GOOD PRACTICE MANAGEMENT

Curly Waterweed (*Lagarosiphon major*)

RAPID

Reducing and Preventing
Invasive Alien Species Dispersal

GOOD PRACTICE MANAGEMENT GUIDE FOR
Curly Waterweed (*Lagarosiphon major*)

Other names: African Curly Waterweed, African Elodea, Oxygen weed, Curly Water -thyme

For ID guides and more information:

http://www.nonnativespecies.org/downloadDocument.cfm?id=34

http://www.biodiversityireland.ie/wordpress/wp-content/uploads/African-Curly-Waterweed.pdf

Curly Waterweed (*Lagarosiphon major*)

Version 1: August 2018

MANAGEMENT SUMMARY

Ecology and impact of Curly Waterweed

Native to southern Africa, the Curly Waterweed has a very rapid growth rate which allows it to outcompete other, slower growing plants by creating dense, light excluding canopies on the water surface. This increases shading and deoxygenates the water and can alter the insect community structure, favouring invasive zebra mussels (Inland Fisheries Ireland). Curly Waterweed can attain a biomass well in excess of 1000g dry weight m–2. Infestations of this plant can impede boats and anglers, as well as increasing risk of flooding due to slowing water flow.

All Curly Waterweed plants in Great Britain are female and disperse through vegetative means, mostly by fragments getting attached to machinery or boats. This species is found in depths from 0.5–6.5m, but it usually dominates from 2–5m, where it displaces the native vascular community of pond weeds. It is limited to depths of less than 6.6m due to inability to anchor roots under increasing water pressure. Curly Waterweed grows best in clear, still and slow-flowing water systems water due to its preference for high light conditions. It can live in a wide range of trophic conditions providing that a silty or sandy bottom rich in nutrients is available (Bickel, 2012).

Effective management: summary

The control of dispersal between freshwater systems is critical as Curly Waterweed spreads vegetatively very rapidly. The most successful treatment in larger stands may be the use of pre-cut biodegradable jute or burlap matting to smother the weed on the bottom of the lake. In a trial at seven sites in Lough Corrib, Ireland, jute mats were very successful, getting rid of the majority of the curly water weed and with colonisation of native species seven months later..

In areas with underwater obstacles or small areas (<1m^2), removal by suction dredging followed by hand excavation of any remaining plants may be used, though care must be taken to capture and remove any plant fragments and dispose of dredging properly. Chemical control may be effective though may require multiple applications for eradication and, at the moment, there are no chemicals approved for use on submerged aquatic plants in the UK.

MANAGEMENT METHODS

Mechanical

Covering site with jute matting

Method: For weed stands of >1m^2 to around 1000 m^2, pre-cut biodegradable jute matting may be fed from shore or boat as appropriate. For depths >1m, this may require scuba divers. In trials, a purpose-modified boat with a rear-mounted dispensing reel was used to deploy sheets of 30 m in length. Weights are attached at the corners of the sheet and at 3 m intervals using tying wire. These 1 kg weights can be made from jute sacks containing washed pea gravel. The sheet should be stretched and laid flush to the bottom over the infested area. The matting should be water-saturated before deployment to enable it to sink effectively. Adjacent sheets can be stitched together using tying wire. In shallow depths (< 1 m), a double layer of jute matting is recommended.

Potential equipment requirements (excluding PPE): Boat modified with dispensing reel, support boat, jute matting (900m long x 5.16m wide, with max weave density of 4mm^2), 1kg weights, rope, 2.5mm gauge tying wire, marker buoys, scuba gear.

Most suitable situation for method: The method is most effective and most easily applied when the plant mass is collapsed on the water bottom. Best in areas with an even substrate that is free from obstructions.

Efficacy: In the trial in Ireland, the jute mats gave a very high degree of control, with the majority of the Curly Waterweed decayed after four months. Seven months after placement, the mats were colonized by native charophytes and, to some degree, by other macrophyte species. Overall, the jute matting has several advantages over plastic sheeting: it is easier to place due to its negative buoyancy, it is biodegradable and therefore cost effective (no removal necessary) and gas permeable (preventing the creation of anoxic conditions), stabilizes sediments and lastly, it assists the regeneration of native macrophytes from the seed bank (Caffrey et al, 2010).

Mechanical (cont)

Constraints: If there are underwater obstacles, laying of matting may be difficult. Areas around obstacles may require suction dredging or hand excavating, depending on the area. If using dredging, waste should be deposited on the site where it have been removed, but far enough away from the water body to prevent plant fragments being washed back into the water. The Regulatory Statement for treatment and disposal of invasive non-native plants is available at: https://www.gov.uk/government/publications/treatment-and-disposal-of-invasive-non-native-plants-rps-178/treatment-and-disposal-of-invasive-non-native-plants-rps-178

When to manage Curly Waterweed with jute matting

Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec

Mechanical (cont)

Mechanical Cutting and Harvesting

Method: A containment net should be set around the treatment area. The mechanical cutting boat should be moved over buoyed out sections of the infestation so V-blades and chains rip through the sediment. The cut vegetation will float to the surface and should be removed by a harvesting boat, submerging the front-loading forks just below the water surface. Weed should be taken for composting on dry land. In very dense stands, the canopy may be thinned first by the front-loading forks on the harvesting boat before V-blading commences. The containment net should be serviced regularly to remove weed fragments.

If a mechanical cutting boat is not available or the site is not suitable, weed knives, trailing knives, chains, rakes, etc. can be used as long as the location is netted to retain propagules

Post-control assessment is essential both immediately after the control operations to assess the need for further control and additionally at least annually. Remediation measures such as re-planting or transplantation of native species may be required. Further control treatment may be necessary.

Potential equipment requirements (excluding PPE): Mechanical cutting boat with trailing V-blades (2.5 m long) attached by chains up to 8 m long, harvesting boat with front-loading forks, support boat, containment net, composting area or vehicle & trailer if not disposing at site. Drysuits, wheelbarrows, forks, rakes, stop-nets and sweep nets.

Most suitable situation for method: This method may be more effective than covering when the weed is growing erectly and forming a surface canopy. Curly Waterweed tends to survive over winter in Southern areas of Britain, and therefore mechanical control can be undertaken early in the season. Further north, the plant mass collapses, but never dies down completely, meaning that early season cutting should be deeper than normal, or should be delayed until the plant has started to grow in late April.

Mechanical (cont)

Efficacy: Efficacy is dependent on the site and equipment. If Curly Waterweed is harvested repeatedly and close to the bottom, a change to more desirable vegetation can occur. If weed is only partially or locally removed, Curly Waterweed readily re-establishes from leftover fragments and encroachment of the remaining Curly Waterweed occurs (Bickel 2012). Submerged objects will compromise efficiency. Generally thought to be effective if propagules can be prevented from spreading.

Disposal of plant material should follow the Regulatory Statement for treatment and disposal of invasive non-native plants, available at: https://www.gov.uk/government/publications/treatment-and-disposal-of-invasive-non-native-plants-rps-178/treatment-and-disposal-of-invasive-non-native-plants-rps-178

Constraints: Requires good access and appropriate methods for waste management. Great care needs to be taken to avoid spreading the plant fragments.

When to manage Curly Waterweed with cutting (dependent on area of UK)

Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec

Manual

Hand pulling

Method: Scuba diving can be used for treatment of infestations of low abundance (<1 m^2). Work downstream of water current to maintain visibility. Pull the weed at the base of the stem from the substrate ensuring all roots and rhizoids are removed. Place the removed material into a mesh bag and compost on dry land.

Potential equipment requirements (excluding PPE): Boats, scuba gear, drysuits, bags for collecting weeds, wheelbarrows, forks, rakes. Vehicle & trailer if not disposing at site. Stop-nets and sweep nets.

Most suitable situation for method: Shallow areas or sites at which the water level can be dropped for management purposes (unless you have scuba gear). Curly water-thyme can grow to a depth of 3m.

Efficacy: As a stand-alone method, efficacy is moderate to poor. Hand weeding can be a very efficient follow up method after suction dredging (Bickel 2012). Hand weeding is labour intensive and costs can be high.,

Constraints: Time-consuming, expensive, requires good access and shallow water (unless you have scuba gear).

When to manage Curly Waterweed with hand pulling: all year round

Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec

Ineffective or unavailable control

Chemical

There is no approved herbicide for submerged plants in the UK.

Biological

Grass carp has been somewhat effective in NZ (Bickel 2012), though studies have shown that Curly Waterweed is not one of their preferred food sources in the UK (CEH, 2004). Their introduction would negatively impact the remaining native submerged vegetation. Note also that it is illegal to introduce fish to ponds (except garden ponds) without appropriate legal approval.

Release of a leaf-mining fly, *Hydrellia lagarosiphon*, is being considered in Ireland. An application for release in New Zealand has been deferred and may be reintroduced in 2018 (Manaaki Whenua, 2018).

Mechanical

Light-exclusion using plastic sheeting has only limited success. It is difficult to handle in the field and requires removal due to smothering of native plants and non-biodegradable nature (CAISIE Project, 2016).

Preventing spread

Preventing the spread of Curly Waterweed between areas is key in any attempts to contain or eradicate the species. Check, clean, dry is the standard recommended biosecurity measure. In addition to this, a study has shown that treating equipment with hot water (45°C for 15 minutes) is as, or more, effective for Curly Waterweed, with 97% mortality 1 hour after treatment compared with drying which required around 3.2 days for 90% mortality. The compares to 17 days required for 90% mortality with no treatment (placed in unsealed plastic bags and stored in a climate controlled room at 14 ± 1 °C).

Legislation

Under the EU Invasive Alien Species Regulation, as well as Section 14 (2) of the Wildlife and Countryside Act 1981 (as amended) and Article 15 (2) of the Wildlife (Northern Ireland) Order 1985, it is an offence to plant this species, or otherwise cause it to grow, in the wild. Under the EU Invasive Alien Species Regulation it is also an offence to import into the EU, keep, grow or cultivate, transport (to, from or within the EU; except to facilitate eradication), place on the market, use or exchange this species - unless there are specific exemption or permit.

Health and Safety

Useful resources and guidance on health and safety when planning a project working with invasive species is available on the GBNNSS website: http://www.nonnativespecies.org/index.cfm?pageid=266

Acknowledgements

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References

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Where To Go For More Information

- http://www.anglingtrust.net/
- http://www.invasive-species.org/
- http://www.europe-aliens.org/
- http://www.nonnativespecies.org/beplantwise
- http://www.nonnativespecies.org/home

RAPID

RAPID is a three year EU funded LIFE project led by the Animal and Plant Health Agency (APHA), with Natural England and Bristol Zoological Society as key partners that piloting innovative approaches to Invasive Alien Species (IAS) management in freshwater aquatic, riparian and coastal environments across England. The project is supported by a number of further Technical Partners.

http://www.nonnativespecies.org/rapid

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