GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Cabomba caroliniana***

Cabomba caroliniana 简体中文 正體中文

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Plantae	Magnoliophyta	Magnoliopsida	Nymphaeales	Cabombaceae

Common name fanwort (English), Carolina water-shield (English), Carolina fanwort (English), Washington-grass (English), fish-grass (English), Washington-plant (English), cabomba (Portuguese, Brazil)

Synonym

Similar species *Cabomba furcata, Ceratophyllum spp., Myriophyllum spp.*

Summary Cabomba caroliniana is a submerged perennial aquarium plant that grows in stagnant to slow flowing freshwater. It spreads primarily by stem fragments and forms dense stands that crowd out well-established plants. C. caroliniana may clog ecologically, recreationally or economically important water bodies and drainage canals. Depending on its location (ie: drinking water supply or small closed water body) it may be managed by a number of control techniques including mechanical removal (being careful not to spread fragments to new locations) and habitat modification to increase shading (*via* planting trees) or decrease hydration (*via* draining).

view this species on IUCN Red List

Species Description
C. caroliniana is fully submerged except for occasional floating leaves and emergent flowers (Australian Department of the Environment and Heritage 2003). The roots grow on the bottom of water bodies and the stems can reach the surface. Parts of the plant can survive free-floating for six to eight weeks. It is a perennial, growing from short rhizomes with fibrous roots. The branched stems can grow up to 10m long and are scattered with white or reddish-brown hairs. The underwater leaves are divided into fine branches, resulting in a feathery fan-like appearance. These leaves are about 5cm across and secrete a gelatinous mucous which covers the submerged parts of the plant. The floating leaves, however, are small, diamond-shaped, entire, and borne on the flowering branches. The solitary flowers are less than 2cm across and range in colour from white to pale yellow and may also include a pink or purplish tinge. The flowers emerge on stalks from the tips of the stems (Australian Department of Environment and Heritage, 2003).

Lifecycle Stages
C. caroliniana flowers from May to September. In the southeastern U.S., *C. caroliniana* is self-pollinating and seeds readily germinate (The Washington State Department of Ecology 2003).

Uses
C. caroliniana is commonly used as an aquarium plant because of its delicate appearance. Large numbers of plants are sent from Florida to the rest of the U.S. for commercial use. It is also grown commercially in Asia for export to Europe and other parts of the world. Small-scale, local cultivation occurs in some areas (Orgaard 1991). In its native habitat *C. caroliniana* is eaten by waterfowl and some fish and provides cover for some small fish and plankton (Mitchell 1979 c.f. Orgaard 1991).

Habitat Description
Cabomba is sensitive to drying out and requires permanent shallow water, usually less than 3 metres (but up to 10 metres) deep (Australian Department of the Environment and Heritage 2003). It grows rooted in the mud of stagnant to slow flowing water including streams, and smaller rivers (The Washington State Department of Ecology, 2003). It also grows in ponds, lakes, reservoirs, sloughs, ditches, and canals (The Washington State Department of Ecology, 2003). \r\n
It can respond to wide fluctuations in water depths and is a water column feeder that grows well in silty substrate and exhibits reduced vigour in hard substrates (Australian Department of Environment and Heritage, 2003). It may be found in streams, small rivers, ponds, lakes, reservoirs, sloughs, ditches and canals. Growth of 50mm a day has been reported in Lake Macdonald in Queensland, Australia. It grows well in high nutrient environments with low pH, but in more alkaline waters it tends to lose its leaves (Australian Department of Environment and Heritage, 2003). High calcium levels inhibit growth and unlike other aquatic weeds, cabomba can grow well in turbid water (Australian Department of Environment and Heritage, 2003). It prefers a warm, humid climate with a temperature range of 13-27ºC but can survive when the surface of the water body is frozen (Australian Department of Environment and Heritage 2003).

Reproduction
C. caroliniana is an herbaceous perennial that spreads primarily by stem fragments or rhizomes (The Washington State Department of Ecology 2003). The erect shoots are upturned extensions of horizontal rhizomes. The species forms large clones as new rhizomes and floating shoots arise as axillary branches. The rhizomes are fragile and easily broken, facilitating vegetative spread (Orgaard 1991, in the Washington State Department of Ecology 2003) and transport to new water bodies.

General Impacts
C. caroliniana is an extremely persistent and competitive plant. Under suitable environmental conditions it forms dense stands and crowds out previously well-established plants. Once established, this plant can clog drainage canals and freshwater streams interfering with recreational, agricultural, and aesthetic uses (The Washington State Department of Ecology 2003).\r\n
In Austrailia Cabomba is regarded as a \"Weed of National Significance\". It is one of the worst weeds in Australia because of its invasiveness, potential for spread, and economic and environmental impacts. It is choking waterways along Australia's east coast (Australian Department of the Environment and Heritage 2003). It is extremely persistent and can take over a water body, excluding native plant species. It can also have an impact on native animals - in northern Queensland platypus and water rat numbers are lower in infested creeks (Australian Department of the Environment and Heritage 2003).\r\n
Cabomba grows quickly and produces a large amount of plant material. It can significantly reduce water storage capacity and taint drinking water supplies. Water treatment costs can be increased by up to $50 a megalitre (Australian Department of the Environment and Heritage 2003). Heavy infestations can also raise water levels to a point where overflows and heavy seepage losses occur.\r\n
Cabomba's dense mass of underwater stems and leaves provide a hazard for recreational water users (Australian Department of the Environment and Heritage 2003). When this vegetation dies off, decomposition causes dramatic oxygen reductions and foul smelling water.

Management Info
In a recreational water body or river, hygiene protocols are needed to ensure washdown of boats, trailers and fishing equipment. Habitat modification *via* re-vegetation is also recommended and may offer some control if it produces a shading effect. In a closed water body with a heavy infestation it is recommended to use strict hygiene regulations and mechanical control (involving cutting and removing plants and ensuring fragments are not spread). Ongoing mechanical control is expensive but may be the only option. In the case of isolated plants and in small areas physical control (hand pulling by divers) and the use of herbicides may offer suitable control. Because cabomba requires direct sunlight, shading has been used to kill it in small areas; however the cost is prohibitive for large-scale programs. In drinking water supplies the only recommended option is habitat modification *via* draw-down of water (Australian Department of the Environment and Heritage 2003).
Preventative measures: Preventing new outbreaks is critical and can be achieved by sterilising boats and boating equipment, disposing plants using burning or drying-out methods and discouraging the deliberate seeding of waterways with cabomba (which is done to supply the aquarium trade). As the plant is submerged and not easily visible education and public awareness is needed to prevent the spread of cabomba. Community awareness about the weed and identification skills need to be increased. People also need to be educated to buy other species of aquarium plants to stop the demand for cabomba (Australian Department of the Environment and Heritage 2003). \r\n
A Risk assessment of *C. caroliniana* 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 18 and a recommendation of: reject the plant for import (Australia) or species likely to be of high risk (Pacific).
Physical: Cabomba is sensitive to drying out and requires permanent shallow water; where possible, draining a water body can provide temporary control (Australian Department of the Environment and Heritage 2003). If the base of the water storage dries out completely there is little chance of cabomba surviving but if it remains damp there is a more than 50% chance it will return (Australian Department of the Environment and Heritage 2003). In the case of drinking water supplies lowering water levels is particularly effective; in the southern USA water level draw-downs have been used to reduce *C. caroliniana* growth. Extreme drying is required to prevent regrowth from seed (The Washington State Department of Ecology 2003). \r\nCabomba easily fragments from disturbance, so control activities can actually contribute to spread of the weed if great care is not taken. Using a venturi dredge, which is like a giant vacuum cleaner, can overcome this problem. It minimises fragmentation and also extracts the root ball.\r\n
Chemical: A herbicide is registered for cabomba control in non-drinking water in Queensland and the Northern Territory but there is community opposition to its use (Australian Department of the Environment and Heritage 2003). There is no herbicide registered for cabomba control in drinking water. In the north American region herbicide treatments have been used for cabomba control. Endothall provides excellent control but it is a contact herbicide only. Fluridone provides good control.
Biological: A new project being funded under the Natural Heritage Trust to identify potential biological control agents in the native range of the weed.

Pathway
Cabomba caroliniana is commonly used as an aquarium plant because of its delicate appearance (The Washington State Department of Ecology 2003).

Principal source: Washington State Department of Ecology, 2003. Technical Information About *Cabomba Caroliniana* (Fanwort)
ERDC, UNDATED *Cabomba caroliniana* Gray (Fanwort)

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

Review: Anon

Pubblication date: 2006-04-03

ALIEN RANGE

[7] AUSTRALIA
[1] CHINA
[1] JAPAN
[1] NEW GUINEA
[1] SWEDEN
[1] CANADA
[1] INDIA
[1] MALAYSIA
[1] PERU
[4] UNITED STATES

BIBLIOGRAPHY

15 references found for **Cabomba caroliniana**

Managment information

Australian Department of the Environment and Heritage, 2003. Cabomba (*Cabomba caroliniana*). Weeds of National Significance: Weed Management Guide Department of the Environment and Heritage and the CRC for Australian Weed Management, 2003.
Summary: Available from: http://www.weeds.gov.au/publications/guidelines/wons/c-caroliniana.html [Accessed 23 October 2008]

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]

CSIRO, 2006a. Cabomba: a fast-growing submerged aquatic weed
Summary: Available from: http://www.csiro.au/science/ps2fi.html [Accessed 20 March 2009]

CSIRO, 2006b. Project Biological Control of Cabomba
Summary: Available from: http://www.csiro.au/science/ps2ku.html [Accessed 20 March 2009]

Department of Primary Industries (State of Victoria)., 2007. Landcare Notes. Cabomba Department of Primary Industries Updated: November 2007 LC0259 ISSN 1329-833X
Summary: Available from: http://www.dpi.vic.gov.au/dpi/nreninf.nsf/9e58661e880ba9e44a256c640023eb2e/b95be6f176f96f8aca25739800136ccb/$FILE/LC0259_Nov07.pdf [Accessed 20 March 2009]

European and Mediterranean Plant Protection Organization (EPPO), 2006. Guidelines for the management of invasive alien plants or potentially invasive alien plants which are intended for import or have been intentionally imported. EPPO Bulletin 36 (3), 417-418.

National Aquatic Weeds Management Group, 2008. Review Of Progress Towards the Cabomba Strategic Plan. 2006-2007. Prepared by: Andrew Petroeschevsky National Aquatic Weeds Coordinator on behalf of the National Aquatic Weeds Management Group.
Summary: Available from: http://www.weeds.org.au/WoNS/cabomba/docs/Cabomba_Strategic_Plan_Review_2006-07.pdf [Accessed 20 March 2009]

Washington State s Department of Ecology. 2003. *Technical Information About Cabomba Caroliniana (Fanwort)*. Water Quality Program: Non-Native Freshwater Plants.
Summary: Information on description, economic importance, distribution, habitat, history, growth, and impacts and management of species.

General information

ERDC (Engineer Research and Development Center). UNDATED. *Cabomba caroliniana* Gray (Gray Fanwort) U.S. Army Corps of Engineers: Noxious and Nuisance Plant Management Information System.
Summary: Information on distribution, description, growth characteristics, and problems associated with species.

FNZAS (Federation of New Zealand Aquatic Societies Inc.). UNDATED. *Cabomba caroliniana*. FNZAS Plant Survey.
Summary: Information on nutrient requirements of species.
Available from: http://www.fnzas.org.nz/320+B6JnVzZXJfcGxhbnRzPTIyJmNIYXNoPTM4YjcyYjRhNjY_.0.html [Accessed October 30 2003]

ITIS (Integrated Taxonomic Information System), 2004. Online Database *Cabomba caroliniana*
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.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=18408 [Accessed December 31 2004]

Pacific Island Ecosystems at Risk (PIER)
Summary: Available from: http://www.hear.org/pier/wra/australia/cacar-wra.htm [Accessed 24 September 2004]

USDA-GRIN (Germplasm Resources Information Network). 2003. *Cabomba caroliniana*. National Genetic Resources Program [Online Database] National Germplasm Resources Laboratory, Beltsville, Maryland.
Summary: Information on common names, synonyms, and the distributional range of species.
Zhang, X., Z., Yang, and C., Jiakuan. 2003. Fanwort in Eastern China: An Invasive Aquatic Plant and Potential Ecological Consequences. AMBIO: A Journal of the Human Environment, 32:158-159.
Summary: Information on spread of species in China.