GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Lagarosiphon major***

Lagarosiphon major 简体中文 正體中文 **System:** Freshwater

Kingdom	Phylum	Class	Order	Family
Plantae	Magnoliophyta	Liliopsida	Hydrocharitales	Hydrocharitaceae

Common name African elodea (English), oxygen weed (English), submerged onocotyledon (English), Lagarosiphon (English), curly waterweed (English), South African oxygen weed (English)

Synonym *Elodea crispa*

Similar species *Hydrilla verticillata, Egeria densa, Elodea canadensis*

Summary Lagarosiphon major is a rhizomatous, perennial, submerged aquatic plant. It can inhabit freshwater lakes, dams and slow-moving streams. Lagarosiphon major can form dense floating mats in deep-water reservoirs and other water bodies and it can block the intakes of hydro-electric systems. Dense growth of Lagarosiphon major can block light penetration into waterways, eliminating growth of native water plants and affecting associated populations of aquatic invertebrates. Lagarosiphon major can also restrict the passage of boats and limit recreational activities like swimming and angling. Storms can tear weed mats loose and deposit large masses of rotting vegetation on beaches, spoiling their amenity value.

view this species on IUCN Red List

Species Description
L. major is a rhizomatous, perennial, submerged aquatic plant. The National Heritage Trust (2003) state that, \"*L. major* reaches its maximum growth in clear water up to a depth of 6.5m, but may only grow to 1 metre in murky water. It has numerous threadlike roots, which are 'adventitious' (branching from the stem) and, along with rhizomes (horizontal stems in the sediment), anchor it to the bottom. Stems, which can reach the surface, are brittle and sparsely branched, 3-5mm in diameter and curved towards the base (J-shaped). The leaves are 5-20mm long and 2-3mm wide, and occur in alternate spirals along the stem. They generally have tapered tips curving downwards towards the stem, except in low alkalinity water where they are straight. The three-petalled female flowers are very small, clear-white on the surface, and grow on very thin white to almost translucent filament-like stalks. Neither the male flower, which floats freely to the surface, nor fruit or seeds have been recorded in Australia or outside of its native range.\"

Notes
The National Heritage Trust (2003) states that, \"A native of southern Africa, *L. major* is found in high mountain streams and ponds. It has spread throughout the world as an aquarium plant and is also known as an 'oxygen plant'. Note, however, that dense infestations can actually consume more oxygen than they produce, and reduce water quality and available oxygen.\"

Uses
Davies *et al.* (2003) demonstrated that, \"*L. major* and other aquatic species grown in small outdoor tanks can be used successfully to assess the effects of crop-protection products on non-target aquatic flora.\"McGregor and Gourlay (2002) state that, \"*L. major* has some beneficial attributes. In some freshwaters, this species and some other exotic species are the only aquatic plants that can tolerate particular conditions, and removal of these plants can further degrade the habitats. It also provides habitat for aquatic fauna, and its leaf surfaces support periphyton. Where stands of the plant grow, sedimentation is increased and while this may be detrimental in some areas, elsewhere it is a benefit.\"
Chapman and Coffey (1971) reviewed the possible utilization by harvesting for stock food in New Zealand lakes. Though harvesting was considered practicable the use of the plants as fodder was thought to be unsuitable because of the content of arsenic accumulated by the plants from the thermal waters that enter the lakes. Arsenic in amounts of 35–75 ppm dry weight are common, and extreme values up to 2 000 ppm have been recorded. It is possible in other countries that the use of plants as fodder could be practical.

Habitat Description
The National Heritage Trust (2003) states that, \"*L. major* grows best in clear, still or slow-moving fresh water with silty or sandy bottoms. It prefers the cooler waters of the temperate zone, with optimum temperatures of 20-23°C and a maximum temperature of around 25°C. It can live in high and low nutrient levels and grows best under conditions of high light intensity. It also tolerates relatively high pH (ie alkaline conditions). Growth of *L. major* is greatest in sheltered areas protected from wind, waves and currents.\" Csurhes and Edwards (1998) state that, \"*L. major* inhabits freshwater lakes, dams and slow-moving streams.\"

Reproduction
Strikland *et al.* (2000) reports that, \"*L. major* is only known to produce seed in its native range. It can only be spread by vegetative fragments drifting downstream, or by transfer from place to place by becoming fouled on various watercraft and trailers.\"
Since the species is dioecious (sexes on different plants) both must be present for sexual reproduction. Only female plants are known outside of the native range of this species. All reproduction in introduced regions is therefore asexual primarily by fragmentation or local growth by rhizomatous spread. (Symoens and Triest 1983).

Nutrition
Rattray (1994) found that early shoot growth by *L. major* is more rapid under oligotrophic and eutrophic conditions.(A **eutrophic** lake or river is characterised by high productivity and biomass. It is rich in dissolved nutrients, often shallow and seasonally deficient in oxygen. This fertilization can be a natural process or one brought on by human activity, the latter often having a negative impact on the ecosystem. A water body is termed **mesotrophic** if its production is considered moderate. The term **oligotrophic** describes a lake or river with low productivity, deficient in plant nutrients, rich in oxygen throughout its depth and with good water clarity).

General Impacts
In New Zealand, the plant has blocked intakes of hydro-electric systems and has formed dense floating mats in deep-water reservoirs and other water bodies. *L. major* has the potential to become a troublesome weed of lakes and slow-moving streams throughout temperate and sub- tropical regions of Australia. Under favourable conditions, dense growth of the plant can block light penetration into waterways, eliminating growth of native water plants and affecting associated populations of aquatic invertebrates and vertebrates. Once widespread, control would be extremely difficult (as is the case for most submerged aquatics) (Csurhes and Edwards, 1998).
James *et al.* (1999) state that, \"*L. major* creates progressively stressful conditions of high pH and low CO2 content. *L. major* may be successful in out-competing *Elodea* spp. as a result of its ability to photosynthesize and consequently grow, particularly under very stressful conditions of high pH and low free CO2, perhaps through more efficient bicarbonate utilization than the other species. There is some indication that the competitive success of *L. major* may be a consequence of greater toleration to pH stress.
McGregor and Gourlay (2002) state that, \"*L. major* replaces native vegetation; dense infestations restrict the passage of boats and limit recreational activities like swimming and angling; storms can tear loose the weed and deposit large masses of rotting vegetation on beaches, spoiling their amenity value.
Rattray (1994) states that, \"*L. major* has successfully out-competed native species wherever it has colonized.\"
James *et al.* (1999) report that, \"*L. major* has been reported to be actively displacing *E. nuttallii* and appears to be competitively superior to *Elodea* spp. in at least some habitats.\"

Management Info
McGregor and Gourlay (2002) report that, \"The main, current control methods for this species include the application of herbicide (usually Diquat), mechanical and suction dredging and weed matting, but all these have substantial disadvantages; particularly their cost, their failure to give long-term control and, for some, the question of adverse environmental effects, whether actual or perceived.\"
Chemical: Hofstra and Clayton (2001) report that, \"The aquatic herbicide diquat is the only product registered in New Zealand for controlling the submerged weeds, including lagarosiphon (*L. major*.\" The authors claim that, \"However, diquat can be ineffective under some environmental conditions and it does not control certain submerged weeds.\" The authors studied three other herbicides (endothall, triclopyr, and dichlobenil), and found that, \"Endothall killed coontail, lagarosiphon and hydrilla and some species of *Myriophyllum* and *Potamogeton* but not egeria or species of *Chara* or *Nitella*. Only transient growth effects were observed in target plants treated with triclopyr and dichlobenil.\"
Davies *et al.* (2003) investigated the use of Sulfosulfuron, which is a selective, post-emergence, sulfonylurea herbicide intended for use in winter wheat. The authors found though that, \"Treatment with sulfosulfuron at any concentration stimulated biomass accumulation.\" This product should not be used as a treatment method.
Biological: Lake *et al.* (2002) state that, \"Selective feeding by rudd may also be significant in lakes that have been invaded by exotic oxygen weeds in New Zealand (e.g. *Egeria densa*, *Elodea canadensis*, and *Lagarosiphon major*) by facilitating their monospecific habit through suppression or exclusion of more desirable species.\"
McGregor and Gourlay (2002) report that, \"The nematode *Aphelenchoides fragariae* has been recorded attacking the apical tips of *L. major* causing shoot dwarfing. *Nymphula nitens* feeds on many aquatic weeds and might be a potential biological control agent, but it also feeds upon native aquatics. Biological control offers the prospect of re-establishing native macrophyte communities in infected waters, however biological control and the removal of *L. major* may only result in the replacements of one exotic species for another.\"Chapman and Coffey (1971) review the introduction and spread of *L. major* in New Zealand. The possibility of the use of grass carp was investigated for control so a few fish were imported from Malaysia.Trials showed that carp would eat the problem weeds.

Principal source: McGregor and Gourlay, 2002 Assessing the prospects for biological control of lagarosiphon (*Lagarosiphon major* (Hydrocharitaceae))
National Heritage Trust, 2003 Lagarosiphon (*Lagarosiphon major*)

Compiler: National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG) with support from the Terrestrial and Freshwater Biodiversity Information System (TFBIS) Programme (Copyright statement)

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Pubblication date: 2006-04-11

ALIEN RANGE

[5] AUSTRALIA
[1] FRANCE
[2] ITALY
[21] NEW ZEALAND
[1] SWITZERLAND
[1] EUROPE
[1] IRELAND
[1] MEDITERRANEAN AREA
[1] REUNION
[3] UNITED KINGDOM

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Managment information
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Summary: The database of alien plants in Ireland contains detailed information on 715 alien plant taxa currently occurring in (semi-) natural habitats in Ireland (both the Republic and Northern-Ireland). This database was developed in 2006 at the School of Natural Sciences, Trinity College Dublin, as part of the BioChange project, funded by the Environmental Protection Agency (EPA), Ireland.
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Summary: This report is the second stage in the development of a Border Control Programme for aquatic plants that have the potential to become ecological weeds in New Zealand. Importers and traders in aquatic plants were surveyed to identify the plant species known or likely to be present in New Zealand. The Aquatic Plant Weed Risk Assessment Model was used to help assess the level of risk posed by these species. The report presents evidence of the various entry pathways and considers the impact that new invasive aquatic weed species may have on vulnerable native aquatic species and communities.
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Spanish:
La lista de especies del Sistema de informacin sobre especies invasoras de mxico cuenta actualmente con informacin aceca de nombre cientfico, familia, grupo y nombre comn, as como hbitat, estado de la invasin en Mxico, rutas de introduccin y ligas a otros sitios especializados. Algunas de las especies de mayor riesgo ya tienen una liga directa a la pgina de alertas. Es importante resaltar que estas listas se encuentran en constante proceso de actualizacin, por favor consulte la portada (http://www.conabio.gob.mx/invasoras/index.php/Portada), en la seccin novedades, para conocer los cambios.
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