



A guide to freshwater pest plants of the Wellington region



Ministry for the
Environment
Manatū Mō Te Taiao

Fresh Start for Fresh Water Clean-Up Fund



greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

Contact information

For more information contact Greater Wellington Regional Council's Biosecurity team.

Phone us: 0800 496 734
Visit our website: www.gw.govt.nz/biosecurity
Send us an email: pest.plants@gw.govt.nz

The Greater Wellington Regional Council's Biosecurity Pest plant officers can:

- Help you identify pest plants on your property.
- Provide advice on different control methods.
- Undertake control work in areas outlined in the Regional Pest Management Strategy.

Download the Greater Wellington Regional Pest Management Strategy – www.gw.govt.nz/pest-plants-3

Acknowledgements

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Foreword

“The effects of freshwater pest plants on Maori cultural values”

Freshwater pest plants are considered a problem by most people regardless of their cultural beliefs. The following explanation briefly explains how these pest plants effect Maori cultural values in and around Wairarapa Moana.

There are animate and inanimate life forms that belong naturally in a location. In English we describe these beings as endemic. Whether plant, animal or rock these are a part of the place they are found and may have lived there for millions of years. Within tikanga Maori these long term residents are taonga tuku iho – treasures put in place through descent from the atua (gods) at the dawn of time. All life forms are related, but a group living in the same place such as in or around a stream will have some degree of interdependence. This is an ancient Maori understanding that has links to the relatively modern concept of biodiversity. It has also been realised for centuries that if you mess with nature there will be repercussions.

If one endemic plant is unsettled there is an inevitable flow on effect to other forms of endemic life and more than likely, eventually to humans.

Hundreds of years ago Polynesian explorers settled in what we now call coastal Wairarapa. They made mistakes such as deforestation that subsequently led to erosion into rivers and thereafter loss of essential food supplies. They were also adversely affected by events that were out of their control such as earthquakes, tsunami's, floods and temperature variations. All in all they worked out quickly enough that they were not the masters of their universe but rather they survived because of the good will of the gods – principally through the body of Papatuanuku the earth mother that provided all the resources they needed including the most important, which was her blood – water. Making sure Papatuanuku was cared for became and still is a paramount concern.

At the most basic of levels the infestation of a water body by an introduced pest plant can mean a loss of food or drinking sources for people, major compromises of cultural values, but of course it goes much wider than this.

The ultimate overall effect of the land and waterways suffering is that we suffer. Contemporarily Maori want to be able to buy nutritious food but if water problems lead to market changes that force prices upwards some items become unaffordable. Some people want to undertake traditional activities such as fishing and swimming. But these and many more activities become difficult if freshwater pest plants are affecting the health of waterways.

Joseph Potangaroa

Purpose

This Freshwater Pest Plant Guide is designed for use by landowners and farmers and includes key information on aquatic plant species that may be encountered at Wairarapa Moana Wetlands, and can be found throughout the Wellington region.

Plant identification guides are provided for 13 aquatic plant species known to cause problems in lakes, ponds, streams, rivers and drains. Individual fact sheets provide key identification notes and photos for each plant species, a brief description of why they are a problem, their preferred habitat, how they are spread and possible options for control.

Another 13 pest plant species are described in a 'report these to us' section that lists freshwater pest plant species that currently have a very limited distribution or have never been recorded in the region before. These pest plants pose a serious threat to Wairarapa Moana and the Wellington region and it is asked that if any of these pest plants are located, please report your findings to the Greater Wellington's Biosecurity team.



Aquatic life struggles to survive in this weed infested lake in Masterton

Understanding aquatic plants

Aquatic plants are plants that have adapted to living in or around water and they play an important role in the overall health of our region's waterways, ponds and lakes. They provide food and shelter to native fish and wildlife, lend stability to shorelines and lake beds, tie up nutrients thereby reducing algae blooms, improve water clarity, produce oxygen by day and can provide aesthetic beauty to an area.

Aquatic plants can grow in a variety of different forms. Some grow rooted in shallow water along shorelines and are called emergent plants because much of these plants stand up out of the water. Some float freely or have floating leaves but are rooted to the bottom sediments, and others grow almost entirely under water and are called submerged plants.

In New Zealand, we have a unique and special assemblage (biodiversity) of 'native' aquatic plants that naturally occur and grow in our water bodies, and these plants seldom cause problems.

However, our waterways are now under attack! Invasive 'alien' aquatic



Native aquatic plant species growing in Lake Waikaremoana (North Island)



Invasive weed bed (*Lagarosiphon major*) dominating all other vegetation in a North Island lake

plants – plant species that have originated from other countries – have been introduced into our water ways by humans, either accidentally or on purpose, with many having escaped from garden ponds and fish tanks. The most serious pest plants continue to be liberated, or spread by contaminated boats or fishing gear.

These pest plants have no natural enemies (such as plant-eating insects) and have the ability to spread and grow more quickly than our native aquatic plants causing major ecological damage to our freshwater habitats.

As well as smothering out our native plant communities, dense invasive weed growth can restrict the movement of water, cause flooding, block irrigation and drinking water intakes, destroy habitats for native fish and wildlife, decrease water quality and can restrict recreational activities such as boating, fishing and swimming.

Prevent the spread

The best way to prevent potential weed issues is to stop aquatic pest plants from getting into our waterways in the first place.

To help prevent aquatic weed invasions, always:

CHECK – before leaving a waterway check boats (anchors and bilges), trailers, fishing gear (particularly nets) and other equipment and machinery such as diggers for any plant material and remove it. Remember a thumb-nail sized plant fragment may be all that is needed!

CLEAN – wash all equipment (e.g., nets, machinery and footwear) thoroughly using detergent (5% dishwashing liquid) or salt water (sea strength or 1 cup of table salt per 1 liter of water) until completely soaked.

DRY – dry completely inside and out and then leave dry for at least another 48 hours.

What else can you do?

- Always empty aquarium contents onto the compost heap, NOT into or near a waterway or drain.
- Know your enemy. Learn to identify plants in and around your waterways, or contact the Greater Wellington Biosecurity team if you see something new or suspicious.

For more information on preventing the spread of invasive species – CHECK, CLEAN, DRY message – visit the Ministry for Primary Industries website: www.biosecurity.govt.nz/biosec/camp-acts/check-clean-dry.

Control options

Pest plant control aims to minimize the impact of pest aquatic plants on the environment by reducing plant biomass, while eradication involves the ongoing removal of all pest plant biomass from an area and includes managing the ability of the plant to re-establish from plant fragments or seed. Once aquatic weeds become established in an area, they can be difficult to eradicate and in most situations, only control is possible.

Methods for controlling aquatic pest plants will vary depending on the problem being caused, time of year, site, infestation size and plant involved. Often a combination of controls is used to fight a pest plant problem from several angles and the different controls may work better at different points in time – integrated control.

Control options fall into 4 general categories:

1. **Physical/Mechanical control** – is the removal of plants (and/or roots) by pulling (hand weeding), cutting, raking or mowing. For larger areas, specially designed weed harvesters that cut and collect plants can be used. Diggers are commonly used to remove aquatic plant material from drains.
2. **Habitat manipulation** – disturbing the plants' ability to grow by altering the light, sediment or water conditions. Shading is an effective physical control technique that reduces the amount of light available for plant growth. Shading or bottom-lining products such as weed mat, black plastic or carpet can be used for this purpose as long as it reduces light by 90%. Shading provided by riparian planting on the northern side of a waterway may also reduce weed abundance. Water level lowering to dry and kill underwater plants can also be effective in some instances.
3. **Biological control** – reduces the growth of the plants by introducing a plant predator species. Currently the only biological agent for use on aquatic weeds is Grass carp *Ctenopharyngodon idella*. Grass carp can provide long-term control for underwater plants, however the area would need to be assessed for suitability and made secure for the fish. Permission is required from the Department of Conservation (DOC).

4. **Chemical control** – is the use of herbicides which can kill or stunt the growth of pest plants. The successful use of herbicides in aquatic or riparian situations is dependent on a range of factors including:
- Species of aquatic pest plant being targeted.
 - Whether a herbicide is registered for use on a particular species.
 - The size, depth, flow rate, temperature and turbidity of the water body.
 - Whether a resource consent is required.
 - A possible resource consent, depending on the relevant rules and legislation in regard to discharging herbicides over, on or into water as covered under Greater Wellington Regional Council's regional plans.
 - The actual application of herbicides will require certified trained personnel and possibly specialist equipment.

For these reasons every water body or riparian area needs to be assessed on an individual basis and a site specific management plan developed. Anyone considering control of aquatic pest plants using herbicides should contact the Greater Wellington Regional Council for advice.

Identifying aquatic weeds

Look for these symbols on the pest plant identification guides to assist in their correct identification. Also be aware that depending on what time of year observations are taking place, described flowers may or may not be present.



Emergent – plants grow above the water’s surface in shallow areas such as around the edges of lakes and shorelines, e.g., Yellow Flag Iris.



Sprawling marginal – grow across the ground and out over the water surface, e.g., Water pepper.



Floating – float freely or are rooted with leaves that float on the water’s surface, e.g., Azolla species.



Submerged – grow beneath the water’s surface, though flowers may appear above the water surface, e.g., Oxygen weed species such as egeria and hornwort.



CANADIAN PONDWEED

Elodea canadensis

What does it look like?

- A submerged plant with long stems that can grow up to 5m tall.
- Leaves are small (usually 6-12mm long) and are arranged in whorls of three around the stem, with a gap between.
- Flowers, if present, are small, cream colored and float on the water surface attached by long thread-like stalks.

Note: Elodea is the only member of the oxygen weed family that is allowed for aquarium use in New Zealand.



Why is it a problem?

Dense submerged weed growth can block water flow (cause flooding), interfere with pumping and irrigation equipment, and negatively impact on recreational activities like fishing, boating and swimming.

Threat to biodiversity – weed beds can smother and replace beneficial native submerged plants.

Similar looking species

Similar in appearance to other oxygen weeds, but can be easily distinguished by the arrangement of its leaves in whorls of three.

Preferred habitats

Slow moving water in lakes, ponds, rivers and streams.

How does it spread?

Stem fragments can produce runners and continue growing from any node.

What to do?

Recommended approaches:

- Herbicide – diquat will destroy green stems but not the root crown. When using any herbicide in or around water, seek advice from your regional council.
- Shading – planting of trees to create shade may reduce weed abundance in the longer term.
- Bottom lining – can control small areas using weed mat. In flowing water, begin at upstream end of infestation and work down, leaving for 3-4 months per section.
- Water level draw down – while the water level is lowered, remove all plant vegetation (mechanically or by hand) or cover with bottom lining.
- Grass carp – may be suitable for some contained water bodies.



CAPE PONDWEED

Aponogeton distachyus

What does it look like?

- Distinctive, long, oblong shaped leaves float on the water surface.
- Leaves can grow up to 25cm long and have parallel veins.
- The leaves are produced on long stalks attached to a round tuber-like base or rhizome (3-4cm in diameter).
- Flowers have fleshy white petals, are very fragrant and are produced on a Y-shaped spike above the water surface.
- Has green spongy seeds.



Why is it a problem?

Can form mats on the water surface which can block waterways and contribute to flooding.

Threat to biodiversity - shades out native submerged vegetation.

Similar looking species

Swamp lily (*Ottelia ovalifolia*) has fibrous roots compared with the tuber-like base of the cape pondweed. The swamp lily has rounder leaves which have a darker green pattern of veins.

Preferred habitats

Still and slow-flowing water bodies. Shallow water less than 60cm deep.

How does it spread?

Spreads by seeds and tubers. Seeds are dispersed by water and waterfowl.

What to do?

Recommended approaches:

- Hand weeding can be effective where it is growing in soft sediment that enables the tubers to be removed.
- Herbicides – diquat will destroy the leaves and stems but not affect the tubers. When using any herbicide in or around water, seek advice from your regional council.



CURLED PONDWEED

Potamogeton crispus

What does it look like?

- Submerged leaves are arranged alternately along a thin stem that is rooted in bottom sediments.
- Leaves have no stalks, are oblong, grow up to 8cm long and are olive-green to reddish brown in colour.
- Leaf edges are wavy and finely toothed, resembling small lasagne pasta.
- Leaves have 3 main veins which are normally reddish in colour.

Small green flowers (November to January) are arranged in spikes up to 1cm long, and grow above the water surface.



Why is it a problem?

Can form dense mats of weed growth that can reduce water flow and interfere with recreational activities.

Threat to biodiversity – Dense growth can also displace beneficial native submerged vegetation.

Similar looking species

Native pondweed species – *Potamogeton ochreatus* and *P. cheesemanii*. *P. ochreatus* has a straight-edged leaf, whereas curled pondweed has a wavy or toothed margin. *P. cheesemanii* has pointed submerged leaves and often has small, oval floating leaves.

Preferred habitats

Lakes, ponds, rivers, streams and drains.

How does it spread?

Spreads by rhizomes, seeds, stem fragments or special hardened buds (turions).

What to do?

Firstly establish that the plant is not a valued native pondweed species.

Recommended approaches:

- Herbicide – diquat can be effective and give temporary control. When using any herbicide in or around water, seek advice from your regional council.
- Shading – planting of trees to create shade may reduce weed abundance in the longer term.
- Bottom lining – can control small areas using weed mat. In flowing water, begin at upstream end of infestation and work down, 3-4 months per section.
- Water level draw down – while the water level is lowered, remove all plant vegetation (mechanically or by hand) or cover with bottom lining. Let sediment dry out if possible.
- Grass carp – may be suitable for some contained water bodies.

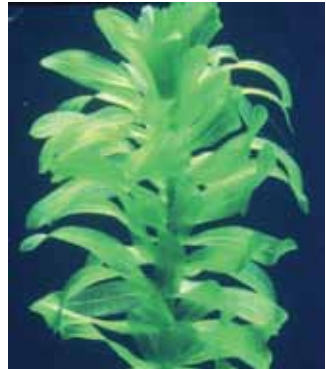


EGERIA

Egeria densa

What does it look like?

- A bottom rooted submerged plant growing up to 5m tall.
- Denser and more leafy than other oxygen weeds, with larger leaves usually in whorls of 4-5 (sometimes 3-8).
- Leaves narrow towards the tip and are 10-30mm long.
- Egeria is the only oxygen weed with visible white flowers (<20mm) forming just above the water surface in summer.



Why is it a problem?

Dense submerged masses of weed can block water flow, interfere with pumping and irrigation equipment, and adversely affect drinking water supplies. Can also interfere with recreational activities like fishing, boating and swimming. *Egeria* is a weed in hydroelectric dams.

Threat to biodiversity – tall, dense weed beds smother and replace beneficial native submerged plants.

Similar looking species

Canadian pondweed (*Elodea canadensis*) and lagarosiphon (*Lagarosiphon major*). Canadian pondweed almost always has smaller leaves arranged in whorls of only three. *Lagarosiphon* has leaves that curl downwards and are not arranged in whorls.

Preferred habitats

Moderate flowing to still water in lakes, ponds, rivers and streams. Usually found in moderate to highly enriched water bodies.

How does it spread?

New plants develop from buds on stem fragments. *Egeria* does not produce seed in New Zealand with only male flowering plants being present. Spreads to other waterways via boats, trailers, nets and contaminated machinery.

What to do?

Recommended approaches:

- Herbicide – diquat will destroy green stems but not the root crown. When using any herbicide in or around water, seek advice from your regional council.
- Shading – planting of trees to create shade may reduce weed abundance in the longer term.
- Bottom lining – can control small areas using weed mat.
- Water level draw down – while the water level is lowered, remove all plant vegetation (mechanically or by hand) or cover small areas with bottom lining.
- Grass carp – may be suitable in some contained water bodies.



FERNY AZOLLA

Azolla pinnata

What does it look like?

- A tiny free-floating fern that forms red coloured mats on the water surface (green in shaded areas).
- Plants are 1-3cm long, have a triangular outline and are regularly branched.
- The roots are densely covered with branched, fine, hair-like rootlets up to 5cm long.



Why is it a problem?

Biodiversity threat - forms dense seasonal mats on the water surface that can inhibit the growth of beneficial native submerged plants. Can also decrease oxygen levels in the water by decreasing surface water mixing causing the water to stagnate.

Similar looking species

Azolla rubra (Pacific azolla) – a native floating fern.

Pacific azolla is more rounded in shape and is irregularly branched. Also its roots are not branched

Preferred habitats

Small, still and slow-flowing nutrient rich water bodies (lakes, ponds, dams). Flowing water and wave action skims it off the water surface.

How does it spread?

Reproduces rapidly by fragmentation so can be dispersed by water flow downstream or on equipment. Also produces spores which may be spread by waterfowl.

What to do?

Ferny azolla is difficult to control as it re-establishes quickly.

Recommended approaches:

- Hand raking – rake weed onto dry land. A floating boom and a windy day may help to concentrate plants into one area.
- Wind exposure – expose the site to prevailing winds by removing windward shelter and increasing shade in areas where summer growth concentrates.
- Herbicide – diquat is very effective. When using any herbicide in or around water, seek advice from your regional council.



HORNWORT

Ceratophyllum demersum

What does it look like?

- Submerged aquatic plant that can grow to more than 10m deep and forms dense surface reaching weed beds.
- Stiff dark green leaves are finely divided with small teeth - makes the plant rough to touch.
- Feathery leaves are arranged in whorls on the stem of 5 or more.
- Has no roots but buried whorls of leaves can anchor it to bottom sediments.
- Flowers are minute and located at the base of the leaves.



Why is it a problem?

Hornwort grows rapidly and can survive as a free floating mat absorbing all the nutrients it needs from the surrounding water. Dense submerged masses of weed can block water flow, interfere with pumping and irrigation equipment, and adversely affect drinking water supplies. Can also interfere with recreational activities like fishing, boating and swimming. Hornwort is a major weed in hydroelectric dams.

Threat to biodiversity – tall, dense weed beds smother and replace beneficial native submerged plants.

Similar looking species

Fanwort (*Cabomba caroliniana*) and *Myriophyllum* species (in particular *M.triphyllum*), all have finely divided submersed leaves.

Unlike hornwort, fanwort has leaves arranged in pairs, not whorls and *Myriophyllum* species differ in that their leaves are not forked like hornwort but are in a feather-like arrangement.

Preferred habitats

Moderate flowing to still water in lakes, ponds, rivers and streams.

How does it spread?

New plants develop from stem fragments from its brittle stems. Flowers occur on this species but there is no evidence of seed production in New Zealand. Spreads to other waterways via boats, trailers, nets and contaminated machinery.

What to do?

Recommended approaches:

- Herbicide –diquat and endothall (e.g., Aquathol® or Aquathol Super K®) provide very good control of Hornwort. When using any herbicide in or around water, seek advice from your regional council.
- Shading – planting of trees to create shade may reduce weed abundance in the longer term.
- Bottom lining – can control small areas using weed mat.
- Water level draw down – while the water level is lowered, remove all plant vegetation (mechanically or by hand) or cover small areas with bottom lining.
- Grass carp – may be suitable in some contained water bodies.



LAGAROSIPHON

Lagarosiphon major

What does it look like?

- A submerged plant that is anchored to the bottom, with slender, brittle and branched stems that can grow up to 5m tall.
- Leaves are strongly curved downwards (J shape) and are arranged in a spiral pattern around the stem.
- Leaves are small (6-20mm long) and are clustered more densely at the tips of branches.



Why is it a problem?

Dense submerged masses of weed can block water flow, interfere with pumping and irrigation equipment, and adversely affect drinking water supplies. Can also interfere with recreational activities like fishing, boating and swimming.

Threat to biodiversity – tall, dense weed beds smother and replace beneficial native submerged plants.

Similar looking species

Canadian pondweed (*Elodea canadensis*), egeria (*Egeria densa*) and hydrilla (*Hydrilla verticillata*). These three species have leaves arranged in whorls on the stem, whereas lagarosiphon has leaves arranged alternatively in a spiral pattern.

Preferred habitats

Moderately fast flowing to still water bodies. Likes high levels of light, so is usually found in clear waters only to a maximum depth of 6m.

How does it spread?

New plants develop from stem fragments. No seed is produced in New Zealand with only female plants of this species being present. Spreads to other waterways via boats, trailers, nets and contaminated machinery.

What to do?

Recommended approaches:

- Herbicide – endothall (e.g., Aquathol® or Aquathol Super K®) can be effective. Diquat will give one season's control but will not kill the root crowns below the sediment. When using any herbicide in or around water, seek advice from your regional council.
- Shading – planting of trees to create shade may reduce weed abundance in the longer term.
- Bottom lining – can control small areas using weed mat.
- Water level draw down – while the water level is lowered, remove all plant vegetation (mechanically or by hand) or cover with bottom lining.
- Grass carp – may be suitable in some contained water bodies.



MONKEY MUSK

Erythranthe guttata

What does it look like?

- A bog herb with spreading or upright stems growing up to 60cm tall.
- Leaves are bright green, rounded, mostly hair-less, up to 12cm long, and have toothed margins.
- Flowers are distinctive snap-dragon like in appearance and bright yellow with red dots in the throat. The mouth of the tubular flower is hairy.
- Each flower stalk can bear five or more flowers, 3-4.5cm in diameter.
- Flowers November to March.



Why is it a problem?

Dense mats of weed growth can reduce water flow impeding drainage.

Threat to biodiversity - can significantly alter the structure of water body margins and riparian plant communities.

Similar looking species

None known.

Preferred habitats

Found around the edges of still and slow flowing water bodies and drains. Can grow in shallow water less than 60cm deep.

How does it spread?

Flowers produce a large quantity of seed which can be spread by wind and water. Also spreads by vegetative fragments.

What to do?

Recommended approaches:

- Mechanical control – dig out mechanically where possible.
- Herbicide – glyphosate isopropylamine or diquat may be considered. When using any herbicide in or around water, seek advice from your regional council.



PARROT'S FEATHER

Myriophyllum aquaticum

What does it look like?

- A marginal plant with stems forming dense mats of vegetation on the water surface, or growing on damp ground.
- Emergent leaves are a light bluish-green and deeply divided giving them a feathery appearance.
- Leaves up to 3.5cm long are usually arranged in whorls of 4-6.
- The stem can be up to 2m long, but with only up to the top 10cm emerging above the water.
- Flowers are white, tiny (up to 1.5mm across), with no petals, and form at the base of each leaf.



Why is it a problem?

Dense mats of weed growth can break off and block water flow (cause flooding), and can interfere with pumping and irrigation equipment.

Threat to biodiversity – dense weed smothers out beneficial native submerged plants.

Similar looking species

Native milfoil (*Myriophyllum*) species. Of the native milfoils, the rare *M. robustum* is the most similar to parrot's feather, but differs by having a pointed leaf tip whereas parrot's feather has a rounded leaf tip.

Preferred habitats

Usually found along the edges of still or slow moving water bodies and in drains. Likes nutrient rich, wet conditions.

How does it spread?

New plants develop from stem fragments and lateral stem growth. There is no seed production in New Zealand with only female flowers known to be present here. Spreads to other waterways via boats, trailers and contaminated machinery. Initially escaped from cultivated pond plants

What to do?

Recommended approaches:

- Herbicide – Triclopyr triethylamine (e.g., Garlon® 360). Best to spray new growth (above water) in late spring and re-spray before growth reaches 50mm high (3-5 weeks later). Diquat can be used for above water burn off. When using any herbicide in or around water, seek advice from your regional council. Ensure that all instructions and safety requirements are followed.
- Bottom lining – can control small areas using weed mat.
- Water level draw down – while the water level is lowered, remove all plant vegetation by hand or with a digger.



SWAMP LILY

Ottelia ovalifolia

What does it look like?

- Submerged and floating leaves may be present.
- Juvenile submerged leaves are strap-like while the older leaves float on the surface, are more spoon shaped, with 7 distinct longitudinal veins that are lighter green than the rest of the leaf.
- Floating leaves grow up to 16cm long, 3-6cm wide, are a dark green to bronze colour, and can be quite shiny.
- Leaf stalks can grow up to 40cm long.
- Flowers are large with white petals.



Why is it a problem?

Biodiversity threat – dense growth can shade out native submerged vegetation, but usually this species co-exists with native plants.

Similar looking species

Cape pondweed (*Aponogeton distachyos*) has a tuber-like base compared with the fibrous roots of the swamp lily. The cape pondweed has longer leaves without a lighter green pattern of veins.

Preferred habitats

Still and slow-flowing water bodies. Known to thrive in nutrient-rich water. Widespread but not common.

How does it spread?

Produces many seeds which can be spread by water and waterfowl.

What to do?

Recommended approaches:

- Herbicide –diquat can be effective. Before using herbicides in or around water, seek advice from your regional council. If choosing a herbicide, spray new growth (above water) in late spring and re-spray before growth reaches 50mm high.
- Water level draw down – while the water level is lowered, remove all plant vegetation by hand or mechanically.



WATER PEPPER

Persicaria hydropiper

What does it look like?

- Semi-aquatic plant forms dense mats on the water surface and can grow up to 70cm high.
- Has noticeable red stems and pale green leaves.
- Leaves are narrow, oblong with wavy margins and taper to a blunt tip, about 12cm long.
- Small (3-5mm) white or pale pink coloured, bud shaped flowers are carried in clusters on the end of slender spikes and most often droop downwards.
- Flowers from November to June. Is named due to the strong peppery taste of its leaves (not recommended you try this!)



Why is it a problem?

Dense weed growth can block water flow and interfere with pumping and irrigation equipment.

Threat to biodiversity – dense weed can smother out beneficial native submerged plants.

Similar looking species

Swamp willow weed (*Persicaria decipiens*) is a native willow weed that grows in aquatic habitats. Other willow weeds (e.g., *Persicaria maculosa*), grow in drier habitats. Swamp willow weed is most easily distinguished by its flowers being a darker shade of pink on an upright stem and leaves without wavy margins, often with a dark blotch.

Preferred habitats

Typically found in boggy, water-logged areas such as drains or wetlands, and around the edges of still or slow moving water bodies. Can also invade flood-prone pasture.

How does it spread?

Produces many seeds which can be spread on the water and by waterfowl.

What to do?

Recommended approaches:

- Shading – Water pepper is not tolerant of shade so where possible reduce light with trees and riparian planting.
- Herbicide – diquat can be effective. When using any herbicide in or around water, seek advice from your regional council.



WATER PLANTAIN

Alisma lanceolatum

What does it look like?

- Emergent aquatic plants with lance-shaped leaves up to 28cm long and 5cm wide.
- Leaf stalks grow up to 1m tall.
- Flower stems are leafless and extend well above the leaf blades with flowers arranged in whorls.
- Flowers are small with three round or slightly jagged, white or pale purple, petals.
- Flowers October to February and petals only open in the afternoon.



Why is it a problem?

Can occasionally block water flow causing flooding and silt build-up.

Threat to biodiversity – dense growth can shade out native vegetation.

Similar looking species

None known.

Preferred habitats

Usually found around the edges of still or slow moving shallow water bodies.

How does it spread?

Produces many seeds which can be spread on the water and by waterfowl.

What to do?

Recommended approaches:

- Herbicide – glyphosate isopropylamine or diquat may be considered. When using any herbicide in or around water, seek advice from your regional council.
- Shading – in narrow waterways riparian planting may reduce weed abundance.
- Hand weed – in small areas remove plants by carefully digging them out.



YELLOW FLAG IRIS

Iris pseudacorus

What does it look like?

- Tall marginal plant that grows as leafy green clumps up to 2m tall.
- Has thick creeping rhizomes up to 3cm in diameter, which can grow across the water surface.
- Leaves are sword-shaped, 2-3cm wide and emerge in fans from a reddish base.
- Yellow flowers up to 12cm across, are produced from October to December.
- Flowers are followed by seed capsules containing many brown flattened seeds. Plant dies back in winter.



Why is it a problem?

Plants grow prolifically on the margins of water bodies forming very dense, tall growths and can extend some meters over water forming dense floating rafts of weed. Can block access to the water and interfere with pumping and irrigation equipment. Yellow flag iris is toxic to humans and livestock. Seeds can last up to about 10 years.

Threat to biodiversity – dense mats of weed displace native marginal and submerged plants. May exclude water fowl and nesting activities.

Similar looking species

Raupo (*Typha orientalis*) has narrower leaves than yellow flag and has a characteristic twist in the top of the leaf blade. Manchurian wild rice (*Zizania latifolia*) is much taller and has sharp-edged leaves.

Preferred habitats

Usually found around the edges of still or slow moving fresh or brackish water bodies. Can also invade flood-prone pasture.

How does it spread?

Seeds spread by water and by contaminated drainage machinery. Can also be spread by rhizome fragments.

What to do?

Recommended approaches:

- Hand weeding – Small clumps can be carefully removed by digging them up.
- Wind exposure – expose the site to prevailing winds by removing windward shelter and increasing shade where summer growth concentrates.
- Herbicide – glyphosate isopropylamine may be considered. Before using herbicides in or around water, seek advice from your regional council.

Report these weeds to us!

The Greater Wellington Regional Council's Biosecurity team are always interested in sightings of aquatic pest plants that are currently not recorded in the region or are of very limited distribution.

If you suspect any of the following species to be within the region, please do not hesitate to contact a Biosecurity officer on 0800 496 734.



ALLIGATOR WEED

Alternanthera philoxeroides

Spreading marginal plant that can form floating mats over water.

- Bright green, waxy leaves grow in opposite pairs or whorls along a stem.
- Stems are thick, hollow and often reddish in colour.
- White, papery clover-like flower clusters form on the end of stalks during summer.





CALIFORNIAN ARROWHEAD

Sagittaria montevidensis

Emergent plant growing up to 2m tall.

- Emergent leaves are large, glossy and have 3 points making a distinct arrow-shape.
- Leaves vary in size up to 25cm long and 20cm wide.
- Flowers have 3 white petals with a purple spot at the base, and are arranged in whorls on round smooth erect stems.





CALIFORNIAN BULRUSH

Schoenoplectus californicus

Tall emergent plant up to 4m high.

- Stems are triangular near the base and round in upper parts, up to 3cm across.
- Leaves are absent, instead has thin brown papery sheaths at the base stems.
- Small brown flowers are produced on drooping heads near the stem tip.





DELTA ARROWHEAD

Sagittaria platyphylla

Emergent plant forming leaves above and below the water surface.

- Submerged leaves are strap-shaped.
- Leaves above the water are oval, tapering to a point held above the surface by rigid triangular stems.
- Flowers are white with 3 petals and about 6cm across.





EELGRASS

Vallisneria australis

Submerged aquatic plant arising from long creeping stems.

- Thick ribbon-like leaves grow up to 5m long.
- Leaf tips can have finely toothed margins.
- Small green flowers form on long, thin stalks, often spiraled, that can reach the water surface.
- Eelgrass is of limited distribution around New Zealand, and is subject to total control under the Regional Pest Management Strategy.





HAWAIIAN ARROWHEAD

Sagittaria sagittifolia

Emergent plant with creeping stems.

- Glossy emergent leaves have a distinctive arrow-shape.
- Stems are triangular in cross-section.
- Is not known to flower in New Zealand.

Longer leaves and triangular stems distinguish it from Californian arrowhead (*S. montevidensis*).





HYDRILLA

Hydrilla verticillata

Tall submerged aquatic plant growing up to 6m tall.

- Many branched stems.
- Leaves occur in whorls of three to eight with obvious toothed edges.

Differs to egeria or Canadian pondweed in that it has toothed edges.





MANCHURIAN WILD RICE

Zizania latifolia

Dense mat-forming emergent aquatic plant.

- Coarse grass-like tufts grow up to 4m high.
- Leaves are long and straight with visible lines tapering to a sharp point.
- Flowers purplish or reddish brown, November to December.





PURPLE LOOSESTRIFE

Lythrum salicaria

Tall emergent aquatic plant.

- Normally 60 – 100cm tall, but can grow taller.
- Narrow leaves are usually paired and opposite on the upper stem, while heart-shaped or wider and rounder at the base.
- Purple flowers form on dense flower spike, 20-25cm long, December to February.



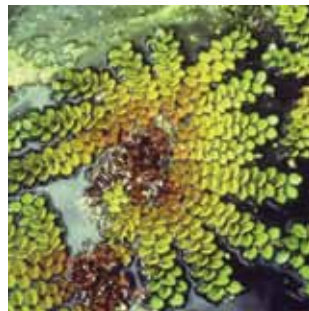


SALVINIA

Salvinia molesta

Small free-floating aquatic fern forming extensive mats.

- Light green to brown-green rounded leaves overlapping, folded with upper surfaces covered in hairs.
- Lower submerged leaves look more like roots and can be up to 30cm long.





SENEGAL TEA

Gymnocoronis spilanthoides

Tall sprawling aquatic plant growing in leafy green clumps up to 2m tall.

- Leaves vary in size from 5-20cm long, taper to a point and are in opposite pairs on the stem.
- Leaf margins have toothed edges and are slightly wavy.
- Flowers are highly scented and grouped in ball-like clusters of tiny white petals at the end of stems.





SPARTINA

Spartina spp.

Clump forming emergent grass growing to 1.5m high.

- Leaves are wide at the base tapering to a point and are ribbed.
- Hollow stems.
- Flowers are produced in a head of short flattened spikelets.
- Is the only grass species which can tolerate growing in the intertidal zone of estuaries.





WATER HYACINTH

Eichhornia crassipes

Free floating aquatic plant.

- Rosettes of thick, glossy, rounded leaves.
- Stems at base of leaves have a distinctive, swollen bladder for buoyancy.
- Thick masses of feathery roots hang in the water.
- Mauve-blue flowers with a yellow spot are produced on a single flower stalk.



