

Salinity Management Update & Where to from here?

COOMANDOOK

Wednesday 22nd March 2023

4.00pm - 7.00pm

REGISTRATIONS for catering
text on 0427 750 050

By Monday 20th of March 2023

What will you see and hear?

Discuss what you are seeing &
what you want to try next

Fodder Beet potential on saline ground

Safflower SAGIT Demonstration Update

Automated piezometer results & impact
on management decisions

Mallee Seeps Project Outcomes

New Salinity Projects in our District

Speakers

Bruce Hume
Michael Rossman

Cropmark Seeds
Lochaber Farmer

Dr Rhiannon Schilling

SARDI

Felicity Turner

Coorong Tatiara LAP

Chris McDonough

Insight Extension
for Agriculture

Kylie Matthewson
Felicity Turner

Mallee Sustainable Farming
Coorong Tatiara LAP

Followed by BBQ tea & refreshments



**ABOVE: Safflower on
salinity affected site at
Coomandook**

**LEFT: Fodder Beet on
salinity affected site at
Cooke Plains**



Australian Government

**National
Landcare
Program**



**LANDSCAPE
SOUTH AUSTRALIA**
MURRAYLANDS AND RIVERLAND

This project is supported by the Murraylands and Riverland Landscape Board through funding from the Australian Government's National Landcare Program and landscape levies

**Agricultural Bureau
of South Australia Inc.**
PATHWAY TO IMPROVEMENT



	Item	Speaker	Organisation	Time	Page
1	Welcome Group Discussion How is your salty country going? What are you trying?	Everyone Tracey Strugnell	Coorong District Council Coorong Tatiara Local Action Plan	4.00pm – 4.10pm	
2	Fodder Beet Potential Seeding techniques, uses, potential in our District	Bruce Hume	Cropmark Seeds	4.10pm – 4.40pm	3 & Folder
2	Safflower Demonstrations	Dr Rhiannon Schilling	SARDI	4.40pm – 5.10pm	
3	Local Salinity Management Update Automated piezometers & data analysis over recent seasons Salinity project outcomes & new project work QUICK BREAK	Felicity Turner	Coorong Tatiara Local Action Plan	5.10pm – 5.40pm	6
3	Mallee Seeps Project Outcomes & local application	Chris McDonough	Insight Extension for Agriculture	5.40pm – 5.50pm 5.50pm – 6.25pm	7
4	Mallee Sustainable Farming salinity project update	Kylie Matthewson	Mallee Sustainable Farming	6.25pm – 6.45pm	
5	What do you want to try next? EVALUATION FINISH WITH BBQ TEA & REFRESHMENTS with catering support from the Coomandook Ag Bureau	Everyone & Tracey Strugnell	Coorong Tatiara Local Action Plan	6.45pm – 7.00pm	12



**National
Landcare
Program**



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Coorong Tatiara

Sustainability, Agriculture & the Environment



Fodder Beet and Kikuyu on saline soil

This fact sheet covers the steps undertaken and results obtained from seeding Fodder Beet and Kikuyu on saline soils at Cooke Plains over the 2019 –2020 season

Site conditions

The Fodder Beet and Kikuyu demonstration site is located on Brad Kleinig's property, Gypsum Road Cooke Plains. The site is affected by dryland salinity, with sandy to heavy loam soils, with a coverage of volunteer samphire and annual grasses prior to seeding.



The soil ECe was in the range of 4-14 dS/m with a pH of 7.89. It is estimated that the saline unconfined aquifer is around 3 metres below the soil surface.

Left: Site pre seeding
Photo: Kleinig

Fodder Beet

Two varieties of Fodder Beet were sown on this site; Cropmark varieties Geronimo and Summo. Local producers were interested in trialing fodder beet after hearing about successful demonstrations occurring in the mid and lower South East. Several articles appeared in the Stock Journal over 2018 and 2019 about seeding fodder beet. Salt was being added to these sites as a treatment to amend site conditions to enhance establishment.

Geronimo originates from France. It has a yellow-orange tankard shaped bulb that sits approximately 45% above the ground. The crop can be grazed in situ, or be lifted and fed whole or chopped. It is suitable for grazing by sheep and cattle.

Stock Journal

Fodder beet may prove saline solution

CATHERINE MILLER

9 Jun 2019, 9:30 a.m. Beef



LEFT: Stock Journal on line Fodder Beet article

RIGHT: Geronimo yellow orange tankard shaped bulb
Photo: Cropmark Seeds Ltd



Geronimo Fodder Beet Agronomic Traits

Sowing season	Spring
Sowing rate (seeds/hectare)	80,000-100,000
Maturity (days to grazing)	200+
Bulb % above ground	+/- 45%
Dry Matter %	15 - 17%
Disease resistance	Very good

Under optimum conditions **Summo** is a high yielding dual purpose grazing and lifting fodder beet. It has large red conical shaped bulbs which sit approximately 40% out of the ground. Summo fodder beets are suitable for grazing or lifting and can be fed whole or chopped.

Summo Agronomic Traits

Sowing season	Spring
Sowing rate (seeds / hectare)	80,000-100,000
Maturity (days to grazing)	200+
Bulb % above ground	+/- 40%
Dry Matter %	18 - 20%
Disease resistance	Very good

RIGHT: Summo large red conical shaped bulb

Photo: Cropmark Seeds Ltd



Seeding technique

The site was deep ripped with a rabbit ripper and seeded with Geronimo and Summo Fodder Beet with a shearer trash culti drill with press wheels on the 19th of October 2019 following 20mm of rain.

The recommended seeding rate of 100,000 seeds per hectare was used. The site was sprayed with Talstar the day after seeding. The fertiliser application was 350 kg/ha of a DAP / urea blend.

The germination rate was fair, with more of the Geronimo variety emerging than the Summo. Plants persisted well until the very hot and dry conditions in early summer. Some plants died and others lost their older leaves. The surviving plants persisted in spite of the lack of rain over summer. Since rainfall returned in April and May 2020 the fodder beet plants have recovered well. The plants performed well on the moderately saline soils, but not as well on the extremely saline areas.

The plants were observed during frosty conditions in early June and appeared unaffected.

What could be done to improve the result next time?

Landholder Brad Kleinig said, 'I think the main thing required is a precision seeder to get a more even germination of fodder beet plants. Also maybe a follow up insecticide spray as some pest damage was visible after Christmas. I would be interested in doing another trial this year as I see the potential for growing fodder beet in our area.'

Kikuyu

Kikuyu is a prostrate growing perennial grass. Most growth occurs in spring, summer and autumn. It is suited to fertile, well-drained soils. In favourable conditions the runners spread rapidly, making kikuyu a very suitable species for erosion control on sandy soils.

Kikuyu responds well to nitrogen fertiliser.

Kikuyu Grass Agronomic Traits

Sowing season	Spring to early autumn
Sowing rate (seeds / hectare)	1 - 4 kg / hectare
Variety	Whittet
Nutrient deficiencies	Nitrogen, phosphorus, potassium, sulphur
Insect Pests	Army worms, sod web worms, african black beetle
Animal health advice	Occasionally nephrosis or hypocalcaemia in ruminants, due to oxalates. Rare nitrate poisoning in cattle after rapid growth after dry conditions. Not suitable for horses.



RIGHT: Kikuyu Grass

Photo: DPI NSW



LEFT AND BELOW: The growth stages of Fodder Beet over the 2019 / 2020 season on the Cooke Plains site

Photos: Kleinig and Strugnell

LEFT: A Geronimo Fodder Beet with the beet pushing out of the ground

Photos: Kleinig and Strugnell



LEFT: Fodder Beet continuing to grow well during frosty conditions in early June 2020

Photo: Brad Kleinig

Seeding technique

The Kikuyu Grass was seeded on the 19th October 2019 following a 20mm rainfall event at 2 kg per hectare with approximately 50 kg/ha of DAP / urea blend. The Kikuyu had a very strong density at germination but the hot, dry spell in early summer hit it the seedlings hard with around 50% plants dying, and 100% on the extremely saline ground). Like the Fodder Beet, the remaining plants held on well despite the dry summer and have shown good activity since the break of the season in April / May 2020. Landholder Brad Kleinig said, 'Obviously the Kikuyu will go mildly dormant as the cool weather hits but I'm looking forward to seeing how it goes in spring once the soil temperatures rise.'

What could be done to improve the result next time? 'Probably spraying out the Potato Weed next time will leave more moisture for struggling plants. Otherwise I was happy with the result. With a wetter summer I think it would go really well. Like the fodder beet I am interested in sowing Kikuyu again.'



ABOVE: Seedling Kikuyu Grass 2019 Photos: Brad Kleinig



LEFT: Kikuyu Grass with mixed grasses June 2020



Coorong Tatiara Local Action Plan

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W: <https://www.coorong.sa.gov.au/council-services/coorong-tatiara-local-action-plan/soil-health-and-dryland-salinity/saltland-pastures>

Useful Links

Saltland Agronomy

Information on saltland pastures and the saltland pasture redemption project

<https://www.coorong.sa.gov.au/council-services/coorong-tatiara-local-action-plan/soil-health-and-dryland-salinity>

Fodder Beet

Follow the Forage Products tab to Fodder Beets

<https://www.cropmarkseeds.com>

Kikuyu Grass

<https://www.dpi.nsw.gov.au/agriculture/pastures-and-rangelands/species-varieties/pf/factsheets/kikuyu>



Government of South Australia

South Australian Murray-Darling Basin Natural Resources Management Board



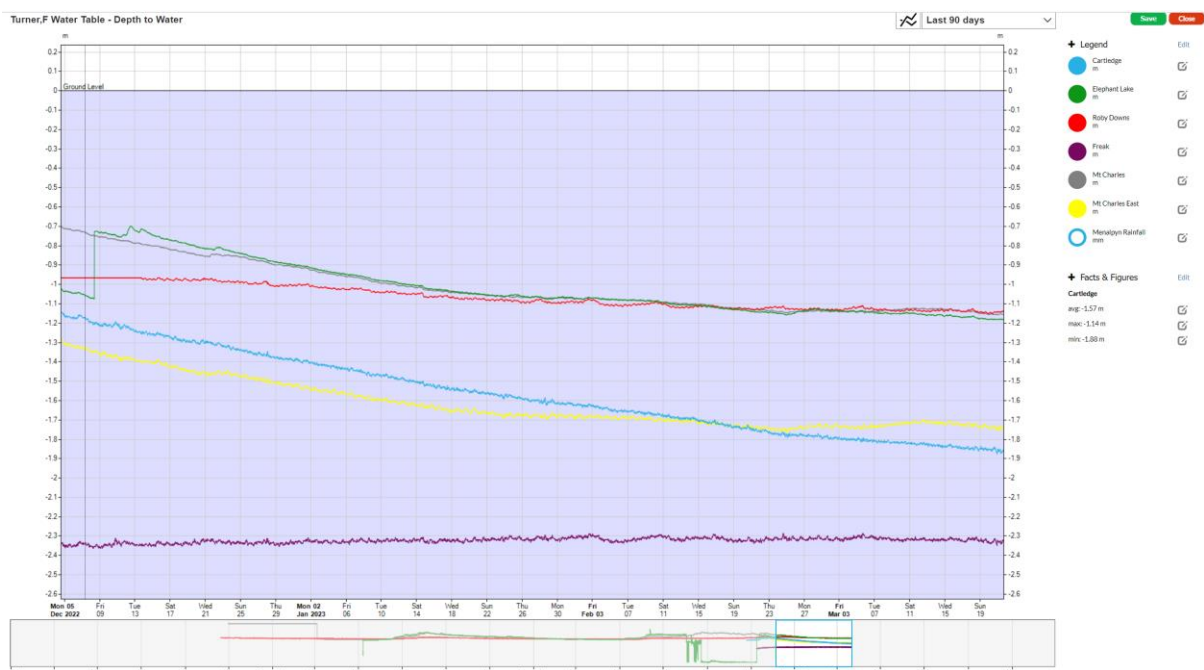
Australian Government



Natural Resources
SA Murray-Darling Basin

This project is supported by the South Australian Murray-Darling Basin Natural Resources Management Board through funding from the Australian Government's National Landcare Program and NRM levies

- Installation of an additional soil moisture probes and depth sensors to monitor water table movement across the landscape
 - o 'upstream' from Roby downs
 - o 'upstream' from Elephant Lake – Macintosh Way
 - o 'upstream' on the same farm but higher in the landscape at Mount Charles
- Analysis of movement of water table depth relative to near proximity sensor to assess if they are independent or if movement appears to be linked in the landscape.
- Comparison of Roby Downs water table depth to rising lake levels.
- Assessment of movement based on seasonal conditions.



Longer term opportunities – observations around capacity to reduce/draw down water table at sites where long-term perennial pastures are established and well maintained.

Key findings to date around new sites:

- Mount Charles sites both moving in a very similar manner.
- Coomandook new site – appears to be very stable although increases at similar times to Roby Downs site and appear to be linked to rainfall.
- Macintosh Way site – gradual decline over time, but doesn't appear to be influenced as greatly by localised rainfall events as Elephant Lake.

Key Steps to Managing Mallee Seeps

Using the Mallee Seep Decision Tree and NDVI imaging





Chris McDonough | Insight Extension for Agriculture | cmcd.insight@gmail.com

The 2 MAIN AIMS for all Mallee Seep Management:

- a. Establish living cover over scalded bare areas,
to slow evaporation and bring topsoil back to health, and
- b. Intercept and utilise excess water flows,
to lower and dry out the perched water table.

There are 5 KEY ASSESMENT QUESTIONS to work through:

1. **Is it a Mallee Seep?** - Go to the Mallee Seeps Decision Tree [Mallee Seeps Decision Tree - Mallee Sustainable Farming \(msfp.org.au\)](https://msfp.org.au) and watch the "What is a Mallee Seep" animation to clarify that you are most likely dealing with a Mallee Seep situation. Follow various options for clear identification.




 <p>Mallee Seep A Mallee Seep is defined as an area affected by a localised perched water table (sitting above tight clay layers) that bring water and salt to the surface, leading to land degradation.</p> <p>Click to choose</p>	 <p>Regional Groundwater Salinity Regional Groundwater Salinity involves areas of shallow saline regional water systems (within 5-10m of the surface) in the Upper South East of SA and on River Murray tributary lines that cause saline degradation in surface layers.</p>	 <p>Regional Creek-line Salinity Regional Creek-line Salinity are areas of saline land within or adjacent to existing creek-lines whose water is often highly saline and emanating from higher catchment areas.</p>	 <p>Dry Saline Land Dry Saline Land (magnesia land) are saline patches that are not formed due perched or regional water tables, but rather salt rising to the surface from subsoil clays, becoming worse after long dry periods.</p>
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2. **Where is the excess water most likely coming from?** - Stand at the seep area and assess the landscape to identify the likely recharge, discharge and possible interception zones of the excess water.



Use NDVI satellite imaging (see instructions below) to assist in assessing the size of the perched water table, the areas of high recharge and to target the best areas for strategic high water use management options.

3. What stage of development is the seep at? - There are 3 Mallee Seep phases to consider as it will help you determine the best course of action. These are the Early Mild, Intermediate Moderate and Established Severe Phases. While in the Mallee Seeps Decision Tree, choose the Mallee Seep option and then click on the development phase which is most aligned to your situation.

 <p>Early Mild Phase The "Early Mild Phase" can present as:</p> <ul style="list-style-type: none"> • small areas of increased plant growth, • waterlogged areas with machinery trafficking issues, • dominant ryegrass invading crops and pasture areas, • plant stress and poor growth beginning in the centre of affected areas, as plant roots begin to find excess water, which may be fresh or saline. 	 <p>Intermediate Moderate Phase The "Intermediate Moderate Phase" develops with:</p> <ul style="list-style-type: none"> • expanding areas of no crop/pasture germination, • plants around edges becoming stressed and dying, • bare patches that begin to scald out in dry periods, and • salt tolerant volunteer species may begin to establish throughout area, and • extended periods of surface ponding after rainfall at some sites. 	 <p>Established Severe Phase Over time these will grow into the "Established Severe Phase", consisting of;</p> <ul style="list-style-type: none"> • large, bare, degraded, unproductive saline scalds, • white salt crystals in a dry crusty surface, or blackened topsoils when wet, • areas that may continue to expand depending on landscape and seasons.
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4. What is the water quality of the perched water table? - Dig a hole in the discharge zone to obtain a sample from the perched water table which is usually found within the top 150cm – but sometimes deeper. See videos/guidelines on how best this can be done on the Mallee Seeps Decision Tree. You can measure or even taste the water to assess if it is in the Low/Medium or High/Very High ranges.



Water Salinity	Deci siemens (dS/m)	Parts Per Million (ppm)
Low	<8	<5000
Medium	8-16	5000 - 10,000
High	16-35	10,000 – 21,000
Very High	>35	>21,000
1dS/m = 100 mS/m = 1000 µS/cm = 640ppm = 640mg/L		

5. What can you do to turn things around and restore sustainable production?

- For many practical management options and short videos of rehabilitated sites, see the Mallee Seeps Decision Tree at <https://msfp.org.au/mallee-seeps-decision-tree/> . Once you have clicked on the Low/Medium or High/Very High water salinity level option, you will be presented with both information and examples of what can be done to best manage your Mallee Seep in the Discharge, Interception and Recharge Zones. There are usually multiple actions needed to achieve the best results.

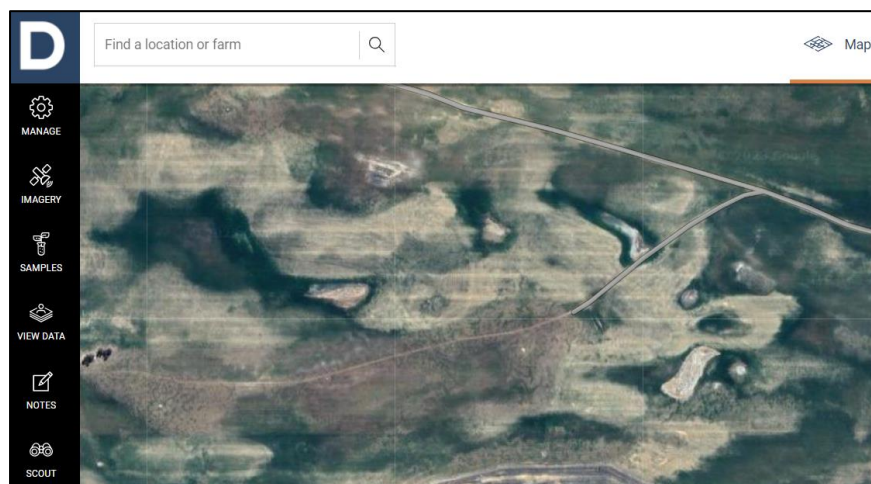
Using DecipherAg Satellite NDVI program to assess your Mallee Seep issues.

Step 1:

Register with the NDVI imaging program, <https://app.csbpdecipherag.com.au/home>

Step 2:

Find and zoom into the paddock area of concern, to an area of approximately 50-100ha, including the sandy rises and discharge areas. Larger focus areas may be useful within catchment areas with multiple mallee seep concern areas.

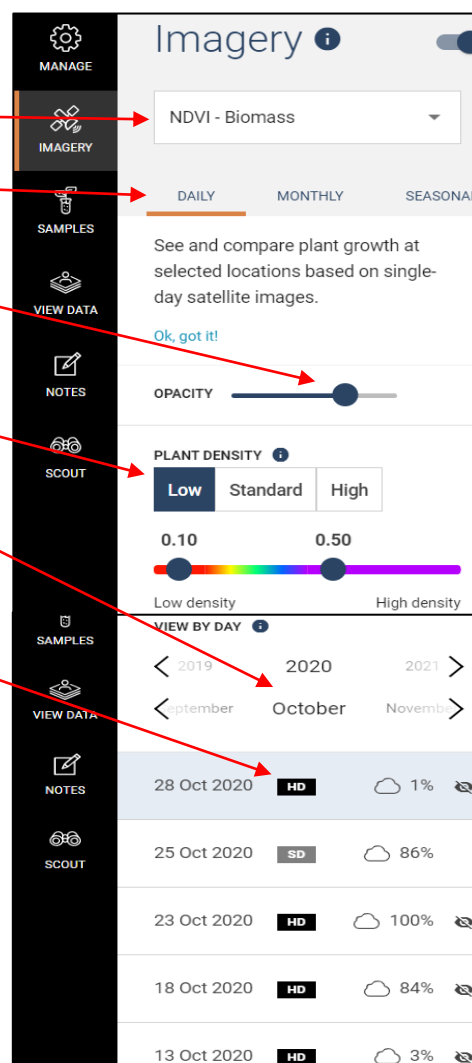


Step 3:

Click on the **IMAGERY** tab.

Set parameters to:

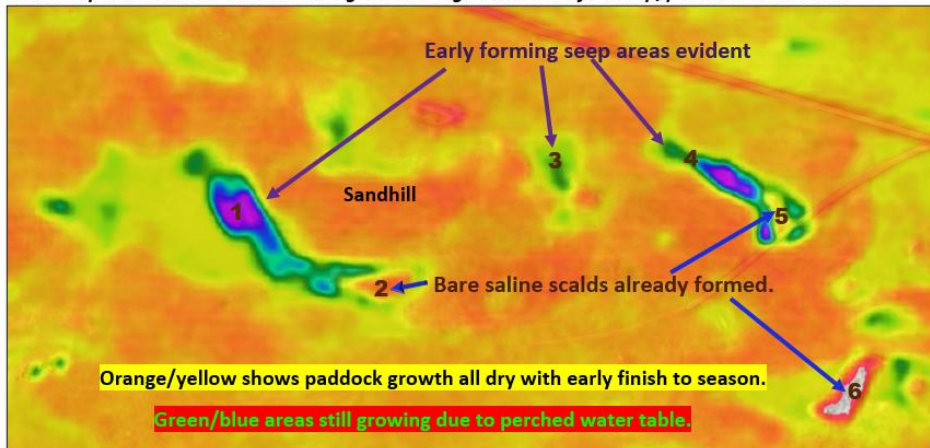
1. **NDVI - Biomass**
2. **Daily**
3. **About 75% Opacity** – to allow for some vision of landscape features through imagery.
4. **Low Plant Density**
5. **HD (High Density)**
6. Initially choose a fairly recent year and month (ie 2020, Oct) when most paddock growth has dried.
7. Choose a HD image date with relatively low cloud cover. NB: Sometimes it can still work for your paddock on a higher cloud cover day.
8. Check for areas indicating high plant growth for longer, well past the surrounding crop or pasture senescence. Bare scald areas will generally show up as a red/orange or clear, often with distinct edge lines. Growth areas appear green/blue/purple depending on density. Permanent vegetation will also show up clearly in these colours.
9. Begin to look at specific months (ie from September to November) in a range of years to find the best images that reveal the key information as explained below. Some trial and error is needed to find the best images.



A. Using NDVI to assess land under threat of developing into a Mallee Seep:

The aim is to identify areas that are staying greener for longer because the plants (crops, pastures or summer weeds) are accessing a perched water table, as in Figure 1. It may be necessary to look at a range of images due to the impacts of late Spring rainfall, cloud cover and rotation, to find the most definitive evidence of extended perched water table impacts around developing areas of concern. Generally these images reveal the areas under threat of salinisation are greater than first thought

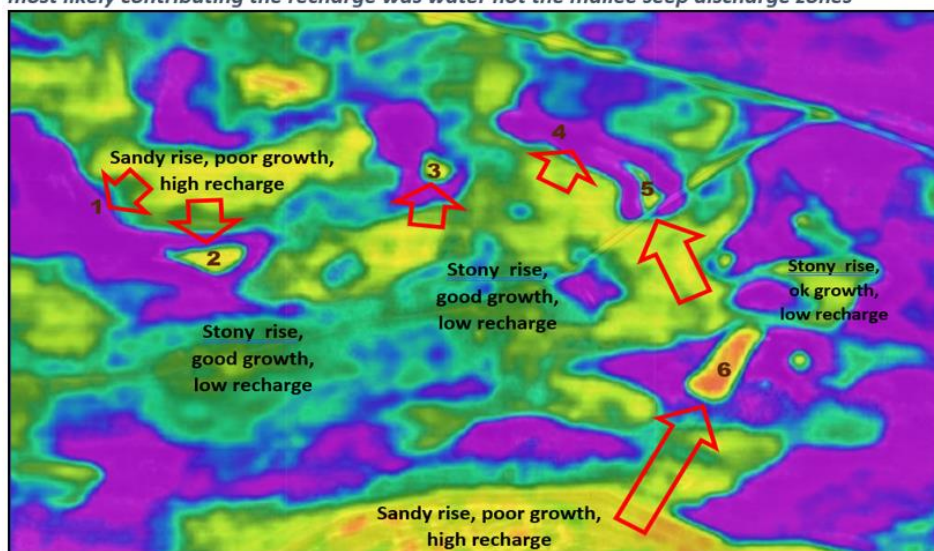
Figure 1. NDVI image 29th October 2018 (2 seasons after wet 2016 Spring) showing evidence of localised perched water tables causing extended growth well after crop/pasture senescence.



B. Using NDVI to indicate Recharge Areas and strategic Interception Zones

This is better achieved by viewing earlier images (August/September) to reveal areas of poorer crop growth (usually deep sands) that at allowing rainfall to seep through to the Mallee Seep areas as shown in Figure 2. Often the scalded seep areas are immediately surrounded by high growth areas that are under threat. These images can also reveal how numerous seeps may be connected through the localised catchment, which is critical for applying high water use strategies to best manage and return the land into sustainable production.

Figure 2. Site 1 NDVI image, Sept 2018 showing areas of deep sands and poor crop growth most likely contributing the recharge was water not the mallee seep discharge zones



Project Acknowledgements - This factsheet results from MSF Projects, "A holistic approach to seep management for preventing land degradation in the landscape" and "Easy access NDVI imaging for Mallee seep management tool".

For further Salinity Management Resources please visit

<https://www.coorong.sa.gov.au/council-services/coorong-tatiara-local-action-plan/dryland-salinity>

The presentations from todays event will be uploaded here

<https://www.coorong.sa.gov.au/council-services/coorong-tatiara-local-action-plan/soil-health-and-dryland-salinity/soil-events-and-farm-walks>

YOUR NOTES

EVENT SURVEY: Salinity Update Workshop - 22.03.2022 Coomandook

Please scan the QR code below on your smart phone camera to undertake this quick survey

OR

Fill out the paper survey below and over the page, tear off and leave with Tracey

THANKYOU!



9. Have you tried any new or interesting salinity management practices you would like to tell us about?

1. Can you please rate this event?

☐ Not great

☐ Average

☐ Terrific

2. Has today's event/session increased your knowledge of salinity management and production options?

☐ Yes

☐ No

☐ Some increase in knowledge

3. As a result of the information you have received today, are you likely to follow-up on any of the ideas discussed, or make any business or on-ground changes?

☐ Yes

☐ Maybe

☐ No

4. Where do you farm?

- ☐ Coomandook - Cooke Plains
- ☐ Meningie East - Field
- ☐ Colebatch - Tintinara
- ☐ Other

5. What area of land that you manage in hectares has been affected by dryland salinity in the last 5 years?

6. How much land in hectares do you think is at risk over the next 5 years?

7. How many hectares of perennial pasture do you plan to establish in the next 5 years?

8. What salinity management practices do you carry out on your farm?