Guidelines and template for preparing a wetland management plan

For primary producers (grazing, dryland cropping) in Queensland's inland catchments

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Contents

1 Introduction and overview

1.1 What is the scope of this document?

The introduction and overview (Chapter 1) of this document explains the concepts, rationale and context for wetland management planning. Chapter 2 outlines a step-by-step process for preparing a wetland management plan. A template (model) is provided in Chapter 3, allowing landholders and other wetland managers to easily insert the necessary information into an appropriate format. Chapter 4 gives additional information that may support the user, as required. This document complements other wetland management guidelines which are available for other parts of Queensland and for other aspects of wetland management.

1.2 Who should use this document?

These guidelines have been produced for use by landholders engaged in grazing and dryland cropping in two inland river basins of Queensland: the Queensland Murray-Darling and the Bulloo. Most of the material is applicable much more widely across inland regions of Queensland and Australia generally.

The guidelines could be used as a module that can fit into, or complement, existing property or sub-catchment management plans and may assist in the development of a land management agreement under the State Rural Leasehold Land Strategy.

The document is also relevant to technical and extension officers of the regional natural resource management (NRM) bodies that support landholders in natural resource management in these river basins. The contents are also applicable to other organisations and government agencies engaged in NRM work.

1.3 What do we mean by 'wetlands'?

A wetland can be characterised by water regime, vegetation and/or soil types that are indicative of wetland conditions. There are many different definitions for wetlands in Queensland but the Queensland Wetlands Program[1] has developed a comprehensive definition with much supporting information and guidance (see Glossary and supporting materials on the Wetland*Info* website—the 'first-stop-shop' for wetland information in Queensland [EHP 2012a]). Key elements to note for inland Queensland are:

- A wetland may be wet permanently, regularly or occasionally.
- A wetland may have water that is fresh, saline or fluctuating between those extremes.
- A wetland may have water that is flowing or static.
- A wetland may be natural, human-modified or entirely human-made.

Therefore, creeks, billabongs, lakes, swamps, gilgai areas, springs and dams, among many others, are all types of wetlands. And it is especially important to recognise that an area is still classed as a wetland even if it has been dry for some years, but potentially may be inundated again one day.

Wetlands are distinctive features of the natural and human-made landscape and possess significant values. Any wetland or system of wetlands has its own 'ecological character' which is made up of ecological components or parts (e.g. water, soil, plants, fish), ecological processes (e.g. water cycles, nutrient processing,), and ecosystem services (e.g. fish nursery, flood control, fodder source).

[1] In 2003, the Australian and Queensland governments established the Queensland Wetlands Program to develop and implement measures for the long-term conservation and management of wetlands in Queensland.

1.4 What is management planning?

To ensure that our use of land and natural resources is sustainable for present and future generations, we need to plan how we will manage them. Lack of planning can result in poor decision making and declining sustainability as social, economic and ecological influences such as rainfall, plants and animals, markets and operating costs interact, often without harmony!

Planning processes operate at state, regional, local government, sub-catchment and property levels. Property management plans have been promoted by a number of producer and regional organisations and many landholders have implemented them.

Management plans specifically for wetlands, at any scale, can ensure the best outcomes for sustaining the values and benefits of wetlands to landholders and the wider community. Planning for wetlands is best done as part of broader planning processes where the specific features and unique values of wetlands can be recognised within the broader context of the business, property or sub-catchment.

1.5 Why do we need management plans for wetlands?

Wetlands have many values when they are inundated (e.g. recreational fishing) but also, to some extent, when they are dry (e.g. honey from yapunyah tree swamps). Here is a short list of examples:

- Rivers transfer water downstream to floodplains that grow stock feed after floods.
- Permanent waterholes are drought refuges for fish that repopulate flowing rivers.
- Shrubby swamps support breeding colonies of ibises that eat agricultural pests.
- Tree swamps and gilgai areas harbour characteristic plant and animal species.
- Grass-sedge swamps filter incoming dirty water, providing clean water for livestock.
- Lakes trap suspended sediments carried by erosive rivers.
- Billabongs provide recreational opportunities.

A full account of the many benefits of wetlands can be viewed at EHP 2012b.

> The Convention on Wetlands advises: Wetlands are dynamic areas, open to influence from natural and human factors. In order to maintain their biological diversity and productivity and to permit the wise use of their resources by people, an overall agreement is essential between the various managers, owners, occupiers and other stakeholders. The management planning process provides the mechanism to achieve this agreement (Convention on Wetlands 2002.)

Given the complexity of wetlands and their many values, it is wise to prepare management plans for wetlands to help maintain these values. This can be done with significant effect at sub-catchment as well as at property levels (see below and Cox 2011). Note that certain interventions in wetlands, such as reshaping the bed, deepening or introducing new species, commonly are detrimental to wetland condition and values.

Increasingly, producers are being asked to demonstrate to government regulators and the community that their business is managing natural resources sustainably. Planning can assist a producer to manage a property's wetlands more sustainably and profitably and demonstrate the sustainable management of natural resources to regulators, markets and the community. A key strength of a wetland management plan is that it allows producers to transparently demonstrate to others how their wetland is being managed.

A wetland management plan for a property or sub-catchment may also demonstrate to potential funding bodies that the landholders have the understanding and intent to manage their wetlands wisely. This can increase their chances of securing funding for work that will benefit wetlands as well as production, consistent with the management plan.

1.6 Scale and scope of a wetland management plan

A wetland management plan can be standalone, or supplementary to and integrated with a management plan for a property or sub-catchment, or it can be part of an overall business plan. It can address a single wetland such as a substantial section of a creek, a lake, or a system of swamps; alternatively, a management plan can be prepared for a suite of different types and sizes of wetlands on a property, or across multiple properties (sub-catchment level).

Essentially, a wetland management plan will address these three fundamental questions:

- What is the present state of the wetland and its existing or desired values?
- How might the situation change and values be lost (what threats apply)?
- What is the plan of action to restore, improve and/or sustain the wetland?

Therefore, a typical scope of topics or sections in a wetland management plan is:

- introduction
- existing natural environment
- existing land use and cultural/social values
- potential impacts and threats
- management actions
- implementation, monitoring and review
- additional information.

A wetland management plan for a single site or property with few or small wetlands could be as simple as a few pages of tables or charts, or text, plus some maps and lists. If dealing with large wetlands, multiple wetlands and/or multiple properties, then the plan will most likely need to comprise more pages and detail.

1.7 Connections to industry, regional NRM and State processes

Property or sub-catchment plans. Where a property management plan (PMP) or sub-catchment management plan exists, developed under industry-specific or NRM frameworks, the present guidelines are a module that should be seamlessly integrated within those frameworks.

Industry processes. A number of best management practice (BMP) tools and guidelines exist for grazing land management (GLM) and for cropping (e.g. BMP Cotton). The present guidelines are designed to be used harmoniously and integrate with these industry tools.

Regional planning. Regional NRM organisations emphasise a number of mechanisms for delivering NRM support to landholders. These include sub-catchment planning and Healthy Waterways Management Plans (for riverine wetlands). The present guidelines take such initiatives into account.

State processes. For rural leasehold land, a Land Management Agreement (LMA) may be negotiated, based on issues identified through a land condition assessment. While this guideline does not replace an LMA (in part or whole), if a landholder has prepared a wetland management plan, the determined management actions and monitoring schedule may be used within the LMA framework if an issue has been identified and the proposed management is appropriate for that issue.

1.8 How to write a plan – where can I get assistance?

By following the guidelines, steps and template below, it should be possible to prepare an adequate wetland management plan for most purposes.

Maps of wetlands at 1:100 000 scale and many other tools are available online across the state on Wetland*Info* (see EHP 2012c).

Consultation with other properties will be essential for a plan at the sub-catchment level and more time will be needed.

Landcare officers or other technical staff of the applicable NRM body for your region should be able to assist. In addition to providing advice at the outset, they may also make time to review your draft plan and provide helpful comments to adjust or improve it.

1.9 What materials will I need?

You will need just some basic materials to prepare the plan itself: mainly paper and pens for preparing maps.

If you do not have a suitable map of your property, or for each property to be included in a sub-catchment plan, then some preparation may be needed. Maps at 1:100 000 scale can be developed from topographic map sheets available at the Landcentre (Level 2 Cnr Main & Vulture Street, Woolloongabba, Brisbane, QLD 4102) or from wetland maps on Wetland*Info*, but maps at larger scale (showing more detail per square kilometre) may need to be developed from aerial photos or special survey. Shire maps and fire management maps may provide a starting base. NRM regional bodies (see above) may provide support for access to maps.

See also section 3.5 of these guidelines.

2 The planning steps

This part of the guidelines provides brief, step-by-step instructions on how to go about preparing a wetland management plan for a property or a sub-catchment. Chapter 3 provides an outline (template) of the items to consider for inclusion in the written plan; some of these items may not apply to each property or a sub-catchment.

2.1 Step 1: Preparation

2.1.1 Define the planning area

- Identify the property, or section of a property, or group of properties, which will form your planning area. The management plan will apply to wetlands within this planning area.
- Obtain or prepare a base map at suitable scale. For large properties, you may need a map of the whole planning area as well as maps of portions of the area showing the wetlands in greater detail.
- Note: Wetlands do not exist in isolation of other landscapes or land uses, therefore any wetland management plans must take these associated areas/uses into consideration.
- Section 3.5. of the guidelines gives detailed information on how to prepare a suitable map and the elements to be included.

2.1.2 Set your goal and objectives

- Consider the overall goal of the management planning activity: the goal should be a single sentence that reveals what you, as owner/manager of the wetland/s, are striving to achieve, for example:

  My goal is to restore and maintain near-natural conditions to Crescent Billabong.

- Next, go to a more detailed and specific level and develop a set of simple objectives. These should be linked to the values you wish to see managed in the wetland, for example:
  - Objective 1: to restore near-natural water flows to the Billabong.
  - Objective 2: to minimise infestations of weeds and feral animals.
  - Objective 3: to establish a system for maintaining the restored near-natural conditions.
- Where more than one wetland or wetland type occurs in the area of the plan, you may set objectives for each wetland or type.
- Deeper into the planning process, you can specify expected outcomes, to help you implement the plan.
- Goal and objectives can be set at this stage, but later you can revise them if the planning process reveals unexpected circumstances or directions that should be addressed.
- It is critical at this stage to identify any legal or permitting issues which may be required for any works you plan to undertake within the wetland. These requirements may be identified by contacting your local council and state government offices.

2.2 Step 2: Gathering information

2.2.1 Identify information to be gathered

- Read the template in Chapter 3 of these guidelines to see the information that you need to collect. This should give a quick appreciation of the information that is needed for developing the management plan.
- Identify general or specific items for which there is no immediately available information, i.e. 'information gaps'.
- This list of information gaps will drive the next steps of the planning activity.

2.2.2 Consult with stakeholders

- Other people and landholders may presently or potentially affect the conditions in the wetland or its catchment, or be impacted by the wetland management plan once it is being implemented.
- Therefore, hold meetings and other discussions, in some cases at the wetland site, with these stakeholders as necessary.
- The main purpose is for you to explain the proposed planning activity and any anticipated works, how the stakeholder is or will be involved (directly or indirectly), and to fill information gaps (see 2.2.3).
- In some cases there may be very few stakeholders—or none other than the owner/manager—and consultations may take only a few hours or be completed within a few weeks. In more complex or larger cases, this step may take more time and effort including follow-up consultations.
- This step (2.2.2) is vital to ensuring that any actions that you eventually take at the wetland are not a surprise to stakeholders who may be affected (e.g. properties immediately downstream now receiving more/less water) and to secure best possible cooperation of stakeholders who may be impacting the wetland condition.
- Official sub-catchment groups or others involved with natural resource management may be able to assist you with this step. These groups may also be able to assist with any legal or permitting requirements.

2.2.3 Fill the information gaps

- You may proceed without all the information, creating a management plan that recognises information gaps and makes the gathering of new information a major component of the plan's implementation. Review of the plan (see 2.5.1 below) would consider the newly acquired information.
- However, ideally you should gather as much information as possible before the plan is written.
- In many cases you can fill information gaps through consultation (2.2.2), through brief and simple examination of the wetland—preferably in different seasons—and through use of maps and information sources such as the wetland management profiles available on Wetland*Info* (EHP 2012d), to ensure a full understanding of the relevant wetland ecosystems.
- But for some gaps you may consider undertaking a substantial investigation, e.g. a short but intensive survey of plants and animals that occur in the wetland in the wet season, replicated in the dry season.
- Recognising the time and financial costs of bigger investigations, you could ask the relevant Landcare group, NRM organisation or community group (e.g. a field naturalist club) to assist by providing expertise free of charge and/or provide funds to engage a consultant.
- It will be useful to take photographs at fixed reference points showing the present condition of the wetland, for comparison with the outcomes of implementing the management plan. GPS devices can be used to record the coordinates of fixed reference points.

2.3 Step 3: Writing

2.3.1 Analyse options and write a draft plan

- You can write a first draft of the management plan by using the template in Chapter 3 of these guidelines.
- In cases that involve small or simple wetlands on a single property, or where the goal/objectives are not complex or far reaching, many of the template items will not be needed and the draft plan may be a rather short document (several pages plus map). Provided the essential elements have been included and the plan has been well considered, this can be a perfectly adequate wetland management plan.
- Plans for a sub-catchment or large complex wetland may involve more pages and detail. In such cases, you should consider issues such as connectivity between wetlands and the wider landscape.
- Planning should identify the unique values and production benefits of the wetland and associated land types, with management options to match.
- Your draft plan should assess the costs and benefits of different management options, the legal and permitting requirements to address threats to the wetland/s and the ability of options to achieve the plan's objectives.
- Consider buffers to wetlands (EHP 2011e) as a way of reducing some of the threats.
- If you plan to undertake rehabilitation or revegetation of a wetland, it is important that you get advice on the best species to use and to ensure that natural values of the existing wetland are not adversely impacted. Also, you should get advice if contemplating the deepening of a wetland because deepening may be detrimental to wetland condition.
- The risks associated with different management options should be assessed.
- Management options that you select should be prioritised based on feasibility, cost effectiveness and ability to achieve objectives.
- Your plan must include a schedule of actions with clear timelines, who will be responsible for each, resources needed and a budget for any material costs involved.
- Also include a program for monitoring and review (see Step 2.5.1).

2.3.2 Revise the draft plan after review

- To ensure a best possible product, circulate the draft plan to appropriate stakeholders, including Landcare and NRM officers, seeking their comments and advice.
- After a short but reasonable review period (e.g. 1-2 months), collect and consider any comments provided to you.
- You may need to make some minor, occasionally major, changes to the draft plan.

2.4 Step 4: Implementation

2.4.1 Implement the plan

- Implement the plan according to the schedule and budget. Ideally, all of the proposed actions should be implemented but time and finance constraints may delay or prohibit some actions.
- Where particular outsiders such as contractors or experts need to perform some of the actions, give them sufficient notice to ensure the plan is not held up by unavailability of key persons at critical stages.
- If funding is required from external sources, allow plenty of time for the application and approval process to run its course: this may be several months or longer.

2.4.2 Monitor progress and outcomes

- At points in time that have been pre-determined in the plan's schedule, evaluate the progress made in meeting the plan's objectives and targets. You may need to allow some flexibility in order to account for changing circumstances and availability of key personnel.
- Monitoring may reveal the need to adjust the implementation at various points in time; early adjustment may ensure best overall outcomes.
- Your monitoring (and implementation) should include keeping records about what was done, what was observed and at what dates. Records can be important for producers to possess for legal, financial and taxation purposes.

2.5 Step 5: Review

2.5.1 Review and update the plan

- At the end of the plan period or after a reasonable time (e.g. three or five years), undertake a review to assess whether or not the wetland management plan has been successful and make any adjustments to long term actions.
- The review could involve consultation with key stakeholders.
- You should decide whether or not to update the plan, taking into account the findings of the monitoring and review steps.
- Steps described in 2.4.2 and 2.5.1 are included in a process widely referred to as MERI (Monitoring, Evaluation, Reporting and Improvement).

3 Template for a wetland management plan

This template may be used for one property or a group of properties such as a sub-catchment group, for a single wetland or a group of wetlands. In some cases it may be best to prepare one plan per wetland or wetland type.

3.1 Identification, purpose and values

Identification	
Name of property, properties, or sub-catchment group:	
Name of manager of each property included in this plan:	
Describe the area to which the plan applies (e.g. which parts of the property or properties):	
Date on which this version of the plan was completed, or updated:	

Maps: Attach a map showing the boundary of the area to which this plan applies (section 3.5).

Stakeholders & purpose	
Stakeholders, in addition to the manager/s, who have an interest in the wetlands in the plan:	
Consultation that has occurred among the stakeholders about this plan (e.g. date of main meetings):	
Main goal of this wetland management plan:	
Detailed objectives (relating to or elaborating on the goal) of this plan:	
Person with lead responsibility for implementing this plan:	
Other strategic or legal considerations (e.g. regional/State policy or regulations) that apply:	
Comments:	

Natural environment of the wetlands in the plan area	
Average annual rainfall (in mm) and median rainfall, if known:	
Rainfall recorded locally (nearest available data) in the five most recent calendar years:	
Recent flood (flow regime) history, if applicable, for the last five years:	
Is the wetland fed by groundwater?	
List the land types within which the wetlands listed (below) occur – use technical name or describe: (And describe the principal soils)	
Regional ecosystems within the wetlands, if known (otherwise, describe main vegetation communities):	
Land types in surrounding areas (up to 500 m from the wetland edges, and in the wider upstream catchment):	
List the rivers and creeks * included in the plan:	
List the billabongs and oxbows * included in the plan:	
List the swamps, lakes, springs * included in the plan:	
List the infrastructure in or directly impacting the wetlands (e.g. dams, weirs, banks, roads, drains, bores, pumps):	
Comments:	

* Those that are mapped at 1:100 000 scale, or as the landholder sees fit to include. Provide names or a brief description, as well as the length (km) or area (ha) of each, at maximum capacity.

Maps: Mark the locations (or boundaries) and names of wetland features included in this plan, and main infrastructure, on the first or second map, or a series of maps (see section 3.5 below). If possible, include GPS coordinates for these features, in a list or table.

Production & social values of the wetlands in the plan area	
Main type of land use in the plan area (e.g. cattle grazing): (Indicate crop types, rotations)	
Additional or secondary types of land use in the plan area:	
How do the wetlands that are included in the plan directly provide water for stock or cropping?	
Importance of these wetlands in directly providing feed for livestock:	
How do these wetlands slow and spread floodwaters or reduce the impacts of floods?	
Importance of these wetlands in cleaning/filtering water that enters the property:	
Recreational values of the wetlands (e.g. fishing, swimming):	
Cultural values of the wetlands (indigenous; other/recent):	
Other ecosystem services provided by the wetlands (e.g. honey production):	

Natural values of the wetlands in the plan area	
Plant species in wetlands in the plan area have been listed? (For which sites?)	
Animal species in wetlands in the plan area have been listed? (For which sites? Birds/frogs/others?)	
Threatened species that occur in the wetlands (give names):	
Significant functions provided by the wetlands—drought refuges:	
Significant functions provided by the wetlands—breeding/nursery sites:	
Significant functions provided by the wetlands—migration stop-over:	
Significant functions provided by the wetlands—other functions:	
Status under Aquatic Conservation Assessment[2] (ask NRM staff):	
Other natural values of the wetlands:	

Maps: Mark the locations of site-specific production and social and natural values (related to the wetlands in this plan) on one of the maps (see section 3.5 below).

[2] See report online at EHP 2012f.

3.2 Rationale and response

Issue (matter of concern or threat[3] to natural or production values)	Location (name of paddock or wetland)	Proposed management action[4] to address the issue (can have more than one action)	Likely risks to success of the proposed action	Expected outcomes (results and benefits of action)
		1 -		
		2 -		
		3 -		
		4 -		
		5 -		
		6 -		
		7 -		

Add more rows as required.

Examples:

Issue (matter of concern or threat to natural or production values)	Location (name of paddock or wetland)	Proposed management action to address the issue (can have more than one action)	Likely risks to success of the proposed action	Expected outcomes (results, benefits of action)
Collapse of banks of Sandy Creek	Right across property (25 km)	1 – Fence creek area out to exclude stock permanently on both sides	High cost of fencing may discourage this action	No trampling, shrubs will regrow, banks will stabilise
Swamp country no longer provides high quality feed	Gum Swamp, Jock's Swamp	2 – Exclude stock from swamps until well after native plants have set and dropped seed, for three years	Low rainfall may reduce capacity to use alternative pasture in key months	The vigour and ground cover of feed plants will increase

[3] See examples of threats in the report by WetlandCare Australia (2008).
[4] See examples of possible management actions in online resources such as Queensland's guidelines for managing coastal wetlands in grazing systems (DEEDI 2011b), wetland management profiles (EHP 2012d) and conceptual models for inland wetlands (EHP 2012g).

3.3 Budget for actions

Category	Description	Relevant action/s	Unit cost	Total cost
Total:				

Note that a review of the total cost of the proposed management actions may show that some actions are too costly; other options may need to be considered.

Examples:

Category	Description	Relevant action/s	Unit cost	Total cost
Materials	Barbed wire, 2 strand, 7 km	1 and 2	$90 per km	$630
Labour	Dozer driver to clear stumps & sticks along fencing strip (swamps): 6 hours	2	$40 per hour	$240

3.4 Schedule and monitoring

Planned action	Lead responsibility	Target start date	Target finish date	Progress notes

Examples:

Planned action	Lead responsibility	Target start date	Target finish date	Progress notes
1	John S.	1 Aug 10	15 Aug 10	Work delayed by rain but completed by 31 October 2010
2	Bill S. and contractor	15 May 11	15 Sep 11	Waiting for contractor to become available
7	NRM facilitator (to lead on the monitoring)	31 Mar 11	30 June 12	Ground cover measured at site in April and October in 2011; next survey due in April 2012

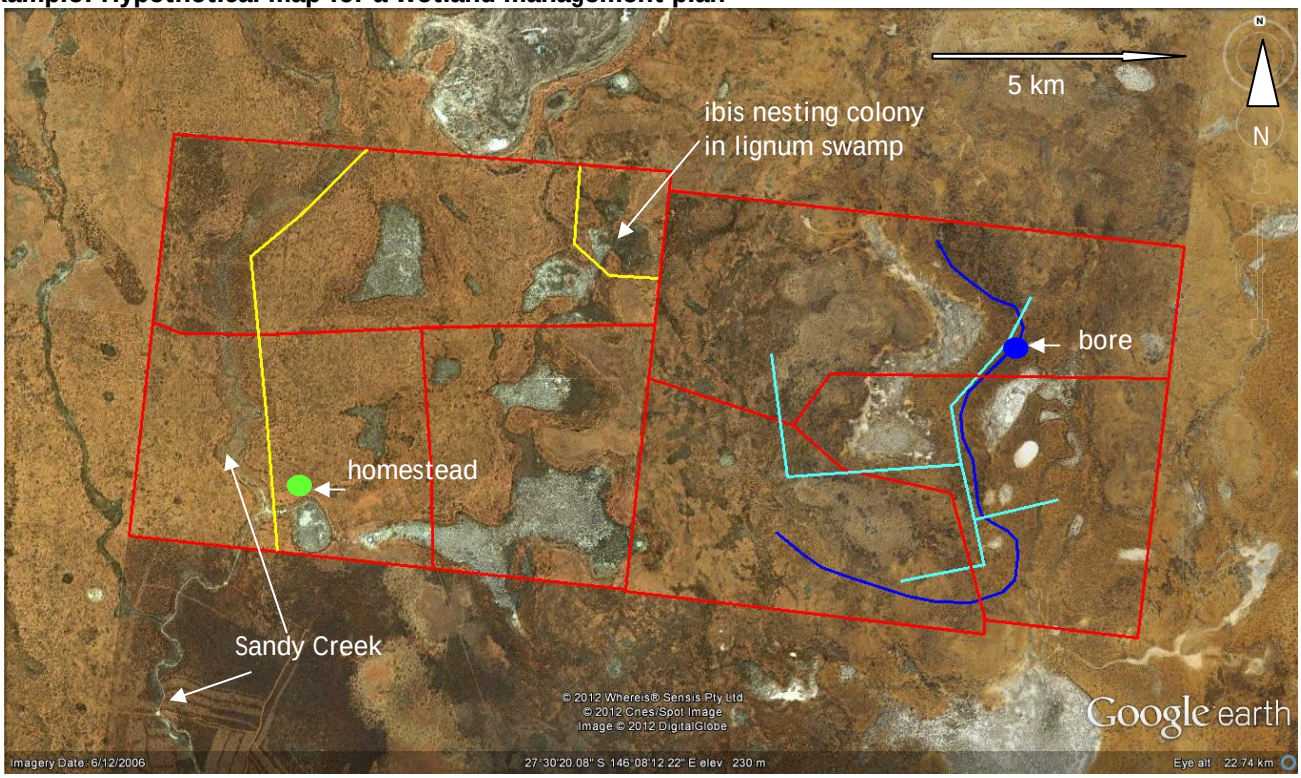
3.5 Preparing maps for this plan

This section provides detailed guidance on how to prepare maps for a wetland management plan, including specifications on items to be included. Additional guidance is given in sources such as the Convention on Wetlands (2009) and guidelines produced by the Western Australian Department of Environment and Conservation (2008).

- Determine what scale of map will be appropriate:
  - 1:100 000 scale may work best for a large property or a sub-catchment (e.g. covering 25 000 ha to 50 000 ha) because it will probably show everything on one page.
  - 1:25 000 or 1:10 000 may work best for a single property of small or moderate size (e.g. up to 10 000 ha in area), or as an additional map to show portions (insets) of the plan area, because these larger scale maps allow sufficient detail to be shown on one page.
- Decide if you will use a base map (e.g. an online satellite image), by copying the essential features from the base map to make a new map or to overlay your information. Otherwise, you could create a map from scratch, though that may be more challenging.
- Basic items to include on the map for the management plan:
  - a North point
  - a scale – either as a line with distance marks, or expressed as a ratio (e.g. 1:50 000)
  - the boundary of the area to which the management plan applies
  - the boundary of each property included in the plan
  - location of homesteads
  - public access roads
  - all wetlands that will be affected by the plan, e.g. rivers, creeks, billabongs, swamps, lakes and springs and names (official or unofficial), should be written in where they exist
  - a simple legend or key to explain any symbols used on the map
  - date on which your prepared map was finalised.

- Note that it may not be necessary to fill the map with items or features that are not directly relevant to the management plan. Some items may not apply to your plan.
- Key aspects of the management plan should be marked either on the same map, or if that will become too cluttered, on one or more extra maps copied from the first map.
- Additional items to depict:
  - paddocks (named or numbered) and property tracks, if that is important to understanding where management actions will occur
  - existing infrastructure related to water, e.g. locations of bores, drains, weirs, stock dams, off-stream watering points.
  - any other essential information about the farming enterprises, which closely relate to the wetland management plan
  - locations of key biodiversity values, e.g. endangered vegetation communities relevant to wetlands, waterbird breeding colonies, drought refuges for fish
  - mappable issues or threats, e.g. areas infested with weeds, areas with low percentage of desired ground cover, erosion gullies to be treated
  - mappable management actions, e.g. positions of proposed new fences and watering points, stock exclusion zones.

Example: Hypothetical map for a wetland management plan



Legend:

red line = existing fences (outer fence = boundary of plan area)
yellow line = proposed new fences
dark blue line = existing bore drain
pale blue line = proposed poly pipeline to new watering points
grey or white areas = swamps

Proposed management actions:

Fence one side of Sandy Ck to control (reduce) grazing along creek.
Fence out the ibis nesting colony (small stock exclusion zone).
Close down the bore drain and replace with piping to new watering points in three paddocks.

4 Glossary and references

4.1 Glossary

The following is an explanation of terms or technical names used in this document or often used in management planning for wetlands.

Best management practice (BMP) – agricultural practice that reflects the current level of knowledge about farm management that sustains land, water and biodiversity resources without sacrificing [economic] productivity (DEEDI 2011a).

Biodiversity – the diversity of plant and animal life on earth at the genetic, species or ecosystem level.

Buffer zone – a wetland buffer is the transition zone between the wetland and the surrounding land use. Its purpose is to support the values and processes of the wetland and protect it from external threats (EHP 2012e).

Catchment – the total area draining into a river (watercourse or stream), reservoir or other body of water.

Ecosystem services – the benefits to humans that come from plants, animals and micro-organisms in nature interacting together as an ecological system, or 'ecosystem'. The functioning of natural ecosystems provides 'services' that are essential for human health and survival. Examples of the kinds of services we receive from nature include water filtration, maintenance of soil fertility, pollination, pest control, and cultural and spiritual fulfilment (Convention on Wetlands 2012).

Floodplain – a flat or nearly flat plain next to a river or stream, naturally subject to inundation during major floods. It is composed of alluvium, which is silt, sand or other material deposited during floods and is characterised by frequently active erosion and aggradation by channelled or over-bank stream flow.

Natural resource management (NRM) – the sustainable, long-term management of our environmental (or natural) resources, like soil, water and vegetation.

Sub-catchment planning – a local community process allowing landholders to address land, water, vegetation, other natural resource management and cultural issues at a landscape scale. Working at a landscape or sub-catchment scale, communities are able to coordinate effort to resolve many natural resource issues that cannot be dealt with by only working on individual properties in isolation. A key step in this process is group and family discussion, workshops and field activities, sharing of good science and adoption of best practices to inform practical property level planning and design.

Wetland – the official definition adopted by the Queensland Government:
In Queensland, wetlands are defined as areas of permanent or periodic/intermittent inundation, whether natural or artificial, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres.
To be classified as a wetland the area must have one or more of the following attributes:

- at least periodically the land supports plants or animals that are adapted to and dependent on living in wet conditions for at least part of their life cycle; or
- the substratum is predominantly undrained soils that are saturated, flooded or ponded long enough to develop anaerobic conditions in the upper layers; or
- the substratum is not soil and is saturated with water, or covered by water at some time.

This definition is based on the broad wetland definitions set out in the Convention on Wetlands (Ramsar, Iran, 1971) or what is more commonly referred to as the Ramsar Convention, and the Strategy for the Conservation and Management of Queensland Wetlands (1999).

Natural wetlands can be broadly classified into five categories: marine, riverine, estuarine, lacustrine and palustrine. These wetland systems can be further divided into wetland classes and types according to features such as geomorphology, hydrology, water properties (such as fresh or saline water) and dominant vegetation.

Additional terms are explained on pages 109-111 of Grazing for Healthy Coastal Wetlands (DEEDI 2011b).

4.2 Resources and sources of information

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