



## Step 2: Identify management issues and objectives

### 3.1 Wetland management issues

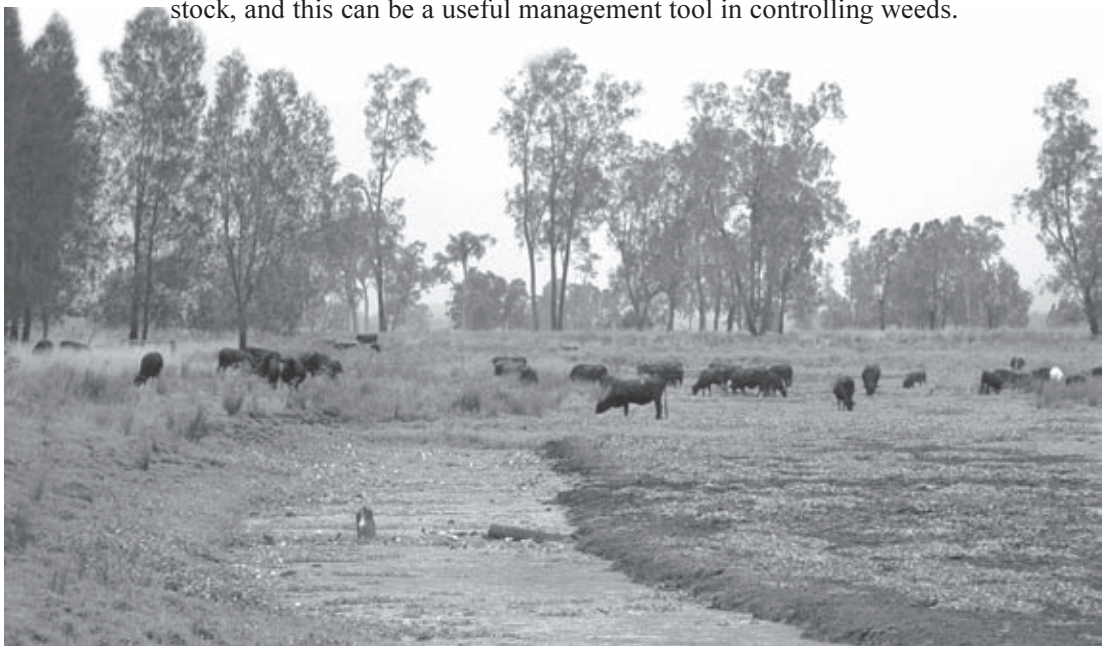
This section contains a brief description of some wetland management issues. Further information on managing these wetland management issues is available in the Resource Folder.

#### 3.1.1 Dams for water storage

The water-holding capacity of a wetland can be a useful resource but wetlands can degrade when the natural water regime is changed. For example, the wetting and drying cycle that governs many wetlands enhances the breakdown of pollutants and organic material and the recycling of nutrients. For this reason, wetlands should not be used to permanently store water or water stock. Dams can be used for these purposes.

#### 3.1.2 Grazing

Wetlands can be useful for grazing. However, grazing can affect a wetland in many ways, and over-grazing can degrade wetlands through trampling of vegetation, compacting and pugging of the soil, disturbing sediments, eroding banks and increasing nutrient levels. This creates poor water quality, which may lead to other problems such as weed infestation, problems with mosquito breeding and algal blooms. Grazing can considerably alter the types of plants in wetlands. Many animals generally avoid less palatable weedy plants, and eat many native plant species. Some weed species, however, are palatable to grazing stock, and this can be a useful management tool in controlling weeds.



Coraki wetlands, New South Wales

### **3.1.3 Cropping**

Cropping can affect your wetland whether you are cropping the wetland itself or cropping areas around the wetland. The frequency of cultivation and cropping determines the degree to which soil nutrients, soil structure, native vegetation recolonisation and habitat presence are altered. Crop volumes also determine the magnitude of these impacts. The clearing of lakebed vegetation can result in a loss of plant diversity and may reduce animal habitat. Increased soil salinity may also occur due to the rising of water tables where vegetation is cleared. Sedimentation can also occur with cropping.

### **3.1.4 Timber harvesting**

Harvestable timber on your property can be a useful resource, but over-clearing is a problem. In wetlands, birds and other animals use both living and dead trees for habitat. Vegetation cover also binds the soil, preventing erosion problems.

### **3.1.5 Aquaculture**

Land-based aquaculture has an impact on water quality as it requires high protein feeds and can produce significant organic inputs from faeces and uneaten food. Aquaculture has the potential to degrade the aquatic environment depending on its location and extent, and the management and type of activities taking place.

### **3.1.6 Drainage**

Drainage has been a major factor in the loss and degradation of wetlands. Usually occurring in order to create agricultural land for grazing and cultivation, drainage results in changes to the occurrence of plant and animal species. Aquatic species may be replaced by terrestrial species, which can lead to a loss of natural wetland functioning (e.g. water quality maintenance, flood mitigation).

### **3.1.7 Use of pesticides and fertilisers**

Pesticides can degrade water quality and potentially harm aquatic life in and around the wetland. They also threaten the quality of groundwater where the receiving wetland is groundwater-fed. Pesticides can also upset the predator-prey balance in a wetland.

Nutrients from fertilisers can cause excessive plant growth. These plants eventually decay, depleting oxygen in the water and resulting in stagnation. Furthermore, fertilisers often encourage the proliferation of weeds at the expense of native plant species.

### **3.1.8 Water resources development**

The impact of water resources development on wetlands varies greatly at both local and regional levels. Activities such as regulation, extraction and diversion result in changed flow regimes, poor water quality, habitat loss and fragmentation, erosion, sedimentation, salinity, cold water pollution, loss of biodiversity and obstructions to fish passage. The main factors causing changes to flows to wetlands usually involve reduction in catchment area, diversion and alteration of flows and harvesting runoff.

### 3.1.9 Water quality

Wetlands can assist in improving and maintaining water quality. However, wetlands are limited in their ability to assimilate nutrients and breakdown pollutants. Indications of degrading water quality include weed infestation, algal blooms, fish kills, pungent odours and general fouling. All of these problems threaten the integrity of the wetland and can pose a health risk to stock and humans.

Poor water quality in wetlands may be caused by stock, by pesticide and fertiliser use, and by cultivation and disposal of irrigation tailwater and drainage water. Furthermore, runoff from irrigation elsewhere in the catchment can have adverse impacts on wetlands.

### 3.1.10 Salinity

In some places, salinity is a natural phenomenon but in others, increasing salinity caused by rising water tables is often the result of particular land-use practices such as over-clearing, urban development, river regulation, irrigation or the cultivation of crops. Salinity from rising water tables is grouped into dryland, irrigation and urban salinity.

The degree to which increases in salinity affect plants and animals depends on the tolerance of each species. While some wetlands are naturally saline (such as salt lakes), highly saline waters can make it impossible for most wetland vegetation and fauna to survive, and these areas are difficult and costly to rehabilitate. Salinity levels in wetlands can change seasonally and throughout wetting and drying cycles.

### 3.1.11 Weeds

Weeds are often a catchment-wide problem, leading to poor water quality, a decrease in the number and variety of native plants, less nutritional feed for stock, unusable recreational areas, and blockage of drains, pipes and irrigation systems. They contribute to the disappearance of native animals that rely on native plants for food and habitat.



**Salinity in an inland NSW wetland.**

Photo courtesy of Dr. Ben Gawne, CSIRO

Nutrient enrichment (due to runoff, fertilisers, etc.) is often the cause of wetlands being choked by nuisance weed species such as azolla, water hyacinth (*Eichhornia crassipes*) and salvinia (*Salvinia molesta*). Alterations to flows can also support the spread of weeds by providing a water regime that supports the growth of problem species such as lippia (*Phyla canescens*), which thrives in floodplain and wetland areas subject to either frequent or occasional inundation.

### **3.1.12 Feral animals**

The most common feral animal species in NSW are pigs, cats, foxes, rabbits and carp. Feral animals destroy native vegetation, compete with and prey on native species and contribute to problems such as erosion and sedimentation. In wetlands, introduced species such as carp pose a particularly serious problem. Carp disturb bottom sediments, often causing an increase in turbidity, which can prevent light penetration and threaten the survival of other fish (through competition for food), invertebrates and even native species. NSW Agriculture and Rural Lands Protection Boards can assist with the management of feral animals. See Section 9 of the Resource Folder for contact details (page 36).

### **3.1.13 Mosquitoes**

Wetlands are aquatic habitats for a variety of vertebrate and invertebrate fauna. Among the vertebrate fauna, mosquitoes are of particular importance because they present a pest disease potential for nearby human communities. In south-eastern Australia there are approximately 120 known mosquito species, although probably less than 20 of these are of any concern as pests or carriers (vectors) of disease to humans.

The nature of a wetland, its form and vegetation, will determine to a great extent the nature of the mosquito fauna. Most mosquito-borne pest and disease problems depend on mosquito abundance, contact with humans and environmental factors such as temperature and humidity.

The hazard and risk from mosquitoes and pathogens can therefore be gauged to some extent by surveillance. Complete eradication of mosquitoes is neither possible nor desirable, but where wetlands remain healthy and are sustainably managed, mosquitoes are less likely to become a problem.

### **3.1.14 Fire**

Fire is a part of the Australian environment and may be used as a management tool in some instances. The environmental effects of fire in wetlands are not fully understood and an appropriate fire regime should be used. Fire can create erosion problems, increasing sediments and nutrients in wetlands. Fire often results in changes to the vegetation, depending on the frequency and intensity of the fire.

### **3.1.15 Loss of biodiversity**

Biodiversity is the variety of living things. The loss of biodiversity means that resource security may be diminished, and this can occur as a result of modifying the land for human purposes. Each of the management issues described here can potentially contribute to losses in biodiversity and so must be monitored carefully.

## **3.2 Identifying issues and objectives**

Once you have gathered information about your wetland, identified its values and clarified which issues are most relevant to your wetland, you can then consider your objectives, or what you want to achieve.

### Creating a Table of Values, Management Issues and Objectives

- List all the benefits you identified in STEP 1 under the “Value” heading in Table 1.
- List the Management Issues you wish to manage in the second column in Table 1 according to the value they apply to.
- Add your Objectives in the third column.

**Table 1: Values, Issues and Objectives for Management**

Value <i>Example</i>	Management Issue	Objectives
Grazing	Damage to vegetation, poor water quality,	Manage stock access to wetland to control erosion and maintain vegetation and water quality.



## Step 3: Actions

### 4.1 Does action need to be taken?

Look at the information you have collected so far (how healthy is your wetland?) and your list of objectives (what do you want from it?) to decide whether or not action needs to be taken.

#### 4.1.1 Passive management

If you decide to manage your wetland passively by deliberately avoiding certain activities in and around it, you may wish to create a list of these activities, by going directly to Step 4 “Keeping Track”. Read through the information and decide on the best way to check the progress of your management of the wetland.

#### 4.1.2 Active management

If you decide that active management is required, prioritise your management objectives so that you tackle the most important ones first, to avoid wasting your resources later.

### 4.2 Identifying causes

Look at the “Management Issues” you have listed and prioritised in Table 1 (previous page) and identify the “Causes” for each, entering these into Tables 2 – 4 (page 19).

### 4.3 Identifying actions

The following considerations should be taken into account when you are deciding what actions to take.

#### 4.3.1 Legislation and planning

Legal requirements relating to wetland management are included in Section 3 of the Resource Folder (page 4). This list includes the relevant Commonwealth and NSW State legislation and policies and international agreements. Use this information to decide which actions will be admissible and what other information you may need to collect in order to achieve your objectives.

#### 4.3.2 Management strategies and options

Managing your wetland for just one of the values identified in STEP 1 would be difficult and is unlikely to be cost effective. The adoption of management strategies to address more than one issue allows you to manage your wetland as a multi-functional resource.

For example, fencing all or part of your wetland may satisfy a number of objectives such as preventing native vegetation loss, improving water quality and maintaining biodiversity because stock access to the wetland is limited. Management Strategies and Options are described in Section 4 of the Resource Folder (page 9).

### 4.3.3 Funding: what financial resources are available?

Funding and incentive programs can provide support for the initiation or continuation of wetland management. There is a range of financial and motivational incentives available to wetland managers at the national, state and local levels. These programs include government and non-government sponsored funding, taxation and rate relief options, trading schemes, voluntary agreements for management and international agreements.

Details on each of these programs can be found in Section 5 of the Resource Folder (page 22).

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#### **Wetland Rehabilitation: Native Dog Wetland Erosion Control and Revegetation**

In 1998, the Native Dog Landcare Group commenced a program of restoration and rehabilitation of the Native Dog Wetland, an area of approximately 80 ha near Berrigan in south-western NSW. Revegetation was undertaken within 50 ha of the wetland with some 8 km of fencing. Most of the funding provided was used for erosion control, weed control, fencing and purchase of plant material. All labour was provided voluntarily.

This project was supported by the State Wetland Advisory Committee, Natural Heritage Trust, Greening Australia, Department of Land and Water Conservation, Berrigan Shire Council, Southern Riverina Field Naturalist Group, and individual landholders.

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## 4.4 Listing your management issues, causes and actions

After assessing the matters raised in Section 4.3 “Identifying actions”, follow any necessary leads to the relevant legislation and its requirements, consider the various management strategies and options available to you, and research any funding avenues to be considered before you fill in the “Actions” column on the next page alongside the causes they are intended to address.

Table 2 (see below) provides an example of a management issue – sedimentation caused by vegetation loss – and identifies some actions that address the cause. Using this as a model, fill in the tables on the next page to identify your own management issues and the actions you will take to deal with them.

Photocopy the next page if you need more space.

**Table 2: Example management issue: sedimentation**

<b>Causes</b>	<b>Actions</b>
<i>Example</i> Vegetation loss	<ul style="list-style-type: none"><li>• careful management of stocking levels</li><li>• fencing to assist stock management</li><li>• regeneration with native vegetation</li><li>• buffer zone around wetland</li></ul>



## 4.5 Forming a management plan

- In preparing your management plan, create a table combining the Issues to be managed, your Aims/Objectives, and the Actions or activities you will undertake. Then allocate any available human and financial resources to these activities and set timeframes for each. See Table 5 below for a sample Management Plan that sets out each of these headings. Table 6 (next page) is provided for your use.
- To supplement your management plan table, use a clear plastic overlay on your property map to indicate the various management activities you will be undertaking eg. where to put fences, buffer zones, etc.

**Table 5: Sample management plan for activities**

<b>Issues</b>	<b>Aims/ objectives</b>	<b>Actions</b>	<b>When and by whom?</b>	<b>Funding required? Source?</b>
Poor water quality	Improve water quality; avoid algal blooms	<ol style="list-style-type: none"> <li>1. Exclude livestock from immediate environs of wetland – use fencing to manage.</li> <li>2. Avoid/minimise use of fertilisers and pesticides.</li> <li>3. Don't run irrigation tailwater or domestic waste directly into wetlands.</li> </ol>		
Weed infestation	Manage weed problem	<ol style="list-style-type: none"> <li>1. Manual weed removal for some weeds.</li> <li>2. Minimise fertilisers entering wetland by minimising use on land surrounding wetland.</li> <li>3. Have a buffer zone around the wetland.</li> </ol>		
Disturbance to wetland	Minimise disturbance in and around wetland	<ol style="list-style-type: none"> <li>1. Exclude stock around the wetland, particularly during bird breeding events.</li> </ol>		

**Table 6: Sample management plan for activities**

<b>Issues</b>	<b>Aims/objectives</b>	<b>Actions</b>	<b>When and by whom?</b>	<b>Funding required? Source?</b>



## 5 Step 4: Keeping track – how to measure progress

Keeping track of changes, or monitoring, is necessary in order to understand how your management activities are affecting your wetland, and whether you are achieving your objectives.

- Take a look at your original objectives, and decide on the best way to monitor the results of any activities you have undertaken.
- Plan how you will monitor your activities by setting out details of who will be carrying out the monitoring, how often the activities will be carried out and what resources will be required to do it (see Table 7 for examples of these). You can keep a record of these in Table 8 (next page).

Section 6 in the Resource Folder “Keeping Track (page 25) includes some monitoring methods for your wetland management activities, including using photography and observing plants and animals, with some help from information sources including plant and animal reference materials, etc.

**Table 7: Example of a monitoring plan**

Objective	Monitoring Methods	Resources required	How often?	By whom?
Manage weed infestation	Take photos of weed infested areas at regular intervals before, during and after activities such as weed removal have taken place.	Camera, film		
Manage livestock with regard to wetland birds and vegetation	Monitor using photography and noting bird species arriving at the wetland over time.	Camera, film; bird identification manuals, recording materials (paper, pens, etc.)		
Control feral and introduced animals	Monitoring by coordinating a register of sightings of these animals, such as pigs, among your neighbours. Photos may also be used to monitor recovery of vegetation previously destroyed by these animals.	A means of collecting information on sightings (phone, etc); camera, film.		

**Table 8: Monitoring plan**

<b>Objective</b>	<b>Monitoring Methods</b>	<b>Resources required</b>	<b>How often?</b>	<b>By whom?</b>

### **5.1 Management problems – when things don’t go to plan**

Sometimes it seems like management is achieving nothing. There are some reasons why this may be the case. Some changes can take longer than others, the changes may be difficult to see or the problem may require a different management strategy.

### **5.2 Plan for maintenance**

Decide who will be responsible for maintenance of the wetland, how often maintenance will be carried out and what resources will be required to do it. Maintain records of the management methods you have used, along with the information you collect. Making your plan a living document (one that changes through time) can help.

**Table 9: Maintenance plan**

<b>Objective</b>	<b>Maintenance Methods</b>	<b>Resources required</b>	<b>How often?</b>	<b>By whom?</b>



## References

Department of Land and Water Conservation (1998). *Constructed Wetlands Manual. Vol. 1 & 2.* DLWC, NSW.

Hawkesbury-Nepean Catchment Management Trust (1996). *Focus on Wetlands – Guide for Preparing a Wetland Management Plan.* HNCMT, NSW.

NSW Government (1996). *NSW Wetlands Management Policy.* NSW Government Printer.  
Ramsar Bureau (2000). [www.ramsar.org](http://www.ramsar.org).



**Mound spring in an inland wetland**

Photo courtesy of Dr. Surry Jacobs, Royal Botanic Gardens