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<http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/publications/management/cabomba-control-manual>

# Introduction

*Cabomba caroliniana* is a submerged aquatic weed that invades bodies of fresh water such as lakes, dams, slow-flowing rivers and billabongs.

Cabomba originated in South America (southern Brazil, Paraguay, Uruguay and north-east Argentina) and is widely naturalised in the south-east of the USA. It has become a weed worldwide, infesting bodies of water in climates ranging from tropical to cool-temperate. It is considered a serious weed in the USA, China, Canada, the Netherlands, Japan and India and is present in South Africa, Hungary and the United Kingdom.

## Cabomba in Australia

Cabomba was introduced to most countries, including Australia, through the aquarium industry, as a popular ornamental, habitat and 'oxygenator' plant for fish tanks and aquariums. It was easily propagated and cultivated for trade. The trade and sale of cabomba is now banned in all States and Territories in Australia.

The first herbarium record of cabomba in Australia dates from 1967, but anecdotal evidence suggests that the weed was introduced in the 1930s. It was recorded in the flora of NSW in 1986 and soon after found naturalised in parts of eastern Australia. Cabomba has been unintentionally introduced into freshwater systems by people emptying aquarium water into creeks and streams, but experts believe the main means of introduction has been illegal planting in natural waterways for cultivation, collection and sale. It then spreads rapidly through catchments when stem fragments capable of reproduction move in water. Stem fragments can also be spread across catchments on watercraft, boat trailers, eel traps and fishing nets.

## A Weed of National Significance

Cabomba has been present for over 70 years in Australia but has been identified as a significant aquatic weed only in the last 15 years. The National Weeds Strategy Executive Committee classified cabomba as a Weed of National Significance in Australia because of its impacts on the biodiversity and function of freshwater and riparian ecosystems, on water quality, water storage and distribution infrastructure, and on recreational and amenity values.

## Impacts of cabomba

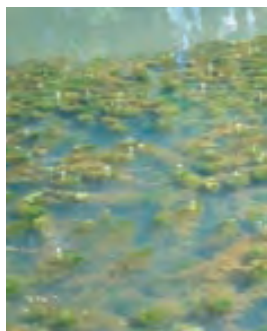
As an aquatic weed, cabomba has a range of environmental, social and economic impacts. Generally, aquatic plants are important parts of freshwater systems because they oxygenate water, provide shelter and habitat for fish and invertebrates, and stabilise banks and beds. However, dense stands of cabomba cause many problems, including:

- increased resistance to flows, resulting in stagnation of water
- increased siltation, affecting bottom-dwelling organisms
- degradation of water quality
- increased flooding
- blockage of pumps
- impeding of navigation
- restriction of recreation
- swimming hazards
- displacement of native aquatic vegetation.



*Cabomba*: a submerged aquatic weed

Northern Territory Government



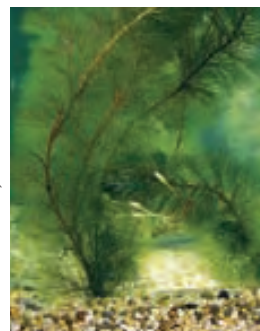
*Cabomba* is a weed in many countries.

Andrew Petroeshevsky



*Cabomba* has been introduced to many freshwater systems by people.

Andrew Petroeshevsky



*Cabomba* was introduced as a popular fish tank plant.

Biosecurity Queensland, DPI&F



*Cabomba* invades bodies of fresh water.

Andrew Petroeshevsky



Shon Schooler

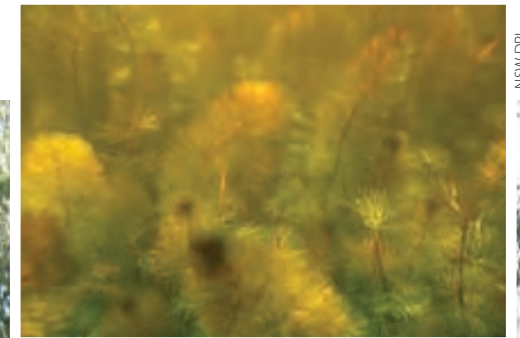
▲ Cabomba is now a Weed of National Significance.

▶ Cabomba alters the aquatic habitat for other organisms.

▶ Submerged growth restricts light penetration



Sue Hayward



NSW DPI

## Environmental impacts

The monoculture that results from fast-growing submerged cabomba infestations excludes native aquatic plants and alters the aquatic habitat for other organisms, ultimately reducing biodiversity. Light penetration is restricted, causing changes to food-chain structures and species composition. Cabomba will outcompete many aquatic plants, such as the native pondweeds (*Potamogeton* spp.), stoneworts (*Chara* spp.), hornwort (*Ceratophyllum demersum*) and water nymph (*Najas tenuifolia*). There are many examples of where such alteration of native aquatic flora has affected populations of native fauna, including platypus, water rats and Mary River cod.

Temperature-dependent seasonal dieback of cabomba infestations can leave large amounts of decomposing plant material and consequently reduce the amount of available oxygen in the water. This results in foul-smelling, oxygen-deficient water and an increase in the rates of release of some nutrients from bottom sediments.

▶ Dense stands of cabomba cause many problems.



Lalith Gunasekera



Terry Stokes

- ▲ OH&S issues are created for workers.
- ◀ Dense submerged stands create swimming hazards.



Vanessa Moscato

### Social impacts

Dense submerged stands of cabomba create public safety concerns and make swimming areas unsafe. Fishing lines become entangled in the weed, and water sports, including boating, sailing and canoeing, are also directly affected by the weed's dense growth. Occupational health and safety issues are created for a range of workers, including water supply engineers and managers, weed managers and protected-area staff.

Cabomba infestations also reduce the scenic amenity values associated with water bodies. Clear rippled water surfaces become darker, still and partly stagnant in the presence of a cabomba infestation.

### Economic impacts

Cabomba will taint and discolour potable water, increasing the costs of water treatment processes. It blocks foot valves and pumps, increasing maintenance and running costs and reducing pumping efficiencies.

In those infestations in Australia that are subject to control measures, the costs are currently estimated to be in the range of \$600,000 to \$800,000 a year.



Phil Moran

Phil Moran

Clear water surfaces become darker, still and stagnant.



*Cabomba affects irrigation systems.*

M. Kean



*Cabomba increases the costs of water treatment.*

Melissa Freeman



*Cabomba taints potable water.*

Phil Moran

## Current distribution

Infestations are currently distributed along the east coast of Australia in Queensland and New South Wales, with isolated populations occurring in the Northern Territory and Victoria.

Cabomba occurs in far north Queensland and south-east Queensland; Northern NSW, the NSW mid North Coast and the Blue Mountains; Lake Nagambie, Lake Benalla and Mildura in Victoria; and the Darwin River at Palmerston in the Northern Territory.

Cabomba infestations have not yet been found in Western Australia, South Australia, Tasmania or the Australian Capital Territory.

## Potential distribution

Cabomba has a wide potential distribution. It currently exists in Australia in a distribution from monsoonal tropical climates to temperate zones. Worldwide it can persist in cold temperate conditions, even persisting under ice in Canada. Cabomba has demonstrated its potential to colonise most water bodies throughout the world and has the same ability in Australia. The potential distribution map shown here has been predicted using a CLIMEX model based on the temperature tolerance found in the native range of cabomba. Each prediction is shown as an EI or Ecoclimatic Index. An EI of less than 30 indicates a low potential for permanent populations and an EI greater than 70 indicates a very high potential for a permanent population. The ranges shown also assume the availability of water.

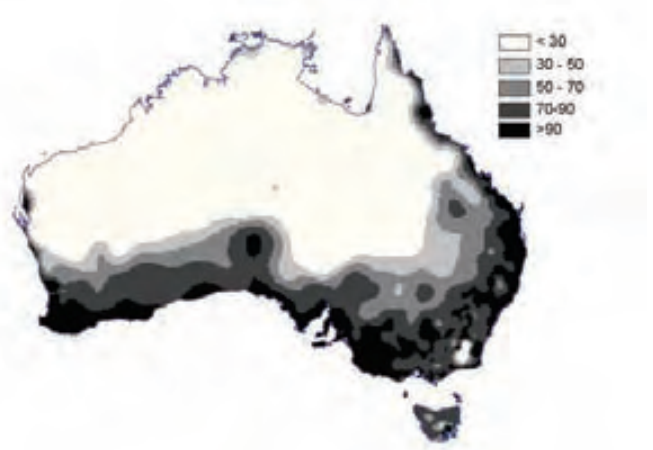
### Current cabomba distribution in Australia

Andrew Petroeschevsky



### Potential cabomba distribution in Australia

Weeds of National Significance Cabomba Strategic Plan 2000



## Legal status of cabomba in Australia

The legal status of cabomba in some States is somewhat restricted by the lack of broad-scale control techniques and eradication strategies for large infestations. Cabomba is prohibited from trade or sale in all States and Territories in Australia. Declarations may change when more effective and sustainable control techniques become available.

## References and further reading

Agriculture and Resource Management Council of Australia and New Zealand, Australian and New Zealand Environment and Conservation Council and Forestry Ministers (2000), *Weeds of National Significance: Cabomba (Cabomba caroliniana) Strategic Plan*. National Weeds Strategy Executive Committee, Launceston.

Northern Territory Government (2007), *Cabomba Eradication Program*, Department of Natural Resources, Environment and the Arts, Palmerston. [http://www.nt.gov.au/nreta/natres/weeds/ntweeds/cabomba/pdf/Cabomba\\_erad\\_0506.pdf](http://www.nt.gov.au/nreta/natres/weeds/ntweeds/cabomba/pdf/Cabomba_erad_0506.pdf)

Petroeshevsky A (National Aquatic Weeds Coordinator), personal communication.

Schooler S, Cabrera-Walsh W, Julien MH (2009) *Cabomba caroliniana* Gray (Cabombaceae). In Muniappan R, Reddy GVP, Raman A (eds), *Biological Control of Tropical Weeds using Arthropods*. Cambridge University Press, Cambridge, pp. 88–107.

## LEGAL STATUS OF CABOMBA

State	Declaration status of <i>Cabomba caroliniana</i>
ACT	Class 1 Notifiable Pest Plant and Class 4 Prohibited Pest Plant under the <i>Pest Plants and Animals Act 2005</i> ; a pest plant whose presence must be notified to the Chief Executive; a pest plant whose importation, propagation and supply are prohibited.
NSW	Class 5 Restricted Weed throughout the State under the <i>Noxious Weeds Act 1993</i> ; plants are notifiable throughout the State and are banned from sale, trade or distribution.
NT	Class A and Class C Noxious Weed under the <i>Weeds Management Act 2001</i> ; small infestations to be eradicated where feasible; not to be introduced to the Northern Territory; restricted from sale in the Northern Territory.
QLD	Class 2 Pest Plant under the <i>Land Protection (Pest and Stock Route Management) Regulation 2003</i> ; landowners must take reasonable steps to keep land free of Class 2 plants; it is an offence to introduce, keep, release, take or supply without a permit.
SA	Class 11+ under the <i>Weed Management Act 1999</i> , restricting sale only; control not required.
TAS	Category D – Declared plant under the <i>Weed Management Act 1999</i> ; importation, sale, distribution, movement and storage are prohibited; plants/infestations are to be reduced, eradicated or restricted.
VIC	Restricted weed under the <i>Catchment and Land Protection Act 1994</i> ; plants that do not occur in Victoria but pose an unacceptable risk of spread if they are sold or traded. (This classification is currently under review owing to the presence of cabomba in the State of Victoria).
WA	Category P1 and P2 Declared Plant under the <i>Agriculture and Related Resources Protection Act 1976</i> ; cannot be introduced to the State; prohibited from sale, trade or movement throughout the State; plants are to be eradicated.
Federal	All species of the genus <i>Cabomba</i> are prohibited entry to Australia under the <i>Quarantine Proclamation 1998</i> .