

Recognising Water Weeds

PARTICIPANT WORKBOOK



WeedED Resource



Australian Government



Industry &
Investment

Recognising Water Weeds Participant Workbook

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VET sector resource:

- RTC2016A Recognise Plants
- RTD2803A Observe and report plants and/or animals

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WeedED training and information resources were originally produced by the Cooperative Research Centre for Australian Weed Management. WeedED resources are now produced and managed by the NSW Weeds Training Program, supported by Industry and Investment NSW, Noxious Weed Grants and the Registered Training Organisation Tocal College. WeedED resources are suitable for Weeds Officers, Project Officers and Natural Resource Managers as well as others involved in operational, managerial or community-based weed management. WeedED information resources won the 2006 CRC Association Award for Excellence in the category of Innovation in Education and Training and Public Outreach Activities.

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Assessment

Participants who meet the assessment requirements of this workshop can be awarded a Statement of Attainment in the Competency Units RTC2016A 'Recognise Plants' and RTD2803A 'Observe and report plants and/or animals'.

To be assessed, you must:

- complete all exercises
- participate in group activities throughout the day
- submit some of your work to the trainer, who will clearly explain the requirements for assessment.

Part 1 Introduction to water weeds

What is a weed?

The broad definition of a weed is a plant growing where it is not wanted. In the last 200 years, over 28 000 foreign plant species have been introduced into Australia. Most have been deliberately imported for pasture, horticulture or ornamental reasons, but some introductions have been accidental. Many of these introduced plants have spread and now cause harmful impacts. Weeds cost the Australian economy over \$4 billion each year; they place numerous native plant species under threat and have been implicated in the extinction of several.

Aquatic weeds are invasive plants that can interfere with the normal functions of waterways. They grow rapidly and spread by seed and fragmentation, quickly infesting rivers, creeks, lakes, wetlands, irrigation channels and water supply dams. Water weeds can form large floating mats, dense underwater thickets or stands along banks, and affect the waterways' environmental, economic and social values. It is very difficult and costly to manage such large infestations. To increase the possibility of successful containment or eradication it is important to recognise, report and control a water weed when its coverage is small and not yet well established.



Photo: Rebecca Coventry

(The Hawkesbury River, Windsor NSW)

The Hawkesbury–Nepean River provides some of Sydney's water supply, is very important to the agricultural industry, and is a popular recreation and fishing destination. In late 2003 a dramatic increase in the amount of salvinia (*Salvinia molesta*) occurred owing to low water flows, increased water temperatures and high nutrient levels. By May 2004 approximately 350 ha of multilayered salvinia infested 88 km of the river and its tributaries. This had an extremely high impact on the river's commercial, environmental and recreational values. In a cooperative effort by many government authorities, \$1.8 million was spent to remove the salvinia. This is recognised as possibly the largest temperate infestation of salvinia to have occurred in Australia.



Photo: Schon Schooler

Seibs Dam, near Cooroy in Southeast Queensland, under heavy cabomba infestation

Cabomba (*Cabomba caroliniana*) has spread throughout Seibs Dam, near Cooroy, in south-east Queensland. It forms dense underwater thickets with white flowers visible at the surface. Cabomba has reduced the aesthetic value of Seibs Dam and displaced native flora and fauna. For an infestation of this extent, control options are limited and expensive. Research is under way, but there are currently no effective registered herbicides and no available biocontrol agents for cabomba. Continuous mechanical removal using harvesters can suppress an infestation at costs of up to \$2500 per day. (Noosa Council currently spends \$120 000 a year harvesting cabomba from just 12 hectares.)



Photo: Paul O'Connor

Coolabah Reserve, Port Stephens NSW

In January 2004, following an alligator weed (*Alternanthera philoxeroides*) identification workshop, Port Stephens Council staff positively identified alligator weed in a stormwater retention basin in Coolabah Reserve. The infestation was relatively small. Early detection and rapid response measures resulted in relatively low-cost containment, removal and eradication. Port Stephens Council used considerably less resources to contain and eradicate this infestation than it would have had it remained unidentified and untreated for several more years.

Classification of weeds

Weeds can be classified as noxious or environmental.

Noxious weeds

Noxious weeds are plants that cause economic or environmental harm, or have the potential to cause such harm, and must be controlled by law. The level of control and restrictions is determined by the weed control category as defined by the state or territory legislation. This legislation differs from state to state, but in most cases declared plants are illegal to possess and must be eradicated or controlled, or restrictions must be placed on their sale. The main intent of noxious weed legislation is to prevent the spread of serious weeds and so protect other landholders from weed invasion.

Table 1 lists the weed legislation and the agency responsible for administering or implementing it in each state and territory. A summary of legislation can be found at <http://www.weeds.org.au/>.

Table 1 Weed legislation and responsible agency in each state and territory

State	Noxious weed legislation	Responsible agency
NSW	Noxious Weeds Act 1993	Industry and Investment NSW
Vic	Catchment and Land Protection Act 1994	Department of Sustainability and Environment
Qld	Land Protection (Pest and Stock Route Management) Act 2002	Queensland Biosecurity
WA	Agriculture and Related Resources Protection Act 1976	WA Department of Agriculture and Food
SA	Natural Resources Management Act 2004	Department of Water, Land and Biodiversity Conservation
Tas	Weed Management Act 1999	Department of Primary Industries, Parks, Water and Environment
NT	Weeds Management Act 2001	Department of Natural Resources, Environment, the Arts and Sport
ACT	Pest Plants and Animals Act 2005	Department of Urban Services

Disclaimer: This information was correct at the time of publication but is subject to change. Check with the local or state weed control authority for current information.

Environmental weeds

Environmental weeds are plants that have a significant environmental impact. These fast-growing plants can out-compete native plants for nutrients, water, space and sunlight and prevent them from re-establishing after disturbance. This also affects the native animals that rely on the native vegetation for shelter, food and nesting sites. Environmental weeds are not declared noxious, and although in some cases they may be banned from sale, there are no legal requirements to manage these plants.

Weeds of national significance

In 1999 the Federal Government announced the Weeds of National Significance (WoNS) list as part of the National Weed Strategy (<http://www.weeds.org.au/nws.htm>). The 20 listed weeds were selected on account of their invasiveness, potential to spread, and environmental and economic impacts. The WoNS program is an effort by the Australian Government to manage some of the country's most serious weed threats. For each species a national strategy was developed and implemented.

Three water weeds are listed because of their potential to seriously affect our waterways: salvinia (*Salvinia molesta*), cabomba (*Cabomba caroliniana*) and alligator weed (*Alternanthera philoxeroides*).

National Alert List

The National Alert List for Environmental Weeds was developed by the Department of the Environment and Heritage in 2000. This list identifies 28 non-native plant species that are in the early stages of establishment and have the potential, if not managed, to become a significant threat to biodiversity.

Three water weeds are included on the National Alert List: senegal tea (*Gymnocoronis spilanthoides*), horsetail (*Equisetum* spp.) and lagarosiphon (*Lagarosiphon major*). These plants have extremely limited distribution but have the potential to seriously affect Australia's waterways.

Activity 1 – Name three plants

Name three plants that you consider to be water weeds and why.

Plant name	Why do you consider it a weed?

How are water weeds introduced?

Most of Australia's water weeds are native to other countries that have a similar climate and water temperatures. Up to three-quarters of the current water weeds in Australia were introduced through the aquarium plant trade. Species such as cabomba (*Cabomba caroliniana*) are believed to have been deliberately planted in waterways by water plant traders to later harvest for personal use or for sale.

Some water weeds have been introduced accidentally. Alligator weed (*Alternanthera philoxeroides*) is believed to have arrived from South America in ship's ballast water.

Other water weeds are Australian natives out of their natural range that have become weedy. Water lettuce (*Pistia stratiotes*), native to northern Australia, was once a popular fishpond plant, but has now become a weed in southern Australia.

Water weeds are spread throughout Australia mainly by human activity, both intentionally and unintentionally. Fragments can easily become stuck in equipment used in waterways and transferred to other waterways.

Water weeds are often introduced at sites of access to a waterway, such as:

- boat ramps
- bridge crossings
- public parks
- near main roads.

Many vectors and activities are capable of spreading water weeds:

- boats, boat trailers and recreational water craft
- deliberate plantings by aquarium plant enthusiasts
- eel trapping equipment
- fishing nets

- dumping of aquarium or fishpond plants
- water movement through irrigation channels
- irrigation equipment
- water movement during floods
- slashers
- livestock (cattle, horses)
- earthmoving equipment (e.g. excavators)
- wildlife (birds, mammals etc.)
- contaminated landscaping supplies (mulch, soil, gravel)
- incorrect disposal
- mistakenly growing weeds as a garden vegetable (e.g. alligator weed)
- cropping (turf production and distribution)

Where do water weeds grow?

Water weeds predominantly require slow-moving, permanent, shallow freshwater to grow. They can be found growing in:

- slow-moving or ponded creeks
- lakes
- wetlands
- farm dams
- water storages
- stormwater retention ponds
- irrigation channels
- canal estates
- urban drains
- irrigated crops (e.g. rice and turf).

Some weeds can grow both in water and on land. Alligator weed (*Alternanthera philoxeroides*) can grow in fresh water, in brackish water and on land. Its ability to grow in such different environments is one of the reasons it poses such a threat.

Water weeds are more likely to grow well with elevated nutrient levels, direct sunlight and warm water temperatures. These are common features of degraded waterways that have been cleared of native riparian vegetation for urban development, cropping, grazing or irrigation and have elevated nutrient levels from crop runoff, stormwater, sewerage or industrial discharge.

Healthy waterways depend on native riparian vegetation, which prevents bank erosion, reduces siltation, retains and utilises nutrients, and provides habitat for native flora and fauna. This riparian vegetation also provides shade, maintaining low water temperatures and reducing the maximum daily temperature by up to 10 °C in small streams.

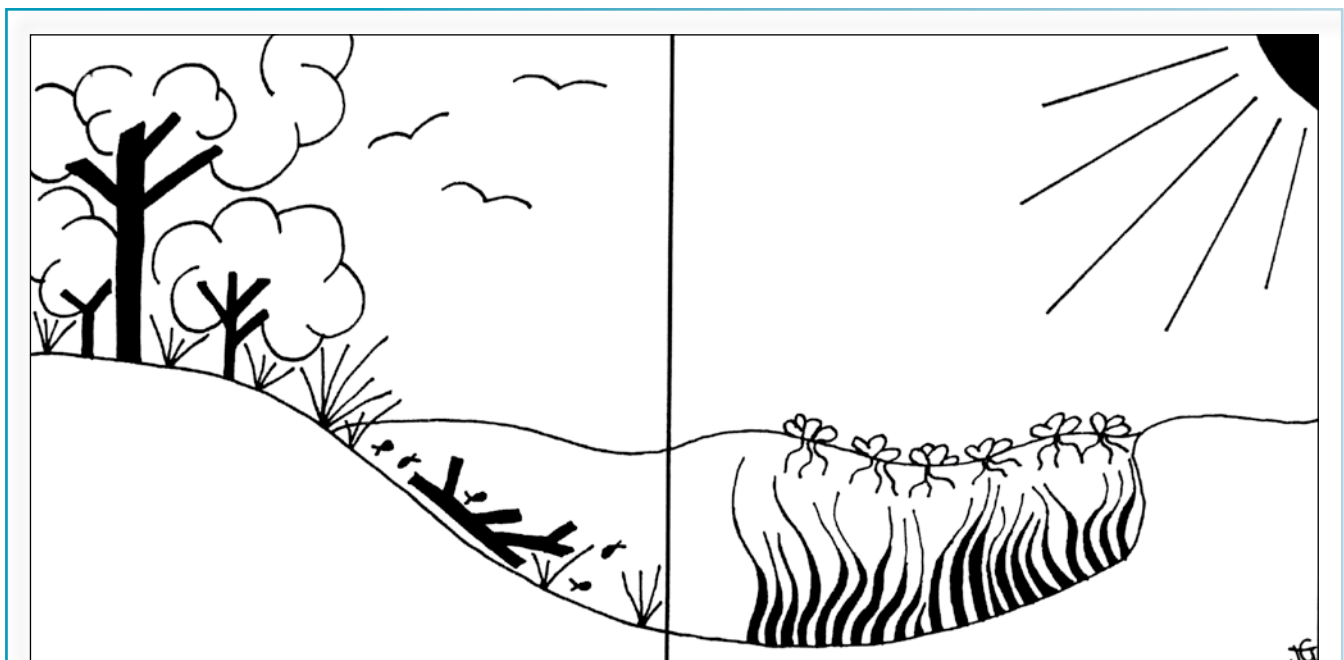
Water weeds often out-compete native water plants. Water weeds grow fast, respond rapidly to changes in surrounding vegetation, water quality and flow, and in Australia are often not affected by the pests or diseases that control them in their natural habitats.

Native riparian vegetation:

- shades and reduces water temperature
- filters and utilises nutrients
- provides habitat for native flora and fauna
- stabilises the banks
- discourages water weed growth.

Clearing of vegetation:

- increases water temperature and sunlight
- increases levels of nutrients in water
- offers no habitat for native flora and fauna
- increases bank erosion
- accelerates water weed growth.



Native Riparian Vegetation versus Cleared vegetation

Impacts of water weeds

Water weeds can form dense floating mats, underwater thickets or extensive stands along banks. The environmental, economic and social impacts are described below.

Economic impacts:

- The quantity and quality of Australia's agricultural products can be reduced.
- Crops (such as rice) can be quarantined or lost.
- The direct costs of control can be very expensive.
- Tourism can be affected.
- Fisheries can be affected.
- Irrigation equipment can become clogged.
- Water supply can be affected.
- Land values can decrease.
- Power generation equipment can be obstructed.
- Livestock may mistake mats of water weeds for pasture and drown by stepping onto it.

Environmental impacts:

- Native flora and fauna can be displaced.
- Bird life surrounding the waterway can be affected.
- The structure and function of water ecosystems can change.
- Nationally and globally significant sites such as Ramsar wetlands, cultural heritage sites, World Heritage Areas, national parks and nature reserves can be affected.

- Light penetration into the water can be reduced.
- Fish stocks can diminish.
- Biodiversity can be reduced.
- Stream flow can be slowed and sediments can accumulate.
- Channels can become blocked, increasing the likelihood of flooding and erosion.
- Water quality and oxygen levels can be reduced as the weeds decompose.
- Few native animals consume introduced water weeds.

Human health and social impacts:

- The community's enjoyment and amenity of the waterway can be spoiled.
- The aesthetic value of the waterway can be reduced.
- Navigation can be hindered and hazards in the waterway can be concealed.
- Swimmers can become entangled and at risk of drowning.
- Water-based recreational activities such as boating, fishing, kayaking and swimming can be seriously impeded.

Part 2 Water plant recognition techniques

How to identify a water plant

It is essential to correctly identify a suspect water weed before selecting a management option. This course focuses on the key features of water plants and plant recognition.

A number of techniques and resources are used for identifying water plant species. Used alone, most identification techniques have limitations, and more than one technique needs to be used to accurately identify a plant. For example, after today you will be able to use your new skills and knowledge to better understand the language used in plant identification reference books, as well as the botanical illustrations. A range of resources that can assist with water weed identification are available. Most come in the form of publications (books, brochures, WEEDeck), which identify the major characteristics of each weed and have high-quality images or line drawings of each species.

Be aware that plant identification requires the scientific study of plant parts, often under a microscope, to determine the species or subspecies. This is usually undertaken by a formal identification organisation such as a herbarium.

Activity 2 – List identification tools

List identification tools and the limitations of using only that tool.

Identification tool	Limitations

Activity 3 – List observation equipment

What equipment might you need when observing plants?

Common and scientific names

Common names may be easier to remember but can be misleading due to inconsistencies and the same name being used for different species. Scientific names will be used during the workshop.

Plant characteristics

Recognising water plants can be as simple as learning what distinguishes one plant from another. Known plant characteristics such as those learned today will help you distinguish between similar looking plants.

Before looking too closely at a plant, it is good practice to look at its general appearance. This will give you a picture in your mind to refer to later. Stand back, look at the plant from a distance and take note of its:

- colour – shade of green
- height – compare to surrounding plants or features
- growth habit – dense, sprawling or upright.

Other general features that may assist identification include:

- surrounding vegetation
- time of year
- site history
- surrounding land use
- smell of foliage.

For an accurate identification of a water plant we need to create a list of features under these categories:

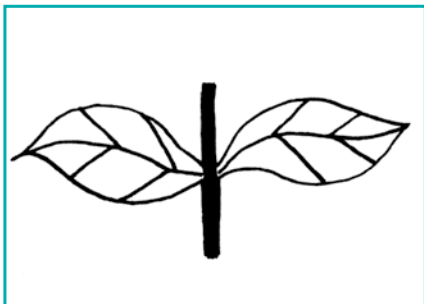
- plant type
- leaf structure
- stem and root features
- flowers.

Leaf structure

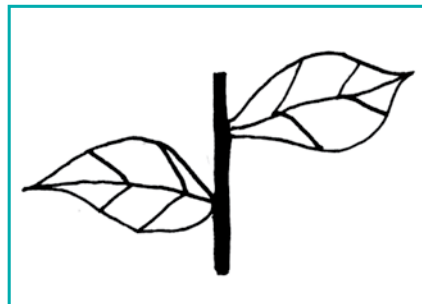
There are many ways to describe the leaves of a plant. Look closely at the leaf, starting from where it branches away from the stem through to its tip (apex). You can describe leaf features of water plants by considering arrangement, shape, margin and tip.

Leaf arrangement: Note the arrangement of leaves on a stem. Leaf arrangements include the following:

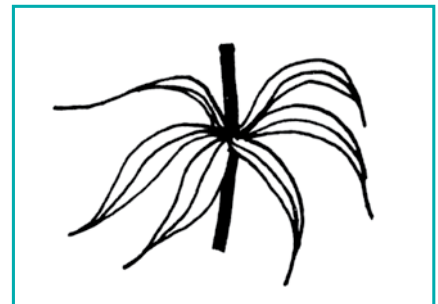
- Opposite – two leaves opposite each other at the same node (the point on the stem from which a leaf or branch arises).
- Alternate – consecutive leaves on opposite sides of the stem.
- Whorled – the arrangement of leaves in circles around the stem.



Opposite



Alternate



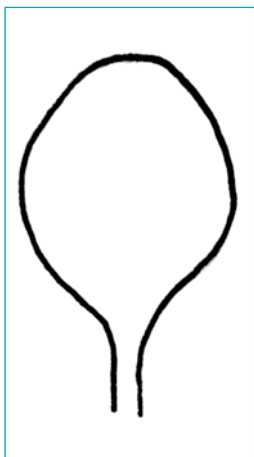
Whorled

Activity 4 – Plants with similar leaf shapes

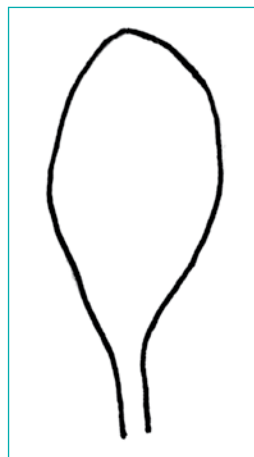
Can you think of water plants that have similar leaf shape but different leaf arrangements?

Name of plant	Leaf arrangement	Similar looking plant	Leaf arrangement

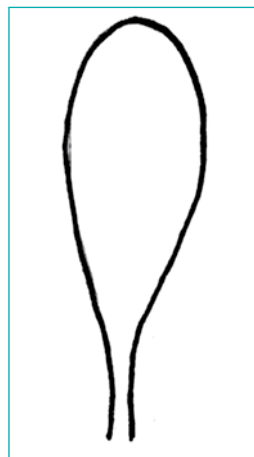
Leaf shapes: Some terms that are commonly used for describing leaf shapes and margins are given below.



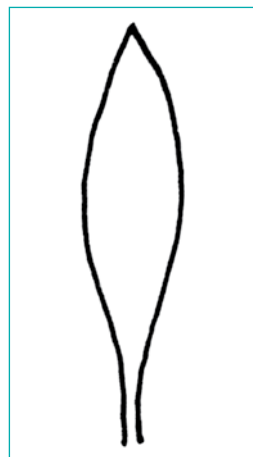
Round



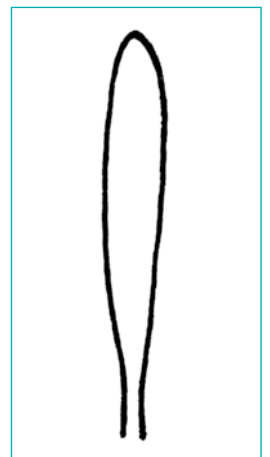
Oval



Narrow

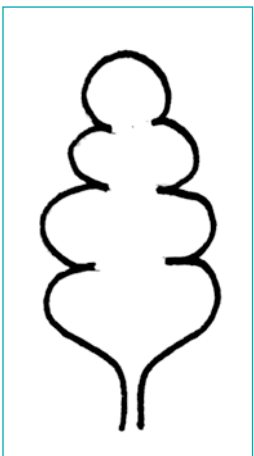


Spear shape

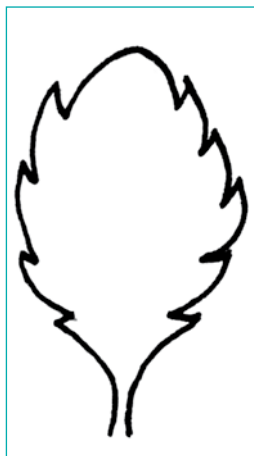


Linear

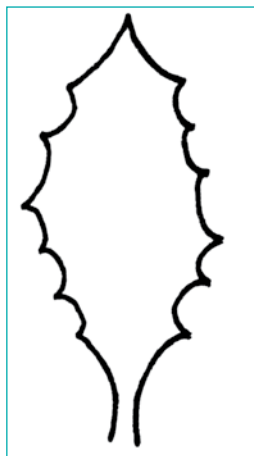
Leaf Margin



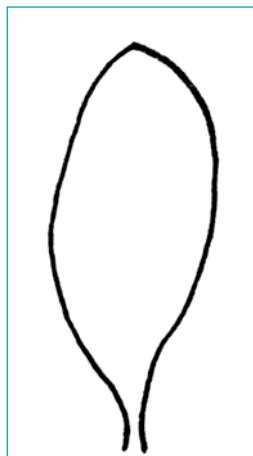
Lobed



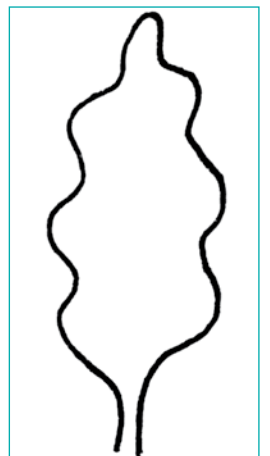
Serrated



Scalloped

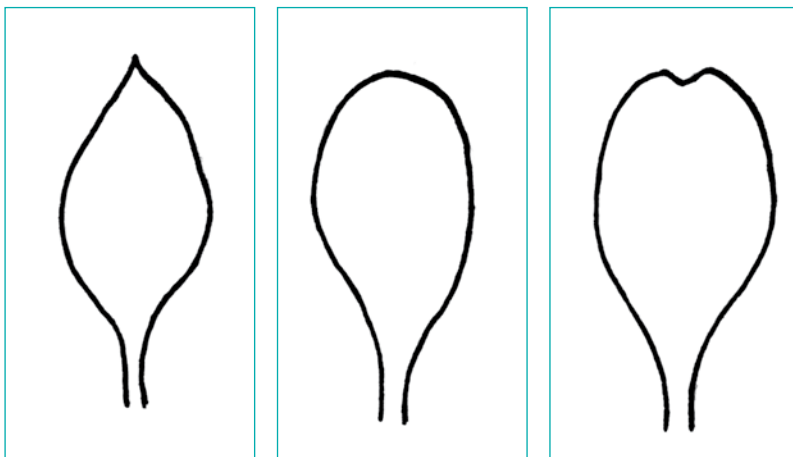


Smooth



Undulating/wavy

Leaf tip



Pointed

Round

Indented

Other leaf characteristics that can aid in the identification for water plants include:

- hairs – e.g. dense, one side only
- leaf surface – e.g. smooth, wrinkly, glossy
- venation – e.g. prominent rib veins, parallel veins
- petiole (leaf stalk) – e.g. absent, long, short.

Activity 5 – Distinguish between water weeds and similar plants

List two water weeds that are easily distinguished from similar looking plants by checking leaf shape, margin or tip.

Name of plant	Distinguishing feature

Stem and root features

The stem and roots can aid in identification of some water plant species:

- fibrous roots
- stem colour
- stem hairs
- rhizomes
- hollow or solid stem.

Activity 6 – Distinct root and stem features

Can you think of a weed that has distinct root or stem features?

Name of plant	Root features	Stem features

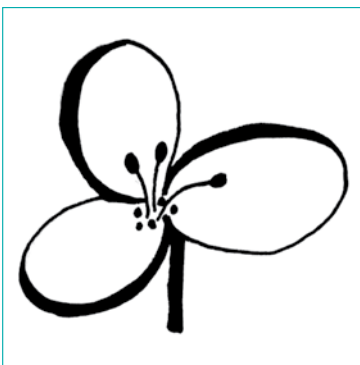
Flowers

Many terrestrial plants can be distinguished from each other only by their flowers, which in many cases have to be dissected under a microscope. Fortunately an inspection by eye of the flowers can provide enough information to support identification of most water weeds. Note the following characteristics:

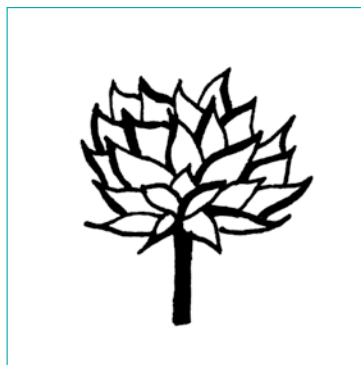
- colour
- structure
- size
- form.

Other characteristics that can be used to describe a flower include:

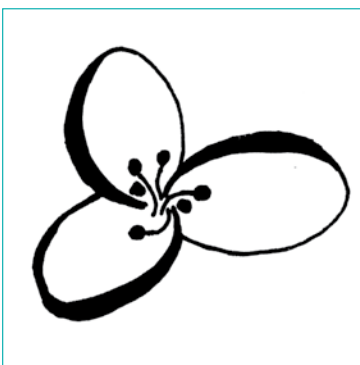
- petals – colour, number, shape and arrangement
- stamens (male parts) – colour, size and position
- location – where the flower is on the plant
- number – flowers in a group (on an inflorescence) or single (solitary)
- flowers sessile (attached to stem) or pedicellate (on a stalk)
- time of year when plant is flowering.



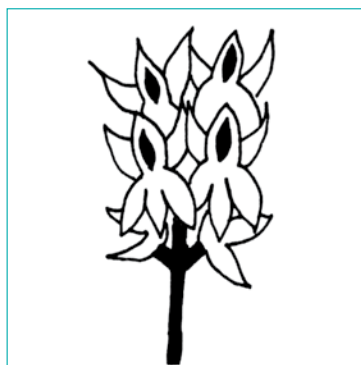
Flower parts



Cylindrical / ball shaped



Single – three petals



Clusters on stem / spike

Activity 7 – Distinct flower features

Can you think of any water weeds that look similar but have different flowers?

Name of plant	Flower colour/form	Name of plant	Flower colour/form

How to collect, prepare and submit a plant for formal identification

If you are unsure of the identity of a water plant that you think may be a weed, it is essential to get it correctly identified. This section shows you how to collect, prepare and submit a plant to a botanist, herbarium or other expert for formal identification.

It is an offence in most states and territories to remove noxious plant material from a waterway without a permit. You can obtain a permit from the authority that administers noxious weeds legislation in your state or territory. Permits to transport a noxious weed are also required.

However, if the plant is being collected for the single purpose of seeking positive identification, responsible removal from the waterway is justifiable. There are several reasons why you would retrieve the plant from where it is growing. You may want to:

- send it to your state herbarium for identification
- show it to someone for identification
- preserve it in your own collection for future reference
- put it on display at a field day.

What to collect

When you find a water plant that you are unable to identify, you need to collect sufficient information to fill in the herbarium identification form, take photographs of the plant in its habitat and collect a good quality specimen. Try to collect a specimen that has the key identification features intact, such as the flowering parts, seed pods, seeds, leaves, stem, roots or rhizomes. Gently wash away as much as possible of the mud and silt from the roots and rhizomes before placing the specimen in paper for pressing.

The materials that you require for plant collecting include:

- plastic bags
- a net
- an Esky if the weather is hot
- a pencil or permanent marker or jeweller's tags
- a notebook
- a camera
- a GPS receiver or a topographic map
- suitable footwear and sun safety clothing
- a lifejacket and water safety equipment.

Specimen preparation

Water plants can be prepared for formal identification in several ways, some of which are described below. The method you use depends on how soon the specimens can be identified or if they need to be stored for some time.

Some herbariums prefer different methods, so first ask your herbarium for the most suitable way to prepare and present your specimen.

1. Preparation for short-term preservation

This preparation method is suitable if the water plant can be identified locally or straight away. The specimen will not be suitable for storage in a collection.

- Put the plants in damp newspaper and into a plastic bag with a few millilitres of water, with the roots towards the bottom of the bag.
- Tag plants with a specimen number, date, collector and locality. If the specimen is in sections, give each sample the same number.
- Put a written label in the bag, as writing on the bag, even with a waterproof pen, can rub off.
- Seal or tie off the top of the bag to keep the contents humid and fresh.
- Keep the specimens out of the sun. Most specimens can be kept in a refrigerator for a few days. The main exception would be specimens with large, soft flowers.

2. Pressing and drying a water plant for identification or storage

- Dry the plant as much as possible before pressing. Simply shake the water off the plant, or place more delicate plants in a cotton bag, then swing the bag around a few times or shake gently.
- Place the plant between several sheets of newspaper or cardboard.
- Arrange the plant so that the key identification features can be seen. (Floating and submerged plants can be difficult to arrange, and method 3 may be more suitable.)
- You can bend larger specimens into a zigzag to fit.
- Cut some flowers in half and fold some of the petals and stamens forward to show the number and arrangement of the stamens.
- Delicate petals and mucilaginous (slimy) leaves tend to stick to newspaper. To prevent this, spread the plant out on a sheet of acid-free paper in the position in which it will be mounted when dry. Cover it with a protective layer of ordinary wax paper with the waxed side against the plant. Prick several holes in the wax paper so that the newspaper can absorb the moisture.
- If the specimen does not adhere to the acid-free paper, secure it with a few gummed paper strips.
- Change the newspaper daily for the first few days, then weekly until the specimen is dry.
- Multiple plant specimens can be laid upon each other between newspapers and then placed between rigid boards with weights such as bricks or books to supply pressure to flatten the specimens. Tag each plant to keep track of it.
- Place any loose items such as seedpods or fruits in an envelope labelled with your name and collection number. Include the envelope with the dried specimen.
- Send the specimen to the herbarium in a pressed and dried state with a herbarium identification form.

3. Pressing floating or submerged water plants

Floating or submerged water plants may be difficult to collect because the entire plant body is normally supported by water and tends to collapse when removed, and the leaves adhere to each other. Prepare such specimens for pressing as here or in alcohol as in method 4:

- Partially fill a flat, shallow dish with water.
- Immerse a sheet of acid-free paper or a strong, thick piece of white paper into the dish.
- Spread the plant over the paper.
- Slowly lift the sheet out of the water, keeping it level so that the plant remains supported and the water drains away slowly.
- A thin sheet of polystyrene under the paper can help to support both plant and paper while lifting.
- If initial attempts are unsuccessful, return the plant and sheet to the water and try again.
- Remove excess water and press and dry the plant as in method 2.

4. Preserving the plant in alcohol

- Place the plant in 70%–80% alcohol or methylated spirits for 2 to 3 days.
- Remove the plant and place it 'wet' in an empty plastic bag or container that is suitable for mailing.
- Seal it with tape and label it with your name, the collection site and date collected.

Submitting a plant to a herbarium

Provide the herbarium with:

- a good-quality specimen complete with key identification features
- a completed herbarium plant identification form (contact your herbarium)
- photos of the plant in its habitat.

You can find more detail on submitting plants for identification on herbarium websites and in the following resources:

Storrie A. 2004. Collecting and preparing plant specimens for identification. NSW DPI Agnote DPI-492.

Storrie A, Bowcher A. 2005. Weed management: collecting and preserving plants for identification.

<http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/publications/factsheets/plant-specimens>

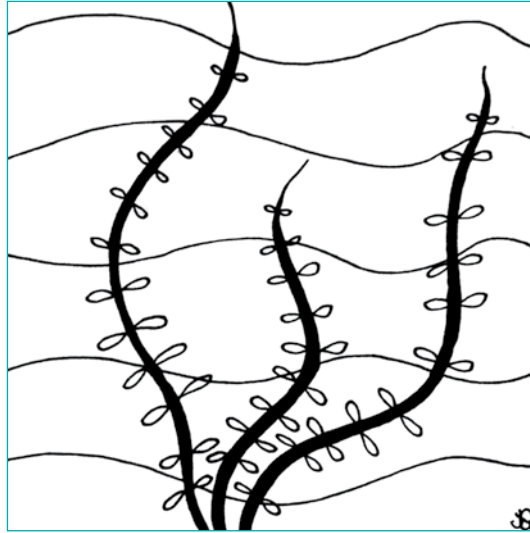
Submerged plants

These plants have most or all of their mass below the water surface, although some portions may appear above the water. Most submerged plants have flaccid or soft stems. Submerged plants can be feathery or non-feathery:

- Submerged feathery plants have leaves that are finely divided; e.g. cabomba (*Cabomba caroliniana*).
- Submerged non-feathery plants have entire leaves more than 1 mm wide; e.g. egeria (*Egeria densa*).



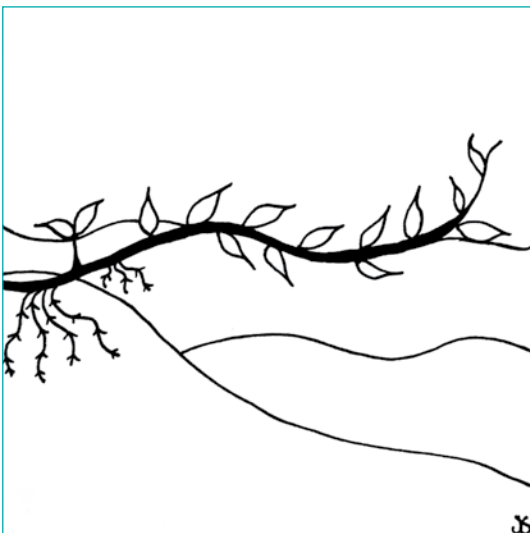
Submerged feathery



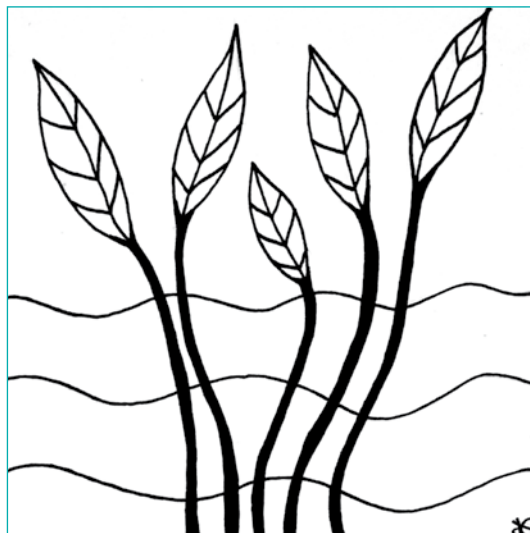
Submerged non-feathery

Emergent plants

These rooted plants project above the water surface and are often found along banks. Their stems tend to be somewhat stiff or firm; e.g. alligator weed (*Alternanthera philoxeroides*).



Emergent



Emergent

Part 3 Water weed identification

Please refer to the *Plant Identification Guide*.

Part 4 Detect water weeds early

Please refer to the *Early Detection Survey Guidelines for Weed Professionals* or the *Early Detection Survey Guidelines for Community Groups*.

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Australian Weeds Committee. 2003. Principles of weeds legislation discussion paper: http://www.weeds.org.au/docs/weeds_leg_dd.pdf (accessed August 2005).

Martin P. 2003. Killing us softly – Australia's green stalkers. CRC for Australian Weed Management, Adelaide.

Moerkerk MR, Barnett AG. 1998. More crop weeds. R.G. and F.J. Richardson, Melbourne.

Morton J. 2005. Collect, prepare and preserve weed specimens. CRC for Australian Weed Management, Adelaide.

Sainty GR, Jacobs SWL. 2003. Waterplants in Australia, 4th ed. Sainty & Assoc., Sydney.

Storrie A. 2004. Collecting and preparing plant specimens for identification. NSW DPI Agnote DPI-492.

Storrie A, Bowcher A. 2005. Weed management: collecting and preserving plants for identification. Factsheet 33/2005/fs: <http://www.weeds.crc.org.au/>.

Victor JE, Koekemoer M, Fish L, Smithies SJ, Mossmer M. 2004. Herbarium essentials: the Southern African Herbarium user manual. Southern African Botanical Diversity Network Report No. 25. SABONET, Pretoria.

Appendix 1 State and territory noxious water plant declarations

Common name	Scientific name	Vic	NSW*	SA	WA	Tas	Qld	NT	ACT
Emergent water plants									
Alligator weed	<i>Alternanthera philoxeroides</i>	S	C2(84) C3(44)	1@	P1/2	D	C1	A/C	C1/4
Arrowhead	<i>Sagittaria montevidensis</i>		C5(S)	1@	P1/2	D			
East Indian hygrophila	<i>Hygrophila polysperma</i>		C1(S)		Unass				
Horsetail	<i>Equisetum</i> spp.	S	C1(S)	1@	P1/2	D	C1	C	C1/4
Hydrocotyl	<i>Hydrocotyle ranunculoides</i>			1@	P1/2				
Hygrophila	<i>Hygrophila costata</i>		C2(55)		Unass		C1		
Yellow burrhead	<i>Limncharis flava</i>		C1(S)		Prohib		C1	C	
Long-leaf willow primrose	<i>Ludwigia longifolia</i>		C3(42) C4(9) C5(S)		Prohib				
Olive hymenachne	<i>Hymenachne amplexicaulis</i>	R	C1(S)	11+	P1/2	S	C2	B/C	C4
Peruvian primrose	<i>Ludwigia peruviana</i>		C3(36)	1@	Prohib		C1		
Pond apple	<i>Annona glabra</i>	R	C1(S)	11+	P1/2	S	C2	A/C	C4
Sagittaria	<i>Sagittaria graminea</i> ssp. <i>platyphylla</i>		C4(14) C5(S)	1@	P1/2	D			
Senegal tea	<i>Gymnocoronis spilanthoides</i>		C1(S)	1@	P1/2	D	C1		C1/4
Shield pennywort	<i>Hydrocotyle verticillata</i>				P1/2				
Water soldiers	<i>Stratiotes aloides</i>		C1(S)	1@	Prohib		C1		
Submerged feathery water plants									
Cabomba	<i>Cabomba caroliniana</i>	R	C5(S)	11+	P1/2	D	C2	A/C	C1/4
Eurasian water milfoil	<i>Myriophyllum spicatum</i>		C1(S)	1@	Prohib		C1	C	
Parrot's feather	<i>Myriophyllum aquaticum</i>				P1/2	D			C1
Submerged non-feathery water plants									
Elodea	<i>Elodea canadensis</i>			1@	P1/2	D		C	
Egeria / leafy elodea	<i>Egeria densa</i>		C5	1@	P1/2	D		C	
Hydrilla	<i>Hydrilla verticillata</i>				Prohib	D			
Lagarosiphon	<i>Lagarosiphon major</i>	S	C1(S)	1@	P1/2	D	C1	C	C1/4
Floating water plants									
Anchored water hyacinth	<i>Eichhornia azurea</i>		C1(S)		Prohib		C1		
Hornwort	<i>Ceratophyllum demersum</i>				Prohib	D			
Salvinia	<i>Salvinia molesta</i>	S	C2(106) C3(22)	1@	P1/2	D	C2	B/C	C1/4
Salvinia	<i>Salvinia</i> spp.				Prohib		C1(d)		
Water caltrop	<i>Trapa</i> spp.		C1(S)		Prohib	D	C1	C	
Water hyacinth	<i>Eichhornia crassipes</i>	S	C2(101) C3(17) C4(9)	1@	P1/2	D	C2	A/C	C4
Water lettuce	<i>Pistia stratiotes</i>		C1(S)		P1/2		C2	B/C	C1/4

*The numbers in parentheses are the numbers of LCAs that have declared this weed noxious.

Codes are explained in Appendix 2.

Disclaimer: This information was correct at the time of publication but is subject to change. Check with the local or state weed control authority for current information.

Appendix 2 Key to state and territory plant declarations

Australian Capital Territory

Category	
C1	Notifiable pest plant: A pest plant whose presence must be notified to the Chief Executive.
C2	A pest plant that must be suppressed.
C3	A pest plant that must be contained.
C4	Prohibited pest plant: A pest plant whose propagation and supply is prohibited.
Notes	
(a)	All <i>Salix</i> spp. except <i>S. babylonica</i> var. <i>babylonica</i> (weeping willow), <i>S. xcalodendron</i> (pussy willow) and <i>S. xreichardtii</i> (pussy willow)

New South Wales

Category	
C1	Class 1 – State Prohibited Weed. Class 1 weeds are also notifiable weeds.
C2	Class 2 – Regionally Prohibited Weed. Class 2 weeds are also notifiable weeds.
C3	Class 3 – Regionally Controlled Weed.
C4	Class 4 – Locally Controlled Weed.
C5	Class 5 – Restricted Weed.
State and Regional Declarations	
Weeds are declared on a Local Control Authority (LCA) basis, and declarations for the same noxious weed can vary across the state. There are 128 LCAs. The NSW DPI's weeds database lists weeds by LCA, category, common name and scientific name.	
(Numbers)	Numbers following categories refer to the number of LCAs in which the weed is declared.
(S)	The weed is declared statewide.

Northern Territory

Category	
A	Class A Noxious Weeds – to be eradicated.
B	Class B Noxious Weeds – growth and spread to be controlled.
C	Class C Noxious Weeds – not to be introduced into NT. All Class A and B weeds are also Class C weeds.
Regional Declaration	
^	Not prescribed for all of the Territory.

Queensland

Category	
C1	Plants not commonly present in the state and, if introduced, would cause an adverse economic, environmental or social impact. Class 1 plants established in the state are subject to eradication. It is an offence to introduce, keep or sell Class 1 plants without a permit.
C2	Plants are established in the state and have, or could have, an adverse economic, environmental or social impact. Landowners must take reasonable steps to keep land free of Class 2 plants. It is an offence to keep or sell Class 2 plants without a permit.
C3	Primarily environmental weeds where the plants are established in the state and have, or could have, an adverse economic, environmental or social impact. A pest control notice can be issued only for land that is, or is adjacent to, an environmentally significant area. Class 3 plants cannot be sold.
Notes	
(d)	Whole <i>Salvinia</i> genus declared Class 1 except <i>S. molesta</i> , which is Class 2.

South Australia

Classes	
1	Generally requiring notification and destruction of the plant throughout the whole state (although sometimes only control in part of the state).
2, 4	Generally requiring notification in at least part of the state and control throughout the whole State.
3, 5, 7	Generally requiring control in part of the state.
6, 8, 9	Special provisions apply.
10, 11	Restricting sale only.
Weed Categories and Regional Declarations	
#	Plant must be destroyed throughout the state (trade and movement usually restricted throughout the state).
^	Plant must be destroyed in part of the state only (trade and movement usually restricted throughout the state).
@	Control required throughout the state (trade and movement usually restricted throughout the state).
*	Control required in part of the state only (trade and movement usually restricted throughout the state).
+	Control not required (usually restricting trade and/or movement only).
N	Notifiable throughout the state.
n	Notifiable in part of the state only.

Tasmania

Category	
D	Declared plants. Details on actual restrictions or measures for each declared weed are given in the weed management plan for that weed.
S	A Statement of Intent to Declare these weeds was made by the Minister for Environment and Planning, and notification was placed in Tasmanian newspapers on 23 June 2005. At this stage, the weeds are not declared in Tasmania.

Victoria

Category	
S	State Prohibited Weeds – Do not occur in Victoria, or it is reasonable to expect that they can be eradicated from the state.
P	Regionally Prohibited Weeds – Are not widely distributed throughout the region, are capable of spreading further and it is reasonable to expect that they can be eradicated from the region.
C	Regionally Controlled Weeds – Occur in the region, are capable of spreading further and continuing control measures are required to prevent their spread.
F	Statewide Noxious Aquatic Species – Plants that pose a serious threat to a fishery, the aquatic environment or human health. Declared under the <i>Fisheries Act 1995</i> . It is an offence to bring these plants into Victoria or possess, sell, transport or release them.
R	Restricted Weeds – Plants that do not occur in Victoria, but pose an unacceptable risk of spread if they were sold or traded.

Western Australia

Western Australia uses a Permitted and Prohibited list for plants permitted entry into the state. The database includes only prohibited plants listed as noxious or declared weeds by another state or territory and not declared in WA. Species not included in the Permitted and Prohibited list require a weed risk assessment before being allowed entry into WA.	
Category	
Prohib	Plant species on the Permitted and Prohibited list not permitted entry into WA under the <i>Plant Diseases Act 1974</i> .
Unass	Plant species declared in other states or territories that are not on the Permitted and Prohibited list, are unassessed and are prohibited until assessed via a weed risk assessment.
Declared weed species listed in the <i>Agriculture and Related Resources Protection Act 1976</i> only	
P1	Prevention of trade, sale or movement.
P2	Eradicate – serious weeds which are not yet widely established in WA.
P3	Control – serious weeds which cannot be eradicated in the short term, but must be kept under control.
P4	Contain – well-established plants where reducing the infestation is either impractical or uneconomical.
P5	Weeds to be controlled on public land or land under the control of a local government.
Regional Declarations	
^	Not prescribed for whole of the state.

Appendix 3 Herbarium contact details

Australian National Herbarium

Centre for Plant Biodiversity Research
GPO Box 1600, ACT 2601
Tel: (02) 6246 5533; fax: (02) 6246 5249
cpbr-info@anbg.gov.au
www.anbg.gov.au/cpbr/herbarium/collecting/index.html

National Herbarium of New South Wales

Royal Botanic Gardens
Mrs Macquaries Road Sydney, NSW 2000
Tel: (02) 9231 8111; fax: (02) 9251 1952
herbarium@rbgsyd.nsw.gov.au
www.rbgsyd.nsw.gov.au

Queensland Herbarium

Brisbane Botanic Gardens
Mt Coot-tha Rd Toowong, Qld 4066
Tel: (07) 3896 9326; fax: (07) 3896 9624
queensland.herbarium@epa.qld.gov.au
www.epa.qld.gov.au/nature_conservation/plants/queensland_
herbarium/botanical_information/

National Herbarium of Victoria

Identifications and Information Service
Royal Botanic Gardens Melbourne
Private Bag 2000 South Yarra, Vic 3141
Tel: (03) 9252 2300
www.rbg.vic.gov.au/research_and_conservation/plant_
identifications

Herbarium of South Australia

PO Box 2732 Kent Town, SA 5071
Tel: (08) 8222 9308; fax: (08) 8222 9353
pbc@saugov.sa.gov.au
www.flora.sa.gov.au

Tasmanian Herbarium

Private Bag 4 Hobart, Tas 7001
Tel: (03) 6226 2635; fax: (03) 6226 7865
herbarium@tmag.tas.gov.au
www.tmag.tas.gov.au/Herbarium/Herbarium2.htm

Western Australian Herbarium

Locked Bag 104
Bentley Delivery Centre Perth, WA 6983
Tel: (08) 9334 0500; fax: (08) 9334 0515
herbarium@dec.wa.gov.au
www.naturebase.net/content/view/125/483/

Northern Territory Herbarium

PO Box 496 Palmerston, NT 0830
Tel: (08) 8999 4516; fax: (08) 8999 4527
www.nt.gov.au/nreta/wildlife/plants/index.html



Water weed ID sheet – attempt 1

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Resource