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GOOD PRACTICE MANAGEMENT

Parrot's feather (*Myriophyllum aquaticum)*

RAPID
Reducing and Preventing
Invasive Alien Species Dispersal

GOOD PRACTICE MANAGEMENT GUIDE

Parrot's feather (*Myriophyllum aquaticum)*

Other names: Water feather, Brazilian water-milfoil, *Myriophyllum brasiliense*, *Myriophyllum proserpinacoides*

For ID guides and more information:
http://www.nonnativespecies.org/index.cfm?sectionid=47

Parrot's feather (*Myriophyllum aquaticum*)

MANAGEMENT SUMMARY

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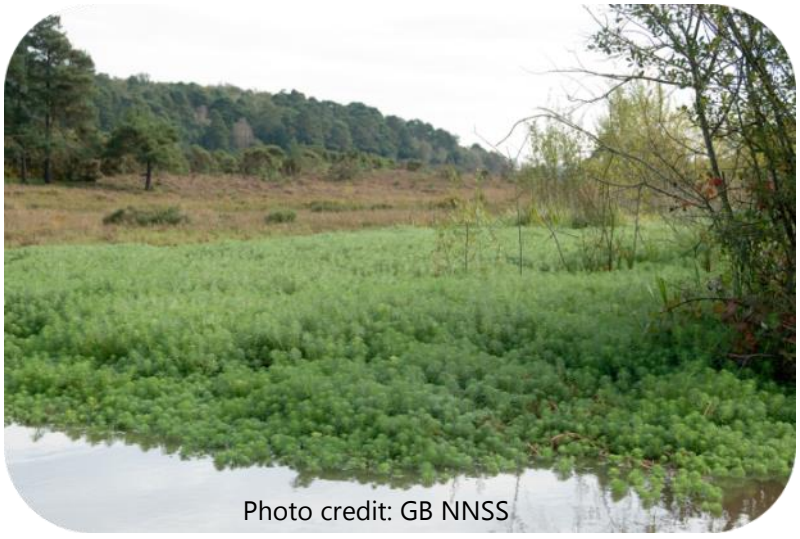
Ecology and impact of parrot's feather

Feather (*Myriophyllum aquaticum*), is a bright green or blueish green perennial freshwater herb named for its feather-like leaves which can be both submerged and/or emergent. The most distinctive trait of emergent leaves is that they are bright green and much stiffer than submergent leaves. Emergent leaves can grow up to 30cm above the water surface and look like tiny fir trees. Native water-milfoil species do not have this emergent feature.

This plant is native to South America and typically grows in sediment in freshwater ponds, rivers and canals. Parrot's feather prefers warm, shallow eutrophic conditions, but tolerates coastal or brackish waters. It can form dense rafts and small fragments propagate easily, making mechanical removal difficult. In its introduced range, the plants are entirely female and all replication is via tough rhizomes which are tolerant of desiccation and can root even after many months of removal. It is intolerant of prolonged cold winter conditions, but can survive short, infrequent frosts such as mild winter conditions in the UK.

Detrimental impacts of parrot's feather include interference with flow of water, increased risk of flooding, blocking of hydroelectric power plants, interference with fisheries and recreation, and threat to native species of plants, fish and invertebrates through shading and monopoly of resources (CABI, 2018).



Parrot's feather (*Myriophyllum aquaticum*) blocking a waterway

Effective management: summary

It is difficult to achieve complete eradication of infestations of parrot's feather. Treatment is usually a combination of more than one method and is likely to continue over a number of years before the plant is completely eradicated. Complete eradication will only be achieved if source population is treated. (Sussex Wildlife Trust).

MANAGEMENT METHODS

Environment Agency Guidance - Treat or bury all types of invasive non-native plant material

You must:

1) Have a management plan which sets out how you'll dig up, treat or bury the material to prevent further growth or spread beyond the site
2) Bury the material on land that's of low-habitat value (land without conservation designations or protected species), in an area that's likely to be undisturbed and more than 7 metres away from an adjacent landowner's site
3) Make sure that the material does not contain pollutants that will pose a threat to groundwater quality
4) You must not store the material for more than 12 months before treating or burying it.

Prevention

The best form of invasive species management is prevention. If prevention is no longer possible, it is best to treat the weed infestations when they are small to prevent them from establishing (early detection and rapid response), such as following the Check Clean Dry procedure. Consistent follow-up work is required for sustainable management. Advice on CCD, other biosecurity measures and preventing the spread of invasive species can be found at: www.nonnativespecies.org.

MANAGEMENT METHODS

Mechanical

Where the parrot's feather grows in thick intertwined mats, mechanical removal is very difficult and has proved to be unsuccessful in the past (CABI, 2018). Care should be taken not to inadvertently spread fragments attached to clothing or equipment. Strict cleaning protocols should be adapted and adhered to. Good practice biosecurity should be carried out. Correct disposal of plant material is also essential. (Kelly, J. & Maguire, C.M. 2009). All plant parts and fragments must be removed or re-growth will occur.

Hand-pulling and dredging: Hand pulling and harvesting may offer temporary control on small infestations of less than one acre. (Madsen, J.D. & Wersal, R. 2007). Dredging is generally very expensive and not feasible for most management situations (Madsen, J.D. & Wersal, R. 2007). Raking may not be feasible due to the rapid biomass production of parrot's feather—the dense, heavy mats may damage equipment. Drawdown may offer control in some situations, however, complete drying of bottom sediments must occur since parrot's feather will root and survive in moist soil.

Cutting: *M. aquaticum* regrows rapidly from shoot fragments and as such, mechanical cutting alone is rarely effective. (Jacot-Guillarmod, 1977). However, more effective harvesting systems that remove the biomass and accumulated nutrient reserves may offer control possibilities (EPPO, 2004). Mechanical control is effective for removing large infestations of this plant in areas where access is available for weed cutting buckets or boats. Care should be taken to restrict the downstream movement of stem fragments which will result from cutting operations as regrowth is rapid from this type of propagule. The stems of this species are especially brittle and fragmentation occurs readily when the plant is cut. Chemical control of remaining plants should be undertaken (CEH, 2004).

When to manage parrot's feather mechanically (green):

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dredging												
Pulling												

Chemical

Although *M. aquaticum* is considered by some to be susceptible to herbicides, it is difficult to achieve complete control. The emergent stems and leaves have a thick waxy cuticle and it requires a wetting agent to penetrate this cuticle. Often the weight of the spray will cause the emergent vegetation to collapse into the water where the herbicide is washed off before it can be translocated throughout the plant (Washington State's Department of Ecology, 2009).

Chemical herbicides have been used for the localized control of parrot's feather (e.g. Morreira et al. 1999). Herbicide control of aquatic vegetation is prohibited in numerous countries (e.g. no herbicides are approved for submerged species in Europe) (De Winton et al. 2013; Hussner et al. 2017). Therefore it is important to consider local regulations before using herbicide control. Glyphosate has given good results used after drying out the application area, though treatment using this pesticide has been showed to have an impact on water quality (Moreira et al 1999). Glyphosate is currently legal to use in the EU (including the UK) though this might change in the near future according to the European Commission. Impacts on non-target species should be considered prior to herbicide use.

Emerged and submerged vegetation may require different herbicides (though note as mentioned previously, there are currently no herbicides approved for use on submerged species in Europe) and adjuvants may increase the efficacy of the treatment.

When to manage parrot's feather chemically (green):

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Chemical												

Environmental control

This species is not tolerant of fast flow and does not appear to grow in rivers or fast flowing streams. Increasing flow by narrowing slow flowing channels may be a way of controlling the growth of this species.

Most emergent species are controlled by increasing shade. This can be achieved by using light barriers such as UV sheeting weighted down. The planting of trees along the south side of water bodies or by placing a floating opaque material over the water surface in early spring has also been suggested. Shade

Ineffective management

Biological Control

There are currently no known successful biocontrol agents for parrot's feather. Parrot's feather has a high tannin content so most grazers, including grass carp, find it unpalatable (Washington State's Department of Ecology, 2003).

Mechanical Control

As mentioned above. There are only limited circumstances where mechanical cutting and dredging may prove useful and usually this would be in combination with other techniques. Where the parrot's feather grows in thick intertwined mats, mechanical removal is very difficult and has proved to be unsuccessful in the past (CABI, 2018).

Legislation

Parrot's feather is listed under Schedule 9 to the Wildlife and Countryside Act 1981 with respect to England, Wales and Scotland. It is covered by Article 15 (2) of the Wildlife (Northern Ireland) Order 1985 as well. As such, it is an offence to plant or otherwise cause this species to grow in the wild. This species is also banned from sale in England due to its significant negative impacts on biodiversity and the economy. This is covered under The Wildlife and Countryside Act 1981 (prohibition on Sale etc. of Invasive Non-native Plants) (England) Order 2014

Parrot's feather is also on the EU List of Invasive Alien Species of Union Concern. The EU Regulation (1143/2014) on invasive alien (non-native) species. 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

A link to other resources on legislation of INNS:
http://www.nonnativespecies.org/index.cfm?sectionid=23

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

Health and Safety cont.

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

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- EPPO data sheet on Invasive Plants: *Myriophyllum aquaticum* (http://www.nonnativespecies.org//downloadDocument.cfm?id=1089)

- Global Invasive Species Database ISSG website (http://www.iucngisd.org/gisd/species.php?sc=401)

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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

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