Best practice management for springs, soaks and waterholes

IN THE NORTHERN AND YORKE REGION

Example of low impact fencing

Options for management and remediation

Springs, soaks and waterholes across the Northern and Yorke region are often used by landholders for on-farm water sources. These water resources are extremely sensitive and it is essential that they are well managed.

The aim of these guidelines is to improve your water source and help take care of our precious water systems.

What are springs, soaks and waterholes

Springs, soaks and waterholes are wetlands that occur naturally where underground water (groundwater) discharges to the surface, or where the natural or modified topography of a watercourse, wetland or lake intersects the underground water table. They are commonly found in watercourses, upper gullies and on hillsides.

Why is management important?

Springs, soaks and waterholes utilised for stock and domestic purposes need to be managed appropriately to ensure the sustainability of supply and protection of water quality for both the farmer, livestock and other users, including the environment.

A poorly managed spring, soak or waterhole that is utilised for stock water can contain salty and contaminated water (from faecal and other organic pollution) which may be unpalatable, harmful to young or weak animals, or toxic in the case of blue-green algae outbreaks. If water quality is not acceptable, stock may drink less than required or stop drinking altogether. This may cause sheep to go off their feed, lose condition, stop lactating or die from thirst, disease or toxicity.

Saline water with high magnesium levels can cause scouring. When stock temporarily refuse to drink for a number of days, the setback in condition and bodyweight can be associated with tender wool problems.

Rapid fluctuations between low and high salinity water are also damaging to stock health.

Maintaining a good quality water source will optimise feed consumption, animal health and productivity, which in turn benefits the farming business.

Springs, soaks and waterholes provide landholders with direct access to groundwater, often after some excavation and modification. Consequently they provide a window through which pollutants can enter. Salinity levels will generally reflect the groundwater quality but salinity can be exacerbated if water sources are not well managed.

Springs, soaks and waterholes often provide essential habitat for water dependent plants and animals as well as refuge sites during periods of drought. Importantly for landholders, protecting water quality and biodiversity (habitat) values often go hand in hand.

Government of South Australia
Northern and Yorke Landscape Board

LANDSCAPE SOUTH AUSTRALIA NORTHERN AND YORKE

Management principles

What are signs of a poorly managed water source?

- Poor quality water and poor habitat values
- Little or no vegetation
- Large exposed areas of water and soil
- Stock entry allowed
- Algal blooms

What are some of the signs of a well-managed water source?

- Good water quality
- Restricted stock access
- Low impact fencing (see Box 2)
- Water pumped or gravity–fed to external troughs
- Desirable plants established and protected
- Minimal exposed area of water and soil
- Bunding to divert contaminated run off
- Monitoring of water quality and levels

Uncontrolled stock access to water points leads to pugging of soils, degraded vegetation and fouling of water quality

Fencing and establishment of additional suitable native plants will improve water quality at this site

Preferred Management Options	*Do I need a permit?
1. Clean out silt in accordance with LSA Act & NY policies[#]	No
2. Fence out stock – with buffer zone a. With low impact fencing and no earth moving b. Involving vegetation clearance or earth moving	 a. No b. Yes
3. Bunding (If necessary)	Yes
4. Establish and maintain native plants	No
5. Control weeds	No
6. Distribute water to an external trough	No
7. Casing and backfilling	Yes
8. Clearing native vegetation (not in accordance with Native Vegetation Council Policy)	Yes
9. Monitor water levels and water quality on a regular basis	No
10. Excavate to deepen water supply (in extraordinary situations)	Yes
11. Modify banks, spillways or other structures in a watercourse	Yes
12. Develop a new water source	Yes

*Water affecting activity (WAA) permit applications need to be submitted for assessment by the Northern and Yorke Landscape Board (the Board). Assessment ensures that proposed works are appropriate for the management of the water source and will assist land owners to achieve the desired outcome.

#See Box 1.

Vegetation provides important benefits, including: shading to avoid salinity build-up; stabilising soils; trapping wind and water-borne sediments; filtering and removing nutrients from inflows; as well as providing habitat for native fauna species. Any clearance of native vegetation associated with water sources should be minimised (in accordance with permits) while revegetation of degraded sites is encouraged.

When plants are removed from around water sources, contaminated nutrient- and sediment-laden water from adjacent bare ground and agriculturally disturbed soils will more readily wash into the water source. Large areas of bare soil and exposed water lead to an increase in evaporation. This results in an increased concentration of salts in the water and the soil capillary zone (where groundwater lies close beneath the surface)

Fencing is highly desirable
When stock are allowed direct access to the water source a range of problems can result, including: Faecal contamination (nutrients and pathogenic bacteria), Stock becoming stuck and dying in the water source, pugging of soils and compaction of water transmitting pathways beneath the ground.

Once in the water, nutrient-rich organic materials (including fertiliser pollution) provide ideal food for bacteria and algae. These organisms grow rapidly using up dissolved oxygen, resulting in anaerobic, smelly and unpalatable water. In warmer months, nutrients, stagnant water and sunlight combine to make toxic algal blooms a frequent problem.

Bunding may be required
To divert polluted runoff.

De-silting and cleaning out regrowth vegetation
May be necessary from time to time to maintain the use of the water source.

What are some of the preferred management options?

1. Clean out silt
Existing springs and soaks are often cleaned out to remove accumulated silts or sediments. Work carefully to avoid increasing the original depth and surface area, as this can damage impermeable clay layers and introduce more saline groundwater. Permits are not required where work is conducted in accordance with principles endorsed by the Board (see Box 1).

Sediment may be spread over agricultural land, provided it is not on a watercourse floodplain or will easily wash back into the source or any other watercourse.

A degraded, silted up spring

Vegetation plays a valuable role in protecting water quality. After de-silting, vegetation should be restored around the water source.

Box 1. Desilting principles

Desilting springs, soaks and waterholes currently accessed for stock water purposes

1. Desilting springs, soaks or waterholes currently accessed for stock water purposes, does not require a permit provided desilting only involves the removal of unconsolidated material deposited since the location has been utilised as a source for stock water use.

2. Material removed during the desilting from a spring soak or waterhole must not be deposited within a watercourse, lake or floodplain of a watercourse.

3. In the process of desilting reasonable measures must be taken to prevent damage to the bed and banks of the watercourse or lake or the bed banks or shores of the lake and to the ecosystems that depend on the watercourse or lake.

4. The maximum capacity of the spring, soak or waterhole must not be increased by altering or excavating the original or consolidated banks of the spring, soak or waterhole.

5. Vegetation must not be removed from the spring, soak or waterhole unless authorisation is obtained under the Native Vegetation Act 1991.

6. If stock access is likely to damage the original or consolidated bed or banks of the spring, soak or waterhole, it shall be negated by the construction and maintenance of a fence around the spring soak or waterhole.

7. Completion of the desilting of a spring, soak or waterhole must be reported to the relevant authority for inspection.

Note: For the purpose of these principles, springs, soaks and waterholes fall within the definition of a watercourse or lake (including a wetland) in accordance with the LSA Act. Springs, soaks and waterholes consist of areas on the land surface where groundwater discharges or where the natural or modified topography or a watercourse, lake or wetland intersects the underground water table. Springs, soaks and waterholes have traditionally been accessed by landholders in the Northern and Yorke region for stock water supplies. In addition to providing stock water supplies, springs, soaks and waterholes have important ecological value, providing habitat and refuge for important plants and animals.

Box 2. Low impact fencing principles

- Minimum disturbance of vegetation and soils.
- Minimise the risk of sediments washing into the water source.
- Avoid compacting soils and water transmitting pathways by using lightweight machinery and fewer strainer posts.
- Identify and protect sensitive areas or habitat.
- Design to suit specific needs for livestock, desirable / undesirable native fauna and bush surroundings.
- Utilise electric wires for low cost, lightweight fencing, subject to fire risk and maintenance requirements. Solar power may be an option for remote locations.
- Create a sufficient buffer, allowing for vegetation and wetter periods (which may expand the wetland area).
- Determine fence placement based on ready access for machinery without clearing scrub.
- Fence to cater for revegetation and regeneration opportunities (e.g. extending fenced area beyond dripline of existing trees, downwind from prevailing wind direction).
- For contractors coming onto the site: provide instructions about access routes and 'no go' machinery zones; no parking on or directly under vegetation; ensure vehicles and equipment are cleaned to prevent spread of plant diseases and are in good working order (no oil leaks); refuel away from the site; and no leaving rubbish, chemicals or fuels near the water source.

Typha domingensis (DWLBC 2007)

WATER SOURCE MONITORING TEMPLATE

LOCATION_____ SITE DESCRIPTION_____

Date	Salinity (µS/cm)	pH	Turbidity (NTU or measure depth of vision)	Surface area (m2)	SWL (m) Water level from natural ground surface	SWL (m) Water level from natural ground surface	Faecal Contamination (Y or N)	Visible algal growth (Y or N)	Surface water inflow (Y or N)	Photo taken (Y or N)	Stocking no's watered (dse)

Silt and sediments cleaned out of water sources should be removed off-site to avoid washing back into watercourses.

2. Fence out stock with a buffer zone for vegetation
Controlling stock access prevents fouling the water through faecal contamination, stock carcasses, pugging, soil compaction and overgrazing by livestock. Low impact fencing (see Box 2) should be used.

Fencing should cater for a vegetation buffer zone several meters wide, in which surface flows are shallow uniform and slow. Buffer widths should be greater on sloping ground, or surrounding large or sensitive water sources.

3. Bunding
May be established where necessary. A bund is an earthen wall no less than 30cm high designed to prevent surface flows carrying polluting material into the water source (e.g. run off from disturbed soils). Bund walls which impede the natural flow of water in a watercourse require a WAA permit.

4. Establish and maintain native plants
To provide shade, stabilise soils, trap sediments, filter nutrients and provide habitat. Fencing out stock and selective weed control, may allow regeneration of native wetland plants without the need to replant. This will be the most cost effective option. If no regeneration occurs or if the site is highly degraded, planting will be required.

Grasses and sedges should be planted closer to the water source, with larger vegetation planted further away. Plant suitability will vary with soil type, pH, water depth and movement, cost and availability, time and extent of disturbance. Local native species should be used.

Sourcing appropriate aquatic plants can be difficult. (See the list of specialist nurseries and revegetation consultants that may be able to help at the end of this document.)

You can also collect seeds from nearby wetland plants and propagate them yourself. Just make sure you have permission, and have collected seed from a native species, and not a weed. Keep in mind that seedlings will grow more quickly than rhizome transplants. Good site preparation is the key. Control weeds and pests prior to establishment and following planting out.

Maintenance of the site may include:

- Watering during low rainfall periods. Create a small depression around each seedling to contain the water.
- Weed control through spring and summer after planting to help seedlings survive and grow until vegetation is well established. Protect seedlings from spray drift with a shielded sprayer.
- Pest control. Be prepared for ongoing control of rabbits, mice and kangaroos.

5. Control weeds

Weeds need to be replaced by desirable local native species, but in the short term they can play an important role offering some of the benefits of native wetland vegetation.

Principles of weed control are:

- Gradual or staged removal (not exposing a lot of bare earth at once).
- Consistent long term approach.
- Address any excess sources of nutrients entering the spring/ soak.
- Where feasible use non-herbicide methods (e.g. slashing mulching, controlled grazing, hand removal/ covering with plastic).
- Consider the impacts, and try to limit them, for whatever weed control is used (herbicide, non-herbicide).
- Re- establishment of suitable local native species (to outcompete weeds).

Herbicides can accumulate in and impact on waterways and wetlands. They often bind to soil and are susceptible to washing into watercourses. Many herbicides and surfactants (used to increase leaf penetration) are toxic to aquatic and riparian plants and animals. South Australian policy guidelines for herbicide use in aquatic areas are not available.

However, guidelines from Tasmania (Noble 2002) state that only glyphosate based products that do not contain surfactants (e.g. Roundup Bioactve ®, Weedmaster Duo ® and Weedmaster 360 ®) are registered for use in aquatic areas.

Improved sites will typically incorporate a number of management options

Glyphosate is still considered slightly toxic to birds, fish, invertebrates and mammals and therefore should only be used in situations where chemical control is judged as the most suitable control technique. The Tasmanian guidelines also suggest a range of additional products that are acceptable for use in occasionally or rarely inundated riparian sites.

Common wetland weeds

Common name	Scientific name	Native species that the weed can be confused with
*Spiny Rush	Juncus acutus	Sea Rush *Juncus kraussii* Pale Rush *Juncus pallidus*
*Giant Reed	Arundo donax	Common Reed *Phragmites australis*
*African Daisy	Senecio pterphorus	Other *Senecio sp*

(*Exotic Species)

Desirable wetland plants

Common name	Scientific name
Sea Rush	Juncus kraussii
Pale Rush	Juncus pallidus
Knobby Club Rush	Isolepis nodosa
Bulrush	Typha domingensis
Salt Club-rush	Bolboschoenus caldwellii
Spiny Flat Sedge	Cyperus gymnocaulos
Saw Sedge	Gahnia filum
Sword Sedges	Lepidosperma sp

6. Distribute water to an external trough

Install mechanisms that enable water flow to be turned on or shut off automatically to ensure reliability of supply and prevent overflows and wastage. Regular monitoring of stock water systems should be undertaken to ensure good water quality and to check for system breakdowns and leaks.

There are three main options for water distribution:

- Lay piping to allow for gravity feed (or siphoning) down to a trough.
- Lay piping to allow for gravity feed (or siphoning) down to a storage tanks, which can then be fed into troughs.
- Pump to a storage tanks, which can then gravity feed to troughs throughout the property. The pump mechanism could be powered by solar, windmill, diesel or mains electricity.

Water availability will naturally fluctuate in response to rainfall variability between seasons and different years. Care should be taken if the rate of water extraction from a spring, soak or waterhole is planned to exceed the previously existing patterns of water use. For example; to support more sheep grazing days than the historic average from the same water source. This is because prolonged higher than average extraction rates decrease the water availability for water dependent ecosystems and risk drawing higher salinity water into the system.

In the interests of maintaining healthy wetland ecosystems, seasonal pumping rates should reflect a similar proportion of the available water. In wetter periods, with higher groundwater discharge.

7. Clearing native vegetation

Clearance of native vegetation is generally undesirable, as the most sustainable water sources are those with the most intact vegetation. Where unavoidable (e.g. for fencing) clearance should only occur in accordance with the Native Vegetation Act 1991 and regulations. Landscape SA NY can provide advice on the approval process.

In many situations weeds, rather than native vegetation are providing water quality benefits. Any removal should be considered with appropriate revegetation.

Clearance of regrowth or colonising vegetation in existing water sources (where a pool of open water needs to be maintained for effective operation) is allowed under the Native Vegetation Act 1991 (through Regulation 5(1) (zj), provided activities comply with certain guidelines (DENR 2007, 2008). Common reeds (*Phragmites australis*) and bulrushes (*Typha domingensis*) can be cleared to the minimum extent required for effective operation, and not beyond the extent of initial clearing.

Any clearance of other species must be discussed with the Native Vegetation Council Secretariat, Department of Environment and Water (DEW) and is likely to require consent via a clearance application, or an approved management plan. Any clearance of regrowth during drought periods should be kept to the absolute minimum to reduce further impacts on the water-stressed plants and ecosystem. The DEW Native Vegetation Branch can be contacted by email at nvc@sa.gov.au .

8. Monitor water levels and water quality on a regular basis

As discussed further below, monitoring should be seen as an important item in the farmer's risk management toolbox. In drought periods, farmers will often need to respond to declining water levels and/or increasing salinity.

It should be noted that some springs and soaks provide better water quality in summer than winter (due to lags in groundwater flow). It is recommended that initial monitoring be conducted quarterly (or at least in late winter and late summer) to provide useful information on water quality patterns.

Salinity in troughs can increase dramatically during hot spells and monitoring will indicate the necessary frequency for flushing out salt build up

9. Excavate to deepen a water supply

This option should only be considered in extraordinary circumstances and in consultation with the Board and or a suitably qualified consultant. A WAA permit will be required. In general, a common risk is the deeper you go the saltier the water, and permanent water quality impacts can result.

10. Modify banks, spillways or other structures in a watercourse

A WAA permit will be required to modify structures in a watercourse. The Board can advise landholders on where to obtain expert advice for this type of work.

11. Develop a new water source

This may be the only option where existing water sources become degraded beyond use. Approvals and permit requirements should be discussed with the Board.

Monitoring and adaptive management

Ongoing monitoring of water quality and water levels are recommended and should be seen as a good risk management strategy for farmers.

During low rainfall years, reduced groundwater recharge may cause the water table to drop and groundwater salinity to rise. Monitoring stock water supplies raises awareness of how the spring or soak operates, and of

potential stock performance issues and the need to evaluate alternative supplies or cut stocking rates.

Aside from stock impacts, drought periods also reduce moisture availability to groundwater dependant plants and ecosystems. In the long term interest of preserving water source vegetation, landholders should monitor plant condition and persistence during dry times and factor this into decisions about water extractions and stocking rates.

Photo points are a useful tool for monitoring the condition of vegetation health, via photos taken at a similar time each year. These can be marked simply by two star pickets (one each for camera position and photo direction).

The height of water in permanent springs/ soaks will generally reflect groundwater levels. Water testing is needed to measure salinity levels and other aspects of water quality.

An initial laboratory water test will identify the relative composition of salts, enabling future measurements to be taken with an inexpensive electrical conductivity (EC) meter.

The Board can assist people in getting started to monitor their water, including testing water samples, interpreting water quality data and establishing a simple record keeping system (A template for recording water quality is attached in the middle of this fact sheet).

Protecting habitat values

Springs, soaks and waterholes are wetlands, and often provide a niche habitat and refuge for a range of animal species, especially during dry times. These water sources have a high habitat value, and protection and enhancement of this habitat is important for the protection of Northern and Yorke's biodiversity. Improving the management of these resources also assist farmers to improve the sustainability of their water supply.

What if my water source has deteriorated and is now unusable

If in doubt, landholders should consult with the Board or a suitably qualified consultant to determine the current quality of the water source. Years of neglect can sometimes cause a localised deterioration of a water source that may be able to be rehabilitated.

Where water sources have degraded to the point that they can no longer be used, management options include:

- Fence off, encourage vegetation and manage the site for environmental & biodiversity values. Continue to monitor water quality to see if it improves and the water source becomes useable again.
- As a result of years of evaporation salts can build up. Pump out the entire volume of the water sources to remove accumulated salts. Inflow of potentially fresher groundwater may result.
- Where sites have negligible habitat or biodiversity values, backfill and abandon the site. Encourage vegetation to shade the soil and prevent salts building up where groundwater remains close to the surface.
- Where water levels have dropped (e.g. due to extended drought) consult with the Board or qualified consultant about options to deepen the water source or establish a new supply.

References and further information

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Stevens C, McFarland I and Ashton B. 2005. Feeding and managing sheep in dry times, Bulletin 4651, Department of Agriculture Western Australia, November 2005

Nurseries & revegetation consultants

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