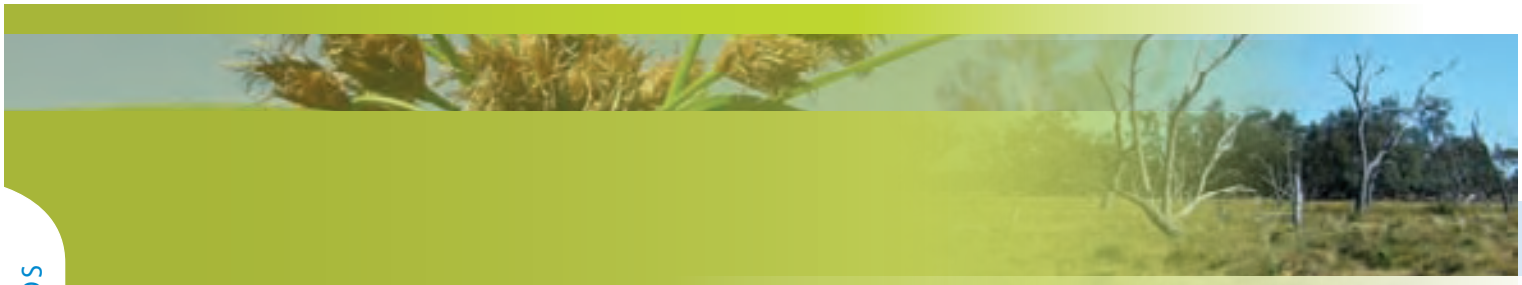


Understanding wetlands

Contents

Introduction

Healthy, well-watered wetlands can:

- provide breeding habitat for waterbirds, frogs, fish and other fauna;
- provide graziers with a valuable fodder resource for livestock;
- remove sediment and nutrients from flowing waters; and
- provide a visually pleasing landscape and recreational opportunities.

Wetlands are easily damaged, and the impacts of water management and landuse are probably the largest threats to most wetlands. This is clearly evident in two of the most well-known semi-arid wetlands of NSW, the Gwydir Wetlands and the Macquarie Marshes.

What are wetlands?

Wetlands can be described as:

> *land where an excess of water is the dominant factor determining the nature of soil development and the types of plant and animal communities living at the soil surface (DEWHA 2008).*

Wetlands (Queensland DPI&F 2008):

- support (at least periodically) plants or animals that are adapted and dependent on living in wet conditions for at least part of their life cycle; and/or
- have a substratum of predominantly undrained anaerobic soils that are saturated, flooded or ponded for long periods; and/or
- substratum that is not soil and is saturated or covered by water.

Importantly, ecological communities can be different between wetland areas and also within parts of the same wetland. This is because of the distribution of wetland types. Many different wetland types can be observed throughout the Gwydir Wetlands and Macquarie Marshes.

Importance of wetlands

Wetlands are important for their ecological diversity, the ecosystem services they provide and their fodder value to graziers. They can be important aesthetically and socially. Key wetlands functions include:

- nutrient deposition and cycling (water quality function);
- drought refuge for a variety of native birds and animals;
- migratory bird habitat; and
- flood mitigation.

Wetland formation

Wetland systems are highly variable. The formation of wetlands depends on the wetting regime and is determined by landscape hydrology, climate and scale. Wetting regime as described by Boulton and Brock (1999) considers the:

- timing of inundation;
- frequency of inundation;
- duration of inundation and the rate of depth change (days to years);
- extent and depth of inundation; and
- predictability of inundation.

Understanding wetlands

Floodplains are the flat expanse of land bordering rivers, streams and creeks. Due to their low topography, floodplains become inundated by high flows from the adjoining watercourse at varying intervals. Small local diffferences in floodplain relief result in areas where flood waters reside for longer intervals, otherwise called wetlands. Floodplain and wetland plant species may be distinguished by the greater tolerance of wetland plants to these longer periods of inundation.

Cumbungi seed head (NSW DPI)

Most wetlands are collectively called **temporary** because they are alternately wet and dry. Wetlands can be classified according to the predictability and duration of flooding (Boulton and Brock 1999):

- Ephemeral wetlands only fill after unpredictable rainfall and runoff. Surface water dries within days of filling and these wetlands rarely support macroscopic aquatic life.
- Episodic wetlands require an annual inflow of less than the minimum annual loss of water in 90% of years. Episodic wetlands are dry most of the time and have rare and very irregular wet phases that can persist for months.
- Intermittent wetlands are alternately wet and dry but less frequently and regularly than seasonal wetlands. Surface water persists for months to years.
- Seasonal wetlands are alternately wet and dry every year. Seasonal wetlands usually fill during the wet part of the year, and dry predictably and annually. Surface water persists for long enough that some macroscopic plants and animals are able to complete the aquatic stages of their life cycles.
- Permanent or near permanent (perennial) wetlands remain permanently filled with variable water levels. These wetlands have an annual water inflow that is greater than the minimum annual loss in 90% of years. Perennial wetlands dry occasionally but much of the flora and fauna are not adapted to drying.

Water Duration: **short**
Predictability: **low**

Water Duration: **long**
Predictability: **high**

Cropping (NSW DPI)

Rookery (Tara Shalk, DWE)

North marsh – Macquarie Marshes (NSW DPI)

Wetland formation (cont.)

In addition to the wetting regime, the wetting pattern refers to the spread of flooding across the landscape. The spread of water:

- is determined by the network of rivers, creeks, channels and depressions across each wetland;
- is influenced by blockages throughout the network;
- depends on small variations in landscape topography and by structures that restrict or divert flow; and
- determines where wetting occurs throughout a wetland with each flooding event.

The wetting regime and wetting pattern combine resulting in water depth differences across wetland areas. This produces a soil-moisture gradient which influences the formation of different ecological communities. For example, Common Reed communities occur in greater water depths than Water Couch meadows.

Land and water management can extensively modify landscapes and influences the wetting regime and wetting pattern. The impact of river regulation on the reduced frequency, duration, depth and extent of flooding has been widely reported (Kingsford 2000).

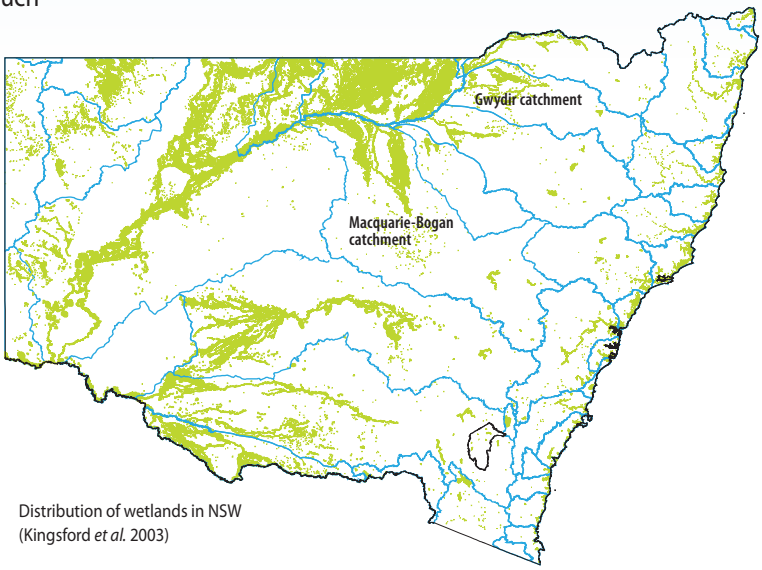
Distribution of NSW wetlands

New South Wales contains thousands of wetlands of all sizes. The NSW National Parks and Wildlife Service mapped the extent and distribution of larger functional wetlands (Kingsford *et al.* 2003).

NSW contains 178 larger wetlands (2,334,734 ha in total) (ANCA 1996) and this represents approximately 6% of NSW. The majority of wetlands in NSW are on private land and there is a commonly held view that some privately and publicly managed wetlands are highly degraded.

Wetland degradation refers to a reduction in wetland function and usually occurs because of:

- reductions in the frequency and extent of inundation events;
- land management practices; and
- land-use change.



Distribution of wetlands in NSW
(Kingsford *et al.* 2003)

Aerial view of the Gwydir Wetlands
(Leah Mackinnon, Border Rivers-Gwydir CMA)

North marsh-Macquarie Marshes (NSW DPI)

Management of wetlands

In addition to environmental and social benefits, wetlands provide many advantages for landholders that include:

- grazing values;
- feed security during drought;
- nutrient rich soils; and
- mitigating flooding events.

To maintain wetland ecosystems, flood waters are essential. In conjunction with this, landholders and management agencies must consider the health and function of wetlands in their management decisions. This will help to support:

- ecological values;
- drought management; and
- animal productivity.

Domestic cattle (NSW DPI)

Feral pigs (NSW DPI)

Authors

Steffan Holmes (NSW Department of Primary Industries)

Simon Speirs (NSW Department of Primary Industries)

Peter Berney (University of New England)

Harry Rose (NSW Department of Primary Industries)

The *Guidelines* are a product of the NSW Department of Primary Industries' *Best Management Practice for Grazing in Wetlands* project. The project was funded by the NSW Wetland Recovery Program, which is jointly funded by the State Government and the Australian Government's Water for the Future plan.

Acknowledgements

Thanks are extended to all landholders who have assisted throughout the development of these guidelines and to all those that contributed to the review of the *Guidelines*, as well as the particular assistance provided by:

Glenn Wilson (University of New England)

Liz Savage (Border Rivers-Gwydir CMA)

Phillip Graham (NSW Department of Primary Industries)

Renee Shepherd
(Department of Environment and Climate Change NSW)

Rodney Price (NSW Department of Primary Industries)

Shona Whitfield (Central West CMA)

Contributions to the preparation and presentation of these *Guidelines* by Belinda Gersbach (NSW DPI), Bill Noad (NSW DPI), David Duncan (Sustainable Soils Management) and Udai Pradhan (NSW DPI) are appreciated.

Guidelines for grazing in the Gwydir Wetlands & Macquarie Marshes
ISBN 978 0 7347 1985 0

Section 2: Understanding wetlands

ISBN 978 0 7347 1987 4

Disclaimer

The information contained in this publication is based on knowledge and understanding at the time of writing – May 2009. This information is not to be used in isolation from other information developed as part of the *Guidelines for grazing in the Gwydir Wetlands and Macquarie Marshes*.

Advances in knowledge since the publication of these *Guidelines*, means that users must ensure that information upon which they rely for management decisions is up to date and to check currency of the information with the appropriate officer of New South Wales Department of Primary Industries or the user's independent advisor.

NSW DEPARTMENT OF PRIMARY INDUSTRIES

Australian Government
Water for the Future

Department of Environment & Climate Change NSW

UNE
UNIVERSITY OF NEW ENGLAND

www.wetlandrecovery.nsw.gov.au