GOOD PRACTICE MANAGEMENT

Floating Pennywort (*Hydrocotyle ranunculoides*)

RAPID

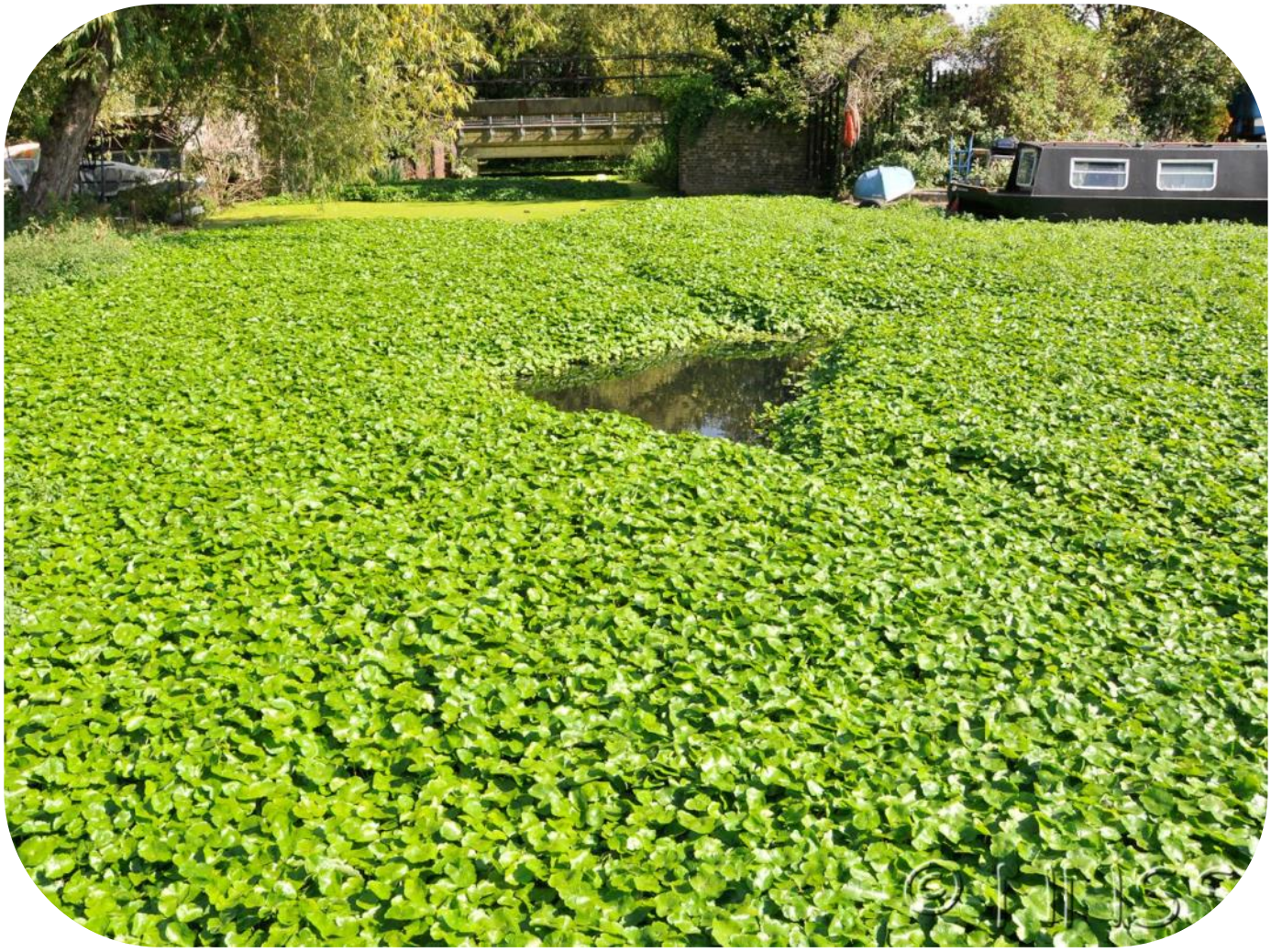
Reducing and Preventing
Invasive Alien Species Dispersal

GOOD PRACTICE MANAGEMENT GUIDE FOR
Floating Pennywort (*Hydrocotyle ranunculoides*)

Other names: Water Pennywort

For ID guides and more information:

http://www.nonnativespecies.org/factsheet/factsheet.cfm?speciesId=1766
https://www.cabi.org/isc/datasheet/28068
http://www.qbank.eu/Plants/Controlsheets/Hydrocotyle_ranunculoides_office_guide.pdf



Floating Pennywort (*Hydrocotyle ranunculoides*)
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MANAGEMENT SUMMARY

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Ecology and impact of Floating Pennywort

This plant can be difficult to detect in early stages of invasion, so often management only begins when plant is well established. The maximum growth period for Floating Pennywort is late summer/early autumn, when it forms extensive floating mats. This species overwinters on margins/banks as smaller/ flatter plant. Floating Pennywort has proved difficult to control in the past due to its rapid growth rates, its ability to vegetatively regrow from seeds/roots and even a single node fragment, as well as its resistance to chemical control. Due to this high regeneration capacity of its shoots and fragments *H. ranunculoides* can spread downstream and disperse to new regions very easily by means of waterfowl via water courses and by human intervention. This species is difficult to completely eradicate from sites at anything larger than a local scale without a large amount of resources and it may be more practical to aim to control and prevent spread of Floating Pennywort.

Effective management: summary

A combination of physical and chemical treatment has seen some success in the past, particularly for localised population reduction. Cutting followed by glysophate treatment was shown to be effective at controlling and removing Floating Pennywort. In 2013, Norfolk Non-Native Species Initiative (NNNSI) has successfully eradicated Floating Pennywort from the River Waveney. This work involved both volunteers and contractors spraying and pulling Floating Pennywort in the river, and continual monitoring of sites to ensure the success of control work and monitor any grow-back.

Whatever treatment you choose, continuous monitoring should occur in the first year of treatment, followed by monitoring of any regrowth in the following spring and summer. Overwintering of untreated material should be avoided at all costs, as this results in very rapid spread within a catchment.

MANAGEMENT METHODS

Chemical

Method: Glyphosate @ 6 l/ha in 400 litres of water. Efficacy greatly increased with use of the adjuvant Codacide Oil @ 1 l/ha

Potential equipment requirements (excluding PPE): Knapsack sprayer, preferably with a long-lance.

Most suitable situation for method: Particularly useful for terrestrial growth, thus avoiding deoxygenation problems. Good for sites that have poor access for mechanical removal, or as a treatment following removal.

Efficacy: Good, but less effective in late summer when the rafts become denser. Late summer treatments are effective against regrowth, if the site was treated earlier in the year. Up to end of July is the best time to apply chemical control, but if it is necessary to minimise damage to non-target species, treatment can be delayed until end of growing season when other plants have died back. The efficacy of chemical treatment is greatly improved with the addition of an adjuvant such as Codacide Oil or Top Film.

Constraints: Requires AqHerb01 approval and NPTC PA1 & PA6 qualifications. Potential non-target damage. There is a risk of deoxygenation if large decomposing biomass is not removed

Timescale: Decomposition following treatment can take up to 6 weeks in slow flowing water. However, thick mats can act as barriers to smaller leaves and prevent control being fully carried out. Best practice management is to follow up initial treatment with spot treatment through a hand lance, or removal of live plants by hand 2-4 weeks after the first application of chemical treatment. One study ((Newman J.R. & Duenas M.A. 2010; Aldridge et al. 2017) suggests that glyphosate with Top Film is most effective up until July and that that glyphosate with Codacide Oil works better from July onwards).

When to manage Floating Pennywort with glyphosate

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

Mechanical

Areas where cutting/pulling takes place must be netted to ensure fragments don't spread downstream. All cut material must be removed from the water and safely disposed of, preferably on site, well away from water courses.

It is possible to strongly reduce Floating Pennywort with mechanical/physical methods in localised areas if treatment is repeated. However, physical methods have historically not been successful at completely eradicating this species. A good way to follow up mechanical cutting (to ensure removal success) is to go back and remove any remaining fragments by hand. This technique was successfully employed at Gillingham Marshes in Suffolk to significantly reduce cover of Floating Pennywort (Kelly 2006) using a mechanical digger for initial removal, then following up by hand-picking at least monthly throughout the growing season (March-September).

When follow up treatments are carried out, it is essential that nets/barriers used to collect plant fragments and any other equipment are cleaned thoroughly between treatments to avoid reinfection.

Cutting

Method: Weed-boat/reciprocating blades. Site netted to retain propagules.

Potential equipment requirements (excluding PPE): Specialist cutting equipment/weed boat. Vehicle & trailer if not disposing at site. Stop-nets and sweep nets.

Most suitable situation for method: Useful for reducing biomass of large infestations prior to chemical control.

Efficacy: Good, if propagules can be contained.

Constraints: Requires access if disposal is off-site. Expensive and it is likely this treatment would need to be repeated regularly, particularly in eutrophic situations. Avoid damage to the habitats of sensitive species, such as water voles and nesting birds.

Timescale: Cutting between July – Oct stops species becoming dominant.

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

Mechanical (cont)

Mechanical pulling

Method: Pulling using a hydraulic rake or bucket. Location netted to retain propagules

Potential equipment requirements (excluding PPE): weed-boat/tractor fitted with hydraulic rake or bucket. Vehicle & trailer if not disposing at site. Stop-nets and sweep nets.

Most suitable situation for method: Useful for reducing biomass of large infestations, prior to chemical control or hand pulling. Has better long-term control on established infestations than cutting.

Efficacy: Good, particularly when the rafts are mature

Constraints: Requires access. Avoid damage to the habitats of sensitive species, such as water voles and nesting birds. Can be expensive.

Timescale: Pull during growing season (March-Oct)

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

Hand pulling

Method: Hand-pulling, disposing of material by composting away from water habitats.

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

Most suitable situation for method: Particularly relevant for smaller infestations, but can be very effective against any size of infestation, depending on the resources and time available. Sites with good access or sensitive areas where non-target damage is an issue. Suitable for volunteer groups.

Mechanical (cont)

Hand pulling (cont)

Efficacy: Good, if propagules can be contained and resources exist to regularly repeat the task.

Constraints: Time-consuming (must be done carefully to ensure fragments do not break off), and requires good access

Timescale: Can be done throughout the year

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

Disposal

The Regulatory Statement with guidelines 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

Biocontrol

CABI is currently researching potential methods of biocontrol of Floating Pennywort with 2 control agents (the stem mining fly, *Eugaurax floridensis*, and the weevil *Listronotus elongatus*), but this is not widely available yet and the efficacy of these agents is still not certain. Research is ongoing and a test release may happen soon.

Preventing spread

Once escaped in the wild, fragmentation and dispersal of Floating Pennywort, (*Hydrocotyle ranunculoides*) can result from a variety of management and recreational activities. As this species is difficult to eradicate, raising awareness and practicing good biosecurity is key to effective management and preventing further spread. For guidance on this, please follow the Check, Clean, Dry guidance in the link below:

http://www.nonnativespecies.org/checkcleandry/index.cfm

Legislation

Floating Pennywort is listed under Schedule 9 of the Wildlife and Countryside Act in England and Wales (2010). It is an offence to plant or otherwise cause to grow in the wild.

Health and Safety

Use of glyphosate requires AqHerb01 approval and NPTC PA1 & PA6 qualifications.

Application to use herbicides in or near water
City & Guilds Level 2 Principles of Safe Handling and Application of Pesticides (PA1)
City & Guilds Level 2 Award in the Safe Application of Pesticides using Pedestrian Hand Held Equipment

Health and Safety Executive Code of Practice for Plant Protection Products

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

Ineffective control

From the current evidence, the following methods are widely considered to be ineffective or untested at controlling Floating Pennywort:

Shading - not a viable option for control

Increasing flow of water - may restrict the growth of Floating Pennywort is situ, but this is not recommended as it may increase the spread of the plant downstream

Grazing - animals tend to only remove the leaves and not the whole plant, thus not solving the problem of vegetative fragments

Dredging - does not seem to be an effective method

Glysophate used without adjuvant - has been shown in trials to have a negligible effect on controlling Floating Pennywort. Furthermore, using glysophate without an approved adjuvant is not recommended as the herbicide is also rapidly excreted from the plant.

Hydrogen peroxide - has some visual encouraging effects, but does not in fact kill the plants.

2,4 D amine – this chemical has been used for controlling Floating Pennywort in the past, but is not recommended due to difficulties caused by rapid translocation and excretion of the herbicide by the plant.

Increasing salinity, liquid nitrogen treatment and using flame treatments — thought to have some effects on reducing Floating Pennywort, but as these have not been widely tested and are not recommended.

References

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Acknowledgements

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Where To Go For More Information

- http://www.anglingtrust.net/
- https://www.cabi.org/
- 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

Animal & Plant Health Agency

NATURAL ENGLAND

Bristol Zoological Society

Life

NATURA 2000