# GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Hydrilla verticillata***

***Hydrilla verticillata*** 简体中文 正體中文 **System:** Terrestrial

| Kingdom | Phylum | Class | Order | Family |
|---|---|---|---|---|
| Plantae | Magnoliophyta | Liliopsida | Hydrocharitales | Hydrocharitaceae |

**Common name** oxygen weed (English), hydrilla (English), Florida elodea (English), water weed (English), water thyme (English)

**Synonym**

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

**Summary** Hydrilla verticillata is a submerged freshwater aquatic weed that can tolerate salinity up to 7%. It crowds out native plants by shading them and out-competing them for nutrients. The dense masses it forms interfere with recreational activities such as boating, fishing and swimming. Hydrilla verticillata can be dispersed by river flow, waterfowl and recreational activities and is sold as an aquarium plant.

view this species on IUCN Red List

**Species Description**
*H. verticillata* is a submerged aquatic perennial with heavily branched stems towards the water surface. Stems are slender and can grow up to 9m long. Leaves are 6 to 20mm long, 2 to 4mm wide. The leaves are strap-shaped with pointed tips and saw-tooth edges, and they grow in whorls of 4 to 8 around the stem. Leaf colour can vary from green, translucent, yellowish, to brown. Hydrilla produces turions (over-wintering dense vegetative buds) in the axils of leaves and tubers within the sediment. The plant sometimes produces flowers. Small white flowers on long slender stems are female, and small, green, free-floating, inverted bell-shaped flowers are male. The plant is usually rooted to the substrate but sometimes grows as floating mats at the surface.

**Notes**
In North America, all dioecious plants are female. In New Zealand, all *H. verticillata* plants are male.

**Lifecycle Stages**
Tubers and turions can survive ice cover, drying, ingestion, and regurgitation by waterfowl. Tubers may remain viable in the sediment for several years.

**Uses**
*H. verticillata* provides a food supply for waterfowl in areas where wetland degradation has lowered their food supply, such as in Florida. Up to 30% *H. verticillata* cover is beneficial to most fisheries because it allows for an increase in the population of prey fish that game fish feed on.

**Habitat Description**
*H. verticillata* is found in freshwater but can tolerate salinities of up to 7% salinity of seawater. It has been found in springs, lakes, marshes, ditches, rivers, and tidal zones. It can grow in relatively low light and CO2 conditions. *H. verticillata* prefers temperatures between 20 and 27 degrees Celsius.

**Reproduction**
*H. verticillata* reproduces mostly by asexual vegetative fragmentation (from stem fragments), but it also grows new plants from tubers and underground tubers and reproduces sexually with flowers. One *H. verticillata* tuber can lead to the production of 5,000 new tubers per square m. It spreads faster in flowing water habitats because the fragments are more efficiently dispersed.

**General Impacts**
*H. verticillata* competes with native plants by growing to the water surface and forming dense mats that totally exclude sunlight from other plants, which in turn can significantly reduce aquatic plant and animal biodiversity. Large populations of *H. verticillata* may affect fish size and population levels where predatory fish cannot hunt effectively within the thick mats. The dense mats also affect recreational activities. Apart from interfering with fishing, boat motors can become tangled with them and swimming areas choked. *H. verticillata* often slows or clogs rivers, irrigation ditches, and flood control canals, creating stagnant water that is prime mosquito breeding habitat. Dense stands can even cause flooding, alter water quality by decreasing oxygen levels and increasing pH and water temperature.

**Management Info**
Preventative measures: *H. verticillata* is on the United States Federal Noxious Weed List, but aquarium supply sales continue through the Internet. It has been classified as a Nationally Banned Plant List species in New Zealand. A Risk assessment of \r\r\n*Hydrilla verticillata* for Australia was prepared by Pacific Island Ecosystems at Risk (PIER) using the Australian risk assessment system (Pheloung, 1995). The result is a score of 20 and a recommendation of: reject the plant for import (Australia) or \r\r\nspecies likely to be a pest (Pacific).
\r\nPhysical: Harvesting and use of motorised boats is not recommended in partially infested lakes or where uncontamainated waterbodies occur nearby, because this can chop the plants and facilitate spread of shoot fragments (NIWA, 2003). In ponds and small lakes, water draw-downs, which expose and kill the plants, have been found effective. Weed mats in public access sites have been used to contain spread,and signage to increase public awareness are some of the containment methods adopted (NIWA, 2003).
\r\nChemical: Aquatic herbicides are effective at temporarily controlling the weed but do not kill the tubers, turions (overwintering structures that detach and geminate in the spring), and seeds. Some of the herbicides which have been used are Fluridone and endothall (dipotassium).
\r\nBiological: Biological controls include Chinese grass carp (*Ctenopharyngodon idella*), tuber-feeding weevils, and leaf-eating flies. Chinese grass carp have been found effective, but these fish are vegetative generalists, so they should be used with care so as not to destroy native aquatic vegetation. Tuber-feeding weevils and leaf-eating flies are still under evaluation for their effectiveness. The tuber-feeding weevil (*Bagous affinis*) only attacks the tuber when the plant is not submerged beneath the water. Leaf-eating flies, such as *Hydrellia pakistanae* , attack the weed by feeding on it as larva.(NIWA, 2003).
\r\nIntegrated management: An integrated approach of fish, mechanical, and manual methods to eradication has been found to achieve maximum success.

**Pathway**
Shipments of water lilies have been found contaminated with Hydrilla.Sold as an aquarium plant.

**Principal source:**

**Compiler:** National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG)

**Review:** Dr John Clayton. NIWA, National Institute of Water and Atmospheric Research. Hamilton, New Zealand.

**Pubblication date:** 2006-03-31

**[1]** AFRICA
**[1]** AUSTRALIA
**[1]** GUAM
**[2]** NEW ZEALAND
**[18]** UNITED STATES

**[1]** ASIA
**[1]** EUROPE
**[1]** NEW CALEDONIA
**[1]** SOUTH AMERICA

## BIBLIOGRAPHY

**23** references found for **Hydrilla verticillata**

**Managment information**

CAIP (Center for Aquatic and Invasive Plants), 2001. University of Florida and Sea Grant. *Hydrilla verticillata* (L. f.) Royle
**Summary:** Report on habitat, description, origin, distribution, effects of introduction, and control measures.
Champion, P. Clayton, J. and Rowe, D. 2002. Alien Invaders Lake Managers Handbook. Ministry for the Environment.
**Summary:** Available from: http://www.mfe.govt.nz/publications/water/lm-alien-invaders-jun02.pdf [Accessed 3 February 2005]
Champion, P.D.; Clayton, J.S. 2000. Border control for potential aquatic weeds. Stage 1. Weed risk model. Science for Conservation 141. .
**Summary:** This report is the first stage in a three-stage development of a Border Control Programme for aquatic plants that have the potential to become ecological weeds in New Zealand.
Available from: http://www.doc.govt.nz/upload/documents/science-and-technical/sfc141.pdf [Accessed 13 June 2007]
Champion, P.D.; Clayton, J.S. 2001. Border control for potential aquatic weeds. Stage 2. Weed risk assessment. Science for Conservation 185. 30 p.
**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.
Available from: http://www.doc.govt.nz/upload/documents/science-and-technical/SFC185.pdf [Accessed 13 June 2007]
Collins, J.N, May M, Grosso C. 2003. Hydrilla *Hydrilla verticillata*. Practical Guidebook to the Control of Invasive Aquatic and Wetland Plants of the San Francisco Bay - Delta Region.
**Summary:** Information on description, economic importance, distribution, habitat, history, growth, and impacts and management of species.
Available from: http://legacy.sfei.org/nis/hydrilla.html [Accessed 22 May 2010].
The Guidebook is available from: http://legacy.sfei.org/nis/index.html
Effects of Grass Carp on the Aquatic Vegetation in Lake Conway, Florida Leslie J Andrew., *et al*. Florida Department of Environmental Protection (March 1994)
Gee II, David E., pers. comm. 2006. Wildlife Biologist, Guam Division of Aquatic & Wildlife Resources and Guam team member of the Pacific Invasives Learning Network (PILN).
Mack, R. N and W. M. Lonsdale., 2002. Eradicating invasive plants: Hard-won lessons for islands. In *Turning the tide: the eradication of invasive species*: 311-318. Veitch, C.R. and Clout, M.N.(eds). IUCN SSC Invasive Species Specialist Group. IUCN. Gland. Switzerland and Cambridge. UK.
**Summary:** Uses *Clidemia hirta* in Hawaii as an eradication case study. *Clidemia* is in the Melastomataceae and somewhat similar ecologically to miconia.
Eradication case study in Turning the tide: the eradication of invasive species.
National Pest Plant Accord, 2001. Biosecurity New Zealand.
**Summary:** The National Pest Plant Accord is a cooperative agreement between regional councils and government departments with biosecurity responsibilities. Under the accord, regional councils will undertake surveillance to prevent the commercial sale and/or distribution of an agreed list of pest plants.
Available from: http://www.biosecurity.govt.nz/pests-diseases/plants/accord.htm [Accessed 11 August 2005]
New Zealand Plant Conservation Network, 2005. Unwanted Organisms. Factsheet *Hydrilla verticillata*
NIWA, 2003. National Institute of Water & Atmospheric Research, New Zealand.
**Summary:** Available from: www.niwa.cri.nz [accessed 24 September 2003].
Rejmanek and Pitcairn, 2002. When is eradication of exotic pest plants a realistic goal? In *Turning the tide: the eradication of invasive species*: 249-253. Veitch, C.R. and Clout, M.N.(eds). IUCN SSC Invasive Species Specialist Group. IUCN. Gland. Switzerland and Cambridge. UK.
**Summary:** Eradication case study in Turning the tide: the eradication of invasive species.
Royal New Zealand Institute of Horticulture (RNZIH), 2005. Hydrilla *Hydrilla verticillata*
**Summary:** Available from: http://www.rnzih.org.nz/pages/nppa_049.pdf [Accessed 1 October 2005]
The Western Aquatic Plant Management Society *Hydrilla verticillata*. (January 2002)
**Summary:** Report on description, biology, effects of introduction, and efficiency of different control measures.
United States Department of Agriculture, Cooperative Agriculture Pest Survey. 2002. Hydrilla
**Summary:** Brief report on distribution, effects of invasion, and description. Also mentioned biological control agents and threats to Lake Georgia.

**General information**

CONABIO. 2008. Sistema de informaci&#65533;n sobre especies invasoras en M&#65533;xico. Especies invasoras - Plantas. Comisi&#65533;n Nacional para el Conocimiento y Uso de la Biodiversidad. Fecha de acceso.
**Summary:** English:
The species list sheet for the Mexican information system on invasive species currently provides information related to Scientific names, family, group and common names, as well as habitat, status of invasion in Mexico, pathways of introduction and links to other specialised websites. Some of the higher risk species already have a direct link to the alert page. It is important to notice that these lists are constantly being updated, please refer to the main page (http://www.conabio.gob.mx/invasoras/index.php/Portada), under the section Novedades for information on updates.
Invasive species - Plants is available from: http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Plantas [Accessed 30 July 2008]
Spanish:
La lista de especies del Sistema de informaci&#65533;n sobre especies invasoras de m&#65533;xico cuenta actualmente con informaci&#65533;n aceca de nombre cient&#65533;fico, familia, grupo y nombre com&#65533;n, as&#65533; como h&#65533;bitat, estado de la invasi&#65533;n en M&#65533;xico, rutas de introducci&#65533;n y ligas a otros sitios especializados. Algunas de las especies de mayor riesgo ya tienen una liga directa a la p&#65533;gina de alertas. Es importante resaltar que estas listas se encuentran en constante proceso de actualizaci&#65533;n, por favor consulte la portada (http://www.conabio.gob.mx/invasoras/index.php/Portada), en la secci&#65533;n novedades, para conocer los cambios.
Especies invasoras - Plantas is available from: http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Plantas [Accessed 30 July 2008]
Conservatoire Botanique National De Mascarin (BOULLET V. coord.) 2007. - *Hydrilla verticillata* Index de la flore vasculaire de la R&#65533;union (Trach&#65533;ophytes) : statuts, menaces et protections. - Version 2007.1
**Summary:** Base de donn&#65533;es sur la flore de la R&#65533;union. De nombreuses informations tr&#65533;s utiles.
Available from: http://flore.cbnm.org/index2.php?page=taxon&num=310cc7ca5a76a446f85c1a0d641ba96d [Accessed 1 April 2008]
Flordia Exotic Pest Plant Council. 2002. *Hydrilla verticillata* L.F. Royle
**Summary:** Report on distribution, biology, and description. Lists common names and gives scientific name.
ITIS (Integrated Taxonomic Information System), 2005. Online Database *Hydrilla verticillata*
**Summary:** An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals.
Available from:
http://www.cbif.gc.ca/pls/itisca/taxastep?king=every&p_action=containing&taxa=Hydrilla+verticillata&p_format=&p_ifx=plglt&p_lang= [Accessed March 2005]
Jacono, C.C. 2002. Nonindigeious Aquatic Species: *Hydrilla verticillata* (L.f.) Royle United States Geological Survey, Biological Resources Division, Florida Caribbean Science Center.
**Summary:** Report on description and effects of introduction. Detailed distribution in the United States.
Langeland, K.A. and Burks, K. C (Eds) 1998. Identification and Biology of Non-Native Plants in Florida s Natural Areas, University of Florida. *Hydrilla verticillata*
**Summary:** Information on plants that pose threats to natural resource areas in Florida.
Available from: http://www.fleppc.org/ID_book/Hydrilla%20verticillata.pdf [Accessed 30 December 2004]
Lefeuvre, J. Cl., 2006. Les invasions biologiques : un risque pour la biodiversit&#65533; &#65533; l&#65533;&#65533;chelle mondiale. In M.-L. Beauvais et al. (2006) : Les esp&#65533;ces envahissantes dans l&#65533;archipel n&#65533;o-cal&#65533;donien, Paris, IRD &#65533;ditions, 260 p.+ c&#65533;d&#65533;rom.
Randall, R. 2003. Pers. comm.
**Summary:** Department of Agriculture, Western Australia