



SEASONAL HERBACEOUS WETLANDS

IDENTIFICATION AND MANAGEMENT HANDBOOK



"NOW YOU SEE THEM. NOW YOU DON'T!"

Seasonal Herbaceous Wetlands are not always obvious as these before and after rain photos show.



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INTRODUCTION

Seasonal Herbaceous Wetlands (SHW) are isolated freshwater wetlands that are seasonally or intermittently filled by rainfall. They are usually inundated in the cooler months (winter – spring), and generally dry out by late summer, so surface water is not permanently present. Being dry for part of each year means they often disappear from the landscape (or at least seem to) and as a result most have been cropped or drained during dry periods, as SHW often occur on fertile soil in agricultural landscapes. As a result, they are now recognised nationally as Critically Endangered.

SHWs have an open vegetation structure with low tree cover (<10%) and are dominated by a range of amphibious broad-leaved herbs, grasses, sedges, rushes and shrubs that are adapted to survive under both wet and dry conditions. Some SHW occur in small scale mosaics; such as Herb-rich Gilgai Wetlands in grassland or woodland vegetation.

This booklet aims to help land managers:

- recognise seasonally herbaceous wetlands;
- assess condition;
- learn about associated plants and animals; and
- understand ecological processes and management actions required for protection from threats and enhancement from current state.

Why are Seasonal Herbaceous Wetlands important?

SHW's provide critical habitat for associated plants and animals, which either live in them permanently or utilise their resources on a seasonal or temporary basis. Part of the SHW ecological community remains present all the time. However, during extended dry periods native plants and animals may not be visible, but persist as desiccated material or propagules (seeds, spores and eggs) in the ground. This community can rapidly revert to a thriving and diverse ecological community; just add water!

SHW, are highly productive and deliver valuable ecosystem services such as:

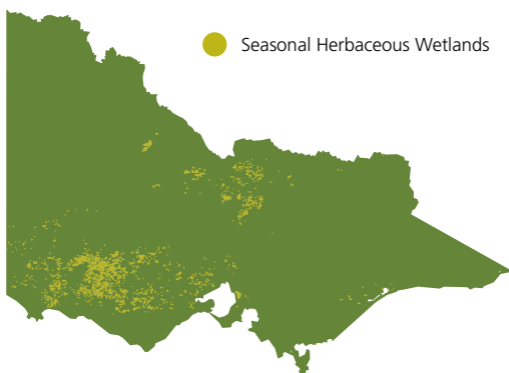
- Water and soil conservation
- Flood mitigation
- Create cooling local climate
- Improve water quality
- Provide habitat for associated plants and animals
- Bushfire prevention
- Pest management
- Provide essential water in dry periods (replenish groundwater, provide drought refuge for biodiversity and stock watering).

For more information go to www.gbcma.vic.gov.au and www.environment.gov.au

Where do Seasonal Herbaceous Wetlands occur?

SHWs are restricted to the lowland plains of temperate south-eastern Australia, in Victoria, south-eastern South Australia and south-central NSW.

- Occur on relatively fertile soils, which are often poorly draining clays.
- Are less than 500m elevation above sea level.
- Occur in areas with an average annual rainfall of 400 – 800mm.
- Occur in seasonally inundated drainage-lines and depressions (sometimes poorly defined) which are filled by rainfall.
- Predominantly occur on private agricultural land, used for grazing and cropping. Given their seasonal nature and prevalence on private land, there is limited knowledge of the current distribution of SHWs, but the map below provides a general guide.



Conservation of Seasonal Herbaceous Wetlands

At least two thirds of Victoria's wetlands have been drained or degraded since European occupation. This loss is practically irreversible because sites have been permanently converted to cropland, pasture, plantation forests, dams or have undergone substantial modification of their drainage and ecological characteristics. In other cases the ecological community now exists in a disturbed or degraded state. In rare cases modified drainage has caused SHWs to be created.

SHW are listed as critically endangered under the federal Environmental Protection and Biodiversity Conservation Act (EPBC Act) because they have:

- A restricted geographic distribution.
- Undergone a substantial decline in distribution.
- Highly reduced ecological integrity.
- Continuing threats and threatening processes which could cause them to become extinct in the immediate future.



As they occur in fertile landscapes that have been almost totally cleared for agriculture some SHW are surrounded by other endangered vegetation types such as this Plains Grassland.

Managing Seasonally Herbaceous Wetlands

The overall aim of managing SHW is to reverse the decline in number, extent and quality of this critically endangered community. In particular to increase the connectivity of sites and their spread across landscapes so they are less at risk from isolation and more able to cope with ongoing pressures i.e. changing climatic conditions such as reduced winter rainfall.

To understand a wetland it is essential to know the underlying conditions that determine its characteristics; these are called ecological drivers.

Important ecological drivers in wetlands are;

- Water regime (Hydrology); depth, duration, frequency and season of inundation.
- Wetland origin (Geomorphology); will determine wetland shape eg. gilgai wetlands, shallow drainage lines.
- Soil and water chemistry; salinity, nutrient availability and water holding capacity.

Managing individual Seasonal Herbaceous Wetlands

Observe, monitor and document

- Observe and learn about your wetland ecosystem
- Seek expert advice
- Develop a management plan
 - Develop clear and specific objectives.
 - Document all available information on the wetland
 - Select your chosen management methods to achieve your aims
 - Monitor the outcomes of management actions and apply adaptive management

Prevent habitat loss, disturbance and modification

- Avoid clearing native vegetation
- If fencing is necessary, fence around wetland and buffer rather than through wetlands
 - establish stock watering points away from wetlands.

Protect or reinstate the hydrology

- Protect (or re-instate if feasible and appropriate) the natural hydrology of the wetland as the highest priority
- Prevent and manage any changes to hydrology that may affect natural levels of inundation and surface runoff, groundwater table levels and water quality
- Avoid works within the property or local catchment/landscape that result in:
 - smoothing out depressions, creating banks/ levees to store or deflect water or constructing raised roads or tracks without adequate culverts
 - hydrology, runoff, water quality impacts that effect SHW ecological function

- Seek expert advice on the hydrology of the wetland as this underpins health of whole system (existing plant communities can provide clues)
 - Use information to re-establish the wetland hydrology (block or unblock drains or artificial sills etc)

Manage invasive weeds

- Manage weeds within the wetland and buffer area, especially new weed incursions
- Include control of major weeds in the development of a site management plan

Control trampling, browsing or grazing

- Prevent grazing at important or significant wetlands through exclusion fencing or other barriers
- Avoid grazing wetlands or surrounds
- At sites where grazing may be useful; develop and implement an appropriate grazing regime that considers:
 - Low stocking rate or for a minimum duration
 - Timed so that it does not interfere with the life cycles of native plants and animals (i.e. not grazing when plants are flowering and fruiting or wildlife are breeding)
 - Grazing only when the soil is dry to avoid pugging and other impacts to the soil surface
 - Grazing only when plants are healthy, for instance not stressed during drought

Manage pest management

- Control foxes, rabbits and feral animals
- Target fox control when birds are breeding and co-ordinate with neighbors

Rehabilitation

Wetlands that have had their hydrological regime disrupted for decades may have lost many wetland plant and animal propagules (seeds, eggs, tubers etc). In order for species to re-establish the wetland would be dependent on either flooding from intact nearby wetlands or introduction by birds or wind.

The amount of human intervention required to rehabilitate a wetland will depend on how many species have been lost and the type and extent of weed invasions; both of these factors often relate to the severity and duration of past disturbances to ecological drivers.

When sourcing plants for wetland rehabilitation it is preferable to get genetic material (seeds or cuttings) from as close to the rehabilitation site as possible.

While many wetland plant species are widespread the taxonomy of some species is unresolved, it is safest to go with what is local. Collecting seed or cuttings from wetlands on public land requires a permit; see your regional environmental department for details.

Fauna

The shallow, temporary wetlands host larger numbers of plant and animal species than deeper, more permanent wetlands such as lakes.

The main animal groups that characteristically inhabit SHWs are aquatic invertebrates, frogs, reptiles and waterbirds. Aquatic mammals and native fish tend to be absent.

Below are a small representation of each group of animals that you could find in a SHW, to highlight that fauna are a critical part of wetland systems (but are not the main focus of this booklet).

Invertebrates

The wetting and drying phases of SHWs promotes high productivity and these wetlands often support a high abundance and diversity of invertebrates which, in turn, provide food for higher order species.



1. Shield shrimps have eggs that are highly tolerant of drying out.
2. A male Wandering Percher (*Diplacodes bipunctata*).
3. Water Boatman (*Corixidae*)
4. Common Bluetail (*Ischnura heterosticta*)

Frogs

SHWs provide breeding and foraging habitat for many frog species. The lack of fish predators allows frog numbers to flourish, and are a significant food source for birds and snakes.



Left-right: Spotted Marsh Frog (*Limnodynastes tasmaniensis*), Common Eastern Froglet (*Crinia signifera*) and Growling Grass Frog (*Litoria raniformis*).

Reptiles

Reptiles can often be seen along the margins of SHWs, feeding on invertebrates, frogs and lizards.



Left-right: Olive Legless Lizard (*Delma inornata*), Eastern Snake-necked Turtle (*Chelodina longicollis*).

Birds

SHWs perform a critical role in providing seasonal resources for nomadic waterbirds, including various species of ducks, water hens, crakes, rails, ibises, egrets, herons, spoonbills, bitterns and snipe; many of which prefer to feed in shallow or temporary waters.



Left: Australian Painted Snipe (*Rostratula australis*). Right: Brolga (*Grus rubicunda*)

Identifying a Seasonal Herbaceous Wetland

This booklet aims to help you identify seasonal herbaceous wetlands and the plant species you might expect to find in them. Some broad considerations of where to find SHW in the landscape, hydrology and expected vegetation are outlined below.

Hydrology

- On isolated drainage lines or depressions which are seasonally inundated.
- Rainfall is the main water source; these wetlands are not dependent on flooding from rivers or creeks
- Water is fresh to slightly brackish.
- The season, depth, duration and frequency of filling is variable.
- SHWs fill to less than 1m deep.
- Can be dry for several years.

Vegetation

- Dominated by a ground layer of native wetland grass/rush/sedge and/or native wetland herbs.
- Freshwater algae often are present.
- Characteristic fauna include invertebrate groups that are temporary water specialists.

Exclusions, when a wetland is not a seasonal herbaceous wetland, are provided in Appendix 1.

Do you have a Nationally Significant Seasonal Herbaceous Wetland?

Only functioning, relatively natural and good condition SHWs are protected at a national level. A four-part process is used to identify this critically endangered community. An assessment tool has been developed to describe sites of national significance (see Appendix 2).

Additional Considerations for Nationally Protected SHW

Appendix 4 lists species which help identify very high quality examples of SHW; Indicator species are illustrated in this booklet.



Wetting and drying phases of Seasonal Herbaceous Wetlands

There are four wetting and drying phases that have been identified:

1. Dry
2. Filling
3. Full
4. Draw Down

Each phase will:

- Have at least some different plants and animals
- Vary in the ability to identify plants
- Vary in the diversity of species
- Have different species in each wetland zone: (edge, centre, surrounds)
- Vary between different SHWs



1. Dry Phase

Most plants remain dormant and underground as seeds or underground organs (such as tubers). It is difficult to identify many species.

2. Filling Phase

As a SHW starts to fill terrestrial plants are drowned and make a rich organic substrate for an array of bacteria, fungi and aquatic microorganisms to break down. Inundation over 2 – 3 months, stimulates aquatic plant growth. Dormant wetland plants are stimulated to grow.

3. Full Phase

Aquatic plant and invertebrate species abound, attracting a diversity of aquatic and terrestrial animals, particularly birds and frogs. Muddy edges and emergent and floating water plants provide habitats and feeding and breeding opportunities.

4. Draw Down Phase

As evaporation begins to exceed rainfall, the water levels begin to draw down, and the shallow SHW's can dry out quickly.

The next section of the booklet aims to help you identify some of the more common or important flora species found in SHWs. To help with identification, three aspects of plants are used:

1. Plants are divided into 'monocots' and 'dicots'. Generally, monocots are plants with strap-like leaves and dicots have various leaf shapes.
2. Dicots flower colour. Dicots often have showy flowers and so for Dicots, the colour of the flowers are also used to put plants into sections, eg Dicots flowers white.
3. The growth stages of plants within a SHW. For both monocots and dicots, the ability to identify plants will vary depending on the phase of wetting and drying. Therefore, icons are used to describe the growth cycle that each species will be at during each phase. For example, some species may show optimal growth during the wetting phase while others will show optimal growth during draw down. And remember, even if you cannot see a particular species, they may still be there!

Growth Cycle Key



Dormant and difficult to find



Present but may be hard to find



Present and easy to find



Optimal growth, often flowering or seeding

FLORA SPECIES

Plants shape the ecology of most SHWs, playing an important role in determining which animals will be attracted to them. SHWs often have a few dominant species but support high species diversity; each different SHW having a unique combination. Generally the more intact a SHW is the higher diversity of indigenous species it will support.

Appendix 3 lists species which help identify very high quality examples of SHWs; sites which support three or more of these species as well as meeting certain other criteria qualify as sites of national environmental significance under the Commonwealth EPBC Act .

River Swamp Wallaby-grass

Amphibromus fluitans



Photos: Damie Cook

- Other names** Water Brome
- Description** Aquatic perennial up to 120cm high, grows mostly in permanent and temporary swamps with seasonally-fluctuating water levels.
- Flowers** Bunched into 5-12 spikelets.
- Leaves** 2-4.5mm wide, rough and deeply ribbed.
- Stems** 1m long stems growing horizontally with tips turned up at the end.
- Fruit** Clustered in spikelets, each seed with a needle-like awn.
- Note** There are eight Swamp Wallaby-grass species in Victoria and all inhabit similar freshwater habitats. They are largely distinguished by the shape of their florets. This species is listed as Vulnerable on the EPBC Act.

Growth Cycle



Common Swamp Wallaby-grass

Amphibromus nervosus



Photos: Russell Best

- Other names** Veined Swamp Wallaby-grass
- Description** Perennial grass up to 120cm high. Occurs in freshwater swamps and drains across most of Victoria.
- Flowers** Bunched into 4-6 green spikelets 10-16mm long.
- Leaves** Smooth, hairless leaves with flat or inrolled blades to 30cm long and up to 3.5mm wide.
- Stems** Tufted stems with 2-5 nodes.
- Fruit** Clustered in spikelets, each seed with a needle-like awn.
- Note** Might be confused with Australian Sweet-grass (*Glyceria australis*) which grows in similar habitat but does not have toothed or awned lemmas.

Growth Cycle



Reed Bent-grass

Deyeuxia quadriseta



Photo: Russell Best

- Description** Perennial grass from 15-120cm tall.
- Flowers** A dense, spike-like multiple branched group of flowers.
- Leaves** Flat to slightly inrolled leaf blades to 30cm in length.
- Stems** Open tufting with 3-4 nodes.

Growth Cycle



Southern Cane-grass

Eragrostis infecunda



Photos: Damien Cook

- Description** Tough, wiry grass to 1m high found in wet, heavy soils, can tolerate moderately saline environments.
- Flowers** Flower head is a closely contracted bunch or group of small flowers.
- Leaves** Leaves smooth and hairless and inrolled to 15cm long and 3mm diameter.
- Stems** 3mm in diameter and often knotty at the base and occasionally branched.

Growth Cycle



Brown-back Wallaby Grass

Rytidosperma duttonianum /
Austrodanthonia duttoniana



Photos (L-R): Lyn Allison, Chris Lindorff

Description

Erect and tufted perennial grass up to 80cm high. Narrow, chaffy and branched flower head to 10cm.

Flowers

Spikelets with 3-8 flowers. Flower heads are reddish before maturing. The lowest branch of the inflorescence is relatively long and is often held at a right angle to the stem.

Leaves

Hairless, 10-20cm long, up to 3.5mm wide.

Fruit

Seeds have a shiny golden-brown husk.

Note

Seeds are eaten by native birds and the plant provides frog habitat.

Growth Cycle



Common Blown-grass

Lachnagrostis filiformis



Photos (L-R): Damien Cook, Sue Guymer

- Other names** Fairy Grass
- Description** Variable annual to perennial grass to 80cm tall with loose tufts.
- Flowers** Small spikelets on individual stalks but clustered towards the ends of the branches.
- Leaves** 25cm long leaves, generally flat and 1-2.5mm wide by may inroll on drying.

Growth Cycle



Common Tussock Grass

Poa labillardierei



Photos (L-R): Russell Best, Giorgio De Nola

- Other names** Eskdale, Poa Grass, Silver Tussock
- Description** Dense perennial tussock grass, tolerant of a wide range of conditions.
- Flowers** Flower heads extend up above foliage, seed heads are open and pyramid shape.
- Leaves** Long, slender greyish-green or blue-green leaves in a weeping habit. Channelled leaf blade.
- Stems** Up to 120cm.
- Note** Similar in appearance to Snow Grass (*Poa sieberiana*) which is characterised by smaller overall size and which generally occurs in drier environments.

Growth Cycle



Fine Twig-sedge

Baumea arthropylla



Photos: Damien Cook

- Other names** Fine Twig-rush
- Description** 0.3-1.3m high.
- Flowers** Upright, oblong flowerhead 8-55cm in length, many 2-4 flowered spikelets along branches with red-brown flowers.
- Leaves** Some internal partitioning in basal leaves, rounded and up to 1.5mm in diameter. Leaves along stem are much shorter and are reddish or straw-colour.
- Stems** Tufted sedge spreading from long underground stem.
- Fruit** A small hard nut.
- Note** Mainly in higher rainfall areas.

Growth Cycle



Rush Sedge

Carex tereticaulis



Photos (L-R): Damien Cook, Kevin Sparrow

- Other names** Poong'ort
- Description** Dense, tufted sedge growing up to 1m.
- Flowers** Flowers in dense spike clusters with more than 20 in a group up to 10cm.
- Leaves** Stem-like leaves up to 4mm or appear as sheaths.
- Stems** Stems are hollow and mostly rounded, with a short triangular section just below the flower or seed head.
- Fruit** Brown seeds which are small in size and quite hard (botanically they are regarded as a nut).
- Note** Used for construction of nets and baskets by Aboriginal people.

Growth Cycle



Black Bristlerush

Chorizandra enodis



Photos: Damien Cook

- Description** Perennial sedge, spreading occurs from rhizomes. Stems form loose clumps up to 1m in height.
- Flowers** Flower clusters located close to the top of stems, spherical form 8-15mm diameter. Flowers are dark coloured, purple to brown/black.
- Leaves** Similar to stem.
- Stems** Dark green to pale brown at base, 1-2mm width.
- Fruit** A small, hard nut.
- Note** Can tolerate a diverse range of water levels. Can pump oxygen into sediment which improves conditions for microbes.

Growth Cycle



Common Spike-sedge

Eleocharis acuta



Photos: Kevin Sparrow

- Description** Spreading perennial aquatic plant.
- Flowers** Small, straight brown spikelet about 30mm in length.
- Leaves** Leafless.
- Stems** Hollow, erect stems, 30-90cm in height.
- Fruit** A small, hard nut.
- Note** Very widespread.

Growth Cycle



Pale Spike-sedge

Eleocharis pallens



Photos: Damien Cook

- Description** Semi aquatic herb, densely tufted.
- Flowers** Long, pale, cylindrical spikelet up to 20mm.
- Leaves** Leaves are reduced to a sheath at the base of each stem.
- Stems** Pale or yellowish green, erect hollow stems up to 50cm.
- Fruit** A small, hard nut.
- Note** Mainly in lower rainfall areas.

Growth Cycle



Small Spike-sedge

Eleocharis pusilla



Photos (L-R): Damien Cook, Russell Best

- Other names** Fairies Fart Sedge, Small Spike-rush
- Description** Spreading perennial herb up to 25cm high.
- Flowers** Very small, spread out flowers. Spikelet up to 7mm long.
- Leaves** Leafless.
- Stems** Dark green, erect, hollow stems.
- Fruit** A tiny, hard nut.

Growth Cycle



Floating Club-sedge

Isolepis fluitans



Photo: Damien Cook

- Description** Either a filamentous, lax, multiple branched, aquatic sedge or a tufted, slender and leafy semi-aquatic sedge.
- Flowers** Thin flower stems ending in a narrow, spike to 5mm.
- Stems** Aquatic form: flat linear stems 20cm x 1mm. Semi-aquatic form: in tufts, to 10cm x 1mm, nearly cylindrical.
- Fruit** Two angled smooth, brown nut to 1mm in length.

Growth Cycle



Common Bog-sedge

Schoenus apogon



Photos (L-R): Kevin Sparrow, Damien Cook

- Other names** Common Bog-rush, Fluke Bog-rush
- Description** Tufted grass-like sedge, up to 25cm.
- Flowers** Spikelets at the end of long stems have four to 10 flowers in alternating overlapping lines up to 4mm long.
- Leaves** In a tuft, shorter than flower stems.
- Stems** Stems are in tufts, linear, green with chestnut-coloured sheaths, 1mm wide and up to 15cm in length.
- Fruit** Three angled nuts about 1mm in diameter, pale brown with multiple dents between ribs.

Growth Cycle



Medusa Bog-rush

Schoenus latelaminatus



Photo: Damien Cook

- Description** Pale-green annual sedge, up to 25cm high.
- Flowers** Flower clusters are narrow and erect with 1-5 spikelets up to 12mm long.
- Stems** Flowering stems are slender up to 15cm high, pale-green, flat and grass like with straw coloured to red-brown sheathes.
- Fruit** A small, hard nut.
- Note** A annual species germinating in damp conditions and dying off as the environment dries out.

Growth Cycle



Soft Bog-sedge

Schoenus tesquorum



Photo: Damien Cook

- Description** Tufted perennial sedge to 45cm high.
- Flowers** Narrow, erect flower heads, up to 15cm in length with spikelets clustered at 2-4 nodes. Flowers are dark yellow-brown to red.
- Leaves** In a tuft, shorter than flower stems.
- Stems** Slender stems up to 30cm long. Straw-coloured sheath, very dark red on stem leaves, shining and can be ridged or smooth.
- Fruit** A small, hard nut.

Growth Cycle



Finger Rush

Juncus subsecundus



Photos (L-R): Giorgio De Nola, Damien Cook

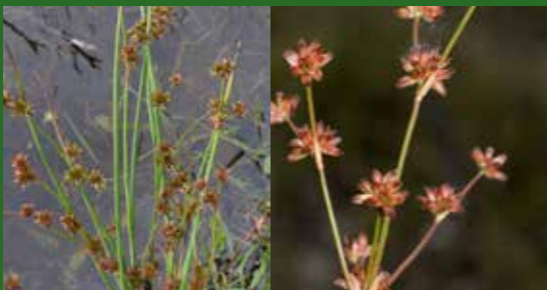
- Description** Tufted perennial rush, which spreads from underground stems.
- Flowers** Small, branching flower heads with clustered flowers containing up to 6 stamens. Capsules are light with golden brown tip which can be longer than flowers.
- Leaves** Reduced to basal sheathes around the stem, called catophylls.
- Stems** Erect and wiry, bluish-green to grey stems up to 2.5mm in width with strongly raised ridges.
- Fruit** Tiny dust-like seed held in an oblong capsule, release as the capsule dries and splits.

Growth Cycle



Joint-leaf Rush

Juncus holoschoenus



Photos (L-R): Kevin Sparrow, Damien Cook

- Other names** Jointed Rush
- Description** Open, tufted perennial rush up to 20cm tall. New shoots can stem from lower nodes.
- Flowers** Branching flower heads with clusters for 2-6 flowers in.
- Leaves** Unlike Finger Rush this species has true leaves, which are hollow and divided into short segments by septa.
- Stems** Erect, cylindrical leaves and long straight flower stems.
- Fruit** Tiny dust-like seed held in a square capsule, release as the capsule dries and splits.

Growth Cycle



Quillworts

Isoetes drummondii / *Isoetes muelleri* / *Isoetes humilior*



Photo: Damien Cook

- Description** Small, grass-like, non-flowering aquatic plant, grows up to 30 cm
- Flowers** none
- Leaves** Erect, linear, tufted leaves
- Fruit** Clusters of spores produced at the base of fronds

Growth Cycle



Austral Pillwort

Pilularia novae-hollandiae



Photos: Damien Cook

- Other names** Australian Pillwort
- Description** A slender, semi-aquatic grass-like fern.
- Flowers** None.
- Leaves** Linear, erect, cylindrical to 7cm x 2mm and hairless. Younger leaves coil before unfolding after stemming from rhizomes.
- Fruit** Spores produced in a small subterranean capsule or "pill".
- Note** Usually most often on drying edges of wetlands.

Growth Cycle



Small Vanilla-lily

Arthropodium minus



Photos (L-R): Giorgio De Nola, Damien Cook

- Description** A small, flowering, grass-like herb.
- Flowers** Sweet-scented, purple, star-like flowers arranged singularly.
- Leaves** Leaves are liner and grass-like, up to 10cm x 5mm.
- Stems** Flowering stems grow to 30cm high.

Growth Cycle



Yellow Star

Hypoxis vaginata



Photos (L-R): David Francis, Damien Cook

Description A perennial herb with leaves growing in tufts up to 35cm in height.

Flowers Yellow star-like flowers.

Leaves Shiny grass-like leaves.

Growth Cycle



Gorae Leek-orchid

Prasophyllum diversiflorum



Photo: Damien Cook

- Flowers** White flowers held on an erect spike.
- Leaves** Cylindrical dark green and fleshy.
- Fruit** Tiny dust-like seed released from a capsule.

Growth Cycle



Swamp Early Nancy

Wurmbea dioica subsp. lacunaria



Photos (L-R): James Booth, Russell Best

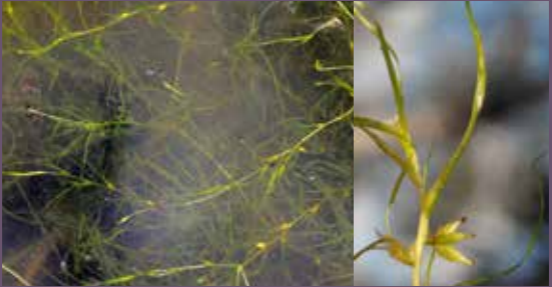
- Description** Perennial herb with white and purple flowers, growing up to 35cm.
- Flowers** White, honey-scented, with a purple band, flowers in racemes of 1-11 flowers.
- Leaves** Three hairless, threadlike leaves, 10-35cm long alternate up the stem with a sheath at the base.
- Note** Different from the typical dry land form of Early Nancy in its habitat (shallow wetlands), the fact it has a greater number of flowers and green rather than purple stamens.

Growth Cycle



Austral Watermat

Lepilaena australis



Photos: Damien Cook

Other names	Australian Watermat
Description	A submerged aquatic herb up to 30cm long.
Flowers	Very small flowers and fruit at the ends of slender stalks.
Leaves	Fine leaves in loose tufts along slender stems.
Fruit	Roughly ovoid (egg-shaped), up to 2.5mm long with small ridges.

Growth Cycle



Swamp Lily

Ottelia ovalifolia



Photos (L-R): G Manley, Tim D'Ombrain

- Description** Floating, emergent aquatic perennial herb with stalks up to 60cm long.
- Flowers** White with dark purple-red centre 5cm wide.
- Leaves** Mature leaves are green, egg-shaped with longitudinal veins, up to 16cm long. Juvenile leaves are submerged and thin.
- Stems** Flowers on long stalks.

Growth Cycle



Red Pondweed

Potamogeton cheesemanii



Photos (L-R): Kevin Sparrow, Russell Best

- Other names** Small-fruit Pondweed, Floating Pondweed.
- Description** A small aquatic herb with long branching stems.
- Flowers** Dense spikes of small green flowers on straight stems, can be up to 45mm long.
- Leaves** Broad, floating leaves on slender stalks attaching leaves to stems.
- Note** Has two different types of leaves; transparent submerged ones and glossy green floating ones.

Growth Cycle



Southern Water-ribbons

Triglochin alcockiae



Photo: Damien Cook

- Description** Tufted perennial herb, leaves up to 90cm long with small plump tubers.
- Flowers** Loose erect terminal spike to 13.5cm.
- Leaves** Long, thin submerged and floating strap-like leaves up to 90cm long and 8mm wide.
- Stems** Flowering stem up to 67cm long.
- Fruit** Up to 67 roundish but elongated segmented fruit at end of flowering stems.
- Note** Has small, edible tubers which act as storage organs through dry periods.

Growth Cycle



Nothern Water-ribbons

Triglochin multifructa



Photo: Damien Cook

- Description** An aquatic, perennial herb with tufted stems.
- Flowers** Small green flowers arranged in a cylindrical spike at the end of a dense stem.
- Leaves** Strap-like leaves, usually floating on the water surface.
- Stems** Flower-bearing erect fleshy stem.
- Fruit** Globular, to 5mm long, with 6 single-seeded capsules, joined along their entire length.

Growth Cycle



Trithuria

Trithuria submersa



Photo: Damien Cook

- Other names** Submerged Watertuft
- Description** Annual herb that grows submerged in fresh water.
- Flowers** Flower clusters are found on small, thin stems in an umbrella-like formation that become longer when the plant is bearing fruit.
- Leaves** Slender, flattened leaves are clustered at the base of a stem growing up to 3cm long, wide at the base and tapered towards the tip. Leaves are bright red when plants are in full sun, green when shaded.
- Fruit** Fruit is between 0.5 and 0.8 mm long, split at maturity. The seed coat is rough and white.

Growth Cycle



Swamp Daisy

Allittia cardiocarpa



Photos (L-R): Russell Best, Damien Cook

- Other names** Hinge-fruit Daisy
- Description** Perennial herb.
- Flowers** White to mauve, single daisy flower heads with yellow centre on single stem which can have some narrow leaves.
- Leaves** Tufted, dark green to purple thin grassy leaves up to 30cm long. Old leaf remnants often remain.

Growth Cycle



Common Woodruff

Asperula conferta



Photos (L-R): Russell Best, Tim D'Ombrain

- Description** A small, low to ground perennial herb.
- Flowers** Very small white flowers, star-like arranged in clusters of three at stem ends.
- Leaves** Small spikey bright green linear leaves with small hairs up to 10mm. Arranged in whorls of six along stems.

Growth Cycle



Water Woodruff

Asperula subsimplex



Photos: Kevin Sparrow

- Description** Prostrate to low perennial herb.
- Flowers** White tubular flowers in clusters at ends of stems.
- Leaves** Shiny, small, narrow pointed leaves arranged in whorls of four. Leaf margins slightly rolled under.
- Stems** Long, thin square stems up to 30cm in length.

Growth Cycle



Woodland Swamp-daisy

Brachyscome basaltica



Photos (L-R): Russell Best, Maree Goods

- Description** Perennial non-woody plant growing up to 60 cm high
- Flowers** Single white flowers with 20-50 petals and a yellow centre at stem ends.
- Leaves** Leaves present at base of plant and alternating up stems up to 10 cm long with pointed tips.

Growth Cycle



Dwarf Brooklime

Gratiola pumilo



Photo: Damien Cook

- Description** Small, erect perennial herb between 4cm and 18cm high.
- Flowers** White tubular flowers, solitary on short stems at the base of leaf clusters.
- Leaves** Flat, opposite leaves up to 2.5cm long, can be sparsely hairy, can have toothed or entire edges.
- Stems** Hairy.

Growth Cycle



Austral Mudwort

Limosella australis



Photos (L-R): Chris Lindorff, Damien Cook

Description Small, semi-aquatic, perennial herb up to 2cm tall.

Flowers Shite, tubular, solitary flowers at the base of stems.

Leaves Linear, hairless leaves up to 5cm in length.

Fruit Ellipsoid capsule, dark brown 3x2mm.

Note Most obvious on the drying margins of wetlands.

Growth Cycle



Poison Pratia

Lobelia concolor



Photo: Terri William

- Other names** Milkweed, Milky Lobelia, White-root
- Description** A prostrate, perennial herb, grows up to 10cm tall.
- Flowers** White or pink, tubular, up to 9mm long, attached by a linear, thin stalk up to 10mm wide.
- Leaves** Oblong, alternative, hairless up to 30 x 15 mm. Leaf margins are smooth or shallowly toothed.
- Fruit** Fleshy, ovoid capsule up to 10mm diameter.

Growth Cycle



White Purslane

Montia australasica/Neopaxia australasica



Photos: David Francis

- Description** Creeping herb with ground running stems up to 30cm in length.
- Flowers** Small white flowers with five petals.
- Leaves** Succulent leaves with papery edges.

Growth Cycle



Upright Water-milfoil

Myriophyllum crispatum



Photos: Kevin Sparrow

- Description** Aquatic or semi-aquatic perennial herb up to 60cm high.
- Flowers** Male flowers are cream to reddish brown or purple stretching 5mm across with four petals, female flowers don't have petals or sepals and have white or pink stigmas.
- Leaves** Arranged in whorls around stems, above water these are linear and up to 20mm long. Under water leaves are 40mm long, divided into narrow, linear leaflets.
- Fruit** 1 mm long capsule covered in small sharp points.
- Note** Has two different types of leaves; fine submerged ones and more robust emergent ones.

Growth Cycle



Ridged Water-milfoil

Myriophyllum porcatum



Photo: Damien Cook

- Description** Annual aquatic herb.
- Flowers** Flowers have no stalk and are arranged in sparsely branched or simple spikes and occur at leaf bases.
- Leaves** Submerged leaves are dark green 11-16 mm long and occur in groups of 4-5. Emergent leaves are 5-6 mm long, elongate, smooth and glossy. Arranged in groups of 3-5.
- Stems** 1-3 mm wide, sparsely branching towards the stem tip and at the base, brittle.
- Fruit** Cylindrical and ribbed 2mm long by 1mm wide

Growth Cycle



Wiry mitrewort

Phyllangium divergens



Photo: Damien Cook

Description	Erect annual herb up to 15cm tall.
Flowers	White tube-like flowers arranged in clusters on small stems up to 50mm long.
Leaves	Elliptic up to 10mm long and 3mm wide.
Stems	Weak, cylindrical, smooth stems.

Growth Cycle



Swamp Starwort

Stellaria angustifolia



Photo: Kevin Sparrow

- Description** Trailing and climbing annual herb.
- Flowers** Flowers in stemless, flat, broad clusters.
- Leaves** Linear from 10mm to 40mm long.
- Stems** Stems are smooth and glossy with four angles.

Growth Cycle



Hundreds and Thousands

Stylidium inundatum



Photo: Damien Cook

- Description** Erect, annual herb up to 140mm high.
- Flowers** Pink with a white throat. 2-3 flowers at the end of stems. Petals are paired 4mm wide and 2mm long.
- Leaves** Narrow leaves which can be scattered up stems up to 8mm at a distance of 1mm apart.

Growth Cycle



Pale Swamp Everlasting

Coronidium sp. aff. *rutidolepis*
(Lowland Swamps)



Photos (L-R): Russell Best, Damien Cook

Other names Previously *Helichrysum rutidolepis* s.l.

Description Grey-green, perennial herb with rhizomes, usually branched once or twice above the base.

Flowers Yellow, Clustered in heads to 2cm wide. Bracts surrounding head in several, overlapping rows, spreading and form most of the flower head, (Flowers Sep-Oct-Nov).

Leaves Alternate, sessile, narrow-oblongate to almost linear, 2-4cm x 2-6mm (upper leaves very small).

Stems Usually erect stems to 40cm tall.

Fruit Cylindrical achenes about 1mm long, glabrous. Pappus a single series of bristles 3-5mm long.

Growth Cycle



Swamp Buttons

Craspedia paludicola



Photos (L-R): Kevin Sparrow, WCMA

Other names Billy Buttons

Description An erect, perennial herb, to 75cm tall, with narrow leaves, at the base of and along red to purple flower stems, which bear a large, yellow, 'button flower'.

Flowers A hemispherical, yellow, 'button flower', to 30mm diameter, consisting of numerous, small florets (Flowers Jan-Feb, Sep-Oct-Nov-Dec).

Leaves Mostly in a basal tuft. 30cm long and 20mm wide, green, hairless, usually red at the base.

Growth Cycle



Yellow Twin-heads

Eclipta platyglossa



Photos (L-R): Chris Lindorff, Damien Cook

Description

Usually prostrate, scrambling annual herb.

Flowers

Yellow approximately 1 cm in diameter.

Leaves

Leaves covered with short, stiff hairs; lanceolate to 5cm.

Note

E. prostrata has larger, white flowers and is a weed and *E. platyglossa* has yellow flowers.

Growth Cycle



Slender Goodenia

Goodenia gracilis



Photos: Ian Higgins

- Description** Annual or perennial herbs to 50cm high, almost glabrous except for flowers.
- Flowers** Flowers many along a single stem with the youngest flowers at the top (termed raceme); stalks to 5cm long.
- Leaves** Leaves mostly basal, linear-lanceolate, 0.5-1.7cm long, 1-5mm wide, margins entire or toothed, thick.
- Fruit** Fruit subglobose to ovoid, 3-6mm long; seeds brown.

Growth Cycle



Spreading Goodenia

Goodenia heteromera



Photos (L-R): Russell Best, Damien Cook

Description Perennial or annual herb with stolons to 20cm long, with strigose hairs, cottony when young.

Flowers Yellow flowers in axils of tufted leaves; flower stalks 10-60mm long, sometimes bent. Petals 6-11mm long.

Leaves Leaves tufted on stolons, oblanceolate to obovate, 1-10 cm long, 3-10 mm wide, margins entire or toothed; axillary hairs dense.

Fruit Fruit ovoid, 6-7mm long; seed circular, 1.5-2.5mm diam., brown, glossy, reticulate; wing 0.2-0.5mm wide.

Growth Cycle



Yam Daisy

Microseris scapigera s.s.



Photos (L-R): Damien Cook, Kevin Sparrow

- Other names** Murrnong (Koorie name)
- Description** An erect, perennial herb to 50cm tall and a few narrow, basal leaves and a large, nodding, yellow, 'dandelion' flower heads at end of a leafless stem.
- Flowers** Clustered yellow 'dandelion flower' 10-20mm across.
- Leaves** Linear-lanceolate or oblanceolate, to 30cm x 15mm.
- Fruit** Cylindrical, to 7mm long, hairless.
- Note** Tubers were an important food source for Traditional Owners, and were eaten raw or cooked .

Growth Cycle



Entire Marshwort

Nymphoides geminata



Photo: Damien Cook

- Description** Native lily-pad type of plant.
- Flowers** Yellow and fringed, submerged when in bud and when seeding. Flowers only open for one day.
- Leaves** Round.
- Note** Listed as rare in Victoria.

Growth Cycle



Drumsticks

Pycnosorus globosus



Photo: Rick James

Description

Stout silvery-white herb with several round yellow flowers on stalks to 120cm high. Achenes cuneate, 1.5-3mm long, 0.5-1mm wide; pappus of 9-16 plumose hairs 2.5-5mm long.

Flowers

Yellow, compound, round head 8-35mm in diameter.

Leaves

Leaves attached to a stem, linear, usually 10-30cm long, 4-12mm wide, with 1-8 prominent longitudinal veins, white to brown-grey woolly with appressed fine hairs.

Note

Can form massed displays of flowers in mid to late spring.

Growth Cycle



Swamp Everlasting

Xerochrysum palustre



Photos: Russell Best

Description

Perennial herb 5-45cm high, with simple erect stems, with underground stolons.

Flowers

Golden yellow, solitary on stems, 2.5-5.0cm diameter. Pointed petals 'everlasting'.

Leaves

Leaves lanceolate-elliptic, acute, 3-10cm long, 3-8mm wide, glabrescent, hairy on the margins.

Growth Cycle



Bluish Raspwort

Haloragis glauca f. *glauca*



Photos: Damien Cook

- Description** Herb 10-40cm high, arising from a perennial rootstock; stems glaucous, glabrous or scabrous with semi-appressed hairs.
- Flowers** Petals 2-3mm long, green to yellow.
- Leaves** Leaves mostly alternate, narrow-lanceolate, usually 35-45mm long, 5-8mm wide.
- Fruit** Fruit globose, warty at the base, 2-2.5mm long.

Growth Cycle



Red Swainson-pea

Swainsona plagiotropis



Photos: Terri Williams

- Description** Prostrate perennial to c. 15cm high.
- Flowers** Racemes 2-5 flowered; flowers 10-15mm long. Corolla reddish purple.
- Leaves** Leaves mostly 5-12cm long; lower surface with scattered hairs; stipules 5-9mm long.
- Stems** Glabrous with hairs.
- Fruit** Pod ovoid-oblong, 15-25mm long.
- Note** Grows on the fringe of wetland habitats and drier grasslands. Listed as Vulnerable on the EPBC Act.

Growth Cycle



Winged Water-starwort

Callitriche umbonata



Photo: Damien Cook

- Other names** Western Water-starwort
- Description** Spreading, submerged or semi-aquatic glabrous herb.
- Flowers** Flowers solitary, to 3.5mm.
- Leaves** Leaves, at least in aquatic forms, dimorphic; lower leaves linear, to 10mm long and 0.5-1mm wide, 1-veined.
- Fruit** Fruit almost circular, 1mm diameter with a prominent wing.

Growth Cycle



Common Sneezeweed

Centipeda cunninghamii



Photo: Damien Cook

- Other names** Old Man Weed
- Description** Erect or ascending perennial herb, glabrous, 20cm high.
- Leaves** Leaves oblong to spatulate, 15mm long and 3-4mm wide; margins shallowly toothed or subentire; narrowed to base but petiole indistinct.
- Stems** Stems much-branched.
- Note** Important medical herb for Aboriginal people.

Growth Cycle



Prickfoot

Eryngium vesiculosum



Photos (L-R): Giorgio De Nola, Russell Best

- Description** A prickly, stiff, low-spreading herb.
- Flowers** Metallic blue flowers, globular in shape to 2 cm width.
- Leaves** Rigid, bright green pointed leaves with prickly edges.
- Stems** Ribbed stems

Growth Cycle



Swamp Isotome

Isotoma fluviatilis subsp. australis



Photo: Russell Best

Description Tiny, dense, matted herb.

Flowers White to blue with a darker band at the petal ends.

Leaves Rounded leaves slightly toothed at edges.

Growth Cycle



Poison Lobelia

Lobelia pratioides



Photo: Damien Cook

- Description** Generally prostrate, it can be a weakly ascending herb; rooting at the nodes.
- Flowers** Flowers solitary in axils of leaves, blue to pale violet.
- Leaves** Leaves narrowly elliptical to narrowly ovate, to 3.5cm long.
- Stems** Stems usually with spreading hairs, sometimes zig-zagged.

Growth Cycle



Native Pennyroyal

Mentha satureoides



Photo: Damien Cook

- Other names** Creeping Mint
- Description** Mat-forming herb, rhizomatous and often producing ascending to prostrate branches at nodes.
- Flowers** Flowers in 3-flowered clusters in axil of a pair of leaves.
- Leaves** Leaves with lamina narrow-elliptic to linear-elliptic.
- Stems** Branches glabrous or covered with short spreading hairs.
- Note** Used by Aboriginal people as a culinary and medicinal herb.

Growth Cycle



Slender Monkey Flower

Mimulus gracilis



Photos (L-R): Maree Goods, Damien Cook

Description

Erect to ascending perennial or possibly annual herb, 4-35cm high, rooting from stolon, glabrous.

Flowers

Flowers 1 in axils; pedicels 1-7cm long. blue, purple or lilac, with a prominent raised yellow palate.

Leaves

Leaves not joined at nodes, lanceolate to linear-oblong, 5-35mm long, sessile.

Growth Cycle



Broughton Pea

Swainsona procumbens



Photos: Maree Goods

Other names Swamp Pea

Description Spreading or ascending perennial plant to 50cm high.

Flowers Racemes has 2-12 flowered; flowers 10-20mm long. Corolla mostly purple or mauve to pink.

Leaves Leaves 5-15cm long; leaflets 15-25mm, linear to obovate.

Stems Stems glabrous or sparsely pubescent with minute, appressed basifixed or sub-basifixed hairs.

Fruit Pod narrow-elliptic to oblong, 20-40mm long.

Growth Cycle



Purple Bladderwort

Utricularia beaugleholei



Photo: Damien Cook

Description

Leaves narrow, to 4.5cm long and 1.6mm wide, tip pointed.

Flowers

Flowers Sep-Mar mostly dark violet; lower lip much larger than upper lip, with 4-11 yellow ridges; flowers single, in opposite pairs or in whorls of 3.

Leaves

Small and inconspicuous.

Note

A carnivorous plant.

Growth Cycle



Common Nardoo

Marsilea drummondii



Photo: Damien Cook

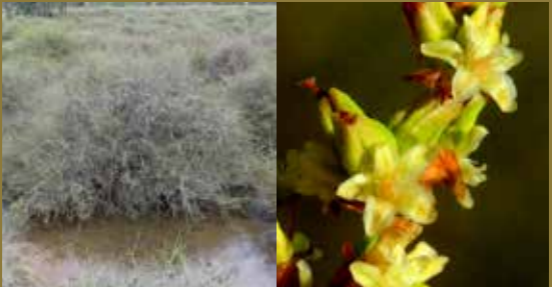
- Description** Rhizome long-creeping, much branched, covered with orange-brown hairs.
- Flowers** Sporocarps usually solitary, stalks 1-10cm long, body of sporocarp 4-9mm long, but usually 8mm long, faintly or distinctly ribbed; upper tooth triangular, lower tooth usually slightly longer, obtuse.
- Leaves** Fronds arising in groups along the rhizome; stipe 2-30cm long; leaflets broad-ovate to cuneate, 5-30mm long and almost as wide, rounded or notched at the apex, usually densely hairy but almost glabrous in plants where the lamina is floating.
- Note** Sporocarps used as a food by Aboriginal people after being carefully treated to remove toxins.

Growth Cycle



Duma Florulenta

Duma florulenta



Photos: Damien Cook

- Other names** Previously known as *Muehlenbeckia florulenta*
- Description** Intricate, rounded shrub 1-3m high and round.
- Flowers** Flower clusters in spike-like inflorescences, 2-12cm long, in clusters at nodes on stems.
- Leaves** Leaves not persistent, linear to narrow-lanceolate, 1.5-7cm long, 2-10mm wide, usually flat and thin, petiole <5mm long.
- Stems** Grey-green, tangled stems.
- Note** Excellent habitat plant.

Growth Cycle



APPENDICES,
GLOSSARY
& INDEX

Exclusions: When is a wetland not a Seasonal Herbaceous Wetland?

The following wetland types do not fall under the Seasonal Herbaceous Wetland description.

Exclusions and contra-indications:

1. Wetlands or vegetation communities which are dominated by taller native reeds/rush/sedges which rely on more permanent water to grow and spread, such as Cumbungi (*Typha sp*), Common Reed (*Phragmites australis*), Cane Grass (*Eragrostis sp*). These more permanent wetlands often develop monocultures of these taller species (>25% cover).

In Victoria these communities are classified into distinct Ecological Vegetation Classes (EVC's) and include:

- Cane Grass Wetland (including EVC complexes 602 and 606)
 - Spike-sedge Wetland
 - Tall Marsh
2. Saline or Brackish Swamps (>3000 mg/L salinity) often indicated by salt tolerant species (Australian Salt Grass, Spiny Rush, Sea Rush, Water-mats, Sea Lavendar, Creeping Monkey-Flower, SeaTassel, Glassworts, Samphires etc.)
 3. Wetlands with dominant water source other than direct rainfall: connected to river systems where the main water source is overbank flow e.g. billabongs. Shallow wetlands where main water source is groundwater (peat bogs, springs and fens).

4. Wetlands subject to ocean or tidal influences (salt marshes and estuaries).
5. Wetlands on very sandy soils (often dominated by species such as Saw-sedges, Sword Sedges, Leafy Twig-sedge, Tassel-sedges and Heaths).
6. Wetlands on limestone or calcarenite – derived substrates.

Examples of Wetland types that do not qualify as SHW:



Tall Marsh; permanent water wetland dominated by tall native rushes (Cumbungi and Giant Rush), lacks characteristic herbs of SHW.



Samphire Shrubland; saline wetland dominated by salt-tolerant species very different from those characteristic of SHW.



Billabong Wetland; main water source is overbank flow from a large watercourse. Water deeper and more permanent than typical SHW.

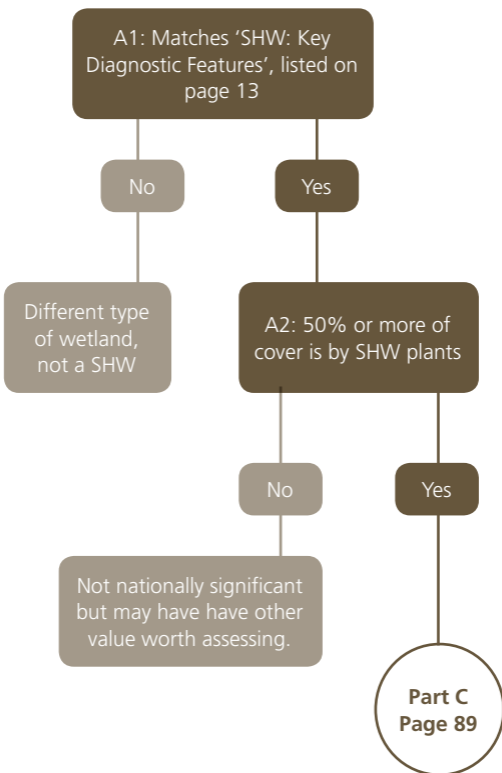


Forest Bog; occurs on very sandy soils and is dominated by Sword and Tassel Sedges, lacks characteristic herbs of SHW.

Key for identifying SHW sites of national significance

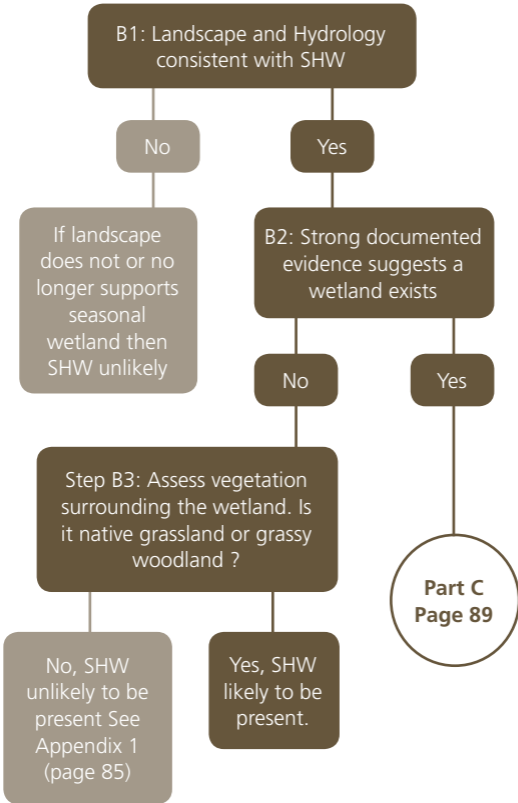
PART A

Assessing Wetland when in wet phase

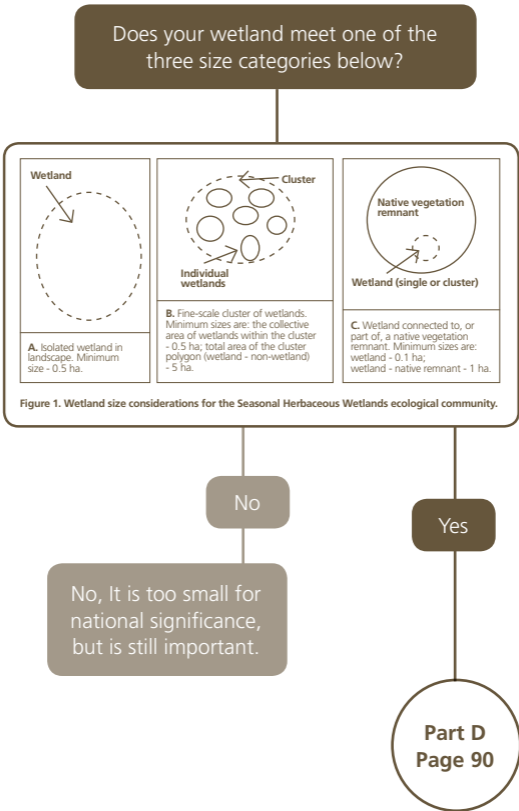


PART B

Assessing Wetland when in dry phase

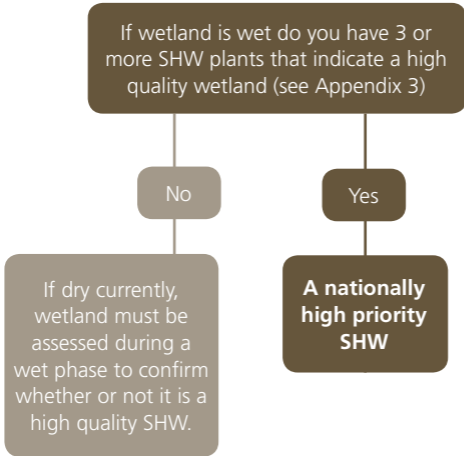


PART C
Minimum wetland size



PART D

Do you have a high quality SHW?



Assessment Tool, Indicator Plant Species of Very High Quality Seasonal Herbaceous Wetlands

Table 1 (below) Native plant taxa present in the Seasonal Herbaceous Wetlands ecological community that are indicative of very high quality and low disturbance of sites. This relates to Part D of the condition thresholds. In cases where a genus comprises wetland and dryland species, only the taxa known to occur in wetlands are relevant.

Table 1

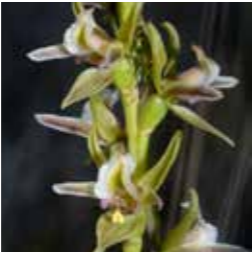
<i>Species Name</i>	<i>Common Name</i>
<i>Allittia cardiocarpa</i>	Swamp Daisy
<i>Asperula conferta s.l.</i>	Common Woodruff
<i>Asperula subsimplex</i>	Water Woodruff
<i>Brachyscome basaltica</i>	Woodland Swamp Daisy
<i>Calocephalus lacteus</i>	Milky Beauty-heads
<i>Calotis spp.</i>	Burr Daisies
<i>Craspedia paludicola</i>	Swamp Billy-buttons
<i>Diurus spp.</i>	Donkey Orchids
<i>Eryngium vesiculosum</i>	Prickfoot
<i>Coronidium rutidolepis s.l.</i> (formerly <i>Helichrysum</i>)	Pale Everlasting
<i>Hypoxis spp.</i>	Golden Stars
<i>Isoetes spp.</i>	Quillworts
<i>Lobelia concolor</i>	Poison Pratia
<i>Lobelia pratoides</i>	Poison Lobelia

Species Name	Common Name
<i>Marsilea</i> spp	Nardoo Species
<i>Microseris</i> spp.	Yam Daisies
<i>Microtis</i> spp.	Onion Orchids
<i>Montia australasica</i> (formerly <i>Neopaxia</i>)	White Purslane
<i>Ornduffia reniformis</i> (formerly <i>Villarsia</i>)	Running Marsh-flower
<i>Ottelia</i> spp.	Swamp Lilies
<i>Pilularia novae-hollandiae</i>	Austral Pillwort
<i>Potamogeton cheesemanii</i>	Red Pondweed
<i>Prasophyllum</i> spp.	Leek Orchids
<i>Ranunculus inundatus</i> s.l.	River Buttercup
<i>Senecio psilocarpus</i>	Swamp Fireweed
<i>Swainsona</i> spp	Swainson Peas
<i>Teucrium</i> spp.	Germanders
<i>Thelymitra</i> spp	Sun Orchids
<i>Triglochin alcockiae</i>	Southern Water Ribbons
<i>Triglochin striata</i>	Streaked Arrow-grass
<i>Utricularia</i> spp.	Bladderworts; Fairies' Aprons
<i>Xerochrysum palustre</i>	Swamp Everlasting

Note: the taxonomy of the species above is current but taxonomic revisions may occur.

Rare and endangered Seasonal Herbaceous Wetland plants

It seems logical that if many of Victorian wetland types are rare or threatened and SHW are critically endangered, then the plants associated with them will also be rare and worthy of the highest level of protection.



Gora Leek-orchid
(*Prasophyllum diversiflorum*)



Swamp Everlasting
(*Xerochrysum palustre*)



Entire Marshwort
(*Nymphoides geminata*)



Ridged Water-milfoil
(*Myriophyllum porcatum*)

Table 2: Species that are indicators of a very high quality SHW

<i>Species Name</i>	<i>Common Name</i>
<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass
<i>Callitriche cyclocarpa</i>	Western Water-starwort
<i>Carex tasmanica</i>	Curly Sedge
<i>Eleocharis obicis</i>	Striate Spike-sedge
<i>Eriocaulon australasicum</i>	Southern Pipewort
<i>Haloragis exalata</i> subsp. <i>exalata</i> var. <i>exaltata</i>	Square Raspwort
<i>Lachnagrostis adamsonii</i>	Adamson's Blown-grass
<i>Myriophyllum porcatum</i>	Ridged Water-milfoil
<i>Nymphoides spinulosperma</i>	Marbled Marshwort
<i>Poa sallacustris</i>	Salt-lake Tussock-grass
<i>Prasophyllum diversiflorum</i>	Gorae Leek-orchid
<i>Rulingia prostrata</i>	Dwarf Kerrawang
<i>Senecio psilocarpus</i>	Smooth-fruited Groundsel
<i>Swainsona murrayana</i>	Murray Swainson-pea
<i>Swainsona plagiotropis</i>	Red Swainson-pea
<i>Swainsona recta</i>	Mountain Swainson-pea
<i>Xerochrysum palustre</i>	Swamp Everlasting

Glossary

Algae	Simple plants, mostly microscopic without roots or leaves.
Amphibious	A plant or animal that can survive both in and out of water for extended periods of time.
Biodiversity	Biological diversity or the variety of all life forms, comprising genetic species and ecosystems diversity.
Biomass	The weight of living organisms in a volume or area.
Catchment	The area of land off which surface water (rainfall) flows into wetlands and waterways.
Crustaceans	Invertebrate aquatic animals that have hard shells.
Ecosystem	An interdependent biological system involving interaction between living organisms and their physical, chemical and biological environment.
Emergent plants	Plants such as sedges and reeds that stick up out of water.
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (the EPBC Act) is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, heritage places and threatening processes.
Fauna	Animals.
FFG Act	The Flora and Fauna Guarantee Act 1988 (FFG Act) is the key piece of Victorian legislation for the conservation of threatened species and communities, and for the management of potentially threatening processes.
Flora	Plants
Gilgai	Puffs and depressions formed by the shrinking and swelling of clays during alternate drying and wetting cycles. The surface eventually becomes covered by a repeated pattern of small mounds and depressions that give the soil surface a 'pock-marked' appearance, sometimes also called crabholes or melonholes.

GLOSSARY

Habitat	Type of environment in which an animal or plant lives and grows including physical and biological conditions.
Invertebrates	Animals without backbones ie aquatic bugs, worms, insects, shrimp, crabs etc.
Macro-invertebrates	Invertebrates with a body length greater than 1mm, that can be seen by naked eye.
Micro-organism	Any organism not visible to the naked eye e.g. bacteria.
Photosynthesis	Process that plants undertake to make carbohydrates using light.
Projective foliage cover	The proportion of ground covered by a vertical projection of branches and leaves excluding the gaps between them. That is, the amount of shadow cast by a canopy on the ground if there were a light source directly overhead.
Propagules	Parts of plants and algae that allow them to make a new individual (seed, corm, bulb, cysts etc).
Reeds	Tall aquatic or amphibious grasses such as <i>Phragmites australis</i> .
Runoff	Rainfall water that runs off the soil surface and does not infiltrate or evaporate.
Salinity	The concentration of salts in soil or water, usually from sodium chloride.
Sedges	A family of grass-like plants that generally have tough leaves and flower stems, many species of which grow in or around water. Their seeds have a hard coating, unlike grass seeds which have a soft coating that can easily be squashed between your fingernails.
Seedbank	Population of viable dormant seed that accumulates in and on the soil, and in sediments underwater.
Wetland	Land inundated with temporary or permanent water that are usually slow moving or stationary, shallow and either fresh, brackish or saline.

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Further information

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Murray Darling Basin Commission (2001). Rivers as Ecological Systems: The Murray Darling Basin. CSIRO Land and Water, Canberra.

Nick Romanowski (2013). Living Waters: Ecology of animals in swamps, rivers, lakes and dams. CSIRO Publishing, Melbourne.

Nick Romanowski (2010). Wetland Habitats: A Practical Guide to Restoration and Management. CSIRO Publishing, Melbourne.

Useful websites

Australian National Botanic Gardens
www.anbg.gov.au/gardens/

Nature Share
www.natureshare.org.au

Victorian Flora
www.victorianflora.wmcn.org.au

Yarra Ranges Council Plant Directory
http://fe.yarraranges.vic.gov.au/Residents/Trees_Vegetation/Yarra_Ranges_Plant_Directory

Museum Victoria
www.museumvictoria.com.au

Birdlife Australia
www.birdlife.org.au

iSpy Frogs
www.gbcma.vic.gov.au/ispy_catchment_creatures/ispy_frogs

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