



Ministry of Fisheries – Marine Biosecurity

ACTION PLAN FOR UNWANTED SPECIES



Caulerpa (*Caulerpa taxifolia*)

Photo courtesy of AIMS

Summary

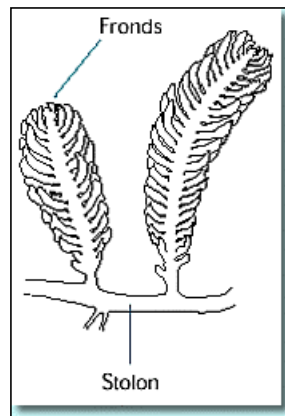
Caulerpa (Caulerpa taxifolia) is a highly invasive green alga that can cause major ecological and economic damage. The most likely way of caulerpa arriving into New Zealand is by importation for use in aquariums. If caulerpa is released into New Zealand marine environments there is a high risk of it establishing, as aquarium strains in particular are highly successful in a wide range of environmental conditions. It is also possible that caulerpa from its natural (tropical) range can adapt to cooler environments and become invasive. This action plan is therefore concerned with all types of *C. taxifolia*.

The Ministry of Fisheries is taking the following steps to decrease the risk of caulerpa establishing in New Zealand:

- Reducing the risk of caulerpa arriving in New Zealand by alerting the aquarium industry
- Increasing the chances of detecting caulerpa if it arrives by determining *C. taxifolia* unwanted and notifiable; targeting this species in the national surveillance programme; and disseminating information on the alga to the MAF Quarantine Service and the public
- Adding *C. taxifolia* to the list of species on the Plant Pest Accord for surveillance of retail outlets by Regional Councils
- Increasing our understanding of caulerpa and how to respond to an incursion.

Biology

Caulerpa taxifolia is a green alga in the family Caulerpaceae. The aquarium strains of *C. taxifolia* reproduce asexually by growth of the stolons or by fragmentation (this is called vegetative or clonal propagation). Plants can regenerate from fragments as small as 1 square cm. If released into wild, aquarium strains are capable of rapid growth (up to 2.5 cm per day) and are highly successful; in some places caulerpa has taken over 100% of the substrate. Caulerpa can survive in damp conditions out of water for several days.



Caulerpa taxifolia

Distribution

C. taxifolia is a widespread tropical species with native populations found in the Atlantic Ocean (West Indies and African coast), the Indian Ocean (Pakistan, Sri Lanka, and north western Australia), and the Pacific Ocean (Philippines, Indonesia, Japan, New Caledonia, and north eastern Australia). Aquarium strains are known from the Mediterranean, California and Port Hacking, Careel Bay and Lake Conjola in New South Wales, Australia. There are two aquarium strains reported in Australia and they are both different to strains found elsewhere. The strain in California is similar to the Mediterranean strain. It appears that this species has evolved cold-tolerant strains at least three times.

In the Mediterranean, the aquarium strain of *C. taxifolia* grows in deeper and colder waters than the tropical populations. It can survive many months at 10 ° C, resuming growth when temperatures are above 15 ° C. It grows on a wide variety of substrates, including rock, sand and mud, and in habitats ranging from protected bays to exposed headlands. Plants occur mostly at depths of 1-35 m, but have been recorded as deep as 100 m.

Vectors

Natural and human-mediated vectors can spread caulerpa. The aquarium trade is the most likely source of introduction to New Zealand. Species of caulerpa are sold on the Internet, although it is not certain whether any of these are *C. taxifolia*. New colonies can establish through distribution of plant fragments attached to boat anchors, fishing gear and other equipment. Caulerpa is unlikely to be introduced to New Zealand in ballast water or on vessel hulls.

Impacts

The aquarium strain of *C. taxifolia* has had devastating ecological and economic impacts in the Mediterranean. It has formed dense carpets, out competed native seaweeds and seagrasses and displaced invertebrates. Dense carpets can also cause sediment anoxia, which can affect the infauna. Species diversity and abundance is reduced where *C. taxifolia* has invaded. Chemical analyses and feeding trials have demonstrated that the alga contains toxins that deter herbivores, including fish. In affected regions of the Mediterranean, fish densities have decreased and fisheries production is reported to have declined. The establishment of *C. taxifolia* is reported to have harmed tourism and pleasure boating, recreational diving, and commercial fisheries.

Eradication and Control

Many methods for eradicating *C. taxifolia* have been tested, although few have proven successful. Manual removal is highly labour intensive and has a high risk of re-establishment or further spread from any small fragments not removed.

Eradication attempts in California were undertaken *in situ* to avoid spread by fragmentation. Each patch of caulerpa was covered with a heavy plastic tarpaulin, sealed to the bottom at the edges and fitted with a small port on top that allowed the introduction of herbicide. This approach allowed for direct treatment of the patch, while preventing loss of herbicide to lagoon waters. Although the alga appeared to have been successfully treated, the tarpaulins were left in place to prevent the growth of below ground material and other parts that may not have been fully treated. The site is surveyed monthly to detect any re-growth, with monitoring continuing for at least five years.

In New South Wales, authorities have banned the use of fishing nets and boats in caulerpa affected areas to try and slow its spread.

Action Plan

The Ministry of Fisheries is taking the following steps to decrease the risk of caulerpa establishing in New Zealand:

- Reducing the risk of caulerpa arriving in New Zealand by alerting the aquarium industry
- Increasing the chances of detecting caulerpa if it arrives by determining *C. taxifolia* unwanted and notifiable (declaring an organism to be notifiable places a duty on any person who becomes aware of the presence of the organism in a new place to notify the Chief Technical Officer), targeting this species in the national surveillance programme; and disseminating information on the alga to the MAF Quarantine Service and the public
- Adding *C. taxifolia* to the list of species on the Plant Pest Accord for surveillance of retail outlets by Regional Councils
- Increasing our understanding of this species and how to respond to an incursion by developing a risk profile and an incursion response plan.

What you can do:

Please do not bring caulerpa into New Zealand for any purpose. If you have been in coastal New South Wales, please clean your vessel, anchors and any equipment used in coastal waters. Vessels travelling between Australia and New Zealand should be cleaned regularly to avoid the translocation of marine pests. Report any suspected sightings of caulerpa to the Ministry of Fisheries.

Contact Details

For further information on this action plan or any marine biosecurity issue please contact:

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