Water and Rivers Commission | **WN3 January 2000**

Water notes

GOVERNMENT OF WESTERN AUSTRALIA

Natural Heritage Trust

ADVISORY NOTES FOR LAND MANAGERS ON RIVER AND WETLAND RESTORATION

Wetland vegetation

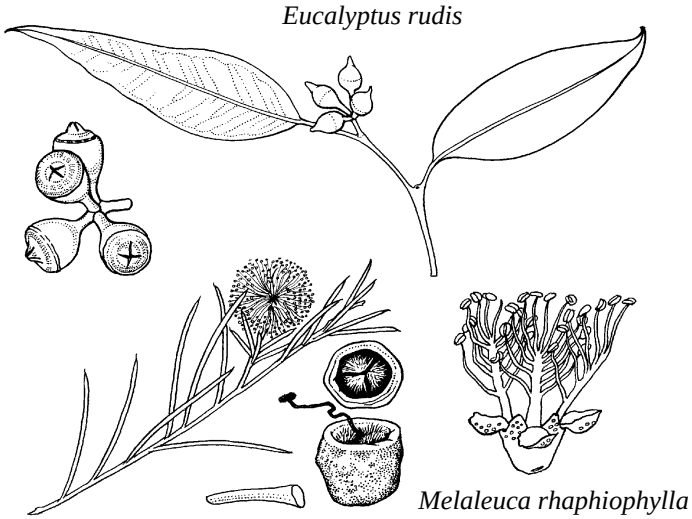
A plant community is a characteristic group of plants that grow naturally together in a particular environment. The composition of a plant community is determined by a complex interaction of several factors including climate, soil type, position in the landscape and competition between plant species. Wetlands are dynamic environments that can experience natural fluctuations in both water level and water quality. As a consequence some wetland plants are able to tolerate both flooding and short periods of drought within a single year.

There are two broad categories of wetland vegetation.

- Aquatic macrophytes are plants that live either completely submerged or floating or have some small portion of the plant emerging from the water. They may be attached (for example *Potamogeton* - Pondweed) or unattached to the sediment (for example *Lemna* - Duckweed).
- Emergent macrophytes are wetland plants which are always rooted in the sediment and whose growth habit results in the plant protruding above the water surface. For example *Baumea articulata* (Jointed twigrush) and *Typha orientalis* (Bulrush).

Emergent macrophytes are able to reproduce by either vegetative means or by the production of seed. Vegetative reproduction is more common and much more rapid than reproduction by seed. It involves growth of a below ground rhizome which grows parallel to the ground and produces a clone of its parent a short distance away. This mechanism allows emergent plant populations to change their distribution in response to changes in the wetland's hydrological regime. Emergent macrophytes such as sedges and rushes are able to respond to long term changes in water levels with recruitment of new individuals taking place either further upslope or downslope in response to higher or lower water levels. Rapid changes in wetland water levels can result from management practices such as the discharge of stormwater into a wetland or the installation of drains which lower wetland water levels. This can result in stress and in some cases death of wetland plants due to either a lack of water when water levels have dropped, or a lack of oxygen as a result of prolonged inundation.

Common wetland tree species such as *Melaleuca rhaphiophylla* (Swamp paperbark), *Melaleuca preissiana* (Modong) and *Eucalyptus rudis* (Flooded gum) reproduce by the production and dispersion of seed. As a consequence, they are unable to respond to rapid changes in water levels. They can however tolerate several years of continuous inundation before tree death occurs. Extended periods of low water levels (for example as a result of drought) is also likely to lead to mortality.



Common wetland plant species - *Eucalyptus rudis* (Flooded gum) and *Melaleuca rhaphiophylla* (Swamp paperbark).

Wetland vegetation functions

As primary producers[1], wetland plants have a vital role in wetland ecology. Wetland plants perform a number of other significant functions including:

- maintaining water quality by filtering out nutrients and sediments;
- providing food, shelter and breeding habitat for both aquatic and terrestrial fauna;
- preventing erosion; and
- contributing to the organic "tea" colour in wetlands and the shading of riparian zones which can reduce the frequency and severity of algal blooms.

Wetland areas are also valued for their landscape amenity, a large part of which is a consequence of the specialised and diverse plant species that are found in them.

Seasonal wetlands often have a higher diversity of aquatic and fringing vegetation in comparison to permanent wetlands. This is because there is a greater number of microhabitats in seasonal wetlands. This in turn increases macroinvertebrate species richness and provides food and shelter for waterbird populations. Seasonally waterlogged areas such as palusplains and damplands have been found to support very high levels of plant species richness. For example, the Brixton Street palusplain in Kenwick supports 517 plant species in an area of 30 hectares.

Threats to wetland vegetation

Lexia dampland, a seasonal waterlogged wetland. *S. Stratico*

Weed invasion is a major problem in wetlands resulting in increased competition for resources such as water, light, nutrients and space. Weed distribution is closely linked to increased levels of disturbance in wetlands from activities which include clearing, grazing, altered fire regimes and the spread of dieback.

In rural and semi rural areas grazing of wetland plants by livestock and pest species such as rabbits can have a serious impact upon wetland plant species diversity, distribution and health. Stock grazing can also result in soil compaction, increased nutrient levels, the introduction of weed species, trampling of native wetland plants and the ringbarking of mature trees. Introduced pests, such as rabbits, can have a very destructive impact upon annual species and young seedlings.

Wetland plants can be threatened by changes in both surface water and groundwater levels as a result of human activities. Wetland plants are sensitive to changes in hydrology which result in a wetland having too much or too little water. Abstraction of groundwater, for public or private use, or the construction of drains can lower the water table locally and significantly affect wetland hydrology and ecology. Wetland plants are dependent upon access to either surface water or groundwater and a decline in the watertable can result in plant deaths and changes in species composition and distribution.

Elevated wetland water levels can also pose a significant threat to wetland vegetation. Increased wetland water levels are closely linked to clearing within wetland catchments which leads to elevated groundwater levels and increased surface runoff as a result of reduced evapotransiration and increased recharge. Wetlands are also commonly used for the disposal of stormwater which can significantly alter water regimes and adversely impact upon water quality.

One species of emergent macrophyte that is causing problems in wetlands on the Swan Coastal Plain is the introduced bulrush *Typha orientalis*. Its distribution and abundance has increased substantially in several coastal plain wetlands as a consequence of changes in hydrology, nutrient enrichment and disturbance.

Protecting wetland vegetation

Fencing is an important management tool used to prevent livestock and pest grazing, reduce trampling of wetland vegetation and to limit human activities to appropriate areas. Both the wetland and its dryland buffer should be fenced to adequately protect the wetland system. There are many different fencing options and it is important to identify the specific management requirements so that the location and design of fencing and gates, is appropriate and effective.

[1] Plants convert carbon dioxide and water into sugars and other complex carbon compounds by means of photosynthesis. This organic matter produced forms the basis of wetland food webs.

Control of weed species is essential to maintain native plant communities in wetlands. The appropriate method of weed control or removal will depend on the type of weed problem. Examples of some methods used to control terrestrial weed species are:

- manual removal by either hand weeding, using a knife or trowel, crown cut or digging out the entire plant;
- mulching in disturbed areas;
- herbicide spraying or wiping (care must be taken to avoid herbicide drift and not to use chemicals which may leach into the wetland); and
- stem injection with herbicide or the painting of herbicide on the freshly cut stump to control weed trees or large shrubs.

A permanent wetland showing healthy emergent vegetation.

Preventative management is the best method of weed control. This means:

- garden rubbish and clippings should never be disposed of in wetlands;
- not planting invasive exotic species in parkland next to wetlands;
- removing problem plants immediately, to prevent them from spreading and taking hold;
- clearing weeds around seedlings for the first two years to dramatically improve growth and survival rates;
- maintaining overstorey native trees that will help to shade out many weeds;
- taking care when spraying for weeds on adjacent land to avoid spray drift into wetland areas; and
- fire management is necessary to prevent the loss of fire sensitive and fire dependent native plant species and to avoid increased weed invasion.

In conjunction with weed control it is important to rehabilitate native wetland vegetation to prevent further weed invasion, protect wetland water quality and provide habitat for native flora and fauna.

Further reading

Available from Water and Rivers Commission

Water note WN1, *Wetlands and weeds*
Water note WN2, *Wetlands and fire*
Water note WN4, *Wetland buffers*
Water note WN5, *Wetlands as waterbirds habitat*

Available from other sources

Australian Association for Environmental Education (WA) (1994) *Forum Proceedings.* Weeding Western Australia; A forum for Land Managers.

Balla, S. (1994) *Wetlands of the Swan Coastal Plain, Volume 1. Their nature and management*. Water Authority of Western Australia and the Department of Environmental Protection, Australia.

Brouwer, D. (1995) *Managing your wetlands on farms*. NSWAgriculture.

Buchanan, R.A. (1991) *Bush Regeneration: Recovering Australian landscapes*. TAFE, Sydney, Australia.

Chambers, J.M. Fletcher, N.L. and McComb, A.J. (1995) *A Guide to Emergent Wetland Plants of South Western Australia*. Marine and Freshwater Research Laboratory, Murdoch University.

Froend, R.H. Farrell, R.C.C. Wilkins, C.F. Wilson, C.C. and McComb, A.J. (1993) *Wetlands of the Swan Coastal Plain, Volume 4. The Effect of Altered Water Regimes on Wetland Plants*.

Hussey, B.M.J. Keighery, GJ. Cousens, RD. Dodd, J. Lloyd, SG. (1997) *Western Weeds: A guide to the weeds of Western Australia*. Plant Protection Society of Western Australia.

Hussey, B.M.J. and Wallace, K.J. (1993) *Managing your bushland.* Department of Conservation and Land Management, Perth, Western Australia.

Powell, R. (1990) *Leaf and Branch - Tree and tall shrubs of Perth*. Department of Conservation and Land Management, Perth Western Australia.

Schetlma, M. and Harris, J. (eds.) (1995) *Managing Perth's Bushlands: Perth's bushlands and how to manage them*. Greening Western Australia. Perth, Western Australia.

Storey, AW. Vervest, RM. Pearson, GB. and Halse, SA. (1993) *Wetlands of the Swan Coastal Plain, Volume 7. Waterbird usage of wetlands on the Swan Coastal Plain*. Water Authority of Western Australia and Environmental Protection Authority, Australia.

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