

Key Steps to Managing Mallee Seeps

Using the Mallee Seep Decision Tree and NDVI imaging





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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 \(msfp.org.au\)](#) 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 log 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.

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.

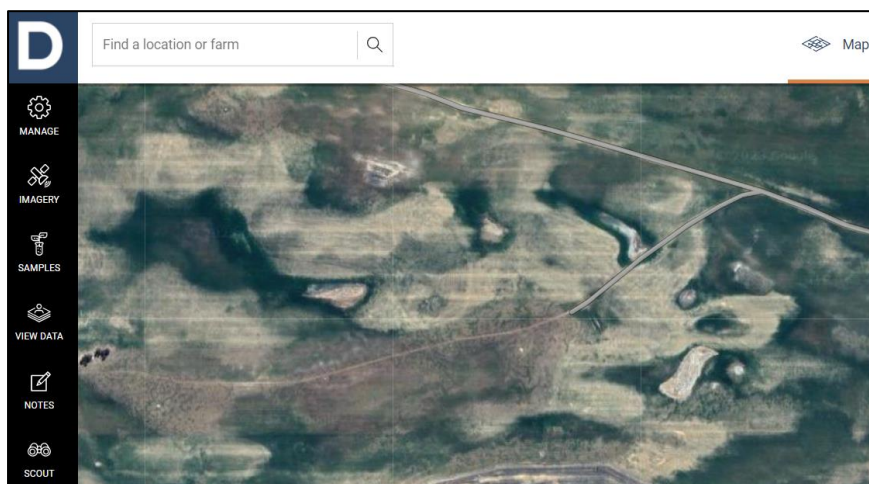
Using DecipherAg Satellite NDVI program to assess your Mallee Seep issues.

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.

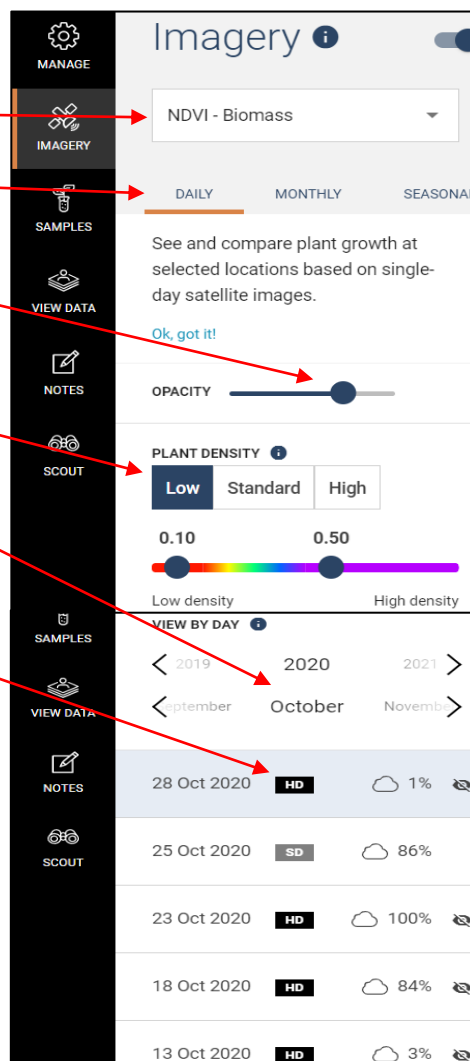


Step 3:

Click on the **IMAGERY** tab.

Set parameters to:

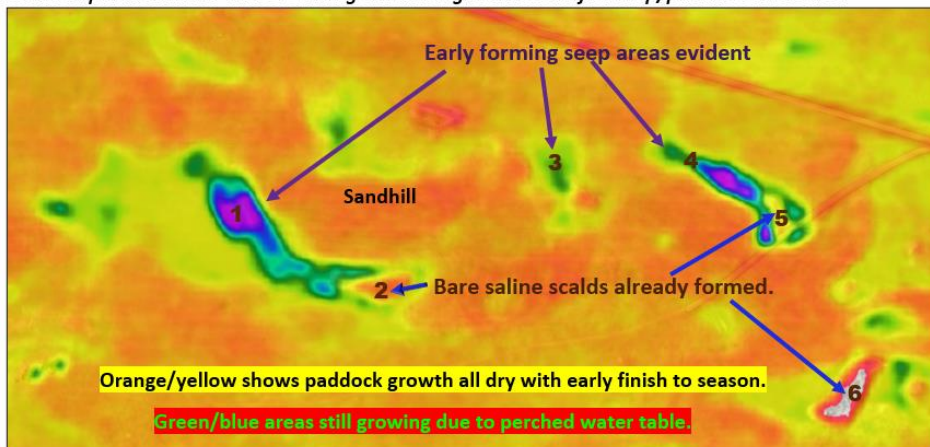
1. **NDVI - Biomass**
2. **Daily**
3. **About 75% Opacity** – to allow for some vision of landscape features through imagery.
4. **Low Plant Density**
5. **HD (High Density)**
6. **Initially choose a fairly recent year and month (ie 2020, Oct)** when most paddock growth has dried.
7. **Choose a HD image 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

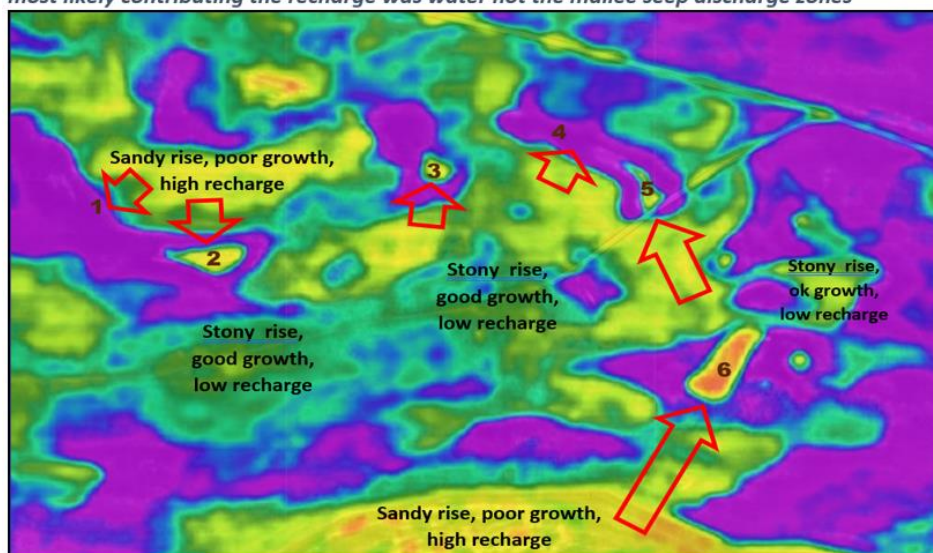
Figure 1. NDVI image 29th October 2018 (2 seasons after wet 2016 Spring) showing evidence of localised perched water tables causing extended growth well after crop/pasture senescence.



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



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