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Pontederia cordata

Species description

Pickerelweed (*Pontederia cordata*) is a rhizomatous perennial aquatic plant native to the American continent. The species was introduced to Europe, including Belgium, through the horticultural trade as a popular ornamental plant for garden ponds. The first records of pickerelweed's presence in the environment in Belgium remain rather unclear but appear to date back to the 1980s. Intentional introduction and disposal of aquarium waste in water systems are probably at the origin of its escape into the wild. Today, while emerging in some countries such as Belgium, the plant is already considered a problematic aquatic invasive species in several countries worldwide. It is therefore a species of the LIFE RIPARIAS alert list. Although easily detectable, its distribution on the Belgian territory is probably underestimated due to a lack of recorded observations and monitoring efforts.

Fig 1. *Pontederia cordata*

Guide de gestion complet en version française

Volledige beheergids in Nederlandse versie

Photo:: Marie Patinet

Pontederia cordata

Pickerelweed grows in shallow, stagnant waters such as marshes, ponds or lake edges. The plant can either be free-floating, with stems emerging above the surface, or rooted in water system margins up to depths of 40cm. As an emerging invasive species in Belgium, the plant might cause, in the near future, diverse environmental, social and economic impacts. For instance, in some parts of its introduced range, it has been observed that this invader has the ability to rapidly form dense mats with detrimental impacts on the ecosystem and biodiversity. It notably strongly competes with key plant species and can alter vegetation composition. Pickerelweed has also been found to provoke important water pond evaporation, which could raise concerns for habitats that are already subject to low water level or seasonal water shortage. Social and economic effects include restriction of recreational activities (angling, boating) and management-related costs.

Biological characteristics, reproduction and spread

In Belgium, flowering of pickerelweed occurs between June and August, with flowers extending above the water surface. In some parts of its native range, flowering is almost continuous.

Reproduction of pickerelweed in western Europe is partially vegetative through fragmented rhizomes. When the plant's rhizomes break into fragments, whether naturally or because of human activity, these small fragments can form a new plant, and therefore a new population away from the initial invaded area. The species also reproduces by seeds, which are contained in fruits (one seed per fruit). The fruits are buoyant and have the ability to float during approximately 2 weeks. While seeds do not seem to be affected by the absence/presence of light to germinate, they appear to require cold stratification. Higher germination rates have also been observed under flooded conditions (underwater). Seeds do not seem to survive for more than 1 year. The spread of this invasive weed mainly occurs through the drift of fragments and seeds within water systems, but also via human activities or zoochory. The species' high regeneration and dispersal abilities highlight the importance of implementing effective management measures.

Fig 2. Pickerelweed invasion forming a dense mat. Photo : Etienne Branquart

References

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General considerations about management

Very few management options have been implemented to control and eradicate the species. Available information on management remains highly limited. Local eradication of pickerelweed is considered achievable for small infestations. However, the feasibility of eradicating populations must be assessed on a case-by-case basis, considering site specificities, and thoroughly discussed within the management team.

Due to the species' ability to reproduce through seeds and fragmentation, precautionary measures must be implemented before management to prevent seed and fragment spread. It is essential to initiate management actions before seed production. Managed areas are also isolated by physical barriers.

The harvested plant material must be safely disposed of far away from water and moist areas and is either composted or dried before incineration. Material that has been in contact with the plant as well as soil that may contain seeds (e.g. machines, nets), should be checked, cleaned and dried before being taken to another site. It is recommended to restrict public access to the managed area in order to isolate the infestations as much as possible and limit the risk of spread.

Managed and surrounding areas must remain under enhanced surveillance for a period of 3 to 5 years after the implementation of the last treatment.

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Fig 3. Pickerelweed population colonising the edges of a large pond. Photo : Marie Patinet

Manual/mechanical removal

v Control and local eradication can be achieved

v Manual removal is highly selective and will have minimal impact on ecosystems and other organisms

x The method is only practical for small and early-detected populations

x Manual removal is time-consuming and labor intensive

Method description

The principle is to remove the whole plant from the ecosystem. Plants are dug out in a way that all plant material is removed from the soil, including roots and rhizomes. This management strategy can be carried out manually or with the use of machinery. It is performed during the vegetative period but before seed production. If seed production has already occurred, it is necessary to remove the flowers to prevent seed dispersal. Operators must ensure that every part of the plant is removed as it will regrow from fragments of rhizome. Manual removal is repeated annually for several years to progressively eliminate seedlings and regrowth from remaining rhizomes. The measure is maintained until no regrowth and seedling are observed.

Material

Management: Spades or little diggers, gloves

Transport: Bags

Fig 4. Manual removal of pickerelweed populations. Photo : Etienne Branquart

References

Dana, E.D., García-de-Lomas, J. and Verloove, F. (2021) First record of *Pontederia cordata* L. (Pontederiaceae) in southern Spain and risk assessment for Europe. *BioInvasions Records*, 10(4), 775–788.

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The impact of management actions on ecosystem services

While the adverse effects of IAS are well-known and provide strong incentives for implementing management actions, the impacts of these management actions on ecosystems and the services they provide are less considered. The matrices are the result of expert assessments of the evolution of relevant ecosystem services (ES) from a highly invaded situation towards a managed situation. ES evolution is considered over 2 given periods of time: 1 year and 5 years after the initiation of management.

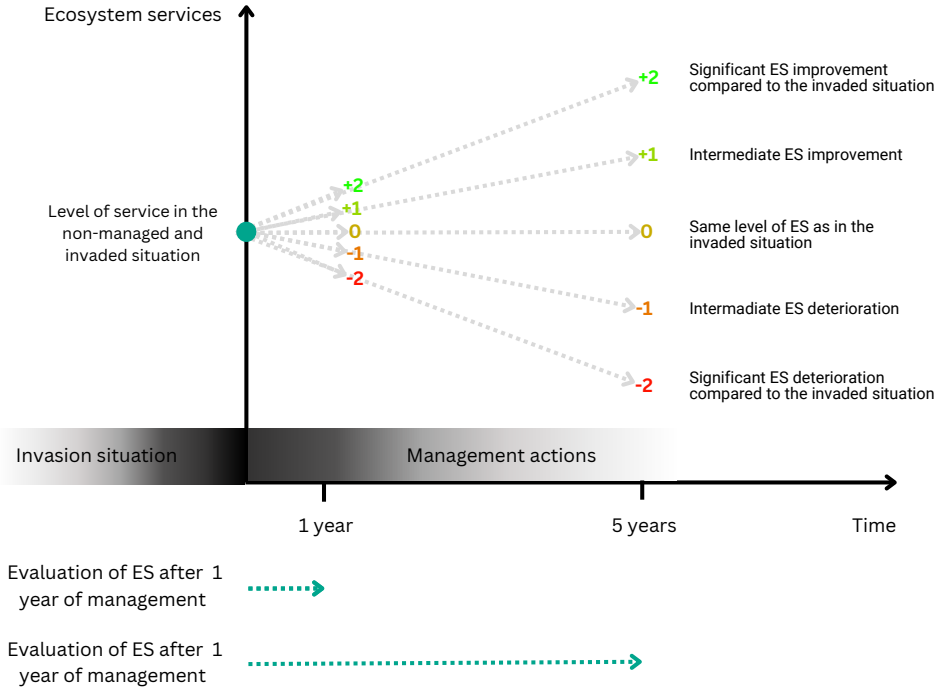

Fig 5. Representation of the survey process

Each matrix displays the average impact scores of management methods on ecosystem services. These scores have been associated to colours to facilitate the visualization of the impacts of every method on every relevant ecosystem service. Green indicates a significant improvement in the ecosystem services (ES) due to management, orange represents no or minimal effect, and red signifies a negative impact of the method on the ES.

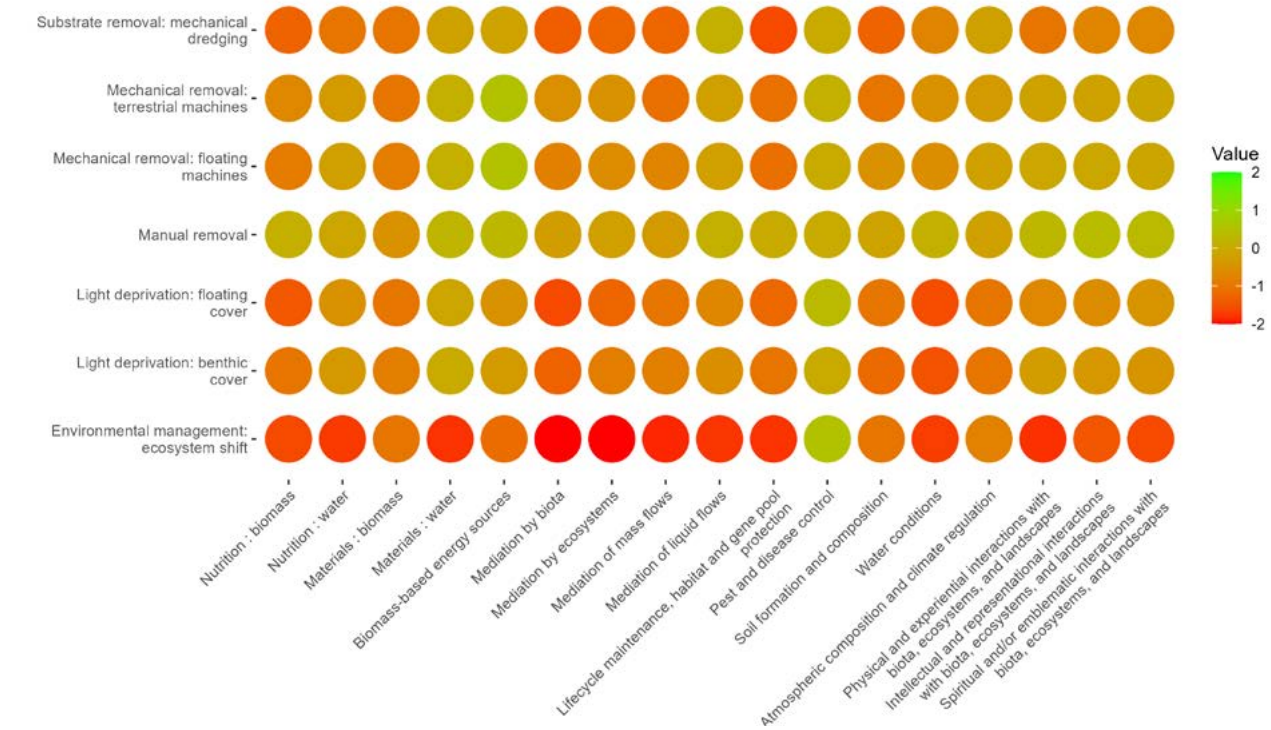

Fig 6. Matrix displaying the impact of management methods for aquatic plant species on ecosystem services after 1 year

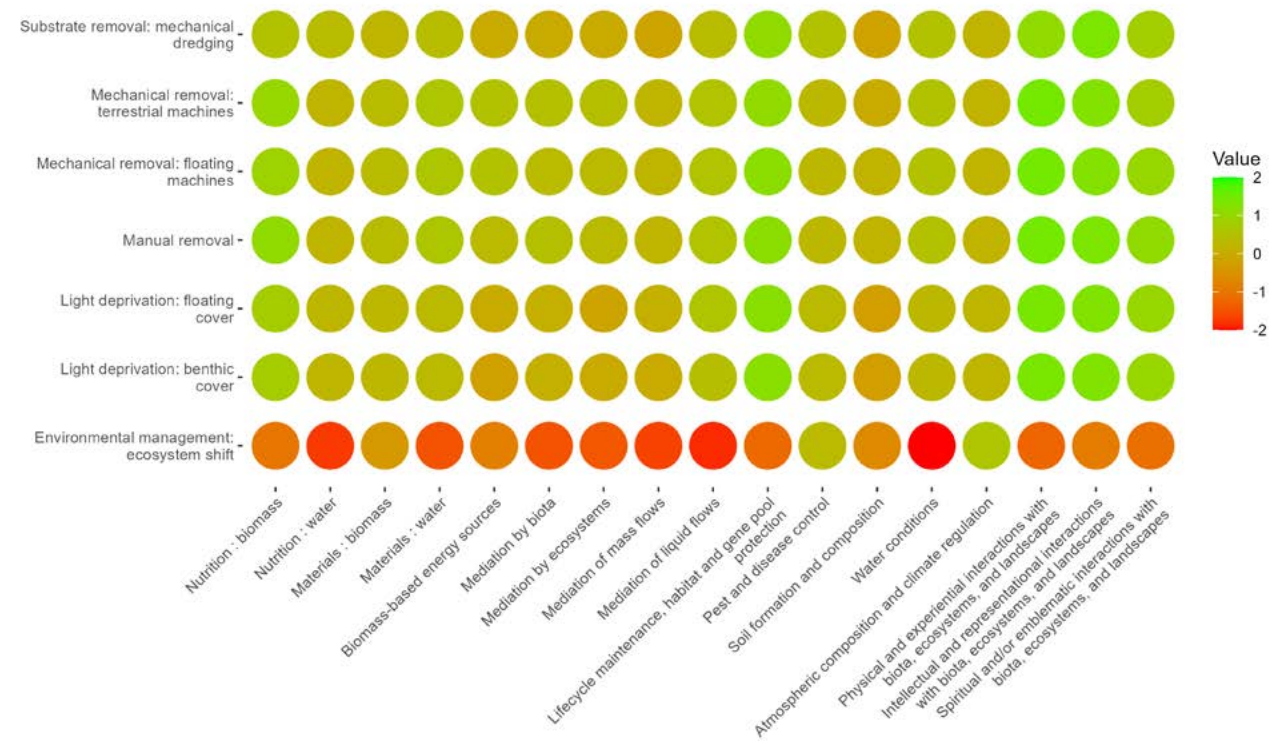

Fig 7. Matrix displaying the impact of management methods for aquatic plant species on ecosystem services after 5 years

LIFE RIPARIAS

Reaching Integrated and Prompt Action in Response to Invasive Alien Species

Citation

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