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Groundwater dependent ecosystem pictorial conceptual model 'spring ecosystems of the Surat and southern Bowen Basins – type 1'

Version 1.5

Type 1 Permanent fresh-to-brackish, palustrine wetlands with well-developed peat wetland soils, dense vegetation coverage, mainly connected to regional and local groundwater systems

Type 1a Wetlands located in off-stream environments, within floodplains

Type 1a wetlands occur in palustrine landscape settings, within topographic lows, gently sloping landscapes and occasionally on floodplains. The wetlands are supported by groundwater inflows from both regional and local groundwater systems, and predominantly occur over deep regolith profiles. The permanent supply of groundwater has enabled the development of peaty wetland soil and mounding.

The wetland water budget is dominated by diffuse discharge and evapotranspiration. During cooler months (outside of summer) when evapotranspiration is low, wetlands may free-flow and pooling can occur depending on the wetland geometry.

The permanent supply of groundwater and deep regolith have enabled a dense coverage of wetland vegetation, including large woody vegetation. The wetlands are characterised by a central core of aquatic vegetation that corresponds to the subsoil development of peaty wetland soil. The immediate area of the wetland is confined by the low hydraulic permeability of the surrounding regolith, contributing to the formation of discrete wetlands.

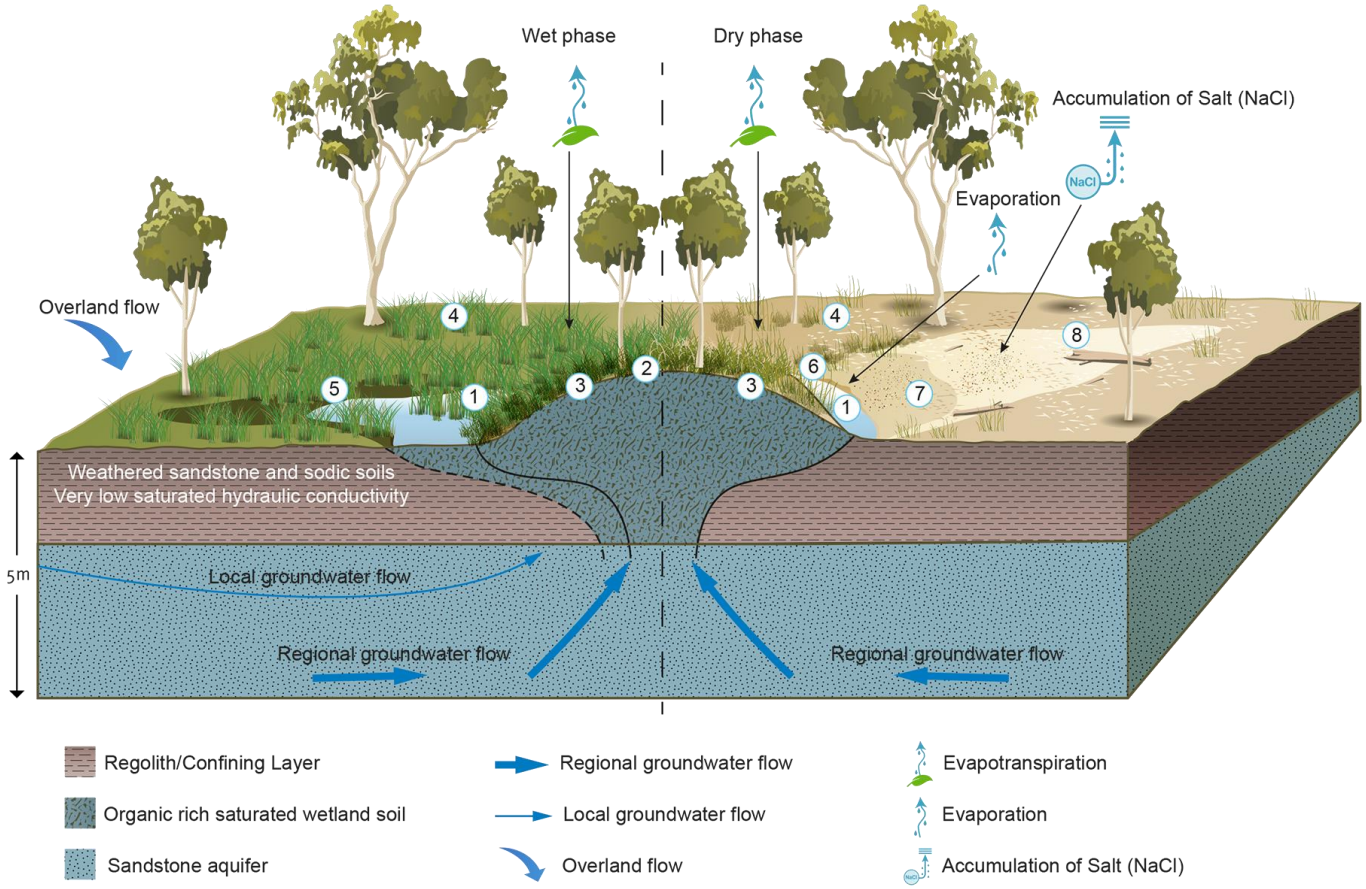
The wetlands are influenced by seasonal changes in climate, longer-term changes in climate and changes in groundwater pressure. During dry periods, the central core of the wetland remains saturated and is dominated by aquatic vegetation. Over this period, the extent of saturated soil and aquatic vegetation is very similar. During cooler and wet periods, wetland discharge increases, which results in an increased wetland area that may result in free-flowing water inundating downslope areas.

Short-term, seasonal changes result in the formation of an outer rim of dried and pugged soil that is often coated in salt efflorescence and iron staining. Long-term changes are expressed as multiple generations of woody vegetation, both living and dead, small ephemeral discharge zones and extensive ephemerally saturated discharge tails.

Examples of type 1a spring wetlands (Lucky Last (left) and Scott's Creek (right))

Type 1 wetlands form around a central core of saturated wetland soil. Eight focal zones have been identified primarily on the basis of wetland vegetation. The zones represent the variability across the wet and dry phase of the wetlands, driven by the groundwater regime. These are:

1. Zone of permanent inundation and/or flowing discharge. This area is dominated by wetland grasses (*Leersia hexandra*), tall sedges (*Baumea rubiginosa* and *Schoenoplectus* spp.) and floating forbs (*Utricularia* spp.). Where sufficient pooling occurs, this zone is forms a suitable macroinvertebrate habitat. During the dry phase, increased water salinity is observed in this zone.
2. Zone of aeration and reduced saturation. On some smaller mounds, shallow-rooted shrubs such as *Leptospermum polygalifolium* are present. On some larger mounds, larger trees including *Lophostemon suaveolens* and *Eucalyptus camaldulensis* are present. These indicate significant build-up of peat and/or soil, allowing adequate aeration for development of woody root vegetation assemblages.
3. Saturated shoulder of the mound. These areas are often dominated by a tall grass/sedge/rush community such as the tall grasses (*Phragmites australis*), sedges (*Baumea rubiginosa*, or *Schoenoplectus* spp.), ferns (*Cyclosorus interruptus*) and other species characteristic of permanent saturation. During the dry phase, increased water salinity is observed in this zone.
4. Non-wetland area. These areas are often dominated by a lawn of *Cynodon dactylon* or can be scalded bare ground with a range of other terrestrial species such as the exotic grass *Chloris gayana.*
5. Discharge tail during the wet phase. The tail area is often dominated by the sedge *Carex appressa,* the grass *Leersia hexandra* and, in very wet tails, *Eleocharis* spp.
6. Wetland to non-wetland transition zone. This zone occurs in a fringing areas of the wetland outside of the discharge area and mound. Soils in this area are saturated with little free water. The area is dominated by grasses including *Cenchrus purpurascens*, *Sacciolepis indica, Isachne globosa* and *Arthraxon hispidus*, a range of forbs such as *Ranunculus lappaceus* and the fern *Cyclosorus interruptus*. These species are generally associated with permanent saturation. However, this zone also includes a small proportion of terrestrial species, such as *Imperata cylindrica* or *Dianella longifolia*, particularly near the wetland boundary.
7. Discharge tail during dry phase. The sedge *Carex appressa* is still prominent. Increased areas of bare ground with terrestrial species such as the grass *Cynodon dactylon*. This area is often pugged by cattle.
8. Discharge tail during the dry phase. Notable features include ground affected by salt scalding, iron staining, often pugged by cattle and the absence of vegetation mentioned in zone 7.



Type 1b Wetlands located at the interface between floodplain and riverine environments and influenced by surface water flows

Type 1b wetlands share very similar conceptual model and wetland processes with Type 1a, however the areas where they occur within the landscape are different. Type 1b wetlands occur at the interface between the floodplain and riverine setting. As a result, Type 1b wetlands have two important differences to Type 1a wetlands:

- the depth of regolith and wetland soil development is thinner, due to the dissected nature of the adjacent riverine landscape and shallower depth to underlying source aquifer (< 20 m); and
- the adjacent riverine landscape may provide an additional water supply during high stream flow events.

Examples of type 1b spring wetlands (Scott's Creek complex, riverine wetlands)

Citation

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