

FACT SHEET

Managing turbidity, cloudiness and algae



Source: EP Landscape Board

Water is essential to farm productivity, and providing clean, quality water can have a profound effect on the performance of livestock and agricultural sprays.

Water supplies that contain organic or inorganic particles in suspension can be unpalatable to animals and may lead to problems with infrastructure, including excessive pump wear, silting in tanks and troughs, or pipe blockages.

Turbidity, cloudiness or algae?

Suspended particles can generally be classified as either organic materials which have entered the water source and broken down, inorganic particles (generally clays) that have become permanently suspended in the water, or algae that is either living and multiplying or that has already died.

These are generally problems associated with surface water catchment and/or storage, rather than with groundwater. Managing water at the trough to minimise algae, surface dust build-up and other contamination can also support palatability and stock performance.

Read our 'Water capture' and 'On-farm water storage' fact sheets (see the Further resources section) for more information on preventing silt and plant matter from entering water storage and causing problems.

Cloudiness

Cloudiness is caused by organic matter entering the water and breaking down. Common sources include plant matter being washed into storage from the catchment area or falling directly into the water from overhanging plants and trees.



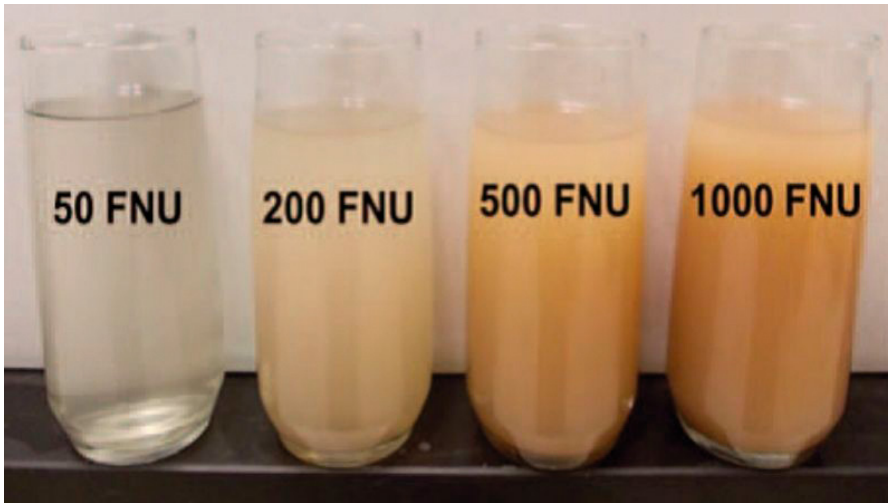
Source: EP Landscape Board

Cloudiness will appear uneven in the water and may even be seen to swirl. It will eventually settle out or break down fully over time. However, depending on the nature of the material, it may be unpalatable to livestock or incompatible with spray equipment while it is still in the water.

Additionally, the cloudy matter may provide nutrients for algae, especially if the water is warm and in direct sunlight.

Cloudiness can be filtered out of the water or cleared by introducing a bacterial probiotic which will consume the material.

Figure 2 Water of different turbidity units (Fozmazin Turbidity Units or FTU) near equivalent to Nephelometric Turbidity Units (NTU) <https://waterfilterguru.com/how-to-measure-turbidity-of-water/>



Source: Water filter guru

Turbidity

Turbidity refers to the presence of suspended particles in a water supply. Usually, these are fine clay, lime or insoluble soil particles which enter the water as it runs over the ground in dam catchments, off machinery pads or roaded and graded catchments. More sediments may enter water while it is stored in an unlined dam.

Turbidity is unlikely to settle out of the water on its own. The particles become permanently suspended in the water body due to electrostatic forces – the particles having a slightly negative charge – that cause them to repel each other.

Why turbidity should be tested

Moderately turbid water is unlikely to be unpalatable or harmful to livestock. However, excessively turbid water can lead to livestock health issues, pipe and outlet blockages and silting of troughs, which can affect the available water for livestock.

Turbidity is also a significant problem in spraying applications. The efficacy of glyphosate and paraquat are both reduced by mixing with muddy water as well as clethodim, as the fine particles readily bind with the chemicals. The particles in turbid water may also cause excessive wear or blockages in the spray rig, including in piping, fittings, nozzles and filters.

Determining if water is cloudy or turbid

Before treating dirty water, it is important to determine whether the water is actually cloudy or turbid.

Cloudiness is caused by organic material in the water and will usually seem more translucent than muddy water. This organic material is best cleared by microbes that consume organic waste.

Turbidity will look more flat and opaque than cloudy. It is caused by fine clay and can be treated with a flocculant. However, it is worth collecting some water samples in glass jars first, to see if the particles start to settle out over a week or two. If they do, then the dirty water is more likely to be caused by recent inflows and the storage being too shallow or silted for them to settle out. Carp can also cause turbidity by their feeding. These physical issues need to be corrected to prevent the turbidity.

If the particles do not settle at all, the turbidity will need to be treated with a flocculant.

How to measure turbidity

There are a number of different ways to assess and monitor turbidity. These range from visual standards through to handheld turbidity meters and in-flow monitoring.

Because turbidity can change, continuous monitoring might be useful for applications where turbidity is critical. If turbidity is less critical, then strategic monitoring (such as after a major in-flow event) may be adequate.

Treatment can occur before water enters a storage, in water storage, or after extraction but before use (batch treatment). In-storage treatment is usually the most convenient on-farm solution.

How to treat turbidity with flocculant

Chemical flocculation or 'floccing' works by introducing positively charged ions into the water, to attract the negatively charged fine clay particles that are in suspension. As a result, they can clump and settle out.

The most common flocculant for farm use is alum, or aluminium sulphate, although ultra-fine gypsum (calcium sulphate) will also work. There is also a wide range of more sophisticated natural and chemical polymeric flocculants and coagulants commercially available.

The optimal amount of flocculant must be added in the first instance as it cannot be 'topped up' later. Calculating the 'optimal' amount is often a matter of trial and error. Testing with water samples is usually recommended, before scaling up to treat a complete body of water. A good testing process is described in Step 4 of [this guide to clearing dam water](https://waterqualitysolutions.com.au/how-to-clear-muddy-water/) (<https://waterqualitysolutions.com.au/how-to-clear-muddy-water/>).

Note that most flocculants will alter the pH of the water body, and may kill aquatic life such as insects, tadpoles, frogs and yabbies.

Always check the pH of flocculated water before using it for pH-sensitive applications, such as mixing sprays – see our 'Managing pH and dissolved iron' fact sheet for more information on how to adjust water pH. When using water which contains alum, take water from the surface to avoid aluminium precipitates or clumps. This is especially important where the water is being used for spraying.

Regular use of alum in a storage may increase aluminium levels in the water, which can be toxic to aquatic life and may affect livestock at very high concentrations. Laboratory testing of the water can be used to monitor this risk.

Aluminium becomes more soluble and bioavailable as water pH decreases below neutral (pH 7).

Algae

Algae are photosynthesising microorganisms that occur naturally in bodies of water. Common green algae species are relatively benign, but blue-green algae and red algae can produce harmful toxins.

If dam conditions are favourable for harmless algae, they could favour toxic varieties as well. Algae growth is most strongly encouraged by direct sunlight which drives photosynthesis, and the presence of nutrients in the water, especially nitrates and phosphorus. Warmer water temperatures accelerate algal reproduction. Minimising manure and fertiliser runoff in catchments will help limit nutrient levels, while shade or covers will help constrain the population by limiting photosynthesis and keeping the water cool.

There are simple DIY blue-green algae test kits on the market, which can be used to detect the presence of blue-green algae before it becomes a problem. If a harmful algae bloom does occur, the water should not be used until the algae have been removed.

Why water should be tested for algae

Algae in water is, at best, unsightly. Large populations can discolour the water,

create a stench as dead organisms decompose under oxygen-depleted conditions, and affect palatability for livestock. High levels of algae can also clog pumps and filters. Most importantly, a bloom of toxic blue-green or red algae can be deadly for livestock, wildlife and the dam ecosystem.

If an algae bloom occurs in an on-farm water supply, it is advisable to have the algae identified by a laboratory and to clean up the bloom before supplying the water to livestock.

How to remove algae

Because algae prosper in warm water with plenty of direct sunlight, they can often be suppressed fairly simply. In terms of on-farm water security, the best solution is almost certainly a cover that will not only block sunlight but also reduce evaporation losses.

If covering is not possible, or warm conditions are encouraging algal growth during the summer months, an aeration system can help by encouraging water circulation and oxygenation. Both factors will help support oxygen breathing microorganisms that can out-compete algae and work to clean up the debris left by dying algae.

Introducing beneficial bacteria and probiotics into the water may provide additional and sometimes vigorous competition.

If an algal bloom does occur, there are several ways to control it:

- Manually removing the algae from the water.
- Algicides based on copper can be used, but the risks include toxicity to fish and livestock, and stagnation of the water source as the algae decomposes.
- Some herbicides can be used to control algae growth but may have specific livestock use restrictions or plant impacts. Always check the product label for information on permitted applications, rates and other usage limitations.
- Aeration/circulation and probiotics can work in combination to clear up algae blooms.

However, it is always better to address the causes of algae growth, if possible.

Water testing

As water quality is critical to agricultural performance and productivity, water sources should be tested regularly.

Water for livestock should be tested at least once each season to assess its qualities and any changes. Water for spraying and irrigation should ideally be checked for at least salinity, pH and hardness before mixing, particularly where quality is variable.

Simple, effective test kits are available for testing water salinity. These kits can be purchased from most hardware or farm suppliers, or online.

Electronic salinity meters are also widely available, and these will give a more specific value than a test kit. Some manufacturers offer multipurpose meters that will measure hardness, salinity, pH and more. If the salinity of a critical water source is highly variable, a continuous metering unit can be used for ongoing monitoring.

However, the best test results will be achieved by submitting water samples to



Source: J Telfer, PIRSA

a laboratory for more sophisticated testing across a range of parameters. The results of these tests can be used to benchmark water quality for each source and to calibrate the results of at-home tests for more frequent monitoring.

For more information on testing options, sampling methods and water quality parameters, see the Further resources section.

Testing for other contaminants

Water may contain other contaminants of concern, depending on the water source or its intended purpose.

These might include microplastics, PFAS chemicals, or agrichemicals, and can be more common in water collected from runoff or stored in dams or pits.

Some contaminants, such as fertiliser runoff, may occur at the same time or be contributors to turbidity or algal blooms. It is important to identify and treat the cause of turbidity or algal blooms as

well as the resulting water quality issues. Some, such as fertiliser runoff, may occur alongside, or even contribute to, turbidity or algae blooms and it is important to identify and treat the cause as well as the result.

Most labs offer a wide range of tests and their costs are likely to vary with test complexity, demand and other variables. If you have a specific requirement, simply ask your preferred lab or search for facilities that offer the testing required.



Source: SA Water

Managing other water quality issues

The colour and smell of water can provide important clues to its quality. Additionally, reduced flow rates may indicate blockages in farm water infrastructure, potentially caused by poor water quality. The cause of these should be addressed along with the impact.

For more information on managing

- Salinity
- Hardness
- pH, dissolved iron
- Water testing

see the Further resources section to access other water quality fact sheets.

Further resources

Additional EP Farm Water Security information and fact sheets
pir.sa.gov.au/sardi/projects/eyre-peninsula-farm-water-security-project



EP Landscape Board
landscape.sa.gov.au/ep/water



Water testing fact sheet, EP Landscape Board
cdn.environment.sa.gov.au/landscape/docs/ep/Water-Testing-fact-Feb2022.pdf



EP Water Security Response Plan, SA Water
sawater.com.au/_data/assets/pdf_file/0004/1017625/EP-Water-Security-Response-Plan.pdf



Water affecting activities resources and policy guide, EP Landscape Board
landscape.sa.gov.au/ep/water/water-affecting-activities



Handy links to local councils on the EP, Eyre Peninsula Local Government Association
eplga.com.au/about/councils



Australian Water Quality Centre (AWQC) Water testing available from independent business unit within SA Water
awqc.com.au



GRDC Spray Water Quality Fact Sheet (October 2019)
[grdc.com.au/resources-and-publications/publications/2019/spray-water-quality](http://grdc.com.au/resources-and-publications/all-publications/publications/2019/spray-water-quality)



Flocculants and water testing instructions, Water Quality Solutions
stage.waterqualitysolutions.com.au/how-to-clear-muddy-water/#:~:text=What%20is%20floccing%3F,particles%20together%20and%20binds%20them



Measuring the turbidity of water supplies wedc-knowledge.lboro.ac.uk/resources/booklets/G031-Measuring-turbidity-in-water-supplies-online.pdf



A quick way of measuring the turbidity of water
wedc-knowledge.lboro.ac.uk/resources/posters/P023_A_quick_way_of_measuring_turbidity.pdf



Glyphosate and the Effect of Hard Water
eurekaag.com.au/glyphosate-effect-hard-water/



About EP Farm Water Security

EP Farm Water Security is a project to promote better capture, storage and management of water on EP farms. It is led by Primary Industries and Regions SA (PIRSA), with project partners SA Water, the Eyre Peninsula Landscape Board, AWI Extension SA, SA Department for Environment and Water and AgCommunicators.

Agriculture is the dominant force in Eyre Peninsula land use and economic activity. It is also the largest user of mains water, accounting for up to 40 percent of local SA Water supply. By acting now to enhance water capture, storage and infrastructure, farmers have the power to underwrite their own water security, save money and reduce their reliance on mains water.

References

ANZG (2023). Livestock drinking water guidelines (currently in draft form). <https://www.waterquality.gov.au/sites/default/files/documents/livestock-drinking-water-guidelines-draft.pdf>

ANZECC & ARMCANZ (2000) Water quality guidelines. <https://www.waterquality.gov.au/sites/default/files/documents/anzecc-armcanz-2000-guidelines-vol1.pdf>

Acknowledgements

NSW DPIRD Water quality for chemical spraying, 2012 (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0008/433691/Water-quality-for-chemical-spraying.pdf)

Sprayers 101 (<https://sprayers101.com/ph-hardness/>)

Decision checklist:

- | | |
|---|---|
| <input type="checkbox"/> Consult with experts to assess the water test parameters needed. | <input type="checkbox"/> Ensure samples will be dispatched for testing promptly after collection. |
| <input type="checkbox"/> Identify a suitable water testing laboratory and confirm the test package covers all required results. | <input type="checkbox"/> Regularly check and monitor water quality to ensure it is safe and fit for purpose, especially prior to using for crop spraying or watering livestock. |
| <input type="checkbox"/> Prepare sampling supplies, including containers labels, courier arrangements, etc. | <input type="checkbox"/> Make sure your water quality tests check for salt, chemical and bio-contaminants such as bacteria and algae. |
| <input type="checkbox"/> Identify suitable sampling locations. | |
| <input type="checkbox"/> Plan for any other requirements, such as running a new bore pump for three hours before sampling. | |

Legal considerations

On-farm construction activities designed to access water resources are subject to State Government legal requirements in South Australia. These requirements are designed to protect the water resources, other water users and the natural environment.

The legal requirements are affected by factors such as the location, size and type of the works, for example:

- Large dams and large, highly visible water harvesting structures (e.g. sheeted catchments) may be subject to the need for development approval via your local Council, under the state's planning regulations.
- A permit is required from the Eyre Peninsula Landscape Board for a range of water affecting activities that may impact on watercourses, including the construction or modification of small to medium sized dams in watercourses in some catchments across southern Eyre Peninsula.
- A permit is required from the Department for Environment and Water (DEW) to construct or modify a groundwater well or to discharge water into a well. A licensed well driller must carry out or supervise the drilling or modifications.

Landholders should seek information from their local Council, Landscape Board and DEW when in the early planning stage of their proposal, so that the activity can be located and designed to meet legal requirements and to streamline any approvals process that applies.

For more information, see the Resources and further reading section.

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