



The transition from Freshwater Wetlands to Swamp Oak Floodplain Forest and Swamp Sclerophyll Forest can be seen here. Photo: Lucas McKimmon



Freshwater Wetland overrun by the weed species, Water Hyacinth (*Eichhornia crassipes*). Photo: Lucas McKimmon



Freshwater Wetlands in a cleared landscape near Grafton showing important conservation significance. Photo: Hugh Robertson



Freshwater Wetlands provide important feeding and breeding habitat for migratory birds like the Cattle Egret and Australian White Ibis as seen here. Photo: Suzette Rodoreda

Degraded sites – conservation significance of remnants

The degree of disturbance (i.e. the site condition) of any remnant of Freshwater Wetlands may vary depending on past land use, management practices and/or natural disturbance and this should be considered at the time of assessment. Whilst not exhaustive, the following are a number of variations of Freshwater Wetlands you may encounter on your land:

1. Damp depressions no longer subject to regular flooding due to changed drainage regimes such as upstream dams or drawdown from irrigation;
2. Damp depressions with low grass structure due to grazing or slashing (wetland species will often recover if this disturbance is removed);
3. Water bodies invaded with floating weeds such as Water Hyacinth (*Eichhornia crassipes*);
4. Vegetated waterbodies enclosed by artificial earthwalls for water storage;
5. Dry cracked soil with low grass type species emerging (i.e. during drought or drying phase);
6. Large monocultures of reed species such as Common Reed and/or Cumbungi.

Even where a remnant is considered to be heavily degraded and in poor condition, it may still have conservation value for a number of reasons including:

1. As part of a stream/wetland corridor that has connective importance for dispersal of native flora and aquatic organisms;
2. Providing important habitat and food source for freshwater fish and amphibian species;
3. Providing a water and food source for native mammal and bird species;
4. It may contain threatened species of flora such as *Aldrovanda vesiculosa*, *Maundia triglochmoides* and *Persicaria elatior*; and/or
5. Maintaining a healthy native seed bank and preserving local provenance (i.e. genetic integrity).

It is important to take these factors into account when determining the conservation significance of remnants.

Disclaimer: The Department of Environment and Climate Change has prepared this document as a guide only. The information provided is not intended to be exhaustive. It does not constitute legal advice. Users of this guide should do so at their own risk and should seek their own legal and other expert advice in identifying endangered ecological communities. The Department of Environment and Climate Change accepts no responsibility for errors or omissions in this guide or for any loss or damage arising from its use.

For further assistance

This and other EEC guidelines are available on DECC Threatened Species website threatenedspecies.environment.nsw.gov.au/

The references listed below also provide further information to aid in identifying EECs.

- Aston, H.I. (1977) *Aquatic Plants of Australia: A Guide to the Identification of the Aquatic Ferns and Flowering Plants of Australia, both Native and Naturalised*. Melbourne University Press.
- Botanic Gardens Trust plant identification assistance: rbgsyd.nsw.gov.au/information_about_rbsyd/botanical_info/plant_identification
- Botanic Gardens Trust PlantNET: plantnet.rbgsyd.nsw.gov.au/search/simple.htm
- Freshwater Wetlands on Coastal Floodplains species profile: threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10929
- Harden, G. (ed) *Flora of NSW Vols 1 – 4* (1990-2002). NSW University Press.
- Keith, D.A. and Scott, J. (2005) *Native vegetation of coastal floodplains - a diagnosis of the major plant communities in New South Wales*. Pacific Conservation Biology, 11(2): 81-104.
- NSW Scientific Committee Determinations: environment.nsw.gov.au/committee/FinalDeterminations.htm
- Robinson, L (2003) *Field guide to native plants of Sydney revised 3rd edition*. Kangaroo Press.
- Sainty, G. R. and Jacobs, S. W. (2003) *Australian Waterplants – A Field Guide*. CSIRO Publishing, Australia.
- Stephens, K. M. and Dowling, R. M. (2002) *Wetland Plants of Queensland: A Field Guide*. CSIRO Publishing, Collingwood, Victoria.
- Thackway, R, and Cresswell, I. (1995) (eds) *An interim biogeographic regionalisation of Australia: a framework for establishing the national system of reserves.* (Australian Nature Conservation Agency: Canberra).

Freshwater Wetlands on Coastal Floodplains (Freshwater Wetlands)

Introduction

These guidelines provide background information to assist land managers and approval authorities to identify remnants of Freshwater Wetlands on Coastal Floodplains (hereafter referred to as Freshwater Wetlands), an Endangered Ecological Community (EEC). For more detailed information refer to the Freshwater Wetlands Profile and the NSW Scientific Committee Final Determination at: threatenedspecies.environment.nsw.gov.au

What is an Endangered Ecological Community?

An ecological community is an assemblage of species which can include flora, fauna and other living organisms that occur together in a particular area. They are generally recognised by the trees, shrubs and groundcover plants that live there. An Endangered Ecological Community is an ecological community listed as facing a very high risk of extinction in NSW under the *Threatened Species Conservation Act 1995*.

What are Freshwater Wetlands?

Freshwater Wetlands is an ecological community associated with periodic, semi-permanent or permanent inundation by freshwater, although there may be minor saline influence in some wetlands. Meadows of grasses, sedges and rushes

What is the Coastal Floodplain?

Floodplains are level landform patterns on which there may be active erosion and deposition by flooding where the average interval is 100 years or less.

Coastal floodplains include coastal river valleys, alluvial flats and drainage lines below the escarpment of the Great Dividing Range. While most floodplains are below 20m in elevation, some may occur on localised river flats up to 250m elevation. However, there may be local variation associated with river channels, local depressions, natural levees and river terraces. The latter are areas that rarely flood anymore due to the deepening or widening of streams.

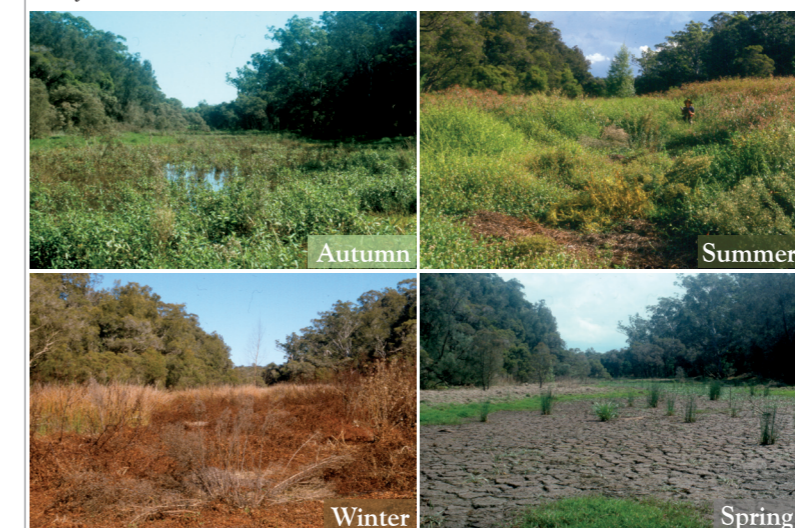
occur where submersion is not prolonged, while aquatic herbs dominate where semi-permanent or permanent standing water is present. Under the influence of saline water tall reeds and rushes dominate. The boundaries of Freshwater Wetlands are dynamic, and vary greatly depending on rain and other climatic factors. A remnant may be considered part of the EEC even when the site is completely dry (see photos).

The final determination of the NSW Scientific Committee for Freshwater Wetlands does not delineate between higher and lower quality remnants of this community. It specifically notes that the composition and structure of the vegetation found is influenced by grazing history, changes to drainage regime and soil

salinity, catchment runoff and disturbance, and may have a substantial component of exotic grasses and forbs. These degraded states are still considered to be part of this ecological community.

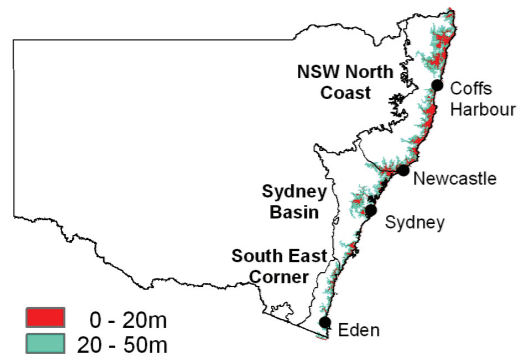
Whilst artificial wetlands created on previously dry land for purposes such as sewerage treatment, stormwater management and farm production, are not regarded as part of this community, they may still provide important habitat for threatened species.

The variation in species composition and vegetation structure between seasons can be seen clearly below.



Photographs: Jocelyn Howell

Where are Freshwater Wetlands found?



Freshwater Wetlands typically occur on silts, muds or humic loam soils in depressions, flats, drainage lines, backswamps, lagoons and lakes associated with the Coastal Floodplain (see page 1) and are not influenced by tidal exchange. The community is usually found below 20m in elevation in the NSW North Coast, Sydney Basin and South East Corner bioregions as mapped above.

Description of the community

The Tree and Shrub layer

Freshwater Wetlands typically have a scarcity to complete absence of woody species, but as they co-exist with other forested vegetation types (e.g. Swamp Oak Floodplain Forest), there may be scattered occurrences of *Casuarina* or *Melaleuca* species found within them, particularly around wetland edges and in transition areas between these communities.

The Reed layer

The community will often consist of large patches of Broad-leaved Cumbungi (*Typha* species) or Common Reed (*Phragmites australis*). These reeds will often exceed 2m in height and can form large monocultures.

The Ground layer – Terrestrial and Aquatic Herbs

The structure and composition of the community varies throughout the year both in space and time depending on the water regime. The structure of the community may vary between years as well as between seasons (see photos).

Wetlands or parts of wetlands that lack standing water most of the time are usually dominated by dense grassland, sedge/land or rushland vegetation, often forming a turf less than 0.5m tall and dominated by amphibious plants including Water Couch (*Paspalum distichum*), Swamp Rice-grass (*Leersia hexandra*), Spiny Mud Grass (*Pseudoraphis spinescens*) and Tall Sedge (*Carex appressa*).

Wetlands or parts of wetlands subject to regular inundation and drying may include large emergent sedges / rushes over 1m tall, such as Jointed Twig-rush (*Baumea articulata*), Spike sedges (*Eleocharis* species), *Juncus usitatus*, *Persicaria* species, *Bolboschoenus* species and *Schoenoplectus* species and *Lepironia* (*Lepironia articulata*), as well as emergent or floating herbs such as Frogbit (*Hydrocharis dubia*), Frogsmouth (*Philydrum*

lanuginosum), Water Primrose (*Ludwigia peploides* subsp. *montevicensis*), Nardoo (*Marsilea mutica*) and Water Milfoils (*Myriophyllum* species).

As standing water becomes deeper or more permanent, amphibious and emergent plants become less abundant, while floating and submerged aquatic herbs become more abundant. These latter species include Azolla (*Azolla* species), Hornwort (*Ceratophyllum demersum*), Water Thyme (*Hydrilla verticillata*), Duckweeds (*Lemna* species), Water Snowflake (*Nymphoides indica*), Swamp Lily (*Ottelia ovalifolia*) and Pondweeds (*Potamogeton* species) and in the north of NSW, Giant Waterlily (*Nymphaea gigantea*).

EECs that may adjoin or intergrade with Freshwater Wetlands

This community occurs with, would have previously occurred with or closely resembles other coastal floodplain ecological communities which are now also listed as EECs. Collectively, these EECs cover all remaining native vegetation on the coastal floodplains of NSW. These EECs are:

1. Swamp Oak Floodplain Forest, Coastal Saltmarsh or Swamp Sclerophyll Forest on Coastal Floodplains where there is increasing estuarine influence;
2. River-Flat Eucalypt Forest on Coastal Floodplains and Sub-tropical Coastal Floodplain Forest (north of Port Stephens) where soils become less waterlogged;
3. Lowland Rainforest on Floodplain in the NSW North Coast bioregion;
4. Sydney Freshwater Wetlands: this community may include a component of woody plant species and is associated with sandplains in the Sydney Basin bioregion. It is distinct from Freshwater Wetlands on Coastal Floodplains.

Collectively, these communities encompass the full range of intermediate native vegetation assemblages on the Coastal Floodplain.

How can I identify areas of Freshwater Wetlands

The following are 'Key Indicators' to look for when identifying Freshwater Wetlands:

1. Is the site on the coastal floodplain of the NSW North Coast, Sydney Basin or South East Corner bioregion (see map and box)?
2. Is the site periodically inundated with or does it maintain a body of semi-permanent or permanent freshwater?
3. Does the site consist of relatively few woody plants?
4. Are more than a few of the species present at the site listed as characteristic of Freshwater Wetlands in the table (check with local botanist, consult reference books or see plantnet.rbgsvd.nsw.gov.au)?

If you answered yes to the above questions your site is likely to consist of Freshwater Wetlands and you should seek expert advice.

Characteristic Species List

Freshwater Wetlands are characterised by the species listed in table below. They have been identified by the NSW Scientific Committee and from the scientific literature. The species present at any site will be influenced by the size of the site, recent rainfall or drought conditions and by its disturbance (including grazing and drainage changes) history. Note that NOT ALL the species listed below need to be present at any one site for it to constitute Freshwater Wetlands.

Scientific Name	Common Name (range)
Grasses	
<i>Hemarthria uncinata</i>	Matgrass
<i>Leersia hexandra</i>	Swamp Ricegrass (N - Syd)
<i>Panicum obseptum</i>	White Water Panic
<i>Paspalum vaginatum</i>	Saltwater Couch
<i>Paspalum distichum</i>	Water Couch
<i>Pseudoraphis spinescens</i>	Spiny Mud-grass
Herbs	
<i>Centipeda minima</i>	Spreading Sneezeweed
<i>Eclipta platyglossa</i>	Yellow Twin-heads
<i>Eclipta prostrata</i>	White Eclipta
<i>Gratiola pedunculata</i>	Stalked Brooklime
<i>Ludwigia peploides</i> subsp. <i>montevicensis</i>	Water Primrose
<i>Maundia triglochoides</i> (T)	Small Water-ribbons (N-Syd)
<i>Myriophyllum crispatum</i>	Upright Water-milfoil
<i>Myriophyllum latifolium</i>	Water-milfoil
<i>Myriophyllum variifolium</i>	Variable Water-milfoil
<i>Nymphoides geminata</i>	Entire Marshwort (N - Syd)
<i>Nymphoides indica</i>	Water Snowflake (N - Syd)
<i>Persicaria attenuata</i>	Smartweed
<i>Persicaria decipiens</i>	Slender Knotweed
<i>Persicaria hydropiper</i>	Water Pepper
<i>Persicaria lapathifolia</i>	Pale Knotweed
<i>Persicaria strigosa</i>	Prickly Smartweed
<i>Ranunculus inundatus</i>	River Buttercup
<i>Utricularia australis</i>	Floating Bladderwort
Reeds	
<i>Phragmites australis</i>	Common Reed
<i>Typha orientalis</i>	Broad-leaved Cumbungi
Sedges & Rushes	
<i>Baumea articulata</i>	Jointed Twig-rush
<i>Baumea rubiginosa</i>	Twig-rush
<i>Bolboschoenus caldwelii</i>	Club-rush
<i>Bolboschoenus fluviatilis</i>	Marsh Club-rush
<i>Carex appressa</i>	Tall Sedge
<i>Cyperus lucidus</i>	Leafy Flat Sedge
<i>Eleocharis acuta</i>	Common Spike Sedge
<i>Eleocharis equisetina</i>	A Spike Sedge (N - B-Bay)
<i>Eleocharis minuta</i>	A Spike Sedge (N - J-Bay)
<i>Eleocharis sphacelata</i>	Tall Spike Sedge

N = North of; B-Bay = Batemans Bay; Clar = Clarence River; Coffs = Coffs Harbour; J-Bay = Jervis Bay; Pict = Picton; Syd = Sydney; W'Gong = Wollongong; (T) = threatened species. For further help with identification see:

plantNET.rbgsvd.nsw.gov.au/search/simple.htm

Scientific Name	Common Name (range)
<i>Fimbristylis dichotoma</i>	Common Fringe-sedge
<i>Juncus polyanthemus</i>	A Sharp Rush (N - W'Gong)
<i>Juncus usitatus</i>	Common Rush
<i>Lepironia articulata</i>	Lepironia (N - Pict)
<i>Schoenoplectus subulatus</i> (formerly <i>Scirpus litoralis</i>)	Shore Club-sedge
<i>Schoenoplectus mucronatus</i>	A Club Sedge (N - Syd)
<i>Schoenoplectus validus</i>	River Club-sedge
Aquatic Herbs	
<i>Alisma plantago-aquatica</i>	Water Plantain
<i>Azolla filiculoides</i> var. <i>rubra</i>	Red Azolla
<i>Azolla pinnata</i>	Azolla
<i>Brasenia schreberi</i>	Watershield
<i>Ceratophyllum demersum</i>	Hornwort
<i>Hydrilla verticillata</i>	Water-thyme
<i>Hydrocharis dubia</i>	Frogbit (N - Clar)
<i>Lemna</i> spp. (<i>L. disperma</i> & <i>L. trisulca</i>).	Duckweed
<i>Marsilea mutica</i>	Nardoo
<i>Najas marina</i>	Prickly Waternymph
<i>Najas tenuifolia</i>	Waternymph
<i>Nymphaea gigantea</i>	Giant Waterlily (N - Coffs)
<i>Ottelia ovalifolia</i>	Swamp Lily
<i>Philydrum lanuginosum</i>	Woolly Waterlily
<i>Potamogeton crispus</i>	Curly Pondweed
<i>Potamogeton ochreateus</i>	Blunt Pondweed
<i>Potamogeton perfoliatus</i>	Clasped Pondweed
<i>Potamogeton tricarinatus</i>	Floating Pondweed
<i>Spirodela</i> spp. (<i>S. polyrhiza</i> & <i>S. pinnata</i>)	Thin Duckweed
<i>Triglochin procera</i>	Water Ribbons
<i>Vallisneria gigantea</i>	Ribbonweed
<i>Wolffia</i> spp.	Wolffia



Azolla & Slender Knotweed herb, species in Freshwater Wetlands. Photo: Lucas McKinnon