
KEY SITE MONITORING

INTRODUCTION

The project aimed to build the capacity of landholders to adopt best management practices through the delivery of practical strategies to remain viable through observed climate variability. One part of this was the establishment of perennial and salt land pasture monitoring at key sites across the greater Cranbrook region. These sites would provide local examples of a change in land practice and would demonstrate the successful establishment of these new land practices to encourage landholders to adopt perennial pasture in the project area. Several sites set up for previous projects were recruited for this monitoring, selected for the quality of the pastures and the enthusiasm of the landholders involved. Monitoring of pasture growth, bore water levels and soil and salinity was undertaken for the duration of the project. Measurement of annual pasture growth at all sites was also taken for comparison.

KEY MONITORING SITES

SITE ONE: Erin and Thys Gorter, "Tamasha"

BACKGROUND

Thys and Erin Gorter have been farming at "Tamasha", in the southwest corner of the Kojonup shire, for over 15 years. "Tamasha" is a 1300 ha property and consists of mainly gravelly loam soils on the hills and sandy loams over clay on the valley floors. Traditionally the type of pastures consist of annual clovers and rye grasses, but over the past 6 years Thys and Erin have been trying to value add to this system by investigating and trialing different perennial species in the quest to extend the growing season, utilising unseasonal rainfall. Their business consists of a number of different enterprises to enable them flexibility across the farm and commodity markets. Prime lamb is their major focus and where their greatest interest lies. However, a percentage of the farm is also used for cropping and Agroforestry.

LOCATION AND SITE DESCRIPTION

The trial site adjoins a large nature reserve and is comprised of three adjoining paddocks – two "ridge line" paddocks and a lower, sandy paddock that also contains bulrushes. Main site issues are pH, fertility, waterlogging and some salinity and erosion. An annual pasture paddock at the entrance to the property consisting of gravelly soils on the ridge grading to sandy loams over clay on the valley floor was also monitored as a comparison.

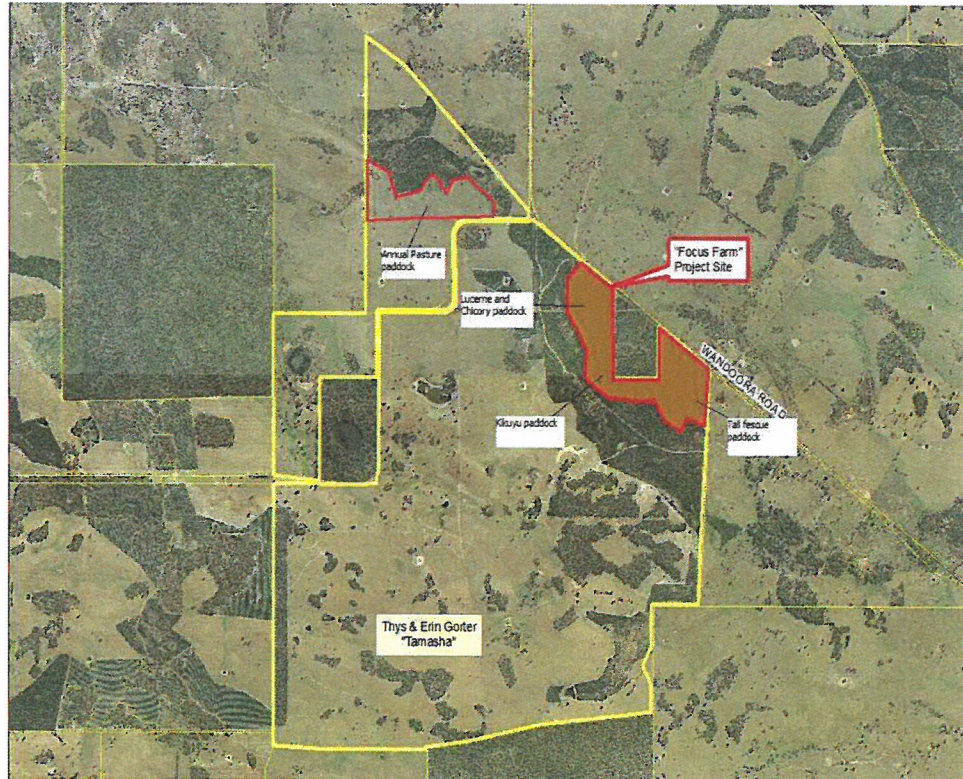


FIGURE 1: SITE LOCATIONS FOR THYS AND ERIN GORTER.

SITE AIM

To investigate the grazing potential of perennial pastures on different soil types, compared to annual sub-clover based pastures.

TREATMENT

The site was soil tested and an EM 38 survey had been conducted across the site. Six piezometers were installed over the site. Significant re-fencing has occurred to split the site into more easily managed grazing cells, and lime was applied at recommended rates. Paddock treatments are as follows:

1. Kikuyu has been established in the lower, sandier "bulrushes" paddock
2. Lucerne and Chicory were established on the "east ridge" paddock
3. Lucerne and Tall Fescue were established on the "west ridge" paddock
4. Control – annual sub-clover based pasture paddock at the entry to the farm.

Waterlevels in piezometers were taken twice yearly and soil pH and Ec were also taken at the start of the project. Pasture cages were placed randomly over each paddock for pasture growth measurements, and pasture quadrats were also monitored following Evergraze measurement protocols.



FIGURE 2: EVERGRAZE QUADRAT USED FOR PASTURE MEASUREMENTS OF FEED ON OFFER, % LEGUME, % GROUNDCOVER AND % GREEN. Summer measurement in Lucerne pasture.

SOIL INFORMATION

Extensive soil sampling was done across the perennial sites and a full soil type map drawn up. Soil types ranged from sand through sandy clays to gravelly sands and gravel. The annual pasture site, while not soil tested, was located in a part of the landscape very similar, and on visual assessment ranged from gravels and gravelly sands on the ridge, down to a sandy clay duplex in the valley floor.

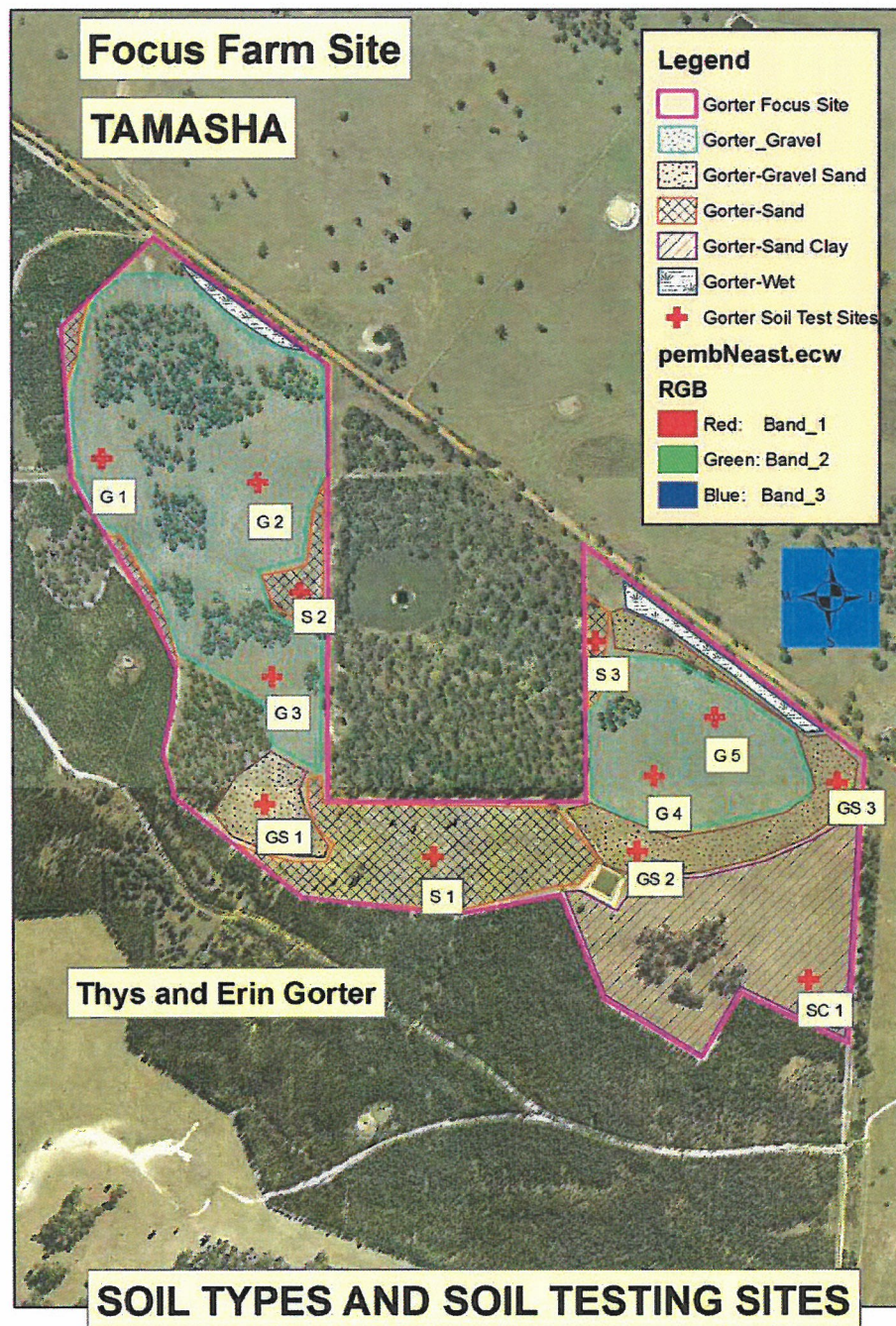


FIGURE 3: SOIL TYPE MAP FOR GORTER'S PERENNIAL SITES.

Based on EM38 readings, the perennial sites at Gorter's were predominantly non-saline with some areas of moderate salinity at the extreme edges of the east ridge paddock (Tall Fescue), up to 200mS/m. There was also some slight salinity expressed at the southern edge of the site in the kikuyu paddock. Both areas giving high readings were also areas of some winter/spring waterlogging.

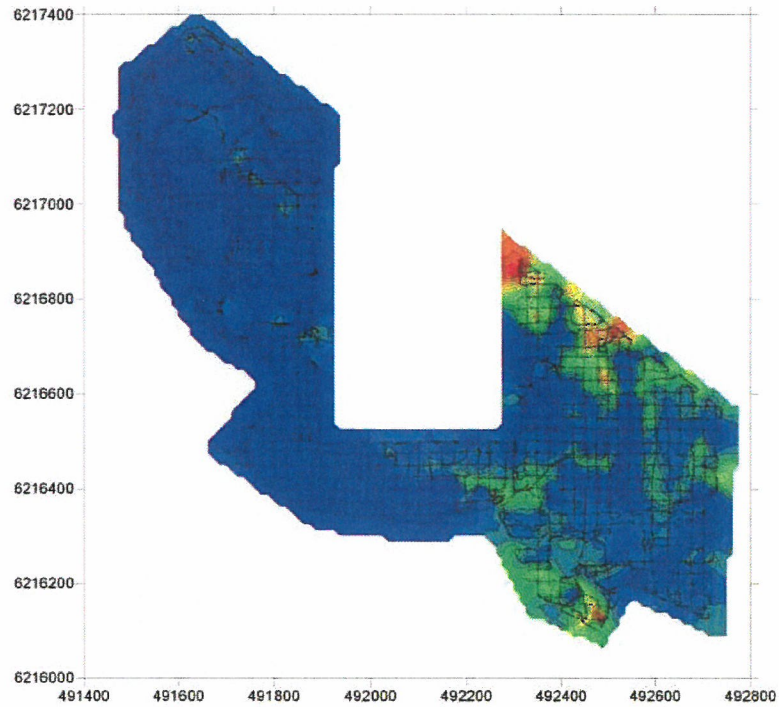
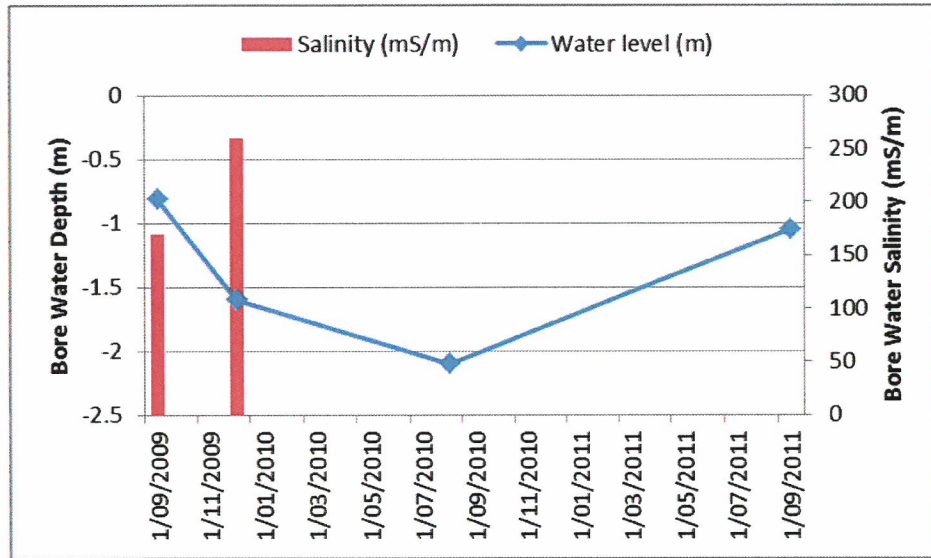


FIGURE 4: EM 38 RESULTS FROM GORTER'S MONITORING SITE.

HYDROLOGY

Two piezometers were drilled in each perennial treatment. Measurements of water depth over the duration of the project reflect annual rainfall with levels falling in 2010 across all piezometers – this year had below average rainfall. Water levels increased again during 2011, reflecting the increased rainfall for this year. Salinity levels were low in all piezometers except G02, located in the tall fescue paddock just above the dam.

(a)



(b)

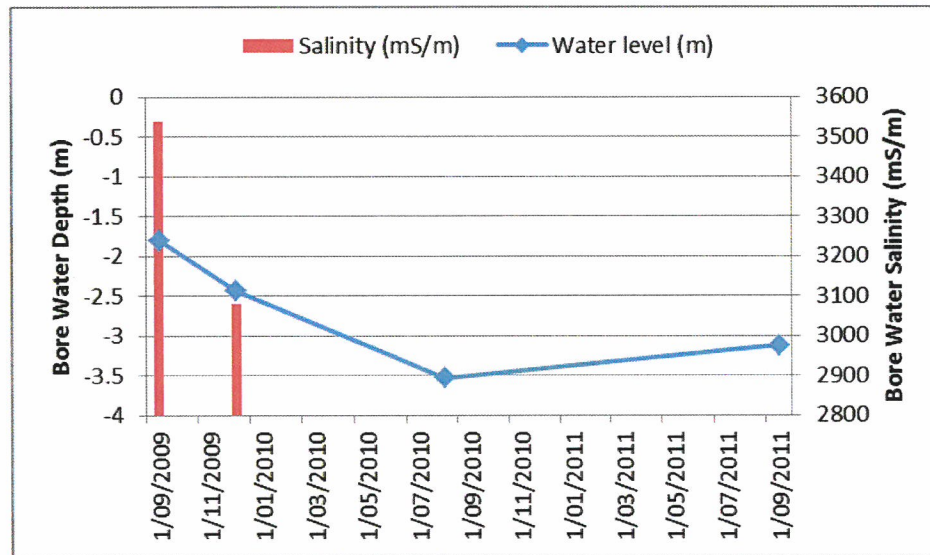
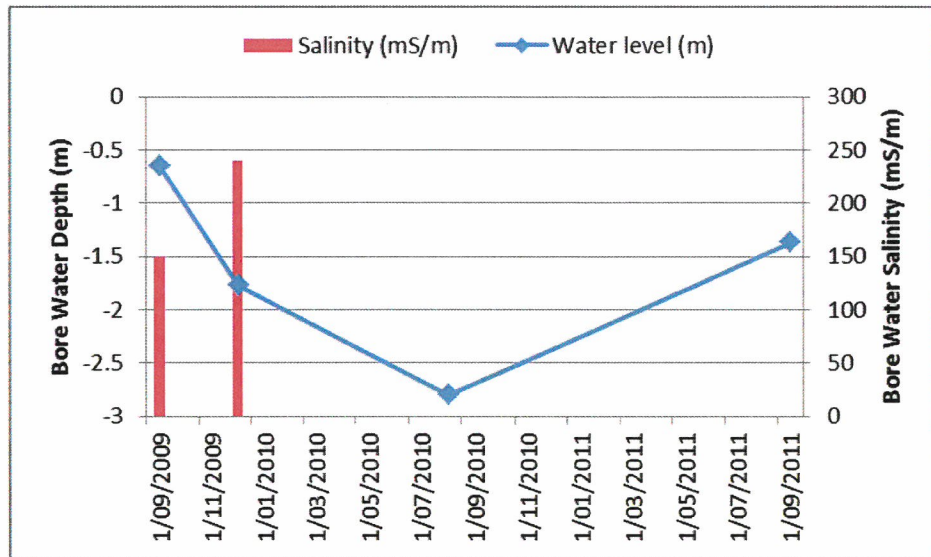


FIGURE 5: PIEZOMETER WATER DEPTH AND SALINITY FOR (A) G01 AND (B) G02 IN THE TALL FESCUE Paddock

(a)



(b)

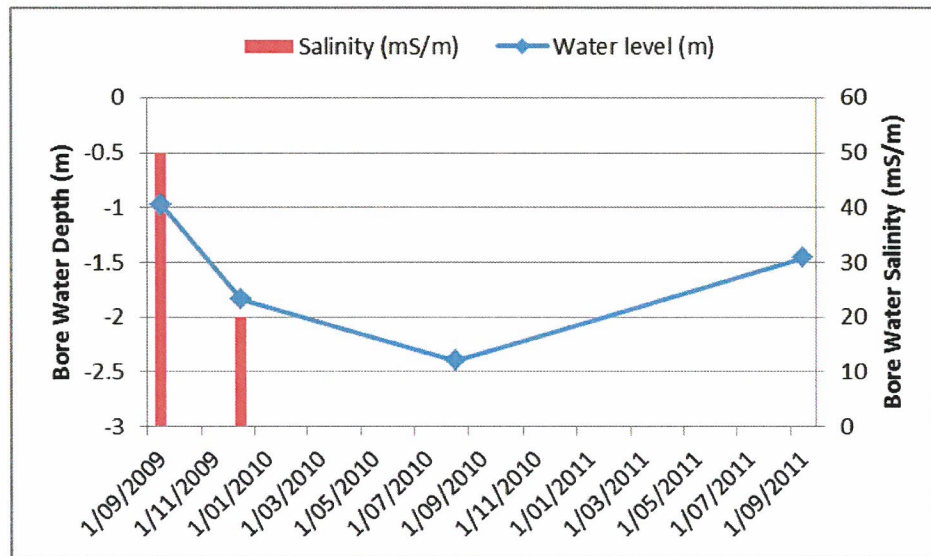
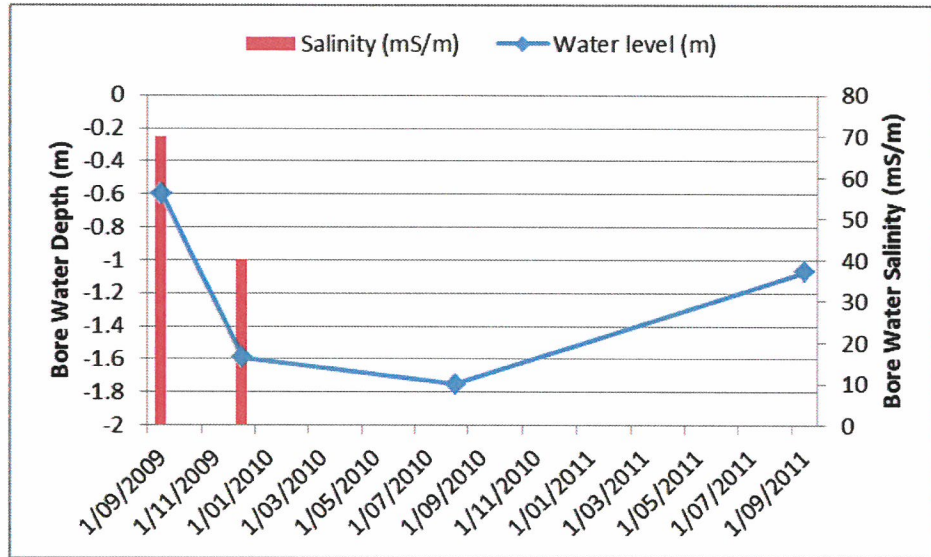


FIGURE 6: PIEZOMETER WATER DEPTH AND SALINITY FOR (A) G03 AND (B) G04 IN THE KIKUYU PADDOCK

(a)



(b)

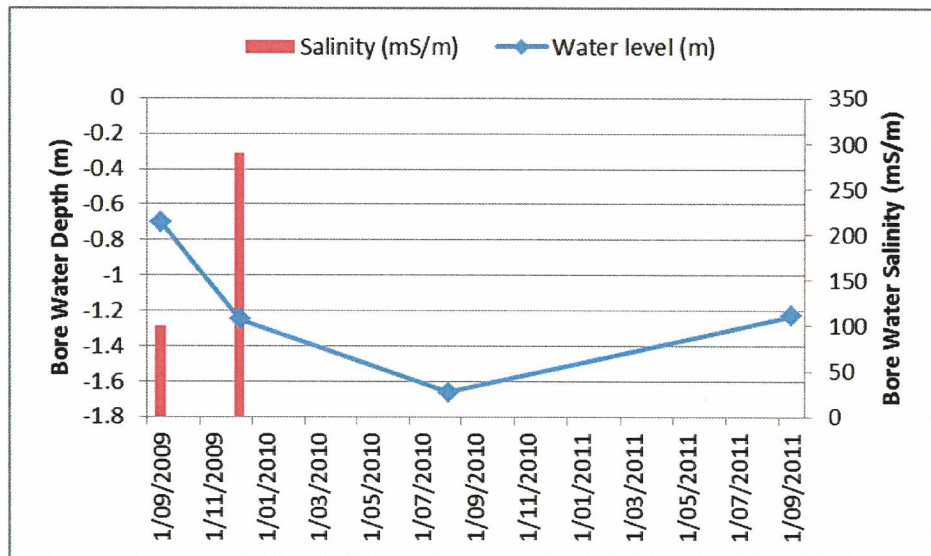


FIGURE 7: PIEZOMETER WATER DEPTH AND SALINITY FOR (A) G05 AND (B) G06 IN THE LUCERNE/CHICORY Paddock

PASTURE AND GRAZING

There were four different pasture treatments – three different perennial pastures (Lucerne/chicory, kikuyu, Lucerne/tall fescue), and one annual sub-clover based pasture. Lucerne failed to establish in the Lucerne/tall fescue paddock, this pasture is referred to hereafter as the tall fescue paddock.

(A)



(B)



FIGURE 8: LUCERNE/CHICORY PASTURE OCTOBER 2012 (A) AND PASTURE CAGE FOR FOO MEASUREMENTS IN THE LUCERNE/CHICORY PASTURE (B)

(A)



(B)



FIGURE 9: TALL FESCUE PASTURE WITH PASTURE CAGE FOR FOO MEASUREMENTS IN THE FOREGROUND IN OCTOBER 2010 (A) AND ROWS OF TALL FESCUE WITH AN EVERGRAZE QUADRAT FOR PASTURE MEASUREMENTS (B)

(A)



(B)



FIGURE 10: KIKUYU PASTURE BEING GRAZED BY SHEEP IN MAY 2009 (A) AND PASTURE CAGE FOR FOO MEASUREMENTS IN AUGUST 2010 (B)

(A)



(B)



FIGURE 11: ANNUAL PASTURE IN OCTOBER 2010 (A) AND QUADRAT FOR EVERGRAZE PASTURE MEASUREMENTS FOR THE ANNUAL PASTURE IN OCTOBER 2010 (B)

Total pasture growth and food on offer over the duration of the project was highest in the Lucerne/chicory and lowest in the annual pasture. Due to the dry season in 2010, the annual pasture was very unproductive.

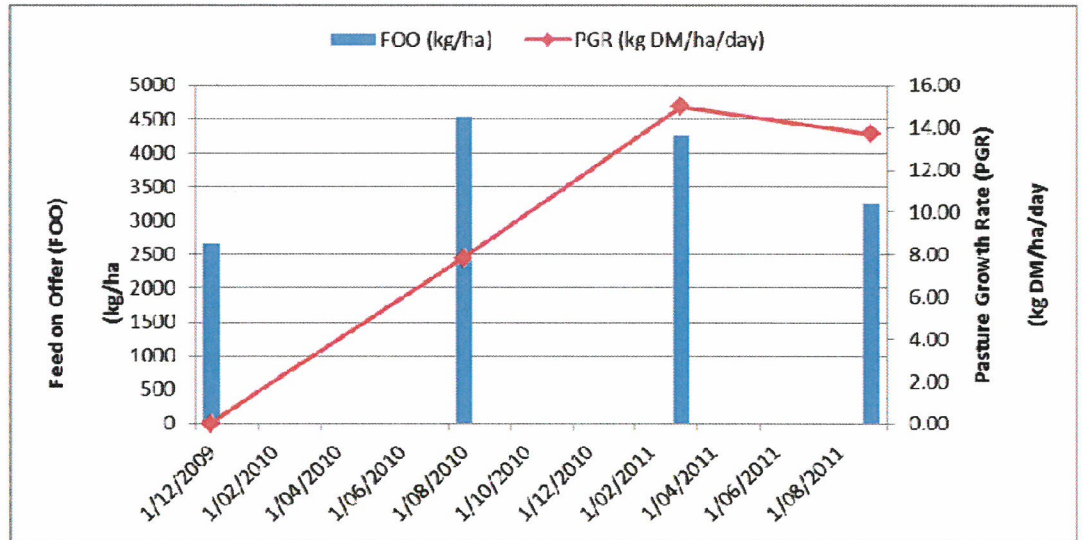


FIGURE 12: FEED ON OFFER (FOO) AND PASTURE GROWTH RATE OVER THE DURATION OF THE PROJECT FOR THE LUCERNE/CHICORY PASTURE

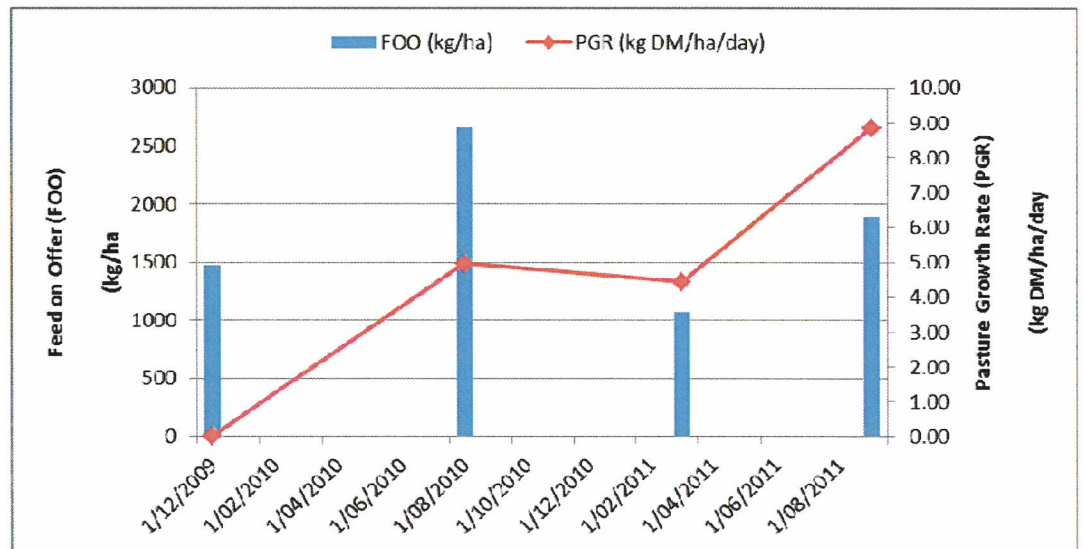


FIGURE 13: FEED ON OFFER (FOO) AND PASTURE GROWTH RATE OVER THE DURATION OF THE PROJECT FOR THE TALL FESCUE PASTURE

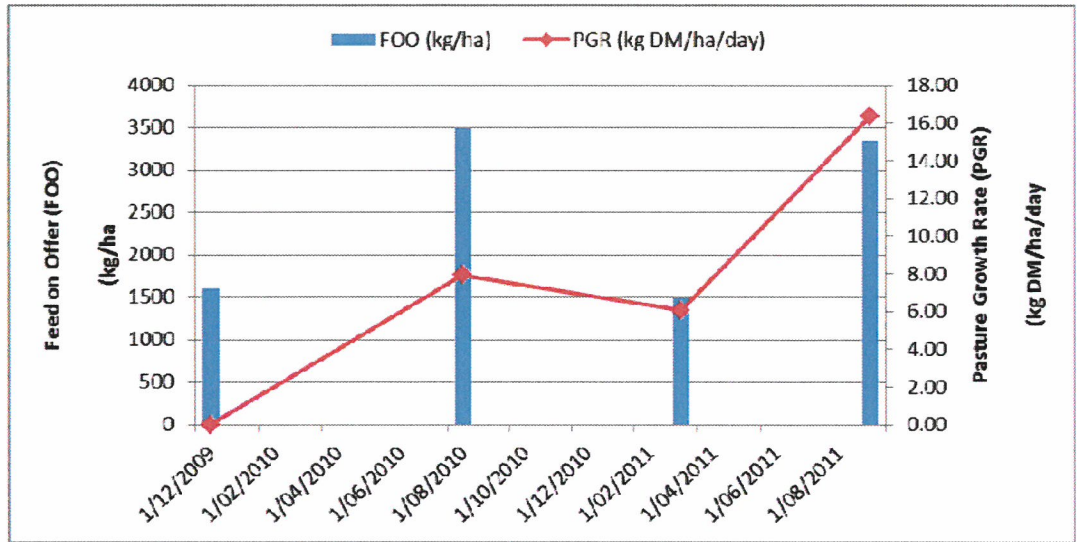


FIGURE 14: FEED ON OFFER (FOO) AND PASTURE GROWTH RATE OVER THE DURATION OF THE PROJECT FOR THE KIKUYU PASTURE

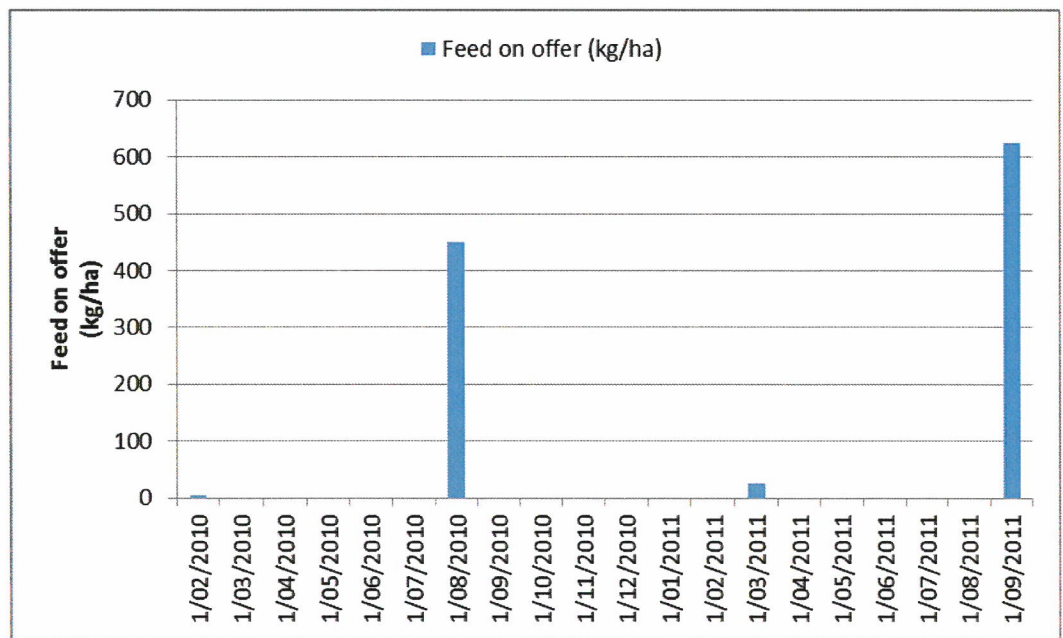


FIGURE 15: FEED ON OFFER (FOO) OVER THE DURATION OF THE PROJECT FOR THE ANNUAL PASTURE

DISCUSSION/COMMENTS

Establishment of Lucerne/chicory and the kikuyu was excellent. Establishment of tall fescue was also excellent, however the Lucerne in this paddock failed to establish with very few plants surviving, probably due to a combination of factors including competition from the fescue and weeds, and soil pH issues.

The perennial pastures provided more feed on offer over the duration of the project than the annual pasture. Rainfall in 2010 was below average and there was more out of season rainfall than usual – this pattern was more suited to perennial pasture growth than annual pastures and is reflected by the higher FOO measured in all three perennials. More measurements on the annual pasture would have provided a better and more accurate picture of the growth of this pasture and total biomass produced. Grazing was heavy on all pastures throughout the project, at times there were not enough sheep grazing the Lucerne/chicory pasture to encourage optimum biomass production. The kikuyu pasture supported heavy grazing well.

SITE TWO: Ian and Michael Walsh

BACKGROUND

The site is located on a Sustainable Grazing of Saline Lands (SGSL) trial site originally established to determine the changes to saline land following the establishment of halophytes and perennials; the effects of differing fertilizer rates on saltbush and perennials; and to determine the rooting depth of saltbush. Standard SGSL procedures were adopted on the site including site characterization and EM38 and EM31 measurements.

LOCATION AND SITE DESCRIPTION

The site is situated on a valley floor and is predominantly mildly to severely saline. The main site issue is salinity and winter waterlogging. The annual comparison paddock located next to the trial paddock is less saline. The soils of the site consist mostly of poorly drained sandy duplex soils with a top soil of loamy sand to a fine sand and subsoils of mottled yellow/brown to pale yellow clay loam to sandy light clay.

SITE AIM

To investigate the impact of fertilizer on saltland pasture, and to examine the persistence of understorey perennials, to investigate the grazing value of saltland pastures.

TREATMENT

For the current project, the objective is to continue to examine the persistence of the understorey perennials and the grazing value of the previously established perennials and saltbush compared to the annual pasture growing in a paddock near the trial site. Perennial understorey originally sown in the paddock included tall wheat grass and Rhodes grass with clover. Puccinellia was already present on the site. The clover and Rhodes grass did not persist and the understorey is now predominantly tall wheat grass and Puccinellia. Treatments for this trial include:

1. control paddock (annual); and
2. saltbush and perennial pastures in alleys

Measurements of saltbush production and perennial pasture growth were taken following SGSL and Evergraze protocols. Two piezometers located in the trial site and annual paddock were also monitored over the duration of the project.

SOIL INFORMATION

The soils of the site predominantly consist of poorly drained sandy duplex soils (the most dominant), moderately drained sandy duplex soils, gravelly duplex soils and a small area of deep sands. Soil issues over the site include extreme to mild salinity, waterlogging, water repellence and soil acidity.

HYDROLOGY

Two bores were positioned in the trial area – one in the saltbush alleys and the other in the annual paddock next to the treatment paddock. Water levels in the treatment bore were closer to the surface than in the annual paddock bore. Both bores reflected the lower than average rainfall in 2010 by showing a decrease in water table depth, although there was a small increase in water levels over the winter period.

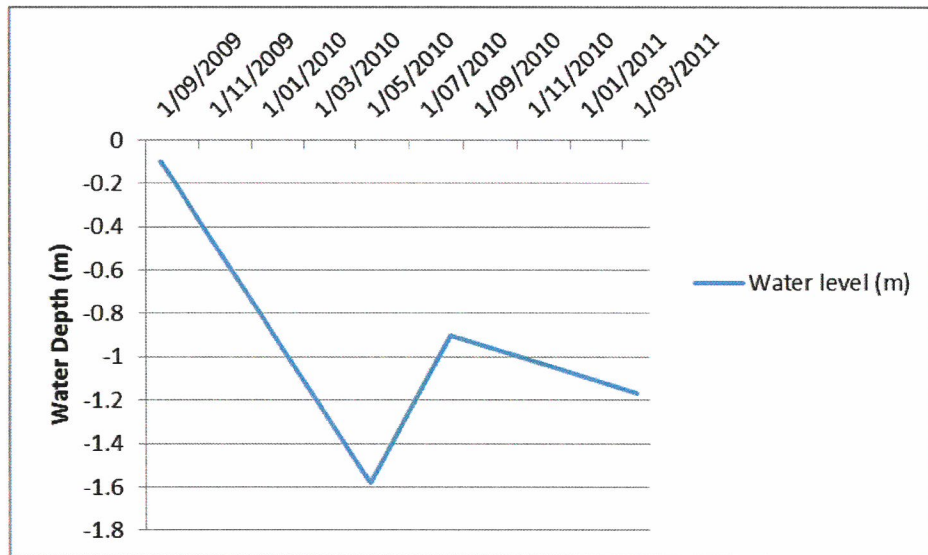


FIGURE 16: WATER TABLE DEPTH IN BORE SGS17 IN THE SALTBUSH ALLEY Paddock

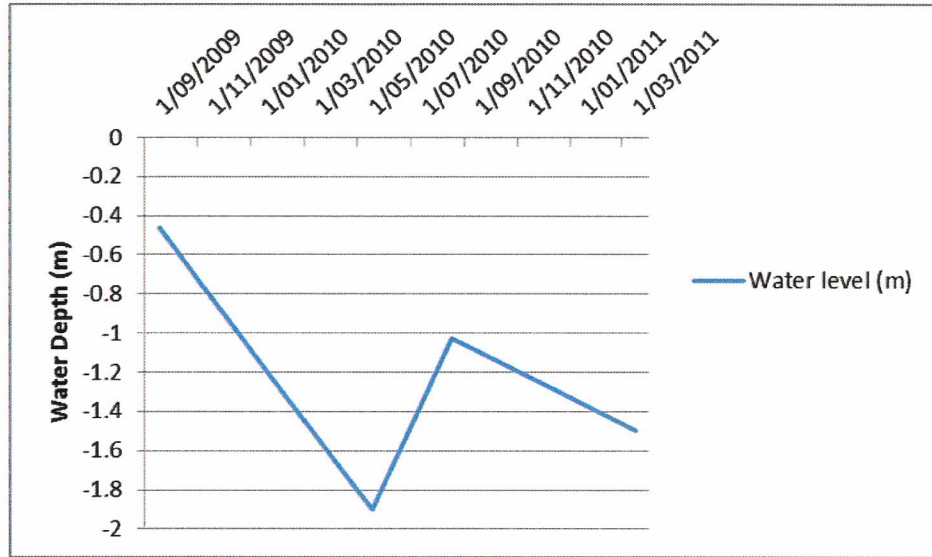


FIGURE 17: WATER TABLE DEPTH IN BORE SGS18 IN THE ANNUAL PADDOCK

PASTURE AND GRAZING

Salt bush production on the site remained fairly consistent over the period of the project. The inter-rows were predominantly puccinellia with tall wheatgrass and some annual weeds. Grazing was carried out mostly over the summer/autumn period with hay rolls and oat grain supplements implemented from late summer. The trial paddock produced more dry matter over the summer/autumn period than the annual paddock which had very little dry feed, and what was available rapidly disappeared when the paddock was grazed. However in winter the site was too wet to graze, and observed production in the annual paddock was higher with more feed on offer.



FIGURE 18: TRANSECT 1 IN THE SALTBUCH ALLEY PADDOCK IN SEPTMEBER 2009, NOTE THE PUCCINELLIA IN THE FOREGROUND



FIGURE 19: TRANSECT 2 IN THE SALTBUSH PADDOCK IN SEPTEMBER 2009



FIGURE 20: TRANSECT 3 IN THE SALTBUSH PADDOCK IN SEPTEMBER 2009, THIS TRANSECT WAS MORE SALINE AND WATERLOGGED, SALTBUSH DID NOT ESTABLISH WELL AND PUCCINELLIA IS LESS DENSE COMPARED TO THE REST OF THE PADDOCK

COMMENTS

Production and grazing value in the saltbush alley paddock was greater than the annual paddock over the summer/autumn period, however the annual paddock provided more feed on offer and higher quality feed over the late winter and spring, even in the dry year of 2010. The site was highly saline, but establishment of inter-row species such as puccinellia and tall wheat grass as well as the salt bush alleys was adequate to provide a valuable feed resource for the summer/autumn feed gap.

SITE THREE: Barry and Stuart Witham

BACKGROUND

The site is located on a Sustainable Grazing of Saline Lands trial site originally established to investigate the use of soil ameliorates on saltland pastures to maximize livestock production of saline and structureless clay soils; and also testing the principles of the Albrecht model (Ca:Mg ratio). Standard SGSL procedures were adopted on the site including site characterization and EM38 and EM31 measurements.

LOCATION AND SITE DESCRIPTION

The site is located low in the landscape in an area mostly suffering from low – moderate salinity, with a small area affected by severe salinity. The main site issue is salinity. There are two main soil types across the site; deep sandy duplex and a brown loamy duplex.

SITE AIM

To investigate the grazing value of saltland pastures compared to unimproved annual pasture.

TREATMENT

For the current project, the objective is to investigate the grazing value of the saltland pastures previously established. Previous treatments included lucerne (+/- lime), biodiversity trees, saltbush alleys with perennials and saltbush in block plantings. Treatments for the present new trial include:

1. control paddock (unimproved annual pasture)
2. saltbush and perennial pastures (tall wheat grass and Puccinellia).
3. saltbush alone



FIGURE 21: EVERGRAZE QUADRAT FOR ESTIMATION OF PASTURE PRODUCTION, SUMMER 2011.

HYDROLOGY

Three bores had previously been drilled over the site for the previous SGSL project, these were monitored throughout the duration of the current project. As for other sites, water levels reflected the annual rainfall patterns, with all bores showing a decrease in water levels for 2010, with a small rise in levels for the spring of that year. The bore located in the high saline section of the salt bush and perennial pasture treatment remained within 30cm of the surface throughout the project period.

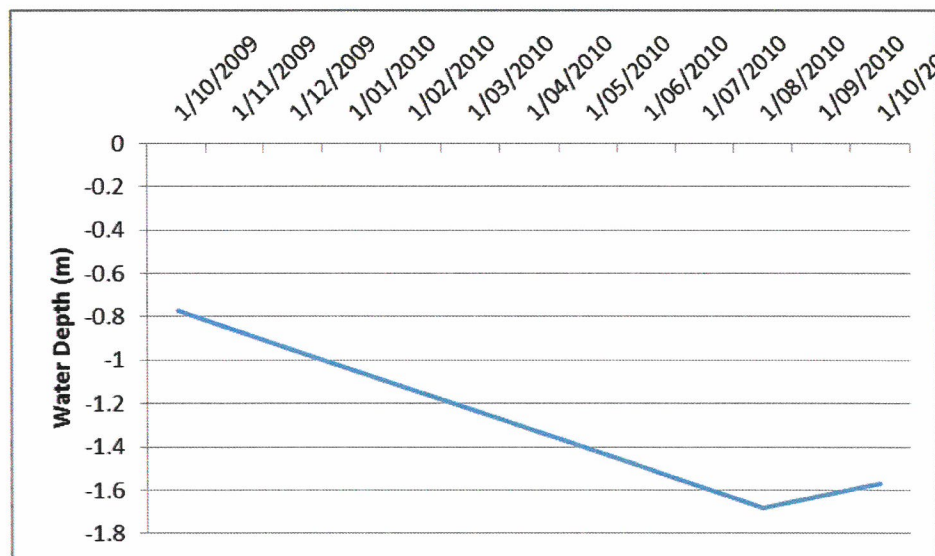


FIGURE 22: WATER LEVELS IN BORE SGS24 IN THE BUSH/TREE Paddock THROUGHOUT THE PROJECT.