellent ground cover

Cottage Hill Run

Ryegrass Native Run

3. Distance to the Nearest Perennial Grass

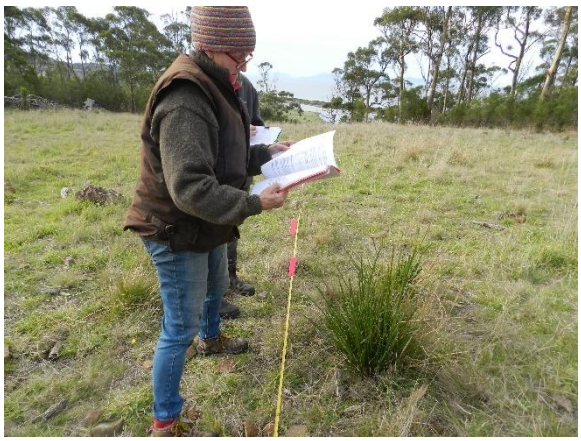


Cottage Hill Run

- Excellent plant spacing.

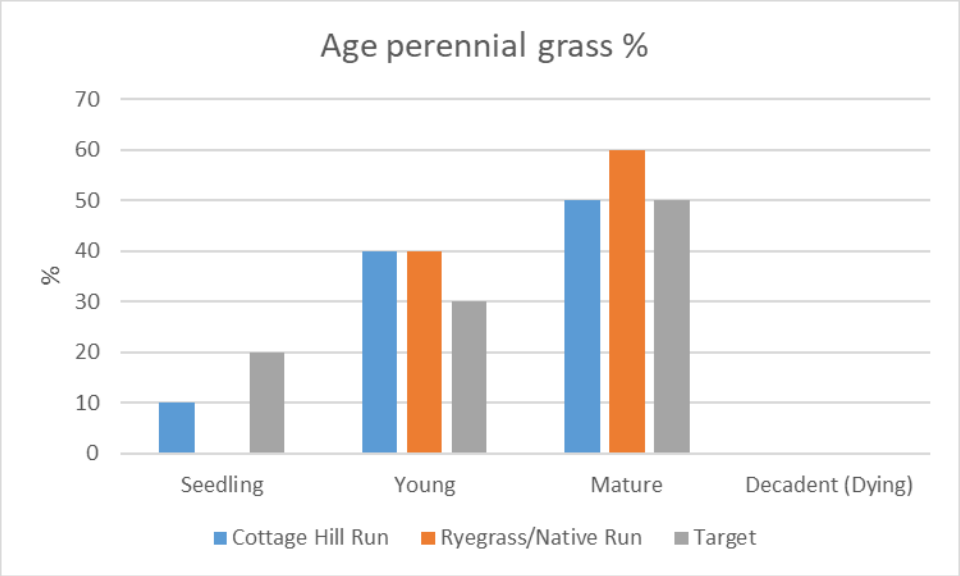
Ryegrass Native Run

- Plant spacing too high, usually from stock density during grazing being too low.



Cottage Hill Run

4. Spread of the Age of Grass



Cottage Hill Run

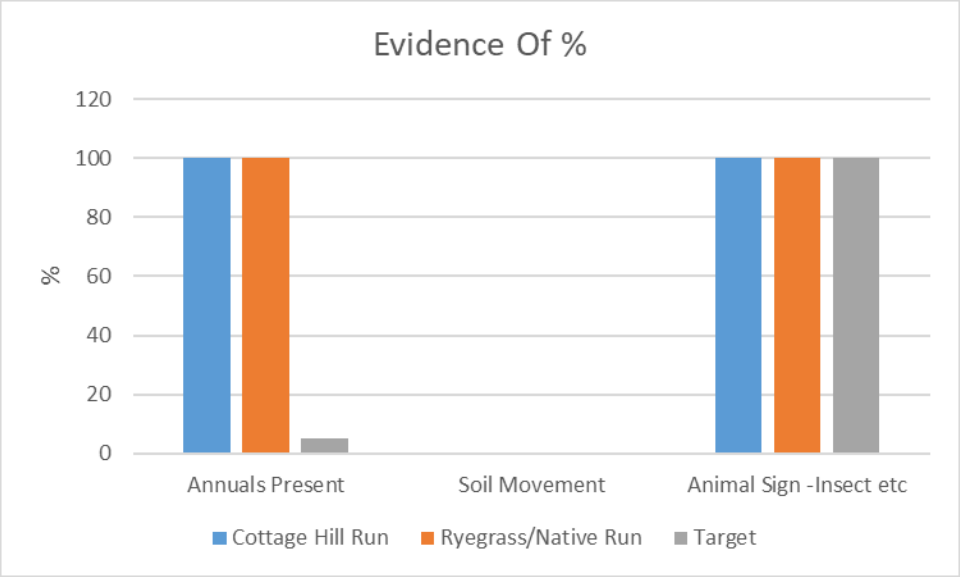
- Excellent perennial grass age distribution.

Ryegrass Native Run

- Good perennial grass age distribution, but was low in seedlings from pasture recoveries too short and / or stock density too low.

Ryegrass Native Run

5. Evidence of Annual plants, Soil movement & Insects/Animals



Cottage Hill Run

- There were excessive annuals, but no evidence of soil movement and good indicators of insect and animal activity. Excessive annuals are usually a result of grass recoveries being too short.

Ryegrass Native Run

- There were excessive annuals, but no evidence of soil movement and good indicators of insect and animal activity. Excessive annuals are usually a result of grass recoveries being too short.

Appendix A

Biological & Landscape Function Monitoring sheet

Dying	At risk	Recover	Regen

PADDOCK ID: _____ TREATMENT: _____ PHOTOS: _____ DATE: _____

	What the dart hit (tick one)					Soil Surface 15cm around the dart (tick one)		Evidence of change (Complete all)			Nearest perennial grass (complete all)		Age Nearest Perennial			Basal area			Observations
Transect number	Bare Soil	Litter No Decomp	Litter Slight Decomp	Litter Fungal Decomp	Perennial Grass Base	Capped soil surface	Covered	Annuals present	Soil Movement	Evidence of other animals, insects etc	Name of nearest perennial grass	Distance to nearest perennial grass (cm)	Seedling	Young	Mature	Distance to nearest perennial grass (>4 cm^2)	Width nearest perennial grass (>4 cm^2)	Breadth nearest perennial grass (>4 cm^2)	Species observed, oxidising litter in perennial grass, woody increasing, annuals/ forbs increasing etc. Photos of litter in perennial bases, Estimated overall litter class
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
Totals	0	0	0	0	0	0	0	0	0	0	Average (cm)	0	0	0	0	0			

Adapted from Holistic Management® & LFA by Graeme Hand

Appendix B

Land Monitoring and Corrective Action Form

Date _____

Variation to Landscape Goal	Possible Cause of Variation	Possible Corrective Action	Who/ When
Bare ground between perennial grass plants – no raw litter present	1. Litter not grown. Perennial grass not fully recovered between each grazing. Unrecovered grass has chewed off tips and no fresh litter. Recovered grass has all fresh tips and fresh yellow litter. Grazing. Recoveries are too short for growth rate. 2. Animals picking up litter as not being moved on gut fill.	1. Check increasing recovery between each grazing in a safe to fail practice (S2F) area. Usual cause is overstocked for growth rate. Determine why recoveries less than what is working in S2F areas. Reduce stocking rate and paddock size while maintaining S2F stock density and utilisation. 2. Check litter before and after grazing to confirm. Usual cause is overstocked for seasonal growth. Determine why stock densities are lower than what is working in S2F areas. Reduce stocking rate and paddock sizes	
Raw litter present but not composting/ decomposing	1. Litter not in contact with soil surface and not available to soil life.	1. Check increasing stock density/ animal impact in a S2F trial area. Usual cause is low stock density and/ or moving animals on too fast. Check animals are moved on gut fill and increase utilisation by reducing paddock size.	
Perennial grass spacing increasing. Annual forbs and grasses increasing	1. Perennial grass dying/ weakened from recovery too short	1. Check increasing recovery between each grazing in a safe to fail practice (S2F) area. Usual cause is overstocked for growth rate. Determine why recoveries less than what is working in S2F areas. Reduce stocking rate and paddock size to achieve S2F stock density and utilisation.	

Appendix B continued

Land Monitoring and Corrective Action Form
continued

Date _____

Variation to Landscape Goal	Possible Cause of Variation	Possible Corrective Action	Who/ When
Seedlings are not present at start of growing season	1. Animal impact/ stock density below level to initiate germination of soil perennial grass seed bank. 2. Lack of perennial grass recovery	1. Check increasing stock density/ animal impact in a S2F trial area. Usual cause is low stock density and/ or moving animals on too fast. Check animals are moved on gut fill and increase utilisation by reducing paddock size. 2. Check if seedlings present before grazing. If present and not establishing increase recovery. Usual cause is overstocked for seasonal growth. Determine why recoveries less than what is working in S2F areas. Reduce stocking rate and paddock size while maintaining S2F stock density and utilisation	
Decline in better perennial grasses	1. Perennial grass dying/ weakened from recovery too short	1. Check increasing recovery between each grazing in a safe to fail practice (S2F) area. Usual cause is overstocked for growth rate. Determine why recoveries less than what is working in S2F areas. Reduce stocking rate and paddock size to achieve S2F stock density and utilisation.	
Grey oxidising grass noted as increasing	1. Paddock too large to allow even grazing	1. Check increasing stock density/ animal impact in a S2F trial area. Usual cause is low stock density and/ or moving animals on too fast. Check animals are moved on gut fill and increase utilisation by reducing paddock size.	
Woody plants noted as increasing	1. Perennial grass dying/ weakened from not having growth points cleared.	1. Check increasing stock density/ animal impact in a S2F trial area. Usual cause is low stock density and/ or moving animals on too fast. Check animals are moved on gut fill and increase utilisation by reducing paddock size.	

Appendix C

How to measure change with

Biological Monitoring

When to monitor

Twice per year.

Tasmania is a winter growing area, so monitor in Spring. This is the best time of the year for grass identification. Monitor again at the Autumn break to capture data at the worst time of the year. This is often when there is bare ground. The change is to 100% ground cover with perennial grass basal area and decomposing litter.

When management practices are changed, monitor to know the impact of changes over time. It is desirable to monitor after each grazing to note the direction of change.

Equipment

- Biological Monitoring Form and pen
- Dart (the sort with the flight melded on to the stem, with string tail attached if the grass is long)
- 3 or 5 m measuring tape
- Camera

Process

1. Identify the Biological Monitoring form:
   - Property name
   - Paddock name
   - Treatment eg Control or trial
   - Date

2. What did the dart hit?

Tick one	Looks like
Bare soil	No plant or litter on the soil
Litter No Decomposition	Litter on the soil surface but no decomposition. Most likely seen in cropping land
Litter Slight Decomposition	Slight colour change in the litter to brownish
Litter Fungal Decomposition	Visible fungal attack
Perennial Grass Base	Lands in a perennial grass base

3. Soil Surface – 15cm around the dart

Tick one	Looks like
Capped soil surface	Sealed soil surface. Lifts in one piece when lifted with a pen/stick
Covered soil surface	Covered with a plant or litter

4. Evidence of change – 15cm around the dart

Complete each	Looks like
Annual present	Annual plants present
Soil movement	Evidence of soil movement
Evidence of other animals, insects etc	Manures, castings, activity etc

5. Name of the nearest perennial grass

6. Distance to the nearest perennial grass

7. Age of the nearest perennial grass

Tick one	Looks like
Seedling	One leaf
Young	Two leaves or more
Mature	Base of the grass measures at least 2cm x 2cm = 4cm2

8. Basal area of the nearest mature perennial grass

Measure and record	
Distance to nearest perennial grass (>4cm2)	Distance from the dart to the base of the nearest mature perennial grass
Width of the nearest perennial grass (>4cm2)	Width of the nearest mature perennial grass base – not the top of the plant
Breadth of the nearest perennial grass (>4cm2)	Breadth of the nearest mature perennial grass base – not the top of the plant

9. Observations – examples are on the Biological Monitoring form.

Adapted from Holistic Management & LFA by Graeme Hand, Hand for the Land