



Department of **Biodiversity,  
Conservation and Attractions**

## **Wetland identification and delineation: information for mapping and land use planning on the Swan Coastal Plain.**

The Swan Coastal Plain, Western Australia supports globally distinct and unique wetlands that provide a range of important ecological and social values. Wetlands occupy greater than 25 per cent of the land surface on the Swan Coastal Plain, from Wedge Island to Dunsborough and the majority of these wetlands have been lost or impacted by human activities (Hill *et al.* 1996).

The Department of Biodiversity, Conservation and Attractions (DBCA) is the current custodian of the wetland mapping dataset for the Swan Coastal Plain. Mapping that displays boundaries, types and management categories for wetlands on the Swan Coastal Plain is publicly available through the *Geomorphic Wetlands Swan Coastal Plain* dataset (dataset). This dataset as well as other wetland information can be accessed through links provided at [www.dpaw.wa.gov.au/management/wetlands](http://www.dpaw.wa.gov.au/management/wetlands).

*A methodology for the evaluation of wetlands on the Swan Coastal Plain, Western Australia* (Department of Biodiversity, Conservation and Attractions 2017) has been prepared to provide a current method on how to evaluate wetlands. A wetland identification and delineation methodology has not yet been prepared for the Swan Coastal Plain. The type of information that DBCA requires to assess a request to review a geomorphic wetland boundary and/or provide technical advice in land use planning processes is provided below. Please contact the Wetlands Section of DBCA to clarify any additional requirements that may apply to your particular situation.

This information sheet replaces the wetland identification and delineation guidance provided in *Protocol for proposing modifications to the Geomorphic Wetlands Swan Coastal Plain dataset* (Department of Environment and Conservation 2008).

The identification and delineation of a wetland is reliant upon characteristics of hydrology, hydric soils and wetland vegetation (Hill *et al.* 1996). Any investigation into the delineation of a geomorphic wetland boundary or demonstration of the presence/absence of a wetland should incorporate information addressing all three wetland determining characteristics. A single characteristic may not provide sufficient justification for the delineation of a geomorphic wetland boundary. Proposed wetland boundaries should consider the entire geomorphic wetland and not be restricted to cadastral boundaries or a particular study area.

A wetland is defined in Schedule 5 of the *Environmental Protection Act 1986* as:

‘wetland’ means an area of seasonally, intermittently or permanently waterlogged or inundated land, whether natural or otherwise, and includes a lake, swamp, marsh, spring, dampland, tidal flat or estuary.

## Hydrology

Hydrology is dynamic and varies annually, seasonally and between wetlands. As such, long term data are required to accurately assess surface water and groundwater levels and patterns (Tiner 1999). For those wetlands that are surface expressions of the groundwater table, a single groundwater level reading may not reflect the groundwater table across an entire wetland. For example, vegetation is known to affect wetland hydrology (Tiner 1999) and may influence groundwater levels across the wetland. Analysis of site specific topographical and groundwater contours may provide an indication of inundated or waterlogged areas.

The type of hydrological information to consider in a wetland identification and/or delineation investigation may include:

- aerial photographs overlaid with topographical and groundwater contours and the geomorphic wetland type boundary from the current dataset
- any available groundwater data
- site specific profile of maximum groundwater level across the wetland (i.e. from on-site hand auger holes, incorporating measurements from the wetland centre and margins)
- visual observations or indicators of inundation or waterlogging (e.g. water marks).

## Hydric soils

Hydric soils are formed in response to prevailing inundation or waterlogging (Hill *et al.* 1996) and are a long-term wetland determining characteristic that can form the basis for wetland delineation in association with vegetation and hydrology. In situations where wetland vegetation has been altered or removed and the hydrology is difficult to determine, hydric soils may be the only reliable wetland indicator remaining. Hydric soils can be difficult to identify in seasonally waterlogged wetlands such as damplands and palusplains due to the fact that these wetland soils experience less saturation than seasonally inundated wetland soils. Information on the hydric soils of the Swan Coastal Plain is detailed in Semeniuk and Semeniuk (2004).

The type of soil information to consider in a wetland identification and/or delineation investigation may include:

- available information from existing maps and databases
- evidence of hydric soils (e.g. peats, peaty sands and carbonate muds)
- evidence of an impervious layer (e.g. clay, laterite)
- evidence of anthropogenic fill
- soil profile analyses from the centre and margins of the wetland (i.e. description of the soil components from an auger sample e.g. at 10cm intervals along the core) and the date and location of auger sample sites illustrated on an aerial photograph
- evidence of biogenesis associated with waterlogging or inundation (e.g. algal or invertebrate remains)
- evidence of biochemical processes associated with waterlogging or inundation (e.g. mottling)

- analyses of the variation between wetland and dryland soil profiles discussing:
  - the existing mapped wetland (as per the dataset)
  - the area proposed for modification
  - the area outside of the wetland (i.e. dryland).

It is important to note that the use of broad scale soil mapping (e.g. 1:250,000) is not considered sufficient for site specific wetland delineation.

### **Wetland vegetation**

Wetland vegetation reflects hydrology and hydric soils. In particular, obligate wetland species (i.e. those plants generally restricted to wetland habitats) are considered reliable wetland indicators (Tiner 1999). On the Swan Coastal Plain, when considering wetland identification and delineation, it is also important to note that facultative species (i.e. those plants that can occur in wetland and dryland habitats) can be common, notably in dampland and palusplain wetlands, or peripheral to sumpland and lake wetlands. It is therefore important to recognise the opportunism and longevity of species, both obligate and facultative, in response to disturbance and changing environmental conditions where annual rainfall is variable. For example, when the climate is drier than in previous years, there may be a combination of opportunistic short-lived facultative species and longer lived obligate species co-inhabiting a wetland environment. It is also important to consider flora species in the context of their location on the Swan Coastal Plain, the vegetation community and the density of species occurrence.

The type of vegetation information to consider in a wetland identification and/or delineation investigation may include:

- a vegetation survey in accordance with *Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment* (Environmental Protection Authority 2016) at the level of a reconnaissance survey
- the vegetation survey should include:
  - at least one sample plot (10m x 10m) per mapped vegetation unit with additional plots to demonstrate the variation of floristics and condition within the unit
  - location of the plot sites illustrated on an aerial photograph
  - a description of the vegetation units including the variation between plots within a unit
  - a comprehensive flora list
  - vegetation unit mapping
- analyses of the variation between wetland and dryland vegetation units discussing:
  - the existing mapped wetland (as per the dataset)
  - the area proposed for modification
  - the area outside of the wetland (i.e. dryland).

It is important to note that the absence of wetland vegetation alone, does not provide sufficient justification for an existing mapped wetland area to be modified to 'No longer a wetland'. Where wetland vegetation has been cleared, a wetland may still retain hydrological or ecological functions, cultural or scientific values.

## References

Department of Biodiversity, Conservation and Attractions 2017, *A methodology for the evaluation of wetlands on the Swan Coastal Plain, Western Australia*, draft prepared by the Wetlands Section of the Department of Biodiversity, Conservation and Attractions and the Urban Water Branch of the Department of Water and Environmental Regulation, Perth.

Environmental Protection Authority 2016, *Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment*, Environmental Protection Authority, Perth.

Hill, AL, Semeniuk, CA, Semeniuk, V and Del Marco A 1996, *Wetlands of the Swan Coastal Plain Volume 2A: Wetland Mapping, Classification and Evaluation, Main Report*, Water and Rivers Commission and Department of Environmental Protection, Perth.

Semeniuk V and Semeniuk CA 2004, 'Sedimentary fill of basin wetlands, central Swan Coastal Plain, southwestern Australia. Part 1: sediment particles, typical sediments and classification of depositional systems', *Journal of the Royal Society of Western Australia* 87:139-186.

Tiner, RW 1999, *Wetland Indicators: A Guide to Wetland Identification, Delineation, Classification and Mapping*, Lewis Publishers, Florida.