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Cabomba

Invasive Species Unit

Introduction

Cabomba (*Cabomba caroliniana*) is a submerged aquatic weed that has great potential to spread in New South Wales (NSW). Cabomba was introduced into Australia as an aquarium plant and was first recorded as naturalised in 1967. It is now posing a serious threat to Australian waterways, and is a Weed of National Significance.

The genus *Cabomba* consists of five recognised species: *C. aquatica, C. caroliniana, C. furcata, C. haynesii* and *C. palaeformis. C. caroliniana* is the only species known to have become naturalised in Australia.

The current definition of *C. caroliniana* includes the previously separate species *C. australis* and *C. pulcherrima,* as well as several natural and horticultural varieties.

Distribution

Cabomba occurs in several locations in NSW. The most severe infestations are on the NSW far north coast in the upper catchments of the Richmond River and the Burringbar Creek system. These infestations have existed for about 10 years.

Other infestations include sites in the Tweed River near Murwillumbah, the Orara River near Grafton, Glenbrook Lagoon in the Blue Mountains, and waterbodies at Coffs Harbour, Port Macquarie, Taree, Forster, and Botany Bay.

Figure 1. Cabomba is an invasive aquatic weed that invades fresh water systems.

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Cabomba has a much broader potential distribution, and most waterways throughout eastern, central and southern NSW could be at risk of invasion by cabomba.

Habitat

Cabomba will invade freshwater systems, particularly if they are nutrient rich, slow-moving, or permanently standing water less than 4 m deep. Dams, ponds, lakes and freshwater streams all provide habitat for cabomba, as well as the margins of deeper water bodies or faster moving waterways. It prefers fine, soft silty sediments and is less vigorous on stony, clay or sand substrates.

Cabomba prefers warm-temperate, humid climates with rainfall throughout the year. Optimal temperatures range from 13° to 27°C; however, it has been known to survive under ice in Canada. Cabomba can tolerate both acid and alkaline water, but optimal pH is 4–6 with growth inhibited above 7–8. Light availability is the main environmental variable affecting cabomba growth, although it can tolerate very low light intensities.

Impact

Cabomba is regarded as a major threat to freshwater systems due to its range of environmental, social and economic impacts.

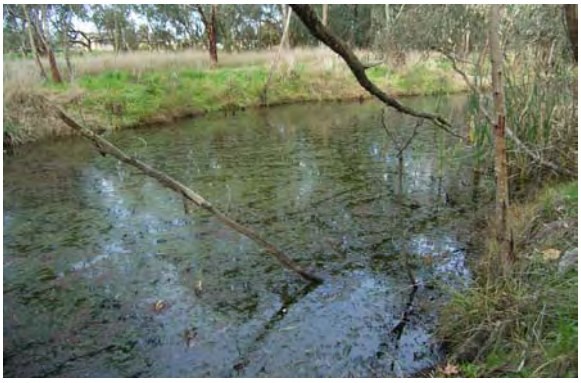

Figure 2. Cabomba-infested water becomes stagnant.

Dense stands of cabomba cause many problems including:

- swimming hazards and public safety concerns as drowning is a risk for entangled swimmers;
- restriction of navigation and recreational use of water bodies;
- degradation of water quality resulting in foul-smelling, stagnant, oxygen deficient water;
- degradation of aesthetic values as water surfaces become dark, still and stagnant;
- displacement of native aquatic plants and animals and alteration of aquatic habitats reducing biodiversity;
- taint and discoloration of potable water increasing costs of treatment and storage;
- blockage of pumps, reduced pumping efficiencies and increased running costs.

Description

Cabomba is strictly aquatic and completely submerged except for its flowers and occasional floating leaves. The roots attach to the bottom of the water body and stems can be up to 10 m long, but usually range up to 5 m.

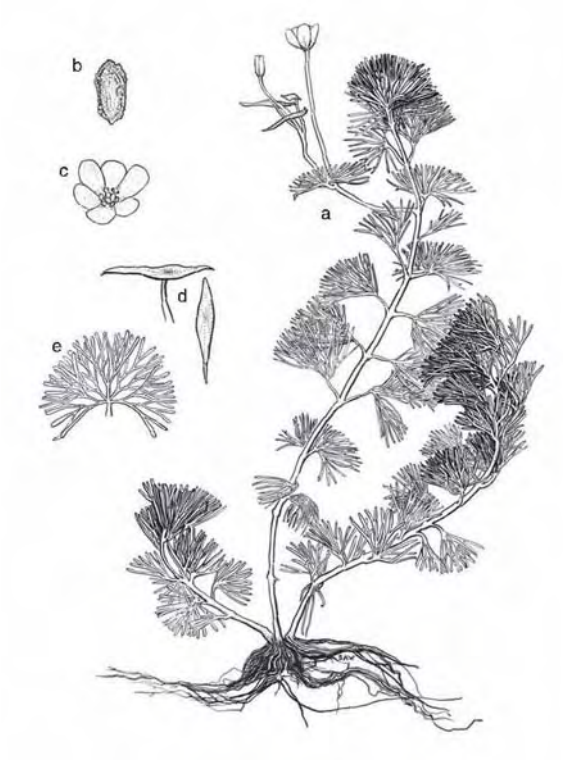

Figure 3. Cabomba caroliniana*.*

The submerged leaves and stems have a thin gelatinous coating. Leaves are arranged in opposite pairs along the stems and are finely dissected giving the characteristic feathery, fan-shaped appearance.

Figure 4. Cabomba has finely dissected fan-shaped leaves.

Single flowers approximately 2 cm in diameter are raised 1–4 cm above the water surface on stalks. They can be milk-white, pale yellow or purplish (usually white petals with yellow centres), and appear to have 6 petals (3 of these are sepals). Flowers emerge from the water during the day and recede into the water overnight. The raised flowers are often the first visible signs of an infestation.

Figure 5. Cabomba flower

Figure 6. Flowers raised above the water surface.

Similar looking species

Pink cabomba (*C. furcata*) is legally sold in some states as an aquarium plant. It is not currently known to occur naturally and is not considered to pose a significant weed risk. It has distinctive pink leaves and stems and purple flowers with yellow centres.

Reproduction

Cabomba is a highly invasive species that can rapidly colonise an entire waterbody. In Australia, reproduction is mostly by stem fragments and through the production of daughter plants.

Any stem fragment that includes a node (a piece as small as 1 cm long) can grow into a new plant. Stems break easily when disturbed, creating thousands of fragments, all capable of spread and reproduction.

Figure 7. Stem fragments form new plants.

In autumn and winter plants lose buoyancy and stems sink to the bottom, where they either break down into fragments that may regrow the following spring, or take root in the substrate, producing new daughter plants.

The only cabomba to produce viable seed in Australia is currently in the Darwin River in the Northern Territory, and reasons for this are unclear.

Spread

Stem fragments float on the water surface and can spread throughout a catchment by normal flows or flooding. Fragments are also moved between catchments and waterbodies by fishing activities and equipment, watercraft and trailers, and animals.

Control and management

Early detection is critical as once established cabomba is extremely difficult to control.

Control methods focus on drawdown, shading, manual removal and mechanical removal. All of these methods are costly and labour intensive and only effective over small areas. In larger infestations it is only viable or practical to reduce cabomba in strategic locations such as swimming areas or to prevent spread by containment.

Management practices to prevent nutrient-enriched run-off entering infested waterways should also be considered.

Figure 8. Successful drawdown of a cabomba-infested ornamental pond.

Herbicides

Diquat herbicides are registered but are not considered effective (they will reduce an infestation by about 50% and regrowth occurs rapidly). Recent research supports a new herbicide for use against cabomba and registration is currently being sought. If registration is successful, details will be listed on the Australian Pesticide and Veterinary Medicines Authority website. See www.apvma.gov.au

Drawdown

Draining or 'drawdown' of a water body can be effective, particularly in smaller dams or retention ponds. Stems and leaves must be exposed until they and the substrate are completely dry. Care must be taken to ensure that cabomba is not spread to other water bodies in the drained water.

Shading

Shading can be created by floating blankets made from builders' black plastic. This must be maintained over a period of 3 or 4 months to kill the cabomba.

Physical and mechanical removal

Manual removal can be useful for small infestations or as a follow-up method to remove regrowth. It requires plants to be pulled up by the roots, either while wading through shallow water or by diving with SCUBA. Contract divers have developed this method to include hand-held suction hoses to dredge the plants out.

Mechanical aquatic weed harvesters can cut and remove large amounts of cabomba from a waterway. This can suppress an infestation and keep the upper section of the water column free of weed. This will be an ongoing operation as regrowth occurs quickly (over just weeks) to uncut levels.

For further detail and information about control and management of cabomba, consult the *Cabomba control manual*, see 'Publications available' below.

Legislation

Cabomba is a Restricted Plant (Class 5 noxious weed) in all areas of NSW under the *NSW Noxious Weeds Act 1993.*

Restricted Plants are likely by their sale or the sale of their seeds or movement within the State or an area of the State, to spread within the State or outside the State.

There are no requirements to control existing Restricted Plants; however, they are notifiable and prohibited from sale in NSW.

A full list of noxious weeds and requirements under the *NSW Noxious Weeds Act 1993* can be found at www.dpi.nsw.gov.au/weeds.

Figure 9. Aquatic weed harvester removing cabomba.

Acknowledgements

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Photos

Figure 1. Andrew Petroeschevsky

Figure 2. Andrew Petroeschevsky

Figure 3. Schooler *et al*. (2009), Courtesy Shon Schooler, CSIRO

Figure 4. Abyss Diving

Figure 5. Andrew Petroeschevsky

Figure 6. Suzanne Hayward

Figure 7. Andrew Petroeschevsky

Figure 8. Robert Metcalf, Courtesy Mildura Rural City Council

Figure 9. Andrew Petroeschevsky.

References

Mackey, A. P. and Swarbrick, J. T. (1998) *Cabomba caroliniana*, Grey. In *Biology of Australian weeds*, Volume 2, RG and FJ Richardson, Melbourne.

Schooler. S., Cabrere-Walsh, W. and Julien, M. (2009) *Cabomba caroliniana* Gray (Cabombaceae). In R. Muniappan et al. (eds) *Biological control of tropical weeds using arthropods*, Cambridge University Press, Cambridge, pp. 88–107.

Publications available

Van Oosterhout, E. (2009) Cabomba control manual: Current management and control options for cabomba (*Cabomba caroliniana*) in Australia, NSW DPI, Orange. For copies contact the Industry & Investment NSW Bookshop, Orange, 1800 028 374 or view online at www.dpi.nsw.gov.au/weeds

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