



FRESHWATER PESTS

of New Zealand

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Introduction

Invasion of our freshwaters by alien species is a major issue for resource and natural heritage managers. Today, few if any New Zealand water bodies support a biota that is wholly native. Over 200 freshwater plant and animal species have been introduced to New Zealand, many of which have naturalised and become pests, or have the potential to become pests. Impacts from these species are significant, including reduction in indigenous biodiversity, destabilisation of aquatic habitats, implications for human health, economic losses through lost power generation, impeded drainage or irrigation, and reduced opportunity for recreational activities like boating and fishing.

The intention of this resource is to introduce users to freshwater pests of greatest concern, provide a description of key features to identify these pests, and background information on their known distribution and biosecurity status, so that significant new records can be discerned and reported. Note that the pests in this series have already been found in New Zealand. If incursions of new-to-New Zealand organisms are suspected, then the Ministry for Primary Industries (MPI) should be contacted.

The freshwater pests considered here can be divided into three sections, with fact sheets provided on:

1. Fish (9 species).
2. Invertebrates (11 species).
3. Plants: algae (2 species) and aquatic weeds (39 species).

Included is information on presence and distribution in NZ, habitats, dispersal mechanisms, identification features, reference photographs, similar species and how to distinguish these, biosecurity status and biosecurity risks.

Species distribution maps are drawn from number and location of records available from source data up until the last date of major revision for the species fact sheets. Historic records are represented, but note that eradicated sites are not distinguished. If these distributions differ from your knowledge of records for species then please seek to submit a record to the source databases. Source data for fish are drawn from the Freshwater Fish Database (www.niwa.co.nz/our-services/online.../freshwater-fish-database), whilst plant and invertebrate data are sourced from the Freshwater Biodata Information System (<https://fbis.niwa.co.nz/>). Didymo records are from the Didymo Samples Database (<https://www.didymosamplesdb.org.nz/>).



Resources

For further identification resources for these pest species, we direct you to the

NIWA Atlas of NZ Freshwater Fishes

(<http://www.niwa.co.nz/our-science/freshwater/tools/fishatlas>) and

‘quick-guide’ keys to aquatic macrophytes

(<http://www.niwa.co.nz/our-science/freshwater/tools/quickguides>).

Acknowledgements

Funding for production of these updated fact sheets was provided by the Terrestrial and Freshwater Biodiversity Information System (TFBIS) Programme. We appreciate comments from a user group that provided guidance on the production of this resource.

The authors would like to thank the following people for permission to use their photos: John Clayton, Aleki Taumoepeau, Nelson Boustead, Deborah Hofstra, Paula Reeves (NIWA), the Bob McDowall collection, Trevor James (AgResearch), Stephen Moore (Landcare), Canterbury University, Grant Barnes (Auckland Council), Noel Procter (Horizons Regional Council), Barry O’Brien (University of Waikato), Bob Kilford (MPI). We acknowledge NIWA’s Systems Development Team, especially Jane Robbins, in developing the Publishing Report System to manage, store and retrieve fact sheet content, graphic input from Aarti Wadhwa and GIS expertise provided by Sanjay Wadhwa (NIWA).

We would also like to thank Bruno David (Waikato Regional Council) and Tracey Edwards (NIWA) for providing the front cover photos.



What to do if you detect a freshwater pest

1. Is the pest from a region or area where it has not been reported previously based on the distribution maps provided? If so this record is likely to be of interest to the agency responsible (see webpage address in tables below).
2. What is the designated biosecurity status for that pest in that location? This information will identify who you need to contact. Refer to the tables below to identify agencies.
3. Document your find by recording site details (GPS grid reference, date and site description) and validate your identification by taking photographs, or preferentially obtaining and preserving a specimen of the organism. Plants may be pressed and dried (include all parts and fruiting material if present) and also wrapped in damp paper towels in a zip-lock bag and mailed to an agency or research organisation. Invertebrates may be preserved in 70% alcohol, while fish may be similarly preserved, or frozen.



Designated biosecurity status (Legal and management designation)

Biosecurity Status	Definition/legislation	Agency	Web-page
Notifiable Organism	Requires immediate notification under Section 44 of the Biosecurity Act 1993	Ministry for Primary Industries	http://www.mpi.govt.nz/
Unwanted Organism*	Restricted sale, distribution and propagation defined in the Biosecurity Act 1993	Ministry for Primary Industries	http://www.mpi.govt.nz/
National Interest Pest Response (NIPR)	Aims to eradicate 11 selected established pests from New Zealand	Ministry for Primary Industries	http://www.mpi.govt.nz/
National Pest Plant Accord (NPPA)	Cooperative agreement between the Nursery and Garden Industry Association, Regional Councils and MPI to prevent sale, propagation or distribution of nominated plants	Ministry for Primary Industries	http://www.mpi.govt.nz/
Regional Pest Management Plan	A strategic and statutory framework for efficient and effective management of pest plants and animals in regions	Unitary Authorities and Regional Councils	See below
Noxious fish*	Illegal to have under control, or rear, raise, hatch or consign under the Fisheries Regulations 1983, but note rescinded for some species in 1986	Ministry for Primary Industries	http://www.mpi.govt.nz/

*Management responsibilities for freshwater fish designated as Unwanted Organisms or as Noxious fish lie with Department of Conservation or Regional Councils.



Central Government, Unitary authorities, Regional Councils, and research agencies

Abbreviation*	Agency	Web-page
MPI	Ministry for Primary Industries	http://www.mpi.govt.nz/
DOC	Department of Conservation	http://www.doc.govt.nz/
NTL	Northland Regional Council	http://www.nrc.govt.nz/
AUK	Auckland Council	http://www.arc.govt.nz/
WKO	Waikato Regional Council	http://www.waikatoregion.govt.nz/
BOP	Plenty Bay of Plenty Regional Council	http://www.boprc.govt.nz/
GIS	Gisborne District Council	http://www.gdc.govt.nz/



HKB	Hawke's Bay Regional Council	http://www.hbrc.govt.nz/
TKI	Taranaki Regional Council	http://www.trc.govt.nz/
MWT	Horizons Regional Council	http://www.horizons.govt.nz/
WGN	Greater Wellington Regional Council	http://www.gw.govt.nz/assets/
TAS	Tasman District Council	http://www.tasman.govt.nz/
MBH	Marlborough District Council	http://www.marlborough.govt.nz/
NSN	Nelson City Council	http://www.nelsoncitycouncil.co.nz/
WTC	West Coast Regional Council	http://www.wcrc.govt.nz/
CAN	Canterbury Regional Council	http://ecan.govt.nz/publications/
OTA	Otago Regional Council	http://www.orc.govt.nz/
STL	Southland Regional Council	http://www.es.govt.nz/
	Chatham Islands	http://www.cic.govt.nz/
NIWA	National Institute of Water & Atmospheric Science Ltd	http://niwa.co.nz/

*ISO 3166 standard published by the International Organization for Standardization (ISO)



FISH

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Ameiurus nebulosus (Lesueur, 1819), Brown bullhead catfish



Brown bullhead catfish (R. M. McDowall)

ID features

Large (up to 40 cm long) elongate, grey to black coloured fish with eight long barbels around the mouth; relatively small eyes ; smooth skin (no visible scales); leading edge of dorsal and pectoral fins with a sharp spine.

Similar species

None.

Biosecurity Status

Regional Pest Management Strategy: NTL, AUK, WKO, BOP, GIS. Possession by non-commercial fishermen is prohibited and catch must be killed and disposed of. Sale is prohibited. Commercial eel fishermen adhere to a Code of Practice to prevent accidental spread by nets and boats.

Biosecurity Risk

Adults feed heavily on freshwater crayfish in Lake Taupo. May compete with eels.

Preferred/known habitats

Catfish occur in lakes, ponds, rivers, streams and wetlands, preferring slow-flowing, shallow waters.

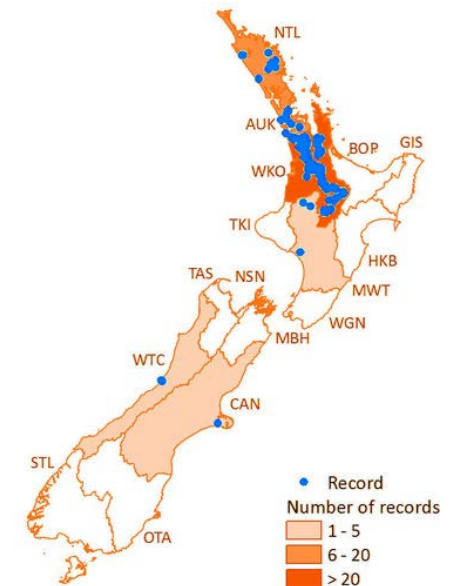
Presence in New Zealand

First introduced to Auckland in 1877 and stock from this source sent to Wellington and Hokitika in 1885. Now widespread throughout the middle of the North Island with a few scattered populations in the South Island.

Dispersal Mechanisms

Catfish are spread accidentally to lakes and rivers throughout New Zealand via eel fishers nets, and by boats and boat trailers. Natural colonisation of downstream habitats occurs via floods.

New Zealand distribution



Carassius auratus Linnaeus, 1758, Goldfish



Goldfish (S.C. Moore)

Biosecurity Status

Regional Pest Management Strategy: WKO.

Biosecurity Risk

High density populations may increase turbidity and contribute to reduced water clarity in shallow lakes and ponds.

ID features

Bronze coloured fish with deep body and large scales. Single dorsal fin originates directly above pelvic fin; no barbels around mouth. Last spine in dorsal fin is stout and serrated.

Similar species

Koi carp (*Cyprinus carpio*), rudd (*Scardinius erythrophthalmus*). Goldfish and koi carp can interbreed and form hybrids.

Preferred/known habitats

Goldfish prefer the shallow areas of ponds, lakes, reservoirs and wetlands where macrophytes occur. They also occur in the slow-moving, weedy areas of rivers and streams.

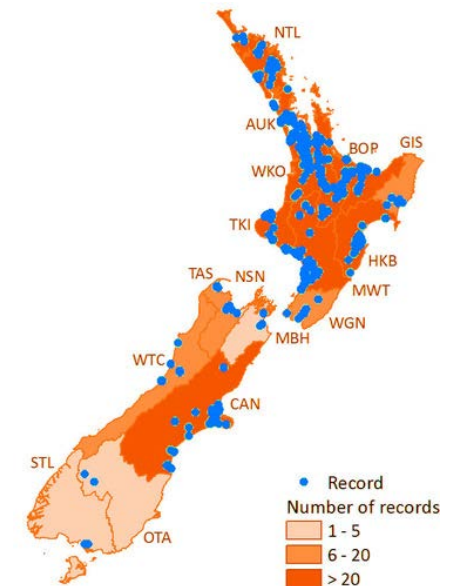
Presence in New Zealand

The earliest documented record for goldfish is their introduction to Rotorua from Auckland in 1919, but they were probably imported to New Zealand and populations established in the wild from 1865 onwards. Goldfish populations are now present throughout both the North and South Island but are much more numerous in the North Island.

Dispersal Mechanisms

Goldfish were widely distributed in the early 1900s by European settlers. Recent spread is mainly from disposal of aquarium fish. Disperses downstream from release sites during floods.

New Zealand distribution



Cyprinus carpio Linnaeus, 1758, Koi carp, common carp



Koi carp (Unknown)

Biosecurity Status

Unwanted Organism, Regional Pest Management Strategy: NTL, AUK, WKO, BOP, GIS, WGN, NSN, MBH. Listed as a noxious fish, but controlled commercial harvest allowed.

Biosecurity Risk

At high densities can increase turbidity, reduce macrophytes, and degrade benthic habitats in lakes.

ID features

Elongate, orange or bronze coloured fish, sometimes with patches of black, white or orange; two small barbels near each corner of mouth; origin of dorsal fin is in front of pelvic fin. Large scales.

Similar species

Goldfish (*Carassius auratus*), rudd (*Scardinius erythrophthalmus*), orfe (*Leuciscus idus*). Can also be confused with mullet (*Aldrichetta forsteri* or *Mugil cephalus*) and grass carp (*Ctenopharyngodon idella*), but these species lack barbels. Hybridises with goldfish (*Carassius auratus*).

Preferred/known habitats

Shallow waters in lakes, reservoirs, ponds and wetlands. Also occurs in still, or slow-moving waters of rivers and streams where aquatic plants occur.

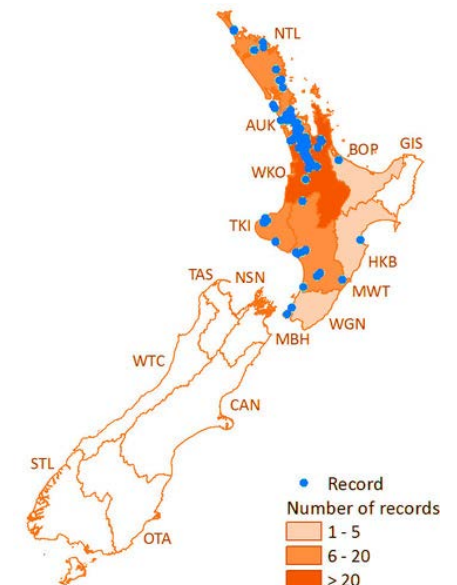
Presence in New Zealand

Ornamental stocks of koi carp existed in aquaria and ponds until 1983 when the first wild population was reported in the Waikato River. Scattered populations now occur throughout the North Island. No longer recorded in the South Island after several populations in Nelson were eradicated.

Dispersal Mechanisms

Koi carp have been spread through illegal stocking into various lakes and ponds in the North Island from the 1980s onwards.

New Zealand distribution



Gambusia affinis (Baird and Girard, 1854), **Gambusia**



Gambusia (R.M. McDowall)

Biosecurity Status

Unwanted organism, Regional Pest Management Strategy: NTL, AUK, WKO, BOP, GIS, WGN, NSN, MBH.

Biosecurity Risk

High density populations reduce galaxiids in shallow lakes and in other still-water habitats. May also affect mudfish. Displaces bullies from shallow, marginal waters of lakes in summer months.

ID features

Small fish with rounded caudal fin and a single, high dorsal fin; origin of dorsal fin behind the origin of the anal fin. Males are smaller than females and have an enlarged, tube-like anal fin. Females may have a black blotch on their side.

Similar species

Common bullies (*Gobiomorphus cotidianus*), guppy (*Poecilia reticulata*), sailfin molly (*Poecilia latipinna*), caudo (*Phallocerus caudimaculatus*).

Preferred/known habitats

Occurs in the shallow margins of lakes, reservoirs, ponds, wetlands, rivers and streams, mainly in summer and autumn months. In rivers and streams, it is confined to still-water areas, and in lakes and ponds it occurs mainly in sheltered bays where macrophytes or emergent vegetation occurs.

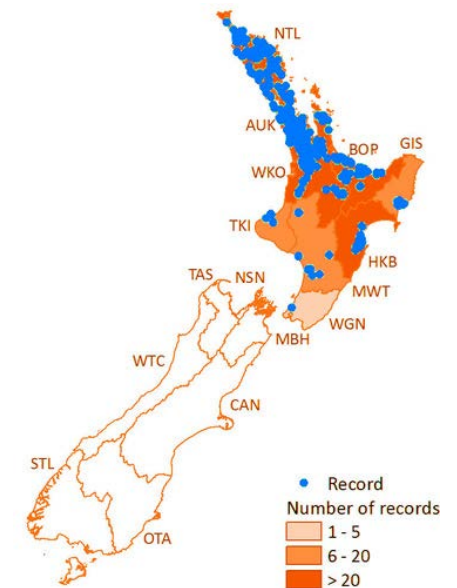
Presence in New Zealand

Introduced to Auckland in 1930. *Gambusia* is now widely distributed throughout the top-half of the North Island (north of Taupo), with fewer populations in Taranaki, Hawkes Bay, Manawatu and Wellington. Populations near Nelson in the South Island were eradicated.

Dispersal Mechanisms

Gambusia have been stocked to control mosquito larvae in ponds and swamps. Downstream dispersal then occurs following floods. It can tolerate high salinity so readily colonises brackish estuaries and mangrove swamps at stream and river mouths in harbours. It can also colonise adjacent catchments (presumably by dispersal via marine currents) and may also be spread accidentally (in fyke nets and boats) by fishermen. Ducks and swans may transport larvae to nearby ponds.

New Zealand distribution



Gobio gobio (Linnaeus, 1758), Gudgeon



Gudgeon (*G. Barnes*)

Biosecurity Status

Unwanted Organism, Regional Pest Management Strategy: AUK.

Biosecurity Risk

The gudgeon is a highly adaptable species that can live in both still and fast-flowing waters. It is primarily a benthic carnivore feeding on aquatic life in silt and sand. It may therefore compete with native fish for food and affect water quality in lakes and ponds.

ID features

A small elongate fish with similar coloration to large common bullies, but has larger scales and may have a series of large, dark blotches along its side. Distinguished from other small fish in New Zealand by the presence of a barb on the side of the mouth.

Similar species

Juvenile catfish (*Ameiurus nebulosus*) and small koi carp (*Cyprinus carpio*) (both have barbels). Large bullies (*Gobiomorphus* species) (no barbels).

Preferred/known habitats

Lakes, reservoirs, ponds, wetlands and the still-water habitats of rivers and streams.

Presence in New Zealand

First reported in an Auckland pond in 2004. This population was eradicated but other unknown populations may be present.

Dispersal Mechanisms

Illegally established in a pond near Auckland but later destroyed. In other countries, it is stocked as a bait species for coarse fish, with spread to other waters then occurring via downstream movement. Transfer may also occur via escapement from bait cages or angler's hooks.

New Zealand distribution

No map available

Leuciscus idus (Linnaeus, 1758), Orfe, golden orfe, ide



Orfe (B. Kilford)

Biosecurity Status

Regional Pest Management Strategy: AUK.

Biosecurity Risk

Like other cyprinids, orfe is a prolific breeder and its natural controls (piscivores) do not occur in New Zealand. It is a carnivore feeding on aquatic insect larvae, gastropods, crustaceans and even small fish so can compete with native fish for food. As it tolerates brackish waters, it has the capacity to colonise the lower, tidally influenced regions of rivers where it could impact on inanga.

ID features

Very similar to rudd, but with smaller scales and lacking the small projection at the base of pelvic and pectoral fins. Typically grows to about 45 cm in length.

Similar species

Rudd (*Scardinius erythrophthalmus*), goldfish (*Carassius auratus*).

Preferred/known habitats

Orfe inhabit slow-flowing waters in rivers and lakes.

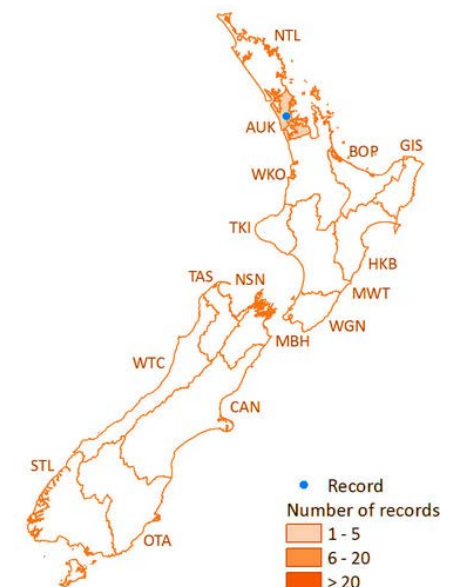
Presence in New Zealand

An ornamental variety (golden orfe) was illegally released in 1985/86 in up to 13 sites (ponds and lakes) north of Auckland. Reported in 1988 from a pond in the Rangitopuni Stream catchment, Auckland. Its status in other waters (except Lake Parawanui where it does not occur) is unknown.

Dispersal Mechanisms

Illegally released into ponds and lakes north of Auckland to establish coarse fisheries and a future source of fish for fishery development via stocking.

New Zealand distribution



Perca fluviatilis Linnaeus, 1758, Perch, redfin perch



Perch (S.C. Moore)

Biosecurity Status

Regional Pest Management Strategy: NTL, AUK, WKO, BOP, NSN, MBH. A sports fish requiring a licence from Fish & Game Councils to catch them.

Biosecurity Risk

Reduces the abundance of common bullies and small planktivorous fish (i.e., smelt and galaxiids) in lakes. Reduces crayfish and is also associated with the development of cyanobacterial blooms in lakes.

ID features

A deep-bodied fish with two dorsal fins, six or more dark, vertical stripes along the side of the body and orange-edged fins; sharp spines on the first dorsal ray and lower posterior edges of the operculum (gill cover).

Similar species

Rudd (*Scardinius erythrophthalmus*), goldfish (*Carassius auratus*), orfe (*Leuciscus idus*).

Preferred/known habitats

Lakes, reservoirs, ponds and wetlands. Also occurs in rivers where water is slow-moving.

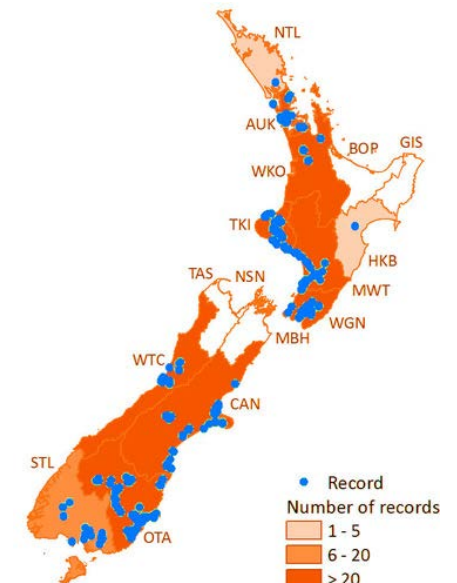
Presence in New Zealand

First populations were established in New Zealand between 1868 and 1877 in Canterbury, the West Coast, Wellington, Wanganui and Taranaki. They were subsequently spread to other parts of the country and are now present in lakes, ponds and reservoirs throughout most of the west coast of the North Island and the east coast of the South Island.

Dispersal Mechanisms

Stocking was carried out in the 1980s and early 1900s by early settlers to create sports fisheries. Since the 1970s, new populations have been established illegally in many lakes and ponds to create coarse fishing opportunities.

New Zealand distribution



Scardinius erythrophthalmus (Linnaeus, 1758), Rudd



Rudd (R.M.McDowall)

ID features

Red to orange coloured fish with red fins; no barbels around the mouth; dorsal fin originates behind pelvic fin; no stout spine in dorsal fin.

Similar species

Goldfish (*Carassius auratus*), koi carp (*Cyprinus carpio*), orfe (*Leuciscus idus*).

Biosecurity Status

Regional Pest Management Strategy: NTL, AUK, WKO, BOP, GIS, NSN, MBH. Sports fish in the Auckland-Waikato Fish and Game Council region, and a noxious species in other regions.

Biosecurity Risk

A high density population was responsible for the collapse of a stocked trout fishery in Lake Parkinson. Rudd are also thought to suppress the regeneration of macrophytes in turbid lakes. High densities of rudd may also contribute to reduced water clarity in shallow lakes through a reduction in large zooplankton.

Preferred/known habitats

Rudd do best in lakes, reservoirs, ponds and wetlands, but also occur in the large, weedy pools of rivers and streams.

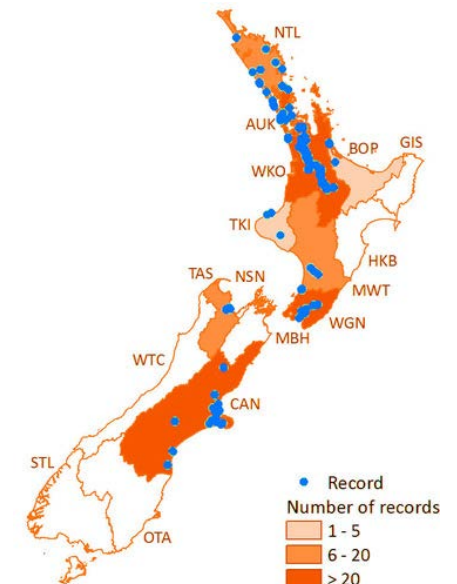
Presence in New Zealand

Illegally imported to New Zealand in 1967. The progeny of these fish have been bred and illegally spread to the extent that wild populations are now present throughout the top half of the North Island (Northland to Waikato), down the western side of the North Island from Taranaki to Wellington, and are scattered down the east coast of the South Island from Nelson to South Canterbury.

Dispersal Mechanisms

During the 1970s and 1980s, rudd were illegally stocked into numerous waters centered around Auckland, and into fewer ponds near Christchurch. It has since been illegally stocked into waters further afield to create coarse fisheries.

New Zealand distribution



Tinca tinca (Linnaeus, 1758), Tench



Tench (N. Boustead)

Biosecurity Status

Regional Pest Management Strategy: NTL, AUK, WKO, BOP, NSN, MBH. A sports fish requiring a licence from Fish & Game Councils to catch them.

Biosecurity Risk

May contribute to reduced water clarity in shallow lakes by altering food webs and disturbing sediments.

ID features

An olive-green fish with very small scales; one small barbel at each corner of mouth; thick, fleshy fins; eyes are small and bright red.

Similar species

None.

Preferred/known habitats

Shallow lakes, reservoirs, ponds and wetlands. Tench are benthic fish and prefer shallow, still waters where macrophytes are present.

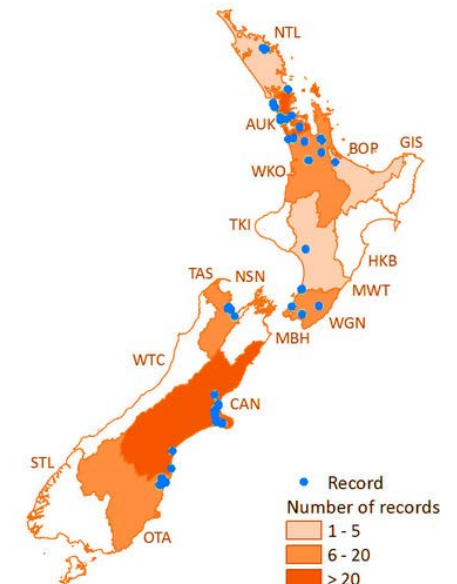
Presence in New Zealand

First populations were established in New Zealand in 1867, probably in Auckland, and later (1950s) stocked in waters near Oamaru and Otaki. They have since been spread to Northland and Whanganui in the North Island, and to Nelson, Canterbury and Otago in the South Island.

Dispersal Mechanisms

Tench were spread by illicit stocking in the 1960s and 1970s to create coarse fisheries, especially in the Auckland region.

New Zealand distribution



INVERTEBRATES

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Barbronia weberi (Blanchard, 1897), Asian freshwater leech



Lateral view and insert showing close-up of eyes (S.C. Moore (courtesy of Canterbury University))

Biosecurity Status

No status.

Biosecurity Risk

Rapid reproductive and growth rate; known to prey on aquatic worms, insects, snails and crustacea.

ID features

Long, narrow, segmented body (worm-like) up to 50 mm; lacks jaws; 3–4 pairs of eyes; 2 copulatory pores on ventral surface; 5–6 testes on each side of body; fresh specimens dark red brown with green markings, fading to yellow-white with preservation.

Similar species

Similar general appearance to native leech, *Dina maoriana*; 2–4 pairs of eyes; 32 testes on each side; copulatory pores on ventral surface.

Preferred/known habitats

Ponds and sluggish weedy streams; also recorded from urban stormwater treatment ponds, particularly around the Auckland region.

Presence in New Zealand

Unknown, first record 1976. Recorded from Auckland and Waikato regions.

Dispersal Mechanisms

Close association with pond weeds by both adult and cocoon (eggs); dispersal artificially enhanced through transport of infected pond weed from water bodies or the aquarium trade; dispersal may also be facilitated by attachment to waterfowl.

New Zealand distribution

No map available

Cherax tenuimanus Smith 1912, Marron, Margaret River marron, hairy marron



Lateral view with insert of ventral view (G.Barnes)

Biosecurity Status

Notifiable organism.

Biosecurity Risk

Marron are large and omnivorous and could threaten native crayfish species by outbreeding them. Like most crayfish, marron can carry two species of tiny parasites attached to their shell and gills, a ciliate protozoan *Epistylis* and a small flatworm *Temnocephala*; although so far absent from Australia and New Zealand, the diseases microsporidiosis and *Thelohania* have been reported in marron; marron are also very susceptible to the crayfish plaque *Aphanomyces astaci*.

ID features

One of the largest freshwater crayfish in the world; can grow up to 380 mm (total length) and weigh over 2 kg; marron have jet-black pinchers and a paler olive-green to brown or cobalt-blue body.

Similar species

Small specimens may initially be confused with native crayfish but can be distinguished by their overall larger size and colouration; marron may have areas of red (underside) and splashes of purple.

Preferred/known habitats

Lakes, ponds, streams, rivers and impoundments; marron prefer good water quality and a diversity of habitat structure such as woody debris.

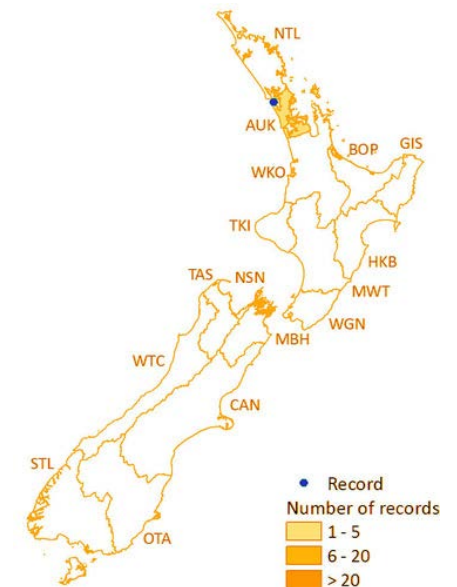
Presence in New Zealand

All known populations eradicated, introduced in 1986.

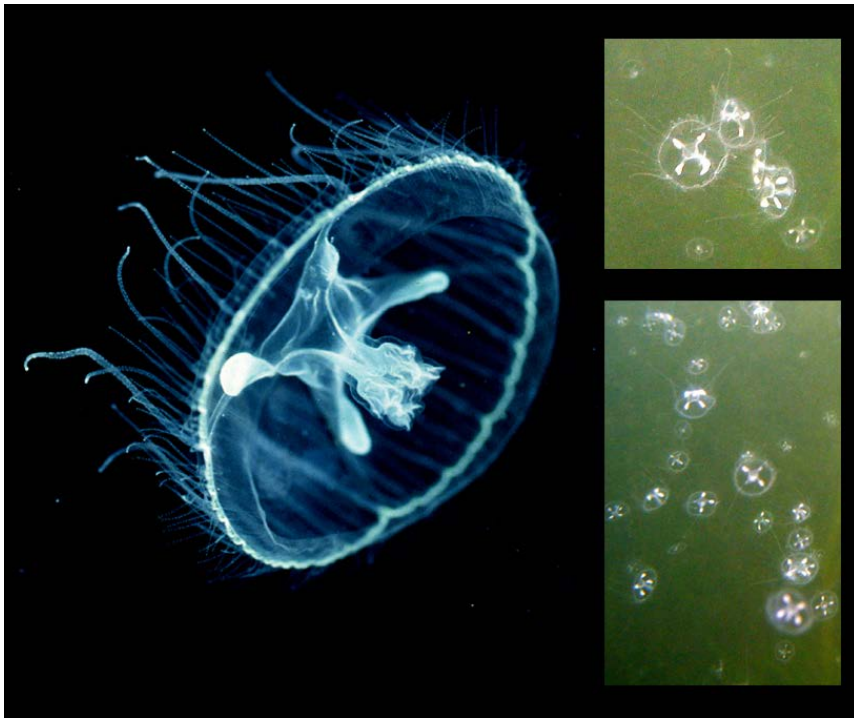
Dispersal Mechanisms

Introduced from Australia for aquaculture; marron are able to survive for long periods out of water, and consequently able to cross land in search of water bodies; dispersal potential enhanced by illegal translocation and breeding.

New Zealand distribution



Craspedacusta sowerbyi (Lankester, 1880), Freshwater jellyfish



Jellyfish medusa and blooms in a lake (inserts) (B. O'Brien, R. Wells)

Biosecurity Status

No status.

Biosecurity Risk

Unlikely to affect zooplankton populations, but potential to compete with native zooplankton feeders such as pelagic fish is unknown.

ID features

There are two distinct life-history stages with the medusa forming the mobile, classic jellyfish shape (20 – 25 mm diameter) with around 400 tentacles around the circumference; the non-swimming stage or polyps can be very small and often overlooked.

Similar species

None.

Preferred/known habitats

Lakes and hydroelectric impoundments; distribution of *Craspedacusta* maybe underestimated due to polyps being less obvious than medusa.

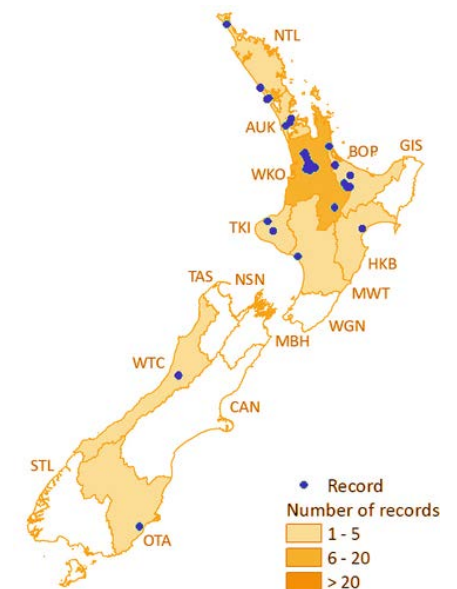
Presence in New Zealand

First recorded from Lake Taupo in 1956, and now widely naturalised in both North and South Islands;

Dispersal Mechanisms

Can reproduce only by 'budding' when water temperatures reach 25°C; juveniles (polyps) may attach to stones, aquatic weed or boats.

New Zealand distribution



Lymnaea auricularia (Linnaeus, 1758), Ear pond snail



Dorsal and lateral view (B. Smith)

Biosecurity Status

No status.

Biosecurity Risk

Serves as an intermediate host to flukes such as echinostomes and trematodes parasitic in aquatic birds; however, studies have shown that *Lymnaea auricularia* is an unlikely host for the liver fluke (*Fasciola hepatica*).

ID features

Easily identified from other lymnaeids by its relatively large size (14–24 mm), short spire, and large lower coil; black blotches visible through the shell.

Similar species

Morphologically similar to *Lymnaea peregra* (absent from New Zealand).

Preferred/known habitats

Ponds and lakes.

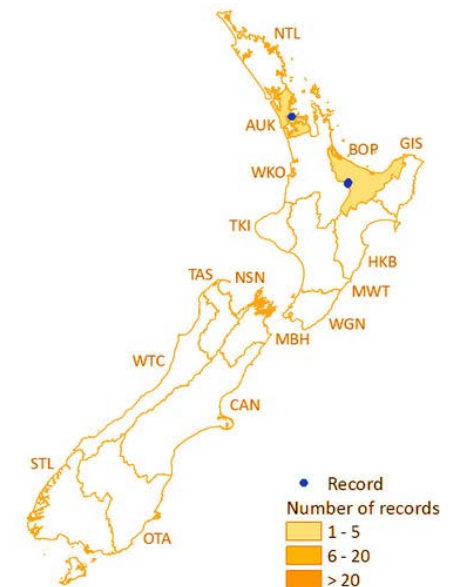
Presence in New Zealand

First record in 1977; widespread within the aquarium trade, but naturalised populations appear limited to Palmerston North, selected Rotorua lakes and the Auckland region.

Dispersal Mechanisms

Dispersal artificially enhanced through transport of infected pond weed; aquarium trade.

New Zealand distribution



Lymnaea stagnalis (Linnaeus, 1758), Great pond snail



Ventral (left) and dorsal (right) view of the shell, with an insert of the animal (B. Smith)

Biosecurity Status

No status.

Biosecurity Risk

L. stagnalis is predominately an omnivore and known to consume plants, detritus and carrion; it is also predatory on insects and other snails, and in the UK has been known to prey on small fish and newts; thought to be an intermediate host for swimmer's itch or duck itch (*Schistosoma* cercarial dermatitis).

ID features

Shell spire long and acute; adult snail may attain a length up to 45–60 mm and width 20–30 mm; shell yellowish to brown with whitish markings; the shell is fragile and easily damaged.

Similar species

Most similar to *Lymnaea columella*, but *L. stagnalis* is much larger and lighter in colour; unlikely to be confused with other established snails in New Zealand.

Preferred/known habitats

Ponds, lakes and impoundments.

Presence in New Zealand

Irregularly distributed throughout New Zealand, though can be locally abundant; still absent from some North Island lakes; readily obtainable through the aquarium trade.

Dispersal Mechanisms

Dispersal enhanced artificially through transport of infected pond weed (eggs), and specimens are readily available through the aquarium trade.

New Zealand distribution



Melanoides tuberculata (Müller, 1774), Red-rimmed melania, Malayan livebearing snail, Malayan/Malaysian trumpet snail



Ventral (top) and dorsal (bottom) views (B. Smith)

Biosecurity Status

No status.

Biosecurity Risk

Overseas information indicates *Melanoides* can compete with native freshwater snails; herbivorous; known vectors for Chinese liver fluke (*Clonorchis sinensis*) and oriental lung fluke (*Opisthorchis* sp.); risk of spreading probably limited by water temperature; unfertilised females able to reproduce.

ID features

Shell an elongate conical shape with rust coloured spots, and whorls with prominent grooves; length typically up to 32 mm, but can attain 80 mm, though usually <15 mm in aquariums; operculum present (see dorsal view photo).

Similar species

Unlikely to be confused with other established snails in New Zealand.

Preferred/known habitats

This tropical snail is limited to warm ponds and thermal habitats (18–30°C); also tolerant of low-oxygenated waters; readily available through the aquarium trade.

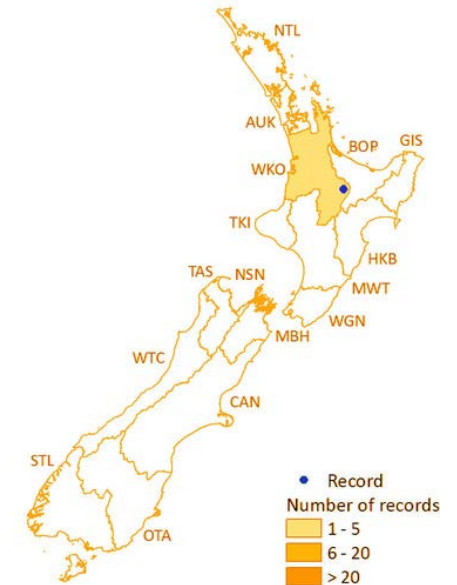
Presence in New Zealand

Locally naturalised, Golden Springs volcanic plateau, near Reporoa. Widespread throughout aquarium trade. First record 1920s.

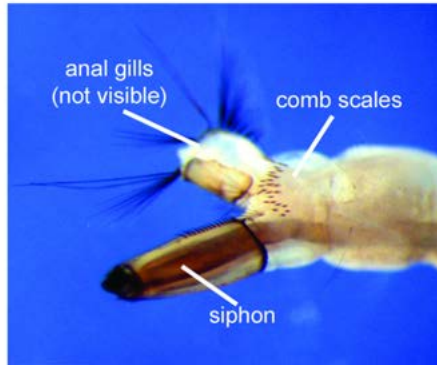
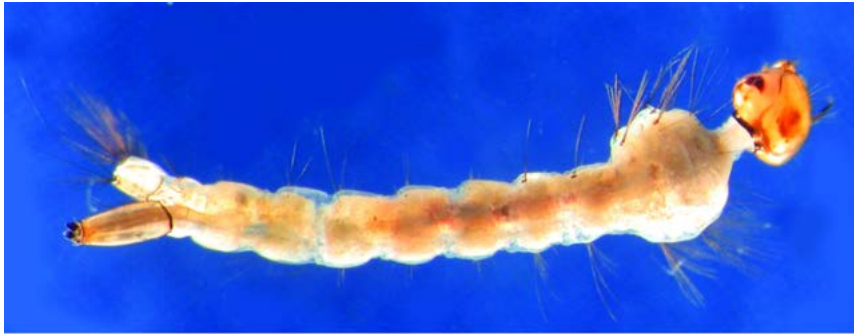
Dispersal Mechanisms

Most likely to be dispersed via the aquarium trade; natural dispersal probably limited by intolerance of cold waters.

New Zealand distribution



Ochlerotatus camptorhynchus (Thomson, 1869), Southern salt marsh mosquito



Larva (top), head (left), rear end (right) (B. Smith)

Biosecurity Status

Notifiable organism.

Biosecurity Risk

Risk of Ross River virus infection is believed to be low; infected possums or farm livestock may act as reservoirs for disease; secondary hazard in the form of 'nuisance biting behaviour'.

ID features

Requires specialist identification of either adult or larval form; larvae identifiable using a compound microscope; anal gills small and round; pecten teeth in single row on siphon; comb scales cockscomb-like.

Similar species

Two native species may also occur with *O. camptorhynchus* (*O. antipodeus* and *Culex pervigilans*); *Ochlerotatus camptorhynchus* is most similar to the native species *O. subalbistrois*.

Preferred/known habitats

Larvae have been found in brackish to saline water.

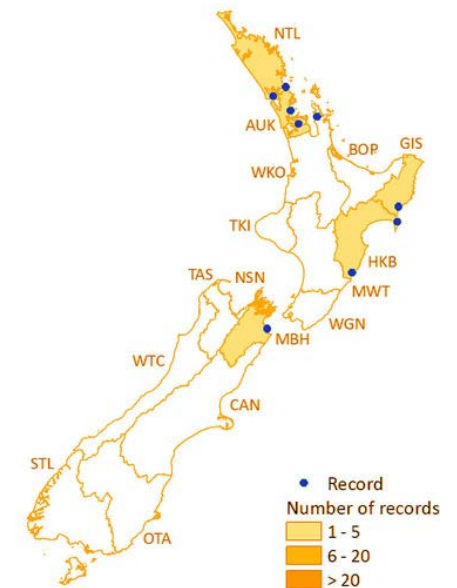
Presence in New Zealand

First record in 1998 from coastal regions of the North Island including Napier, Mahia, Gisborne, Whitford, Kaipara Harbour, Whangaparaoa and Coromandel; it has also been recorded in the South Island from the Wairau/Grassmere regions, near Blenheim; all populations are believed to have been eradicated in 2010.

Dispersal Mechanisms

Introduced from Australia, possibly via containers or imported tyres; under favourable conditions, the entire life cycle from egg to adult can take only 5 days; adults have a 8 km flight range.

New Zealand distribution



Physa acuta Draparnaud, 1805, Left-handed pond snail



Dorsal view (B. Smith)

Biosecurity Status

No status.

Biosecurity Risk

Physa acuta is believed to have displaced the native snail, *Glyptophysa variabilis* to some degree; *Physa* is thought to be an intermediate host for swimmer's itch (*Schistosoma* cercarial dermatitis).

ID features

The shell is thin and smoothly-coiled; in ventral view the opening is on the on left-hand side, and white-lipped; digitate (finger-like) process present on inner mantle opening; the yellowish-grey shell may be transparent with mottled pigmentation; mature specimens up to 12 mm long, but usually about 7–8 mm.

Similar species

Similar to *Glyptophysa variabilis*, which is larger (12–16 mm), reddish, and lacks a digitate process.

Preferred/known habitats

Can be found in a variety of freshwater habitats including lakes, ponds, wetlands, and running waters where it can be locally abundant.

Presence in New Zealand

Widespread and common in New Zealand in both natural and artificial water bodies, though believed to be absent from some Northland lakes.

Dispersal Mechanisms

Dispersal artificially enhanced through transport of infected pond weed and the aquarium trade.

New Zealand distribution



Planorbarius corneus (Linnaeus, 1758), Great ramshorn, trumpet snail, brilliant red ramshorn snail



Lateral view, with insert of shell opening (B. Smith)

Biosecurity Status

No status.

Biosecurity Risk

Planorbarius corneus may survive several weeks out of water during drought; may serve as second intermediate host of *Echinostoma echinatum*, where the final hosts are mammals; human infection can occur via consumption of the host, and results in the clinical symptoms of echinostomiasis (headache and gastric pain to diarrhoea).

ID features

Shell reddish brown to olive brown; shell height up to 14 mm and width up to 30 mm.

Similar species

Similar to the native species *Gyraulus corinna* and *G. kahuica*, which are much smaller (5 mm diameter) and have a yellowish-brown shell.

Preferred/known habitats

Ponds and lakes.

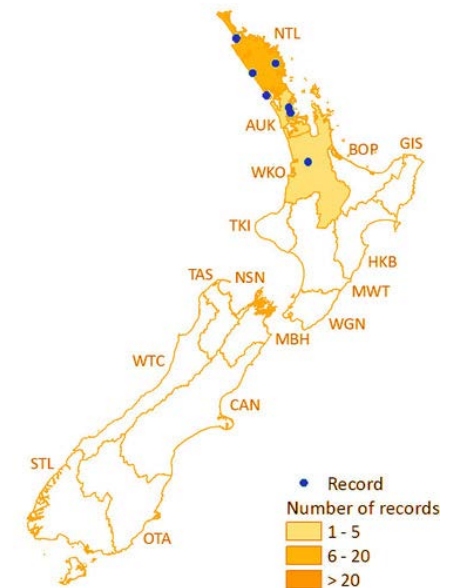
Presence in New Zealand

First record in 1968; widespread within the aquarium trade, but naturalisation appears somewhat localised.

Dispersal Mechanisms

Dispersal enhanced artificially through transport of infected pond weed; aquarium trade.

New Zealand distribution



Pomacea (Lamark, 1819), Apple snail, mystery snail



Lateral view, and colour variations (inserts) (B. Smith)

Biosecurity Status

No status.

Biosecurity Risk

Pomacea is a known vector for rat lungworm (*Angiostrongylus cantonensis*),

which can cause the brain disease eosinophilic meningitis; *Pomacea* will eat rooted aquatic vegetation, and is a serious pest of rice and taro; they are known to eat other snail eggs, and have been observed eating *Lymnaea stagnalis* in the laboratory.

ID features

Large snails (up to 50 mm diameter) with left-hand coiled shell and a large operculum; very long tentacles visible when mobile; shell colouration variable from entirely yellow or with bands of yellow-tan, brownish or black.

Similar species

None.

Preferred/known habitats

Warm ponds and lakes.

Presence in New Zealand

Widespread within the aquarium trade, but not naturalised; a single specimen in poor condition was recorded from Waikato River.

Dispersal Mechanisms

The availability of this large attractive snail through the aquarium trade makes it a welcome addition to any aquaria; this may potentially facilitate its dispersal, particularly if released into warmer water bodies within the upper North Island.

New Zealand distribution

No map available

Pseudosuccinea columella (Say, 1817), American ribbed fluke snail, mimic *Lymnaea*



Dorsal and lateral view (B. Smith)

Biosecurity Status

No status.

Biosecurity Risk

Vector for liver fluke (*Fasciola hepatica*) which affects livestock and humans; in Australia, *P. columella* is thought to be a more important vector of *F. hepatica* than *A. tomentosa*.

ID features

Shell opening on right-hand side with a narrow lip; shell also tends to be fragile with fine striata; operculum absent; wide triangular tentacles present; up to 11 mm when fully grown.

Similar species

Similar to the native *Austropeplea tomentosa*, which has a more globular shape and a thicker lipped opening.

Preferred/known habitats

Ponds, lakes, ditches, seepages and sluggish stream; known also from the Waikato River; prefers open sunny water bodies up to 35 C.

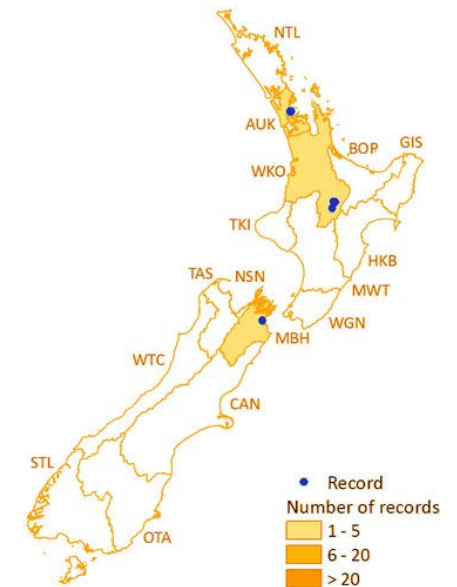
Presence in New Zealand

Widely naturalised, but may not be present south of Canterbury. First record from New Zealand in 1940.

Dispersal Mechanisms

Dispersal enhanced artificially through transport of infected pond weed; prolific breeder able to self-fertilise; aquarium trade.

New Zealand distribution



PLANTS

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Didymosphenia geminata (Lyngbye) M.Schmidt 1899, Didymo



Algae

ID features

A diatom (alga characterised by silica cell walls). Visible colonies are brown to slightly pinkish-brown at the surface, with a cream or white interior. Range from round “pimples” a few mm in diameter to continuous mats up to 50 mm thick. Mats have a tough, woolly feel rather than the slimy texture of most algae. Individual cells bottle-shaped (wedge-shaped in side view) and up to 140 µm long. Cells exude polysaccharide stalks which attach to stable substrates (usually rocks) in flowing water.

Similar species

Native alga *Gomphoneis minuta* var. *cassieae*, another stalk-forming diatom, can form thick mats that resemble didymo. However, *Gomphoneis* mats are more slimy and fragile than those of didymo.



Rock snot growths on river rocks and a microscopic view of cells (J. Clayton, C. Kilroy)

Biosecurity Status

Unwanted organism.

Biosecurity Risk

Ability to form large blooms in low-nutrient waters that would not normally support high algal biomass. Anecdotal evidence suggests that didymo impacts upon environmental (water quality – ecosystem health, biodiversity; indigenous biodiversity – biodiversity/extant), economic (industry – maintenance and nuisance), and social (recreational – swimming; aesthetics – potential) values.

Preferred/known habitats

Mostly in flowing, nutrient-poor waters; tolerates a wide range of water velocities.

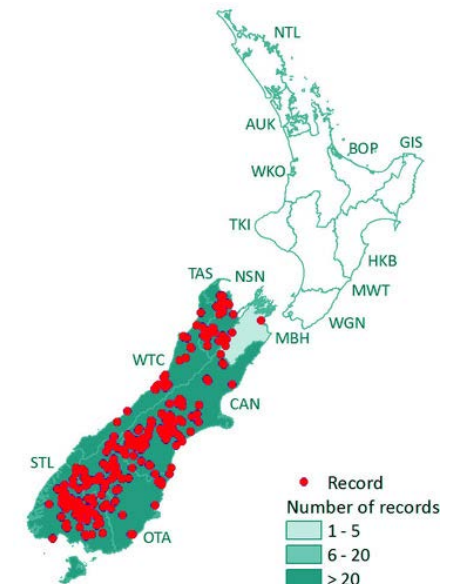
Presence in New Zealand

Widely naturalised in South Island but still apparently absent from the North Island. First recorded in Waiau River, Southland in 2004.

Dispersal Mechanisms

Downstream through transport of individual cells. Inter-catchment spread in the South Island probably via recreational equipment such as angling gear, felt-soled waders, kayaks and 4WD vehicles. In cool, wet conditions, cells can remain viable for weeks.

New Zealand distribution



Hydrodictyon reticulatum (L.) Lagerheim A, Water net



Large surface growths in a lake (top), a close-up of the mesh structure and individual 'nets' (J. Clayton, R. Wells)

Biosecurity Status

Regional Pest Management Strategy: Chatham Islands.

Biosecurity Risk

Extensive floating mats interfere with recreational activities, degrade the aesthetic values of water bodies and accumulate in decaying drifts on beaches. Smothered macrophyte beds become prone to collapse and subsequent decay. Surprisingly, many invertebrates and trout appear to benefit from the water net blooms, with the nets providing refugia for large populations of daphnia and snails. Marked boom/bust behaviour of water net is common.

Algae

ID features

Water net is a green filamentous alga. It is distinctive in that the individual cells are joined to form a six-sided mesh structure (usually visible to the naked eye) which makes up cylindrical colonies.

Similar species

Superficially similar to many filamentous algae e.g. *Spirogyra*, however no other algae forms the mesh or net structure seen in water net.

Preferred/known habitats

Lakes, reservoirs, rivers, streams, ponds, wetlands, ornamental ponds and patches of damp ground.

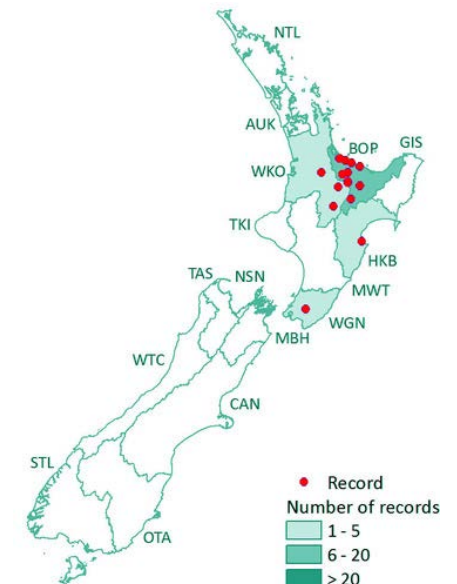
Presence in New Zealand

Naturalised in many locations in the Waikato, Bay of Plenty and Hawkes Bay Regions. First record 1986 Tauranga.

Dispersal Mechanisms

Can establish from a single cell or from spores. Agents for dispersal include wind and water movements, wildfowl, insects, livestock and humans. The aquarium and pond plant industry, movement of machinery, and boating and fishing are all likely to have contributed to its current distribution.

New Zealand distribution



Cabomba caroliniana A. Gray, Cabomba, fanwort



Magnified flower and view of divided foliage and busy growth (R. Wells)

Biosecurity Status

No status, still available for sale as an aquarium plant.

Biosecurity Risk

Not regarded as a significant threat to New Zealand ecosystems based on experimental evaluation. One of the Australian Weeds of National Significance, but only problematic in northern states.

Submerged

ID features

Shoots are grass green to olive green or sometimes reddish brown. The leaves are of two types: submersed and floating. The submersed leaves are finely divided and arranged in pairs on the stem. They are fan-shaped, hence the name fanwort. The floating leaves, when present, are linear and inconspicuous, with an alternate arrangement. They are less than 15 mm long and narrow. The flowers are white and small (less than 15 mm in diameter), and float on the water surface.

Similar species

Hornwort (*Ceratophyllum demersum*) and *Myriophyllum* spp. All have finely divided submersed leaves. However, fanwort has leaves arranged in pairs, whereas the others have leaves arranged in whorls.

Preferred/known habitats

Field site is a spring head, but occurs in slow flowing and still water bodies in other countries.

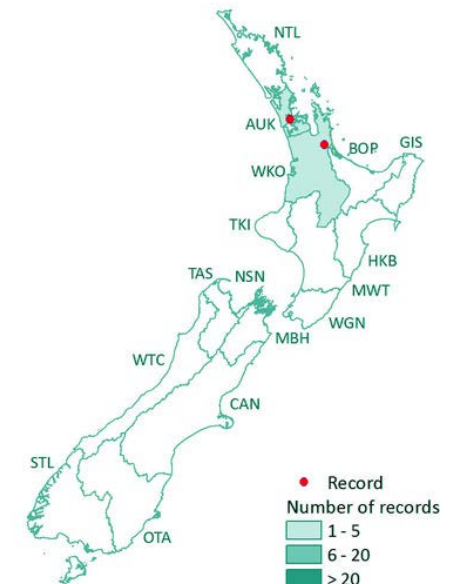
Presence in New Zealand

Only known from one site at Western Springs, Auckland, first record 2009. Previously found in a Karangahape Gorge pond, near Waihi, Waikato.

Dispersal Mechanisms

Sold widely in the aquarium trade, Spreads via stem fragments and rhizomes.

New Zealand distribution



Ceratophyllum demersum L., Hornwort, coontail



Submerged

ID features

Leaves are whorled and 10-40mm long. The leaves fork once or more into linear segments which are toothed (the teeth look like tiny horns – hence the name hornwort, wort being old English for plant). Flowers are minute and located at the base of the leaves. Hornwort has no roots, instead its lower leaves anchor it to sediment. It can survive as a free floating mat absorbing all the nutrients it needs from the surrounding water.

Similar species

Fanwort (*Cabomba caroliniana*), *Myriophyllum* spp. All have finely divided submersed leaves. However, fanwort has leaves arranged in pairs, not whorls and *Myriophyllum* spp. have pinnate (feather-like) arrangement of leaflets, not forked.



A weed bed seen from the surface (top) and underwater (bottom left), with a close-up the plant, forked leaves and minute flower (R. Wells)

Biosecurity Status

Unwanted Organism, National Interest Pest Response (South Island only), National Pest Plant Accord, Regional Pest Management Strategy: BOP*, NSN/TAS, STL, MWT, WGN, AUK, HKB (* management within defined areas of region).

Biosecurity Risk

Currently New Zealand's worst submerged weed, affecting indigenous plant biodiversity, hydro-generation, irrigation, flood protection and recreation.

Preferred/known habitats

Moderate flowing to still water bodies, growing to >15 m deep in some clear water lakes

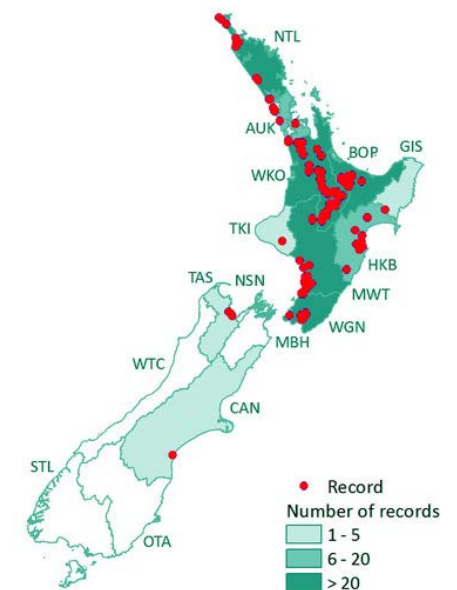
Presence in New Zealand

Widely naturalised in North Island, all South Island sites have been targeted for eradication with no plants seen since 2008, first record from Napier 1961.

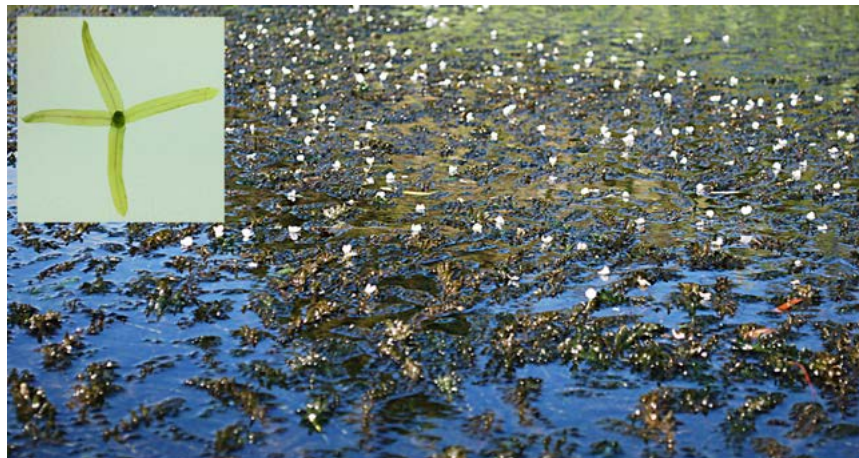
Dispersal Mechanisms

Propagation by fragmentation of its brittle stems. Flowers occur on this species, but there is no evidence of seed production in New Zealand.

New Zealand distribution



Egeria densa Planchon, Egeria



A surface reaching, flowing bed (top), with view of submerged growth and a close-up of the stem (bottom). Note four leaves in a whorl (insert) (R. Wells)

Biosecurity Status

Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: AUK, BOP*, NSN/TAS, STL, WTC, MWT, CAN, HKB, MBH, TKI (*management within defined areas of region).

Biosecurity Risk

Major impacts on indigenous plant biodiversity, hydrogeneration, irrigation, flood protection and recreation.

Submerged

ID features

Submerged perennial. Leaves usually in whorls of 4-5 (sometimes 3-8). Leaves 10-30mm long, narrowing to an acute tip. Egeria is the only oxygen weed with visible white flowers.

Similar species

Canadian pondweed (*Elodea canadensis*) and lagarosiphon (*Lagarosiphon major*). Egeria can be differentiated from the others by its size (larger than the other two). Canadian pondweed almost always has leaves arranged in whorls of three. Lagarosiphon has leaves that curl downwards and are not arranged in whorls.

Preferred/known habitats

Moderate flowing to still water bodies, usually in moderately to highly enriched water bodies

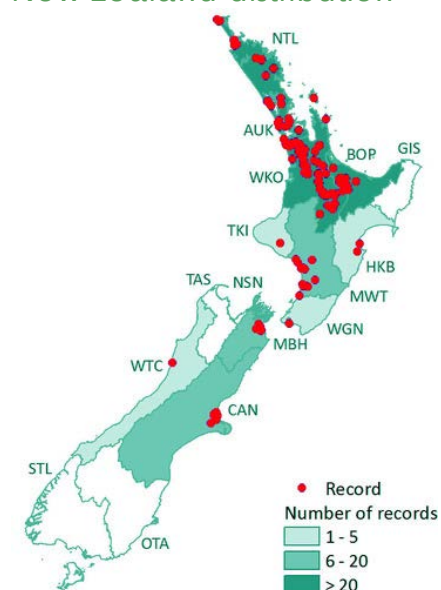
Presence in New Zealand

Widely naturalised in North Island and Marlborough. Few sites elsewhere in South Island, first record from the lower Waikato River in 1946.

Dispersal Mechanisms

Egeria propagates from stem fragments containing lateral buds that give rise to new plants. Egeria does not produce seed in New Zealand, with only male flowering plants being present.

New Zealand distribution



Elodea canadensis Michaux, Canadian pondweed



Submerged

ID features

Leaves in whorls of 3 or in opposite pairs on lower stems. Leaves 6-12 mm long, with a blunt tip.

Similar species

Egeria (*Egeria densa*) and *lagarosiphon* (*Lagarosiphon major*). Canadian pondweed is much smaller than *egeria* and almost always has leaves arranged in whorls of 3 compared with *egeria* which is usually in whorls of at least 4. *Lagarosiphon* has leaves that curl downwards and are arranged in spirals around the stem (not whorls).



Submerged weed bed (top) with close-up of a leaf whorl showing three leaves, and their arrangement on the stem (R. Wells)

Biosecurity Status

Still available for sale and distribution nationally.

Biosecurity Risk

Relatively minor impacts, usually co-exists with indigenous vegetation.

Preferred/known habitats

Moderately fast flowing to still water bodies.

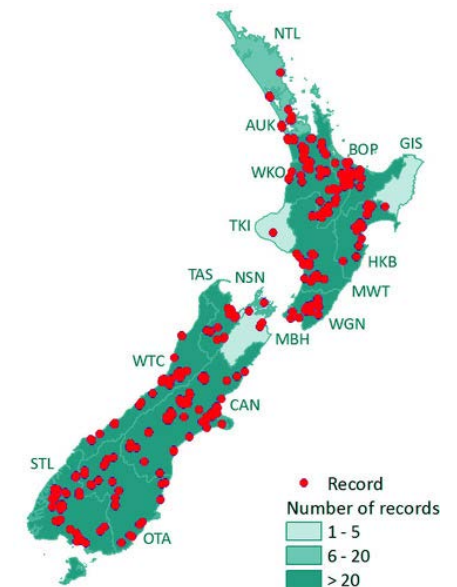
Presence in New Zealand

Widely naturalised throughout New Zealand, first record from the Avon River, Christchurch in 1872.

Dispersal Mechanisms

Spreads by vegetative fragmentation from stem material. Sold in the aquarium trade.

New Zealand distribution



Hydrilla verticillata (Linn. F.) Royle, Hydrilla



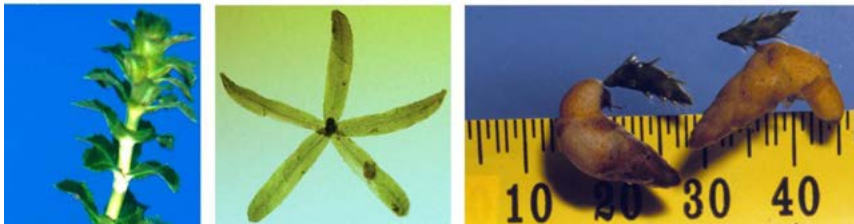
Submerged

ID features

The leaves are 6-20mm long and occur in whorls of 3-10, often varying greatly on the same shoot. They generally have sharp teeth along the leaf margin.

Similar species

Egeria (*Egeria densa*) and Canadian pondweed (*Elodea canadensis*). Hydrilla is most easily distinguished from these two species by its toothed leaf margins.



View into a large weed bed in a lake, close-up of plant, leaf whorl showing four leaves, pale tubers and small dark turions (R. Wells, J. Clayton)

Biosecurity Status

Notifiable Organism, Unwanted Organism, National Interest Pest Response (national eradication programme instigated 2008), National Pest Plant Accord, Regional Pest Management Strategy: NTL, AUK, HKB, WKO.

Biosecurity Risk

A potentially major submerged weed in New Zealand (more competitive than hornwort) and the worst aquatic weed in the USA.

Preferred/known habitats

Only known from lake environments in New Zealand, but grows in flowing waters in other countries.

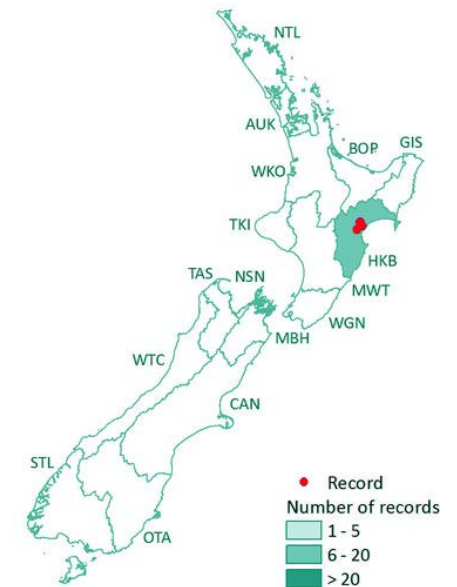
Presence in New Zealand

Locally naturalised in Hawkes Bay, first record from Lake Tutira in 1963.

Dispersal Mechanisms

The most common method of spread is from stem fragments. Hydrilla also spreads via tubers and turions, underground rhizomes, and above ground stolons.

New Zealand distribution



Lagarosiphon major (Ridl.) Moss ex Wager, *Lagarosiphon*



A submerged weedbed viewed from above, and a close-up of the plant stem showing recurved leaves are not arranged in whorls (R. Wells)

Biosecurity Status

Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: BOP*, OTA*, MWT, NSN/TAS, STL, AUK, CAN, HKB, MBH, TKI, WTC (*management within defined areas of region).

Biosecurity Risk

Major impacts on indigenous plant biodiversity and recreation.

Submerged

ID features

Leaves are alternate and curved downwards and 6-20 mm long. Stems are slender, brittle, and much branched.

Similar species

Canadian pondweed (*Elodea canadensis*) and egeria (*Egeria densa*). Both of these species have leaves arranged in whorls on the stem, whereas lagarosiphon has leaves arranged alternately in a spiral pattern.

Preferred/known habitats

Moderately fast flowing to still water bodies.

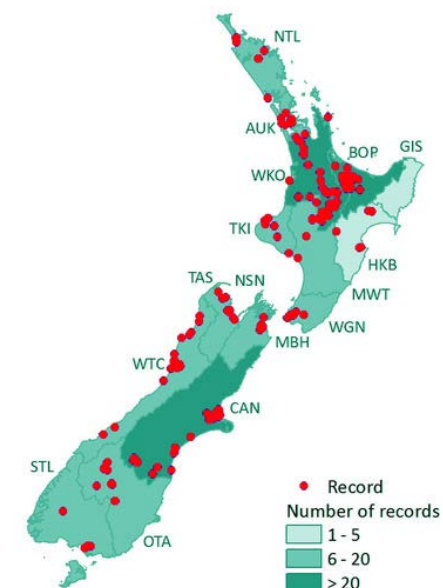
Presence in New Zealand

Widely naturalised in North Island and lowland northern and eastern South island, rare in Westland and upland South island, first record from Waiwhetu Stream, Wellington in 1950.

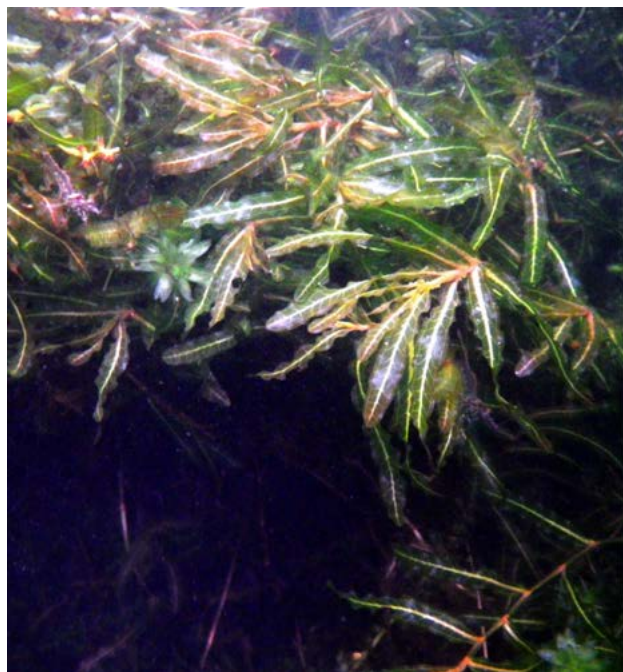
Dispersal Mechanisms

New plants develop from stem fragments. There is no seed production in New Zealand, with only the female plants of this species being present here.

New Zealand distribution



Potamogeton crispus L., Curled pondweed



Submerged plants within a lake, with a close-up of crimped leaves and the seed head (J. Clayton, R. Wells)

Biosecurity Status

Regional Pest Management Strategy: Chatham Islands.

Biosecurity Risk

Relatively minor impacts, usually co-exists with indigenous vegetation.

Submerged

ID features

All leaves are submerged, without stalks, and arranged alternately on the stem. They are green to reddish brown, about 10mm in width, and up to 80mm long. Leaf margins are markedly wavy and crimped (hence the name 'crispus'), with fine teeth near the tip. Main veins of the leaves are normally reddish.

Similar species

Potamogeton ochreatus and *P. cheesemanii*. *P. ochreatus* has a straight edged leaf and a blunt leaf tip, whereas curled pondweed has a rounded leaf tip. It can be distinguished from *P. cheesemanii* by the submerged leaves, which are narrower and much more crimped in curled pondweed.

Preferred/known habitats

Moderately fast flowing to still water bodies.

Presence in New Zealand

Widely naturalised throughout New Zealand, first record from Fielding, Manawatu in 1940.

Dispersal Mechanisms

Spreads by rhizomes, seeds or turions.

New Zealand distribution



Potamogeton perfoliatus L., Clasped pondweed



Single shoot and colony in culture showing the clasped leaf base (J. Clayton, T. James)

Biosecurity Status

Notifiable Organism, Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: AUK.

Biosecurity Risk

A potential major submerged weed, with potential to hybridise with native *Potamogeton* spp.

Submerged

ID features

Leaves are usually narrow to broadly ovate and greater than 6mm wide. The submerged leaves clasp the stem.

Similar species

Potamogeton spp. *Potamogeton perfoliatus* can be distinguished from all other *Potamogeton* spp. by the way the leaf clasps the stem.

Preferred/known habitats

Moderate flowing to still water bodies.

Presence in New Zealand

Eradicated, only known from three sites, never naturalised, first record from a pond near Lake Hayes, Otago in 1996.

Dispersal Mechanisms

Stem fragments and seeds.

New Zealand distribution



Ranunculus trichophyllus Chaix, Water buttercup



Submerged

ID features

Leaves are 2-3 times forked, ending in thread-like segments, and are between 30-60mm long. Leaves are arranged alternately on the stem. Stems are up to 3m long, often rooting at the nodes. Flowers have white petals and a yellow centre and are up to 15 mm across.

Similar species

Fanwort (*Cabomba caroliniana*) and egeria (*Egeria densa*) have similar flowers. Differs from fanwort in that the leaves are not fan-shaped and alternately rather than oppositely arranged. Differs from egeria in that the leaves are forked and not arranged in whorls.



Linear divided submerged plant, and buttercup flowers at the surface (J. Clayton, R. Wells)

Biosecurity Status

Regional Pest Management Strategy: Chatham Islands.

Biosecurity Risk

Relatively minor impacts, usually co-exists with indigenous vegetation.

Preferred/known habitats

Moderately fast flowing to still water bodies.

Presence in New Zealand

Widely naturalised, first record in Waikouiti River, Otago in 1906.

Dispersal Mechanisms

Spreads by seeds or stem fragments.

New Zealand distribution



Vallisneria australis S.W.L.Jacobs & Les, Eel grass



Foliage in flowing water (top), a lake habitat (bottom left) and growth from stolons (bottom right) (R. Wells, A. Taumoepeau)

Biosecurity Status

Notifiable Organism, Unwanted Organism (as synonym), National Pest Plant Accord, Regional Pest Management Strategy: MBH, NTL, WGN, MWT, AUK, WKO.

Biosecurity Risk

A potentially important submerged weed; poor dispersal capacity has limited current spread.

Submerged

ID features

The leaves are thick and strap-like and arise from long creeping stems. Leaves are up to 3 m long and between 0.5 and 5 cm wide. The leaf tips (when not browsed) are obtuse to acute, with fine toothed margins towards the apex. Male plants are only known from Lake Pupuke, with female plants also confirmed there. Male flowers (a translucent sheath surrounding many tiny yellow flowers) being produced in the leaf bases. All other naturalised populations are female, the female flowers are green and cylindrical borne on long, often spiral, filamentous stalks arising in the leaf bases and extending to the waters surface.

Similar species

Sagittaria subulata, *S. platyphylla*, and swamp lily (*Ottelia ovalifolia*). The submerged leaves of these species look similar to the submerged leaves of eel grass; however, eelgrass never has emergent leaves or conspicuous white flowers.

Preferred/known habitats

Moderately fast flowing to still water bodies.

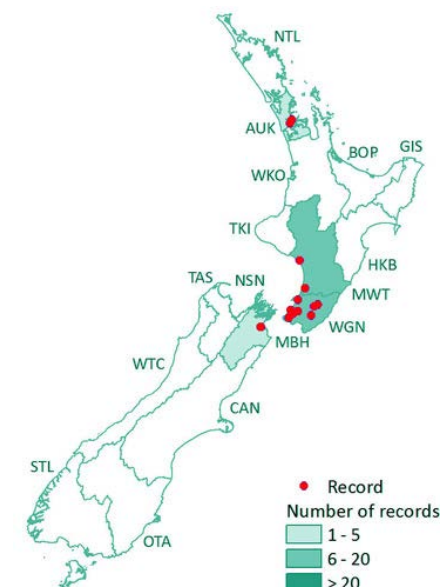
Presence in New Zealand

Locally naturalised in North Island and Marlborough in the South Island, first record 1897 in Lake Pupuke, Auckland.

Dispersal Mechanisms

Spread by stolon fragmentation. There is no evidence of viable seed production in New Zealand.

New Zealand distribution



Aponogeton distachyos L.f., Cape pondweed



Floating-leaved

ID features

Cape pondweed has a basal globose tuber, 3-4 cm in diameter. Floating leaves are basal, dark green, up to 25 cm long, narrow-lanceolate in shape, and with many distinctive cross veins. Submerged leaves are linear in shape. Flowers are on a two-forked spike with fleshy white lobes and very fragrant.

Similar species

Swamp lily (*Ottelia ovalifolia*). Swamp lily has fibrous roots compared with the tuberous rootstock of Cape pondweed. Swamp lily floating leaves are less elongated, with pronounced dark green venation.



Surface leaves growing from the root crown in shallow water (top) and close-up images of flower spike (R. Wells)

Biosecurity Status

Regional Pest Management Strategy: Chatham Islands.

Biosecurity Risk

Minor impact in still and flowing water, apparently disappeared from many former northern sites, possibly displaced by more invasive species.

Preferred/known habitats

Still and flowing water bodies.

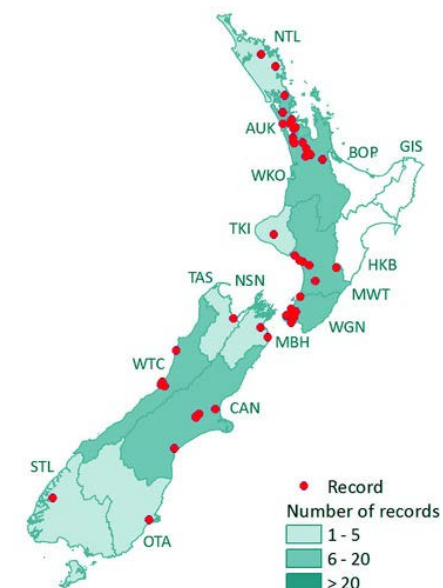
Presence in New Zealand

Widely naturalised, first record from Waimate N, Northland in 1870.

Dispersal Mechanisms

Seeds prolifically, seeds water dispersed.

New Zealand distribution



Hydrocleys nymphoides (Humb. et Bonpl.) Buchenau, Water poppy



Close up of leaf with spongy midvein, yellow flower and a colony growing in shallow water (P. Champion)

Biosecurity Status

Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: AUK, BOP, NTL, WKO.

Biosecurity Risk

Problem weed in still and flowing water bodies, poor dispersal capacity has limited spread.

Floating-leaved

ID features

Underwater stem is elastic, creeping, or floating near the water surface. Leaves and roots attached at each node along the stem. Leaf is a bright glossy green, ovate, 7 cm long, and with an inflated main vein on the underside. The leaf sinus is shallow. Flowers consist of 3 yellow petals with a purple centre (filaments) and are up to 8 cm across.

Similar species

Yellow water lily (*Nuphar lutea*), marshwort (*Nymphoides geminata*), and fringed water lily (*Nymphoides peltata*). Yellow water lily has very thick spongy stolons (up to 10 cm) and much larger floating leaves (up to 40 cm long and 30 cm wide). Marshwort and fringed water lily do not have an inflated mid-vein on the underside of the leaves. They also have wings on the outer edges of their petals.

Preferred/known habitats

Still and flowing water bodies.

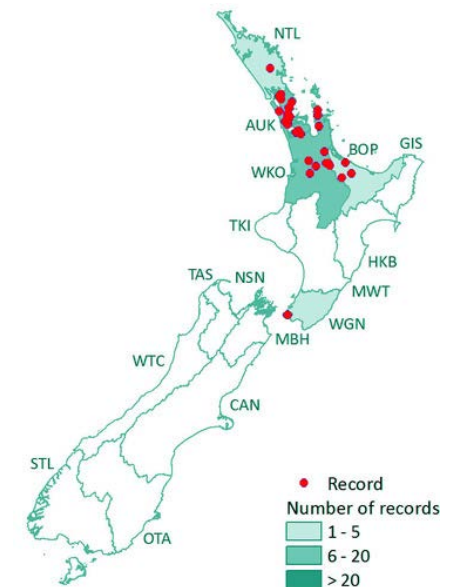
Presence in New Zealand

Locally naturalised, eradicated from most known sites, first record from Te Aroha, Waikato in 1914.

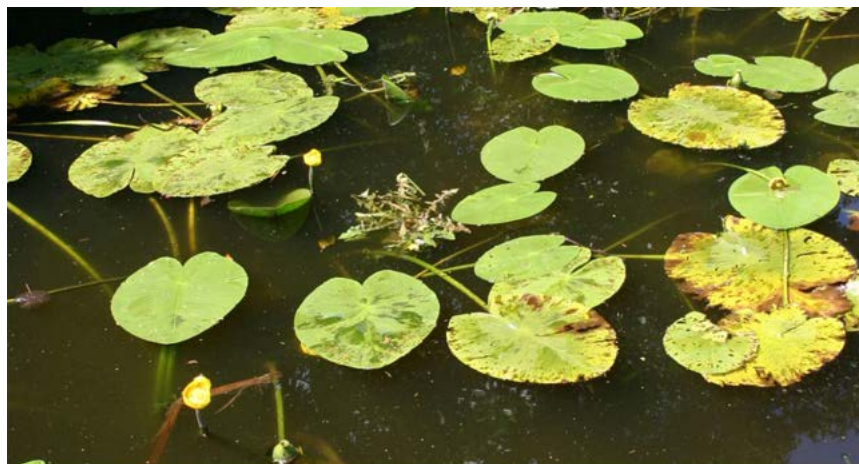
Dispersal Mechanisms

Vegetative spread by stolon fragments, deliberate planting.

New Zealand distribution



Nuphar lutea (L.) Sm., yellow water lily, brandy bottle



Floating-leaved

ID features

Stout spongy, tuberous rhizome that is up to 10 cm across. The floating leaf is ovate, with entire leaf margins, a deep sinus, and up to 30 cm long. The submerged leaf is very thin and lettuce-like. Flower is golden yellow with 6 petals and up to 6 cm across with a strong alcoholic aroma. The flower is held above the water surface by a stout stalk.

Similar species

Nymphaea spp., water poppy (*Hydrocleys nymphoides*), marshwort (*Nymphoides geminata*), and fringed water lily (*Nymphoides peltata*). *Nymphaea* species have a much rounder leaf and lack the thick spongy rhizomes that are so distinctive in yellow water lily. Water poppy, marshwort, and fringed water lily have much smaller floating leaves (up to 10 cm across) than the large leaves of yellow water lily, and also lack the distinctive rhizome.



View of a colony, floating plant with large rhizome, and distinctive bowl-like flower (R. Wells)

Biosecurity Status

Notifiable Organism, Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: HKB, AUK.

Biosecurity Risk

Problem in still water bodies, poor dispersal capacity has limited spread.

Preferred/known habitats

Still and slow flowing water bodies.

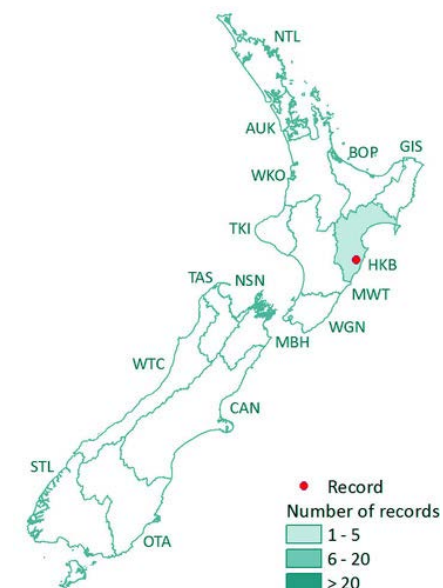
Presence in New Zealand

One known field site targeted for eradication, first record from Horseshoe Lake, Hawkes Bay in 1975.

Dispersal Mechanisms

Rhizome fragments and seed.

New Zealand distribution



Nymphaea alba L., Common water lily



Bed of water lilies, basal rhizome and flowers of two cultivars (R. Wells)

Biosecurity Status

No status, still available for sale as an ornamental pond plant.

Biosecurity Risk

Planted in many water bodies where it may spread and become a minor nuisance, especially in shallow lakes. Poor dispersal capacity has limited spread.

Floating-leaved

ID features

Stout horizontal rhizome up to 60 mm across. Leaves are almost round to elliptical in shape, with a deep sinus. Leaves are up to 25 cm across, green or pink on the lower surface, with a distinct main vein. Flower is either white or pale pink (hybrids can have red, yellow, or blue flowers) and are up to 20 cm across.

Similar species

Mexican water lily (*Nymphaea mexicana*), marshwort (*Nymphoides geminata*), and fringed water lily (*Nymphoides peltata*). Mexican water lily has an erect rhizome distinguishing it from common water lily, which has a horizontal rhizome. Mexican water lily also often has brown blotches on the upper surface of leaves, which don't occur on the leaves of common water lily. Marshwort and fringed water lily have thin stolons which loop across the sediment surface or lie just beneath the water surface, whereas common water lily has thick rhizomes.

Preferred/known habitats

Still and slow flowing water bodies.

Presence in New Zealand

Widely naturalised, first record 1950, but widely cultivated and planted before that time.

Dispersal Mechanisms

Rhizome extension and fragmentation, rarely by seed. Deliberate plantings.

New Zealand distribution



Nymphaea mexicana Zucc., Mexican water lily



Floating-leaved

ID features

Stout erect rhizome with creeping stolons, often ending with distinctive 'brood-bodies' which look like miniature hands of bananas. Leaves are almost round to elliptical in shape, with a deep sinus. Leaves are up to 20 cm across, green or pink on the lower surface, and with brown blotches on the upper surface. Flower is yellow and up to 15 cm across. New Zealand plants are likely to be of hybrid origin, but have the characters of the parent species.

Similar species

Common water lily (*Nymphaea alba*), marshwort (*Nymphoides geminata*), and fringed water lily (*Nymphoides peltata*). Common water lily has a horizontal rhizome distinguishing it from Mexican water lily, which has an erect rhizome and also often has brown blotches on the upper surface of leaves, which don't occur on the leaves of common water lily. Marshwort and fringed water lily have thin stolons which loop across the sediment surface or lie just beneath the water surface, whereas water lilies have thick rhizomes.



Bed of water lilies, close up of the plant base, large yellow flower and adventitious stolons (R. Wells, P. Reeves)

Biosecurity Status

Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: AUK, WKO.

Biosecurity Risk

Problem in still water bodies, much more so than *N. alba*, but poor dispersal capacity has limited spread.

Preferred/known habitats

Still and slow flowing water bodies.

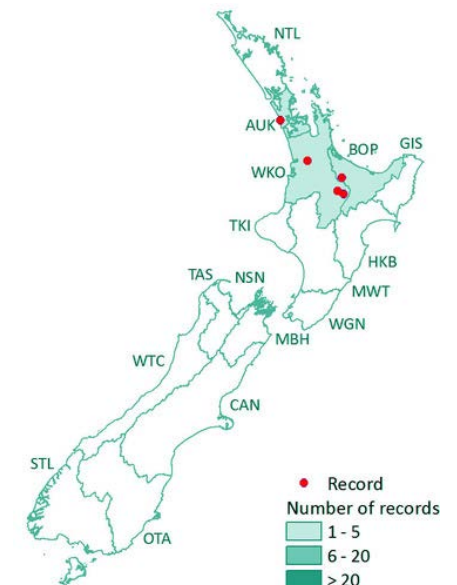
Presence in New Zealand

Locally naturalised, first record from Lake Ohakuri, Waikato in 1982.

Dispersal Mechanisms

Rhizomes, tubers, and seed, deliberate plantings.

New Zealand distribution



Nymphoides geminata (R. Br.) Kuntze, Marshwort



Floating-leaved

ID features

Underwater stem creeping or floating near the surface, with leaves and roots at each node. Leaves are heart-shaped and up to 10 cm across. Bright green on upperside and often pinkish on the underside. The main vein is indistinct. Flowers are bright yellow, with 5 petals that have fringed marginal wings.

Similar species

Fringed water lily (*Nymphoides peltata*), water poppy (*Hydrocleys nymphoides*), water lily (*Nymphaea* spp.), and yellow water lily (*Nuphar lutea*). Fringed water lily has leaves with scalloped margins, whereas marshwort has entire leaf margins. Yellow water lily has very thick spongy stolons (up to 10 cm) and much larger floating leaves (up to 40 cm long and 30 cm wide). Water lily has a larger leaf with a distinct main vein. Water poppy has an ovate leaf with an inflated mid-vein on the underside.



Infestation in the shallows of a lake, heart-shaped leaves and distinctive fringed flower (R. Wells)

Biosecurity Status

Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: AUK, BOP, CAN, NSN/TAS, NTL, WKO.

Biosecurity Risk

Problem in still water bodies, poor dispersal capacity has limited spread.

Preferred/known habitats

Still and slow flowing water bodies.

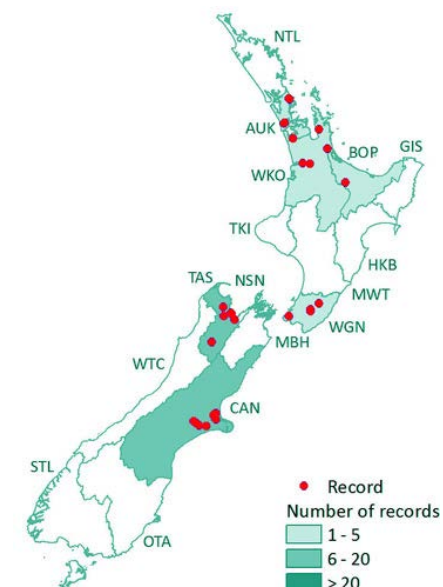
Presence in New Zealand

Locally naturalised, eradicated from most known sites, first record from Lake Okareka, Bay of Plenty in 1985.

Dispersal Mechanisms

Vegetative spread by creeping stem growth and fragmentation. Deliberate plantings.

New Zealand distribution



Nymphoides peltata (S.G. Gmel) Kuntze, Fringed water lily



The water-lily like habit, heart-shaped leaves, stolon and yellow flower (P. Champion, T. James)

Biosecurity Status

Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: NTL, AUK, WKO.

Biosecurity Risk

Problem weed in still and flowing water bodies, fortunately detected and eradicated before establishing as a naturalised species.

Floating-leaved

ID features

Underwater stem creeping or floating near the surface with leaves and roots at each node. Leaves are almost round, with a scalloped margin, deep sinus, and up to 10 cm across. Green on upperside of leaf with purple blotches. Flowers are golden with 5 petals and solid marginal wings.

Similar species

Yellow water lily (*Nuphar lutea*), marshwort (*Nymphoides geminata*), and water poppy (*Hydrocleys nymphoides*). Yellow water lily has very thick spongy stolons (up to 10 cm) and much larger floating leaves (up to 40 cm long and 30 cm wide). Marshwort has entire leaf margins compared with the scalloped leaf margins of fringed water lily and no purple blotches on the upperside of the leaf. Water poppy has an inflated mid-vein on the underside of the leaves.

Preferred/known habitats

Only known from a farm dam and ornamental ponds, but also grows in slow flowing waters overseas.

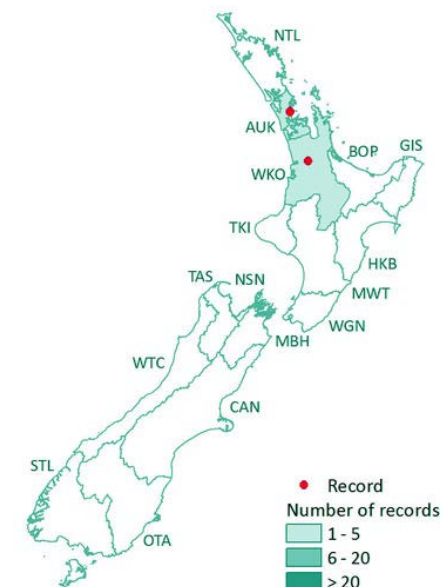
Presence in New Zealand

Nationally eradicated, first record from Whangaparaoa, Auckland in 1988.

Dispersal Mechanisms

Vegetative spread by stoloniferous growth and by floating seeds which are fringed with many bristles. Huge potential for spread because seeds are adapted for water bird dispersal. Also deliberate plantings.

New Zealand distribution



Iris pseudacorus L., Yellow Flag



A stand of yellow flag, with close-up of the large rhizome and distinctive yellow flower (R. Wells, T. James)

Biosecurity Status

Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: NTL, WTC*, AUK, NSN/TAS (* management within defined areas of region).

Biosecurity Risk

A problem in still and flowing water bodies, also in flooded pasture because the species is potentially toxic to livestock. A potential weed of salt marsh vegetation.

Erect emergent

ID features

Tall marginal summer-green perennial. Dark green, leafy clumps. Leaves sword-shaped, 2-3 cm wide that shred to fibres when old. Flower stalk is stout, flowers are yellow and up to 12 cm across. Plants growing over water can form rafts of floating rhizomes, strong enough to support the weight of a human.

Similar species

Raupo (*Typha orientalis*) has a narrower leaf 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/known habitats

Still and slow flowing water bodies, wetlands and reported from salt marshes overseas.

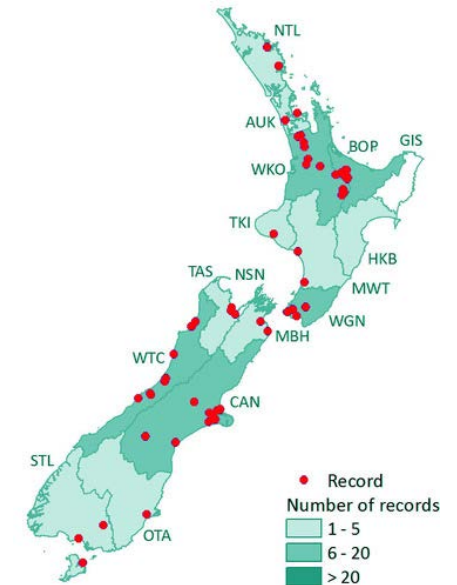
Presence in New Zealand

Widely naturalised, first record 1878.

Dispersal Mechanisms

Spreads by rhizomes and seed. Also deliberate plantings.

New Zealand distribution



Lycopus europaeus L., Gypsywort



Plants growing adjacent to lake, with a close-up of the square stem and ring of flowers (*P. Champion*, *T. James*)

Biosecurity Status

Regional Pest Management Strategy: AUK, CTH.

Biosecurity Risk

Problematic on the margins of still water bodies where it invades other erect emergent vegetation (e.g. raupo, *Machaerina articulata*).

Erect emergent

ID features

Stems erect to 1m and four-sided. Leaves green with a deeply toothed margin. Flowers are white with purple spots in whorls where the leaves meet the stem.

Similar species

Spearmint (*Mentha spicata*). Spearmint has a distinct minty aroma and purple flowers that occur in a spike at the tips of each stem.

Preferred/known habitats

Water body margins and emergent vegetation.

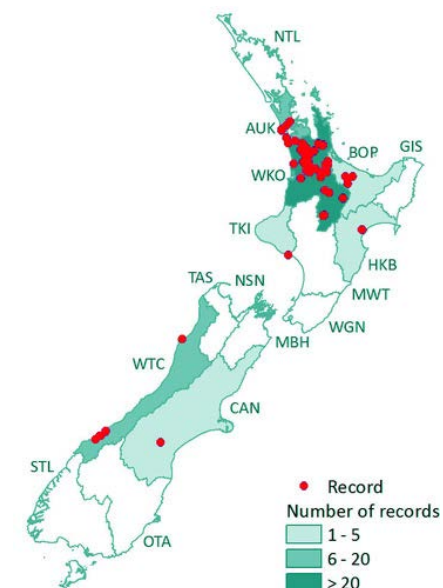
Presence in New Zealand

Locally naturalised, mostly from the Waikato and adjacent regions but also Westland in South island, first record from near Haast in Westland in 1935.

Dispersal Mechanisms

Produces far reaching stolons, also seed.

New Zealand distribution



Lythrum salicaria L., Purple loosestrife



Mass flowering beds (right) with a close-up of the flow and arrangement of stems (*P. Champion. T. James, N. Procter*)

Biosecurity Status

Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: AUK, BOP, MWT, NTL, STL, NSN/TAS, MBH, WKO, WGN.

Biosecurity Risk

Major potential problem in still water bodies and wetlands, a major weed in North America.

Erect emergent

ID features

Tall emergent perennial herb. Normally 60-100 cm tall, but can grow taller. Purple flowers in dense terminal spikes. Stems are angled (4-6 sided). The stalkless leaves can be opposite, often with alternating pairs at 90 degree angles, or sometimes in whorls of 3 near the base. The upper leaves and floral bracts can be alternate. The leaves are 5-12 cm long, wider and rounded or heart-shaped at the base. Leaf shape varies from lanceolate to narrowly oblong. Leaf sometimes covered with fine hairs.

Similar species

None.

Preferred/known habitats

Lake margins and other wetlands.

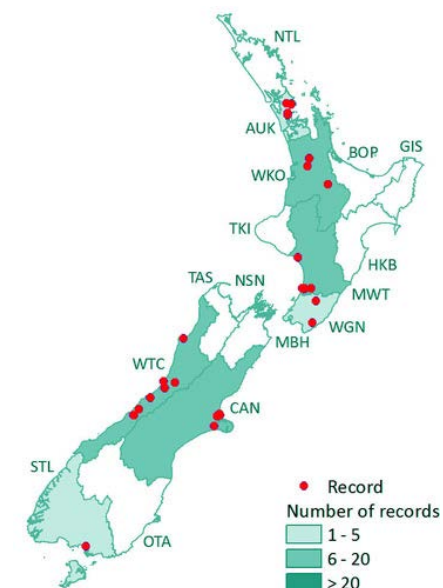
Presence in New Zealand

Locally naturalised, especially in Horowhenua and Canterbury, first record 1958.

Dispersal Mechanisms

Seed or vegetative fragments. Water dispersed, also deliberate planting.

New Zealand distribution



Phragmites australis (Cav.) Trin. ex Steud., **Phragmites**



A flowering bed showing diffuse seed heads (*P. Champion*)

Biosecurity Status

Notifiable Organism, Unwanted Organism, National Interest Response Pest, National Pest Plant Accord, Regional Pest Management Strategy: HKB, NSN/TAS, NTL, AUK, CAN, MWT.

Biosecurity Risk

New Zealand's worst potential problem aquatic weed, fortunately not yet introduced to suitable habitat and not sexually reproducing.

Erect emergent

ID features

Robust summer-green grass, growing to 3 m or more tall, with stout far-reaching rhizomes. Stalks are leafy, rigid, erect, bamboo-like, with many nodes. Leaves bluish-green, up to 60 cm long and 3 cm wide, often aligning in one direction when older. Flower head is purplish, silky, and almost up to 40 cm long.

Similar species

Giant reed (*Arundo donax*) and bamboos. Giant reed is taller with arching stems. Bamboos have stalked leaves rather than leaves that attach directly to the stalk in the case of phragmites. Phragmites is the only tall grass that dies back to underground parts during winter.

Preferred/known habitats

Still and slow flowing water bodies, wetlands and reported from salt marshes overseas.

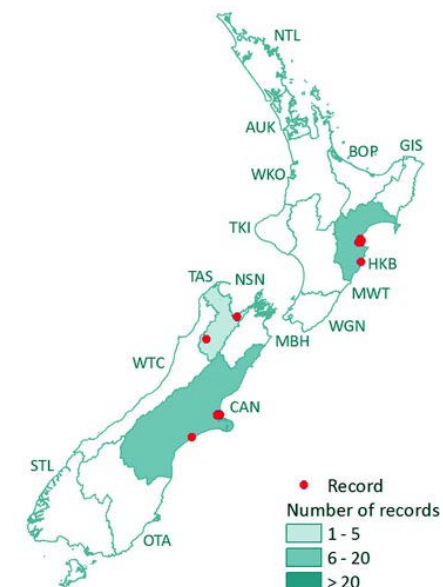
Presence in New Zealand

Locally naturalised, all known sites targeted for eradication, first record from Napier, Hawkes Bay in 1950.

Dispersal Mechanisms

Rhizome fragments or deliberate plantings.

New Zealand distribution



Sagittaria montevidensis Cham. & Schltdl., Arrowhead



Erect emergent

ID features

Tall emergent perennial or annual herb. Stems are erect from 7 cm to 2 m tall. Emergent leaves have a distinctive arrow-shape with basal lobes up to 15 cm long. The rest of the leaf is up to 25 cm long and 20 cm wide. Flowers are white with a purple basal spot, about 2.5 cm in diameter, arranged in whorls.

Similar species

Other *Sagittaria* species. *Sagittaria sagittifolia* also has arrow-shaped leaves but petioles are triangular in cross-section and it produces creeping rhizomes and tubers. The two other *Sagittaria* species present in New Zealand (*S. subulata* and *S. platyphylla*) do not have arrow-shaped emergent leaves.



Wetland infestation (top), with close-up of the arrow-shaped leaf and distinctive blotched flower (P. Champion, T. James)

Biosecurity Status

Notifiable Organism, Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: AUK, MWT, WGN, WKO.

Biosecurity Risk

Problem in still and flowing water bodies, massive seed output, therefore important to attempt early eradication. A major irrigation weed in New South Wales.

Preferred/known habitats

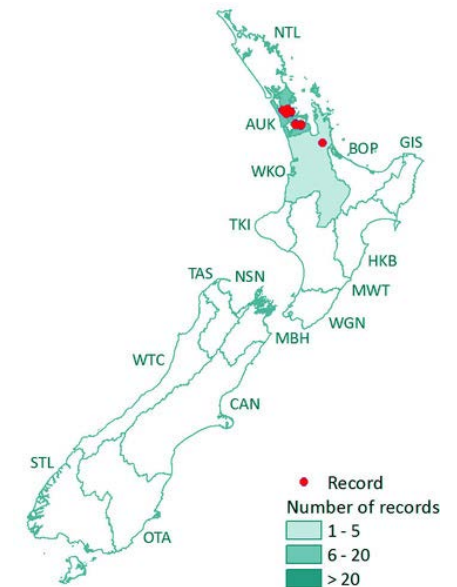
Presence in New Zealand

Locally naturalised, first record from Auckland in 1996.

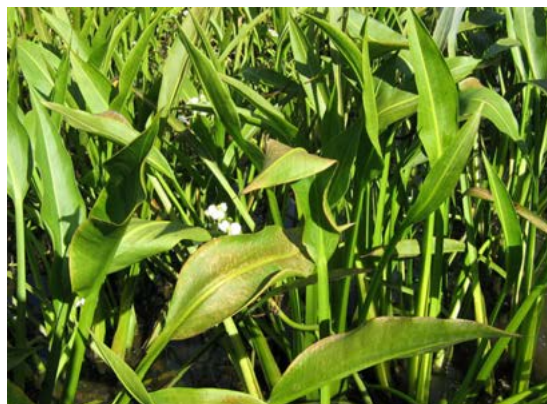
Dispersal Mechanisms

Seeds and deliberate plantings.

New Zealand distribution



Sagittaria platyphylla (Engelm.) J.G.Sm.,



Wetland habitat (top left), lanceolate leaf shape (bottom left), with inserts showing the flower and seed head (P. Champion, H. Pene, T. James)

Biosecurity Status

Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: AUK, MWT, WGN, WKO.

Biosecurity Risk

Problem in still and flowing water bodies, massive seed output, therefore important to attempt early eradication. A major irrigation weed in Victoria.

Erect emergent

ID features

Emergent perennial herb. Submerged leaves are strap-shaped, 10-50 cm long and 3 cm wide with clearly visible longitudinal veins. Leaves above the water have a long petiole (about 40 cm) which is triangular in cross section and a lance-shaped leaf blade. Flowers are white with 3 petals and about 6 cm across. Tubers form on rhizomes.

Similar species

Alisma spp. *Alisma* species have D-shaped petioles and much larger inflorescences with smaller flowers.

Preferred/known habitats

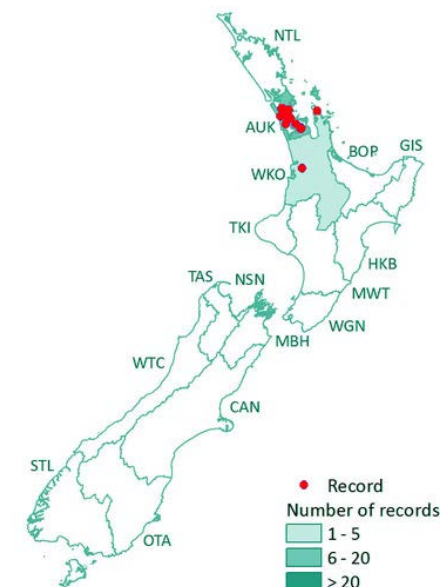
Presence in New Zealand

Locally naturalised, first record from North Shore, Auckland in 1989.

Dispersal Mechanisms

Spreads by water dispersed seed, rhizomes, and tubers. Also deliberate planting.

New Zealand distribution



Sagittaria sagittifolia L., Arrowhead



Rounded tubers on the root system, with insert showing the distinctive arrow-shaped leaf and triangular stem (P. Champion, T. James)

Biosecurity Status

Notifiable Organism, Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: AUK, WKO, WGN.

Biosecurity Risk

A potentially important irrigation weed; poor dispersal capacity has limited current spread.

Erect emergent

ID features

Tall summer-green perennial dying back to underground parts over winter. Emergent leaves have a distinctive glossy arrow-shape with long basal lobes. Petioles are triangular in cross-section. Rhizomatous with round tubers, up to 3 cm across, produced on these. No flowers seen on New Zealand material.

Similar species

Other *Sagittaria* species. *Sagittaria montevidensis* also has arrow-shaped leaves but petioles are D-shaped in cross-section and it does not produce creeping rhizomes or tubers. The two other *Sagittaria* species present in New Zealand (*S. subulata* and *S. platyphylla*) do not have arrow-shaped emergent leaves.

Preferred/known habitats

Still and slow flowing water bodies.

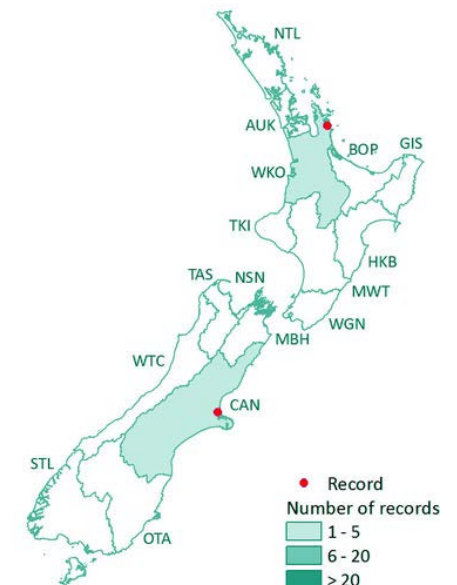
Presence in New Zealand

Locally naturalised, first record from Coromandel Peninsula in 2002.

Dispersal Mechanisms

Apparently by deliberate planting and subsequent spread by water movement. Possibly cultivated as a vegetable by some ethnic groups.

New Zealand distribution



Schoenoplectus californicus (C.A.Mey.) Palla, Californian bulrush



Close-up of seed head (left) and a bed at the water margin (T. James)

Biosecurity Status

Unwanted Organism, National Pest Plant Accord.

Biosecurity Risk

An invasive estuarine species colonising sand banks and river margins; poor dispersal capacity has limited current spread.

Erect emergent

ID features

A tall rhizomatous sedge up to 4 m tall, with stems triangular near the base, round in upper parts, up to 3 cm across. Leaves are reduced to brown papery basal sheaths. Small brown flowers are produced in many branched drooping heads near the stem tip.

Similar species

The native sedge *Schoenoplectus tabernaemontani*. Key differences are the round bluish-green stem, smaller size and clustered, non-drooping flower heads of this species.

Preferred/known habitats

Coastal river banks and estuaries.

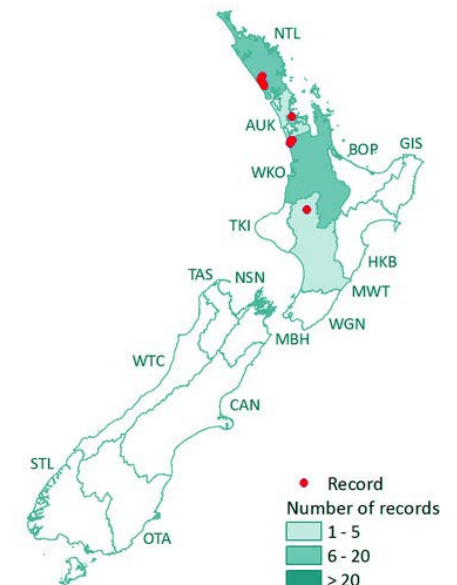
Presence in New Zealand

Locally naturalised, first record from Northern Wairoa River, Northland in 1992.

Dispersal Mechanisms

Seed is viable, but seedlings have not been observed in the field. Movement of rhizome fragments by water is likely to be a major dispersal mechanism. This species was distributed in the past as a plant suitable for constructed wetlands to treat farm/domestic effluent.

New Zealand distribution



Zizania latifolia (Griseb.) Stapf, Manchurian wild rice



Left, close-up of seedhead and foliage, right, beds growing along a river bank (P. Champion, R. Wells)

Biosecurity Status

Notifiable Organism, Unwanted Organism, National Interest Response Pest (except NTL), National Pest Plant Accord, Regional Pest Management Strategy: AUK, EW, WGN, NTL, MWT.

Biosecurity Risk

Problem in still and flowing water bodies, poor dispersal capacity has limited spread, although local spread occurs through contaminated drainage machinery.

Erect emergent

ID features

Tall marginal perennial. Coarse tufts, 2-4 m in height. Stout spreading rhizomes. Leaves light green, up to 1 m or more long and 1-2 cm wide. Inflorescences purplish or reddish brown. Lower part is spreading and male, the upper part is more closed and with female flowers.

Similar species

Raupo (*Typha orientalis*). Raupo is usually shorter (1-3 m) than Manchurian wild rice, with bluish-green leaves with a characteristic twist in the leaf blade and a cylindrical brown flower spike.

Preferred/known habitats

Lowland still and slow flowing water bodies.

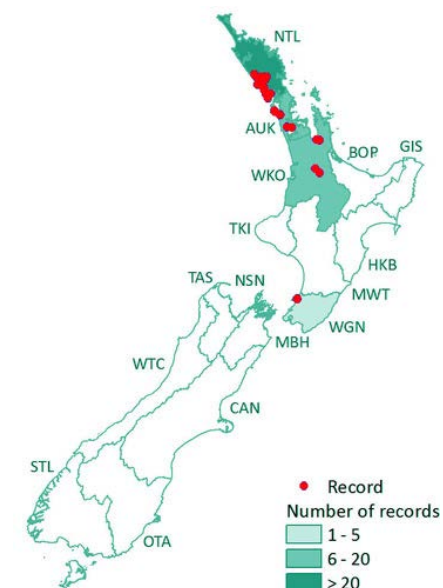
Presence in New Zealand

Locally naturalised, first record from Northern Wairoa River, Northland in 1900s.

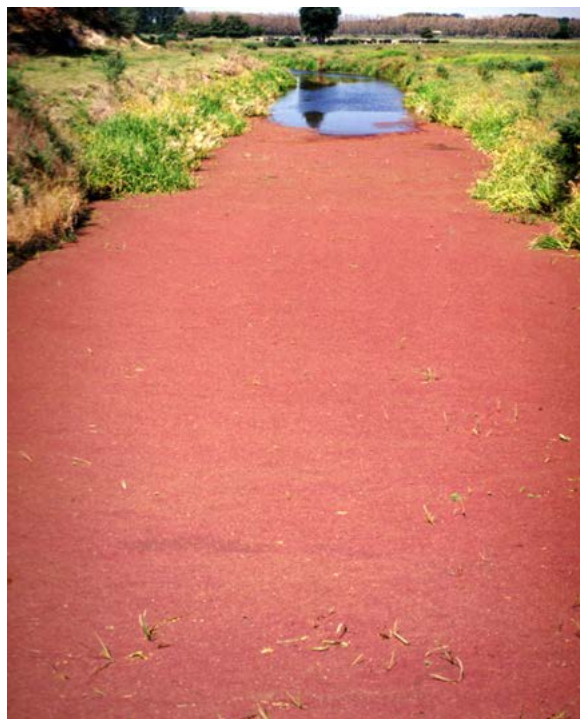
Dispersal Mechanisms

Rhizome fragments, seeds, floating mats.

New Zealand distribution



Azolla pinnata R.Br., Ferny azolla



Conspicuous colour of growth in a ditch, and close-up of angular pinnate leaves (R. Wells, P. Champion)

Biosecurity Status

Regional Pest Management Strategy: Chatham Islands.

Biosecurity Risk

Smothering growths in small, sheltered lakes and ponds.

Free floating

ID features

Floating fern. Plants are 1-3 cm long, triangular in outline, and regularly branched. Leaves green to red (almost purple). Roots densely covered with branched, fine, hair-like rootlets.

Similar species

Azolla rubra (Pacific azolla) – a native floating fern. Pacific azolla is more ovate and irregularly branched. Roots are not branched.

Preferred/known habitats

Still and slow flowing water bodies in warm areas.

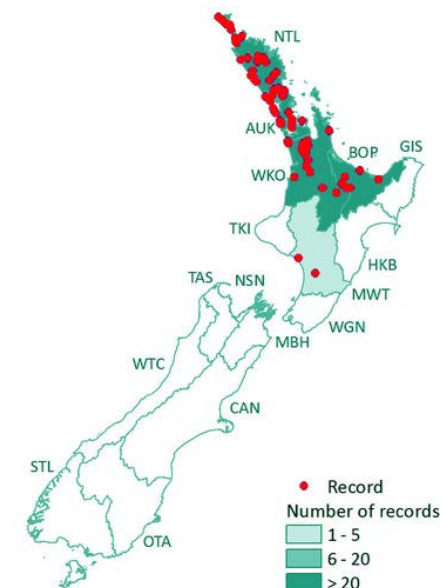
Presence in New Zealand

Widely naturalised, first record 1969.

Dispersal Mechanisms

Reproduces rapidly by fragmentation, forming dense mats across nutrient-rich still waters. Produces spores which may be spread by waterfowl.

New Zealand distribution



Eichhornia crassipes (Mart.) Solms, Water hyacinth



(R. Wells, P. Champion)

Biosecurity Status

Notifiable Organism, Unwanted Organism, National Interest Pest Response, National Pest Plant Accord, Regional Pest Management Strategy: NTL, AUK.

Biosecurity Risk

A major weed in many warm temperate and tropical countries.

Free floating

ID features

Free floating perennial herb. Plants are stoloniferous with daughter plants often attached. Leaves are bright green, often with a spongy inflated petiole. Roots are long and finely divided, and are bright purple when young before becoming black. Flowers are large (7 cm in diameter) in a spike of up to 10 flowers. They are blue-purple with a central yellow eye surrounded by a dark ring on the uppermost petal.

Similar species

None.

Preferred/known habitats

Still and slow flowing water bodies in warm areas.

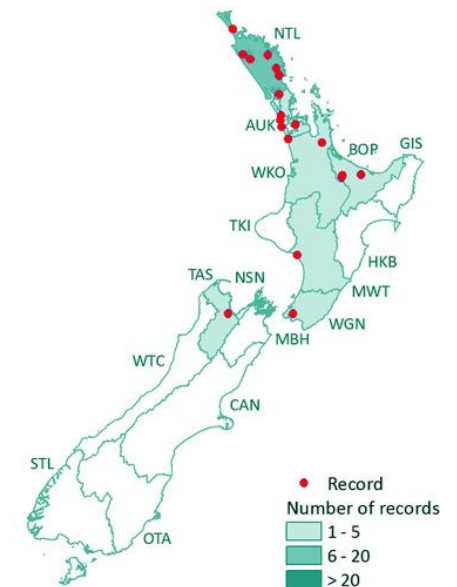
Presence in New Zealand

Locally naturalised, subject to a national eradication programme since 1950's, first record from Rotorua in 1950.

Dispersal Mechanisms

Older stolons between individual plants decay to release young plants. Also spreads by seed.

New Zealand distribution



Pistia stratiotes L., Water lettuce



Distinctive plant rosette shape (P. Champion)

Biosecurity Status

Notifiable Organism, Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: AUK.

Biosecurity Risk

A major weed in many warm temperate and tropical countries.

Free floating

ID features

Free floating perennial herb. Plants are stoloniferous with daughter plants often attached. Leaves are velvety hairy, pale yellow-green, often with a spongy thickened base. Roots are long and finely divided. Flowers are small (about 1 cm long), arranged as a spike enclosed by a hairy green bract.

Similar species

None.

Preferred/known habitats

Still water bodies in warm areas.

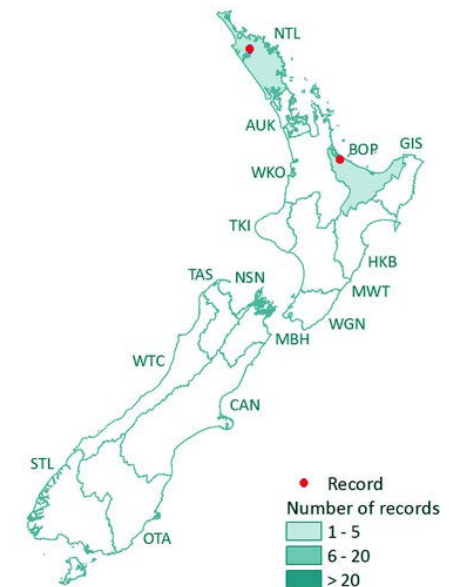
Presence in New Zealand

Nationally eradicated, first record from Tauranga in 1975.

Dispersal Mechanisms

Older stolons between individual plants decay to release young plants. Also spreads by seed.

New Zealand distribution



Salvinia molesta D.S.Mitch., Salvinia



Growth occluding a waterbody (top), mature (left) and early growth-form (right) (P. Champion, R. Wells)

Biosecurity Status

Notifiable Organism, Unwanted Organism, National Interest Pest Response, National Pest Plant Accord, Regional Pest Management Strategy: NTL, AUK.

Biosecurity Risk

A major weed in many warm temperate and tropical countries.

Free floating

ID features

Free-floating fern. Salvinia has a horizontal stem with paired aerial (above the water) leaves. Adult leaves are folded, whereas young leaves are flat. Aerial leaves have hairs shaped like egg-beaters. Lower submerged leaves look more like roots and can be up to 30 cm long.

Similar species

None.

Preferred/known habitats

Still and slow flowing water bodies in warm areas.

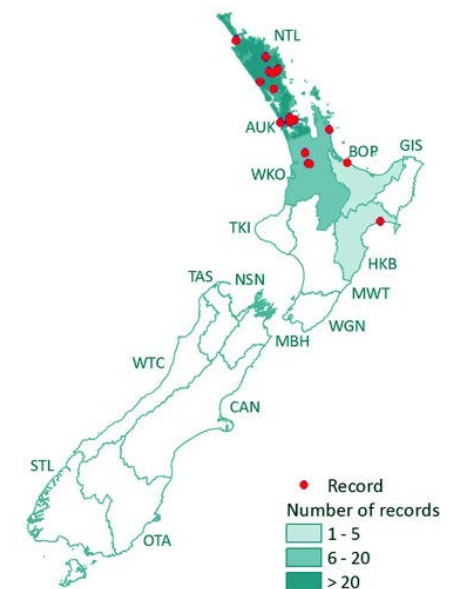
Presence in New Zealand

Locally naturalised, subject to a national eradication programme since 1983, first record from Western Springs, Auckland in 1963.

Dispersal Mechanisms

Spreads rapidly by fragmentation and producing plantlets from the old end of the horizontal axis, and can grow from a single node. The plant is apparently a sterile hybrid.

New Zealand distribution



Utricularia gibba Lam., Bladderwort



Submerged growth within a lake (top), emergent in a shallow habitat (bottom left), and a close-up of the flower (bottom right) (R. Wells, P. Champion)

Biosecurity Status

Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: AUK, MWT.

Biosecurity Risk

Problem in farm dams and irrigation ponds, little known impacts on indigenous aquatic vegetation, but the endangered native *Utricularia australis* has seriously declined with the spread of *U. gibba* in Northland.

Free floating

ID features

Often free-floating just under the water surface or smothering over the top of submerged vegetation. Leaves are filamentous, up to 1 cm long, usually entire but occasionally branched. Bladders are up to 1.5 mm long and obliquely ovoid, situated on the leaves on short stalks. Small yellow flowers are commonly produced above the water surface.

Similar species

Utricularia australis (rare native species mostly in northern North Island) and *U. geminiscapa* (introduced species found in Westland). *Utricularia gibba* has entire or nearly entire leaves, whereas the other *Utricularia* species have leaves divided many times into filiform segments with larger bladders.

Preferred/known habitats

Still water bodies.

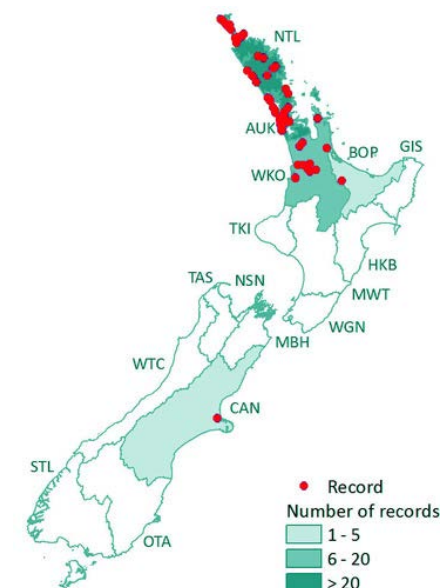
Presence in New Zealand

Widely naturalised in northern North Island, first record from Waitakere, Auckland in 1978.

Dispersal Mechanisms

Vegetative fragments, possibly seed.

New Zealand distribution



Alternanthera philoxeroides (Mart.) Griseb., Alligator weed



Sprawling emergent

ID features

Sprawling emergent perennial herb. Leaves are bright green, waxy, and elliptical. They are between 5-10 cm long, up to 2 cm wide, and arranged in opposite pairs on the stem. The white flower looks like a small clover flower and is at the end of a longish stalk. Stems are thick, soft, and hollow, often with a reddish tinge.

Similar species

Two native *Alternanthera* species nahui (*A. nahui*) and lesser joyweed (*A. denticulata*), Senegal tea (*Gymnocoronis spilanthoides*), and primrose willow (*Ludwigia peploides*). The native *Alternanthera* species are smaller, with the flowers lacking stalks and located at the base of paired leaves. Senegal tea has serrated and wavy leaf margins. Primrose willow has alternate leaves.



Marginal infestation at the edge of a waterbody, plant showing leaf arrangement and white clover-like flowers, and the vigorous root system (P. Champion)

Biosecurity Status

Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: BOP, MWT, WKO, AUK, WGN.

Biosecurity Risk

Currently our worst sprawling emergent weed, affecting arable and pastoral land in addition to aquatic habitats. A major weed in many temperate countries.

Preferred/known habitats

Still and slow flowing water bodies, flooded pasture and cropping land and urban lawns.

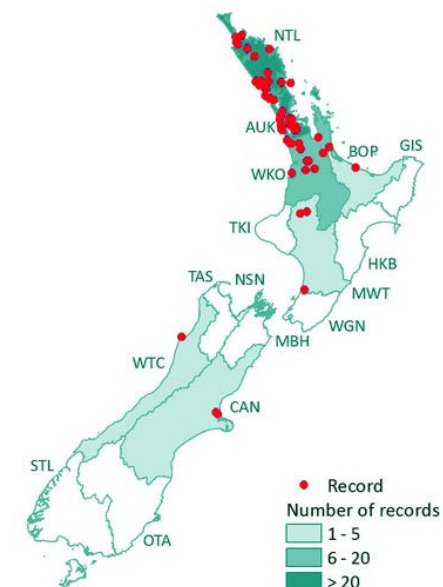
Presence in New Zealand

Locally naturalised, often locally abundant, first record from Northern Wairoa River in 1906.

Dispersal Mechanisms

Reproduction is vegetative by the extension of prostrate stems or stem fragmentation. The floating fringe of marginal mats is also readily fragmented and dispersed. Seed set is unknown in New Zealand.

New Zealand distribution



Glyceria maxima (Hartm.) Holmb., Reed sweetgrass



Sprawling emergent

ID features

Has stout erect leaves (30-60 cm long and up to 20 mm wide), with creeping rhizomes that form large patches excluding all other plants. The tip of the leaf is boat-shaped. The panicles are branched, rather dense, and have numerous spikelets. The sheath has obviously cross veins. Reed sweetgrass can grow to 0.5-2 m tall and is bright green.

Similar species

Glyceria declinata and *G. fluitans*. Both of the other *Glyceria* species present in New Zealand are much smaller (up to 50 cm tall) and form low clumps as opposed to the tall erect clumps formed by reed sweetgrass.



Marginal bed alongside a watercourse, with pale diffuse seed heads (P. Champion)

Biosecurity Status

Regional Pest Management Strategy: MBH, MWT, NSN/TAS, STL*, AUK, CTH, WKO, WTC (* management within defined areas of region).

Biosecurity Risk

Problem sprawling emergent weed, affecting drains and slow flowing waterways. Can be toxic to cattle.

Preferred/known habitats

Still and slow flowing water bodies.

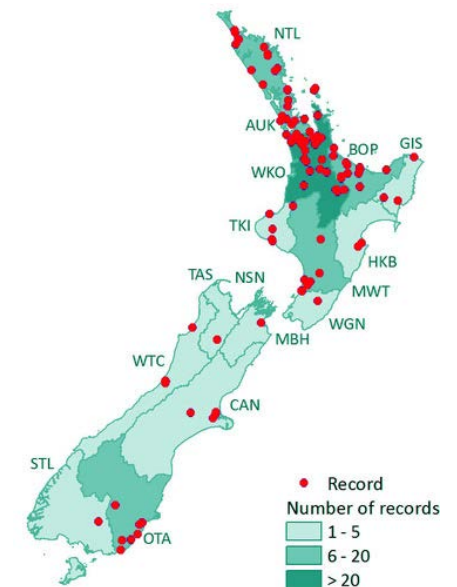
Presence in New Zealand

Widely naturalised, first record from Palmerston North, Manawatu in 1931.

Dispersal Mechanisms

Spread by seed and rhizomes.

New Zealand distribution



Gymnocoronis spilanthoides (Don) DC, Senegal tea



Large stream-side infestation, with close-up of foliage and white flowers (P. Mabin, P. Champion)

Biosecurity Status

Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: AUK, BOP, MBH, NSN/TAS, NTL, TKI, MWT, WGN.

Biosecurity Risk

A potential sprawling emergent weed, with eradication programmes at all known sites.

Sprawling emergent

ID features

Sprawling emergent perennial herb. Leaves are dark green, opposite, and ovate to lanceolate in shape. They vary in size from 5 to 20 cm long, 2.5 to 5 cm wide, and are on shortish stalks. Leaf margins are serrate and slightly wavy. Flowers are whitish, numerous, and grouped into terminal heads that are 1.5 to 2 cm in diameter. Stems are pale green and prostrate, becoming erect when flowering. Flowers are highly scented.

Similar species

Similar to alligator weed (*Alternanthera philoxeroides*) when in its sprawling phase. Can be differentiated from alligator weed by its serrated leaf margins.

Preferred/known habitats

Still and flowing water bodies.

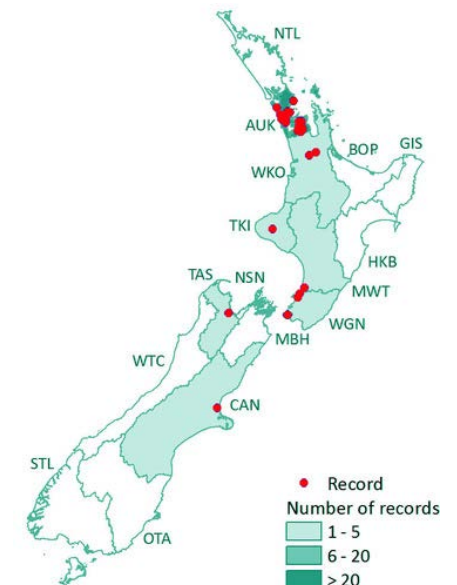
Presence in New Zealand

Locally naturalised, most sites targeted for eradication, first record from Papakura, Auckland in 1990.

Dispersal Mechanisms

Spreads by stem fragments and seed.

New Zealand distribution



Ludwigia peploides sub sp. *montevidensis* (Spreng.) P.H.Raven, Primrose willow



A plant appearance with flower, and from top, sprawling out over water, spongy floating roots and a close-up of the stem showing dark stipules (R Wells, T. James)

Biosecurity Status

Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: AUK.

Biosecurity Risk

Currently a major sprawling emergent weed where it occurs, poor dispersal capacity has limited spread.

Sprawling emergent

ID features

Sprawling emergent perennial herb. Primrose willow has branched stems with roots at the nodes, either attached to soil or hanging in the water. The leaves are alternate and obtuse, and up to 6 cm long. Their upper surfaces are glossy and they taper into petioles that are up to 2.8 cm long, with two dark green, swollen, rounded stipules at the base. The flowers are up to 2 cm, bright yellow, and arise on stalks from the leaf axils.

Similar species

Ludwigia palustris and alligator weed (*Alternanthera philoxeroides*). *Ludwigia palustris* has reddish, opposite, entire leaves. Alligator weed also has opposite leaves.

Preferred/known habitats

Still and slow flowing water bodies.

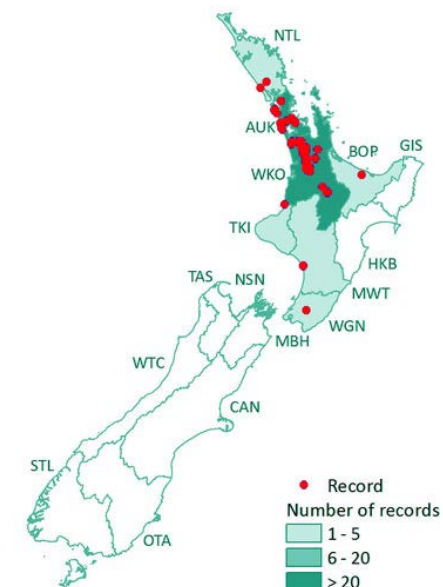
Presence in New Zealand

Locally naturalised in North Island, first record 1933.

Dispersal Mechanisms

Stem fragments and seed, but poor dispersal.

New Zealand distribution



Menyanthes trifoliata L., Bogbean



An emergent bed, with a close up of the white flower and trifoliate leaves (P. Champion)

Biosecurity Status

Notifiable Organism, Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: AUK.

Biosecurity Risk

A potential sprawling emergent weed in peaty areas.

Sprawling emergent

ID features

Sprawling emergent perennial herb. Leaves appear in threes at the end of stems (like the leaves of broad bean). Leaflets are elliptical to obovate, 3-10 cm long, 1-5 cm wide, entire or sometimes coarsely toothed. Leaves are all basal, with the petiole bases arranged alternately on the creeping stem. Flowers have five petals, pinkish-white in colour, with long white hairs on the top surface. Flowers are about 2.5 cm across.

Similar species

None.

Preferred/known habitats

Only found in an ornamental pond and irrigation race in New Zealand, found in nutrient poor waters in native range.

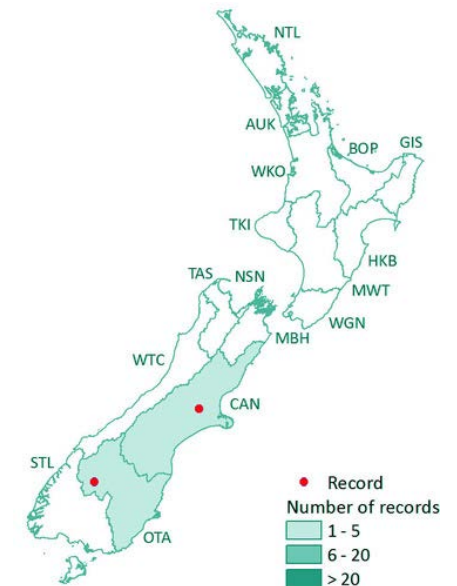
Presence in New Zealand

Nationally eradicated, first record from Darfield, Canterbury in 1976.

Dispersal Mechanisms

Spreads by seeds, stem extension, and fragmentation, Can establish rapidly from stem fragments. Seeds have not been seen in the field in New Zealand.

New Zealand distribution



Myriophyllum aquaticum (Vell.) Verdc., Parrot's feather



A marginal bed merges with adjacent grasses. The similar native *Myriophyllum robustum* is shown (top left), the exotic species having leaves with a rounded tip (centre and lower right) (D. Hofstra, R. Wells)

Biosecurity Status

Unwanted Organism, National Pest Plant Accord, Regional Pest Management Strategy: MBH, WTC, AUK, HKB, NSN/TAS.

Biosecurity Risk

Currently a major sprawling emergent weed, affecting a wide range of habitats. A weed in many warm temperate countries.

Sprawling emergent

ID features

Sprawling emergent perennial herb. Emergent leaves are a light bluish-green, up to 3.5 cm long, and deeply divided (pinnate), giving them a feathery appearance. They are arranged in whorls of 4-6. The stem can be up to 2 m long, but with only up to the top 10 cm emerging above water. Flowers are white, tiny (up to 1.5 mm across), with no petals, and attached at the leaf-stem axil.

Similar species

Other *Myriophyllum* spp. and hornwort (*Ceratophyllum demersum*). Of the *Myriophyllum* species in New Zealand, the rare *M. robustum* is the most similar to parrot's feather. The easiest way to tell the difference is by looking at the shape of each leaf. *Myriophyllum robustum* is pointed at the end, whereas parrot's feather has a rounded leaf tip. Hornwort has forked leaves compared with the pinnate leaves of parrot's feather.

Preferred/known habitats

Still and slow flowing water bodies.

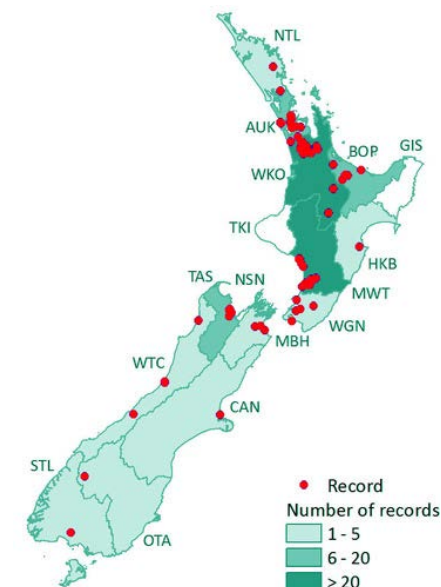
Presence in New Zealand

Widely naturalised, first record from Palmerston North, Manawatu in 1929.

Dispersal Mechanisms

Propagation and spread is by stem fragmentation and lateral stem growth. It does not produce viable seed in New Zealand, with only female flowers known to exist here.

New Zealand distribution



Myriophyllum variifolium Hook. f.,



Emergent from shallow water, with view of a single stem, and comparison with the native *Myriophyllum propinquum* (bottom left) (T. James, R. Wells)

Biosecurity Status

No status, still available for sale as an ornamental plant.

Biosecurity Risk

A potential sprawling emergent weed.

Sprawling emergent

ID features

The emergent leaves are in whorls of 5-6 and have entire leaf margins, although the lower ones may have a few teeth. The submerged leaves have up to 19 elongated and widely spaced leaflets.

Similar species

Myriophyllum propinquum. *Myriophyllum propinquum* has reddish stems and leaves are arranged in whorls of 3-4, whereas *M. variifolium* has whorls of 5-6. Emergent stems of *M. propinquum* have male (yellow stamens) and female flowers on the same stem (male above female).

Preferred/known habitats

Still and slow flowing water bodies.

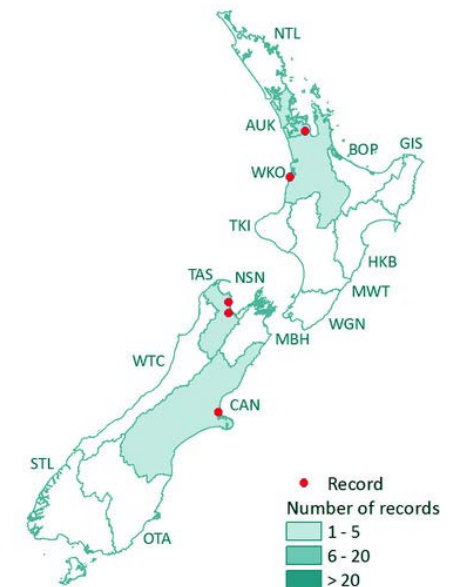
Presence in New Zealand

Locally naturalised, first record from Hunuwas, Auckland in 1990.

Dispersal Mechanisms

Propagation and spread is by stem fragmentation and lateral stem growth. It does not produce viable seed in New Zealand, with only female flowers known from field sites.

New Zealand distribution



Paspalum distichum L.,



Sprawling growth at the waters edge (R Wells)

Biosecurity Status

Regional Pest Management Strategy: Chatham Islands.

Biosecurity Risk

Sprawling weed that can smother margins of water bodies displacing other species.

Sprawling emergent

ID features

Leaves are distantly alternate, the lamina is 4-10 cm long and 2-6mm wide. The flower heads are usually paired forming a 'v' shape and up to 5 cm long. The stems sprawl along the ground and then grow to 60 cm tall. Ligule membranous, up to 4 mm long.

Similar species

Kikuyu grass (*Pennisetum clandestinum*). Differs from Mercer grass in that Kikuyu grass lacks a membranous ligule and has a short flowering head that is almost enclosed within the leaves. In contrast, Mercer grass has a very distinctive forked flowering head.

Preferred/known habitats

Still and slow flowing water bodies.

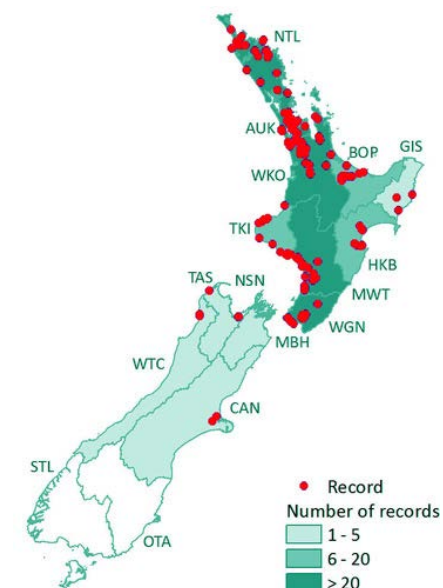
Presence in New Zealand

Widely naturalised, first record 1887.

Dispersal Mechanisms

Spreads by seed and stem fragmentation.

New Zealand distribution



Glossary

Acute:	sharply pointed.	Fin rays:	soft rods that give support to fins. Rays are usually branched into two halves (side by side), are often segmented, and are usually flexible.
Adipose fin:	a small fleshy lobe with no spines or rays on the back of fish between the dorsal fin and caudal fin.	Fin spine:	a stiff, bony rod supporting a fin. Some spines are sharp. Not divided in half.
Alternate:	arranged singly along the stem (opposite of opposite).	Forked:	refers to the posterior margin of the caudal fin: a forked fin is deeply indented.
Anal fin:	the unpaired or single fin on the ventral (underside) of a fish just behind its vent; the base of the anal fin is where it joins the body.	Gill opening:	the exterior opening of the gills – located just behind the head. Gill openings may be covered by a bony plate (the operculum) or soft flaps of skin.
Anal gill:	the respiratory structure positioned at posterior of invertebrate.	Globose:	nearly spherical.
Annual:	plant living only one year or season.	Gonopodium:	a specialised part of the anal fin in male gambusia and other poeciliids (live bearing fish) that is used to transfer sperm to female fish.
Axil:	upper angle between dissimilar parts such as leaf and stem.	Inflorescence:	collection of flowers and their supporting branchlets which arise from a common point.
Barbel:	soft, whisker-like appendage protruding from around the mouth of fish.	Lamina:	an expanded flattened portion of an organ (usually the blade of a leaf).
Basal:	attached near the base, as with leaves on a stem.	Lanceolate:	lance-shaped.
Bladder:	swollen body with hair triggers (carnivorous plants).	Lateral:	from the side, or extending horizontally from the main axis.
Budding:	offspring grows out of the body of the parent.	Ligule:	outgrowth at the inner junction of the leaf sheath and blade.
Bract:	a modified, usually much reduced, leaf (scale-like).	Linear:	narrow with parallel margins (see diagram).
Caudal fin:	tail fin of fish.	Liver fluke:	flatworm parasitic in liver and bile ducts of domestic animals and humans.
Cleft:	deep incision.	Lobed:	divided into (usually rounded) segments.
Comb scales:	small comb-like scales present on lateral margins of last abdominal segment of a mosquito larva.	Node:	the region of a stem from which one or more leaves or branches arise.
Cross-veins:	veins that run perpendicular to the leaf across longitudinal veins.	Oblique:	having a slanting direction.
Dorsal fin:	an unpaired fin on the back of fish; there may be up to 3 dorsal fins and some may be joined.	Oblong:	with parallel sides and rounded ends.
Echinostomes:	intestinal flukes (flatworms) of the family echinostomatidae which consists of many species. They occur in humans and other vertebrates. The intermediate hosts are frequently snails.	Obovate:	egg-shaped, attached at the narrow end.
Elliptical:	rounded at both ends, widest in the middle.	Obtuse:	blunt.
Entire:	not toothed or lobed, smooth.	Operculum:	a hardened plate used to seal a snail shell.
Filiform:	thread-like.	Opposite:	arranged in pairs along the stem (opposite of alternative).
Filament:	stalk of a stamen.	Ovate:	egg-shaped, attached at the broad end.

Ovoid:	of a solid body with ovate outline.
Panicle:	an indeterminate (continuing to grow at the apex) inflorescence which is branched several times. Especially common in grasses.
Pecten teeth:	scale or comb-like teeth on respiratory siphon of mosquito larva.
Pectoral fins:	paired fins (one on either side of the body) located on the ventral side of the fish between the head and the vent. Pelvic fins are not always present, e.g. Mudfish.
Perennial:	living for several or many years.
Petiole:	stalk of a leaf.
Pinnate:	compounds, with parts arranged on either side of an axis.
Rhizome:	stem growing underground, usually horizontally.
Rounded:	refers to the posterior edge of the caudal fin; edge is shaped like a convex curve.
Rosette:	one or more whorls of leaves, clustered tightly at the base of a plant.
Scales:	overlapping plates of a hard substance that protect the skin of fish. The easiest way to tell if a fish has scales is to run your finger along the side of the fish from back to front. If the fish feels smooth and slippery, it has no scales or the scales are small and deeply embedded within the skin; if it feels rough and your finger catches, then it has external scales.
Scabrid:	with minute harsh projections, rough to touch.
Sessile:	attached directly to the stem

Sheath:	enclosing tubular structure, usually around the base of a stem or leaf.
Sinus:	a recess or indentation between adjacent lobes or teeth (usually on the margin of a leaf).
Siphon:	breathing tube of mosquito larva.
Spathulate:	spoon-shaped.
Spike:	inflorescence with an unbranched axis and unstalked flowers.
Spire:	the pointed end of a snail shell.
Stipule:	a leaflet-like appendage at the base of a leaf stalk.
Stolon:	stems growing horizontally at or above ground level and giving rise to upright stems at nodes (runners).
Terminal:	borne at the end of a stem and limiting its growth.
Trematodes:	flukes (parasitic flatworms)
Tuber:	swollen portion of a stem or root, usually underground.
Turion:	a winter bud that is produced by certain aquatic plants. Turions become detached and remain dormant on the pond or lake bottom during the winter before developing into new plants the following season.
Undulate:	wavy, in a plane at right angles to the surface (like corrugated iron).
Vent:	the posterior, external opening of the gut (akin to the anus).
Ventral:	the lower surface of the body or leaf.
Whorl:	three or more parts arranged on one level (see diagram).

