The GB Water Primrose *Ludwigia grandiflora* eradication programme: 2017 progress report

Background

Water primrose *Ludwigia grandiflora* is an ornamental perennial plant native to South and Central America, associated with wetlands and marginal zones of watercourses, ditches, ponds and lakes. The plant has been introduced into the UK through the ornamental aquatic plant trade. It primarily spreads by vegetative fragments and forms dense carpets of growth that exclude native biodiversity, increases flood risk and siltation and degrades amenity.

A coordinated GB eradication programme commenced in 2009. In 2010, the GB Non-Native Species Secretariat Programme Board issued a risk assessment that identified a high risk of establishment and spread across the whole UK. This was largely based on the impact it was already having elsewhere in Western Europe, particularly France (right). For this reason, water primrose became the target of the first Invasive Species Action Plan, which described procedures for its eradication in GB and tasked the coordination of that role to the Environment Agency. Due to concern over potential escapement and spread of this species, prior to 2014, the sale of water primrose had been discouraged by a voluntary code of practice. To prevent any further introductions, in April 2014 water primrose was banned from sale in England and Wales.

Legislation

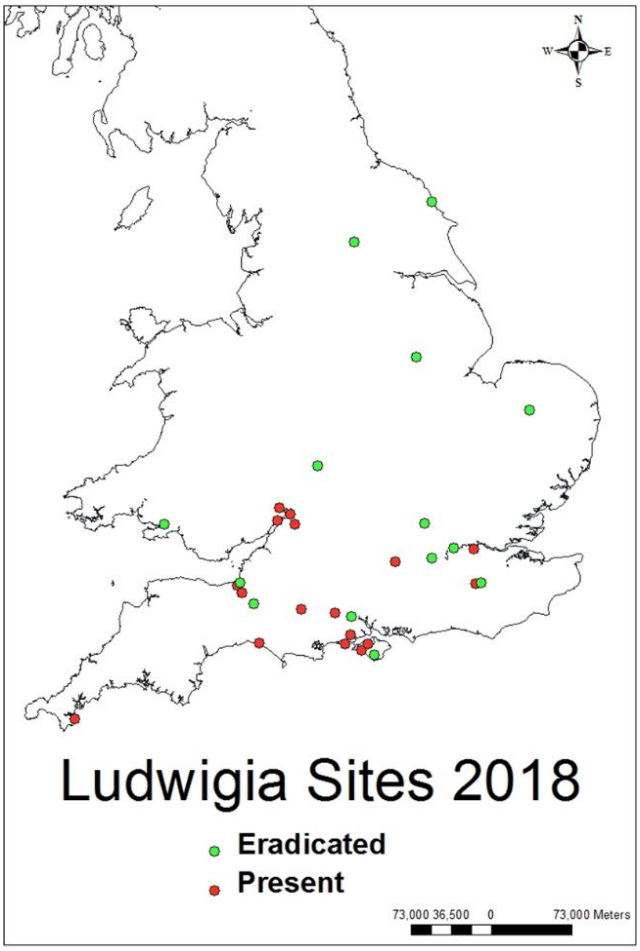
Water primrose is listed on Schedule 9 of the Wildlife & Countryside Act (WCA) 1981, making it an offence to plant or allow this species to grow in the wild. It is also listed as an 'EU species of concern' under the Alien Invasive Species Regulation 2015. In

essence, landowners are obliged to prevent the spread of this species from their property. Its sale and movement is also prohibited.

The WCA provide new powers to deal with INNS as a result of amendments by Infrastructure Act 2015. These new powers in Schedule 9A WCA relate to species control agreements ("SCAs") and species control orders ("SCOs"), and empower the Environment Agency (along with the other "environmental authorities" Natural England and Forestry Commission) to enter into such agreements and make such orders. We would always seek to cooperate with landowners and only resort to such powers when unavoidable. To date, this has not been necessary.

Where has water primrose been detected?

Water primrose is predominantly found in Southern England, but has been found as far north as Scarborough (below). To date, all sites north of the Severn valley are believed eradicated.



Water primrose has the potential to invade a variety of habitats, particularly ponds, lakes, wetlands, ditches and other watercourses. The current stage of invasion suggests that it is mostly confined to primary and secondary sites of introduction.

With respect to flowing water courses, only one river location and three ditch sites have so far been invaded. One of those ditches at West Bay, Dorset, has proved to be one of the most intractable sites to date; having been mechanically excavated once and sprayed 22 times over a nine-year period without yet eradicating the infestation.

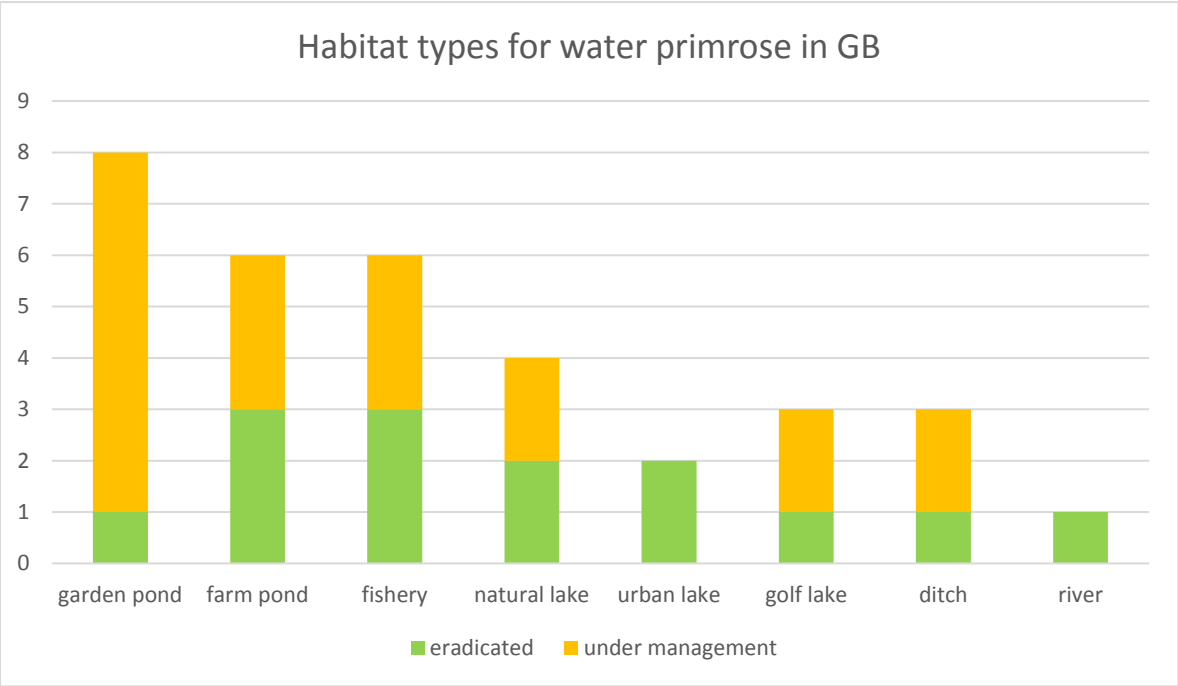


Figure 1: Water primrose habitat types in GB

The majority of sites with confirmed presence are garden ponds (Figure 1, above) which, strictly speaking, fall outside of the remit of this eradication programme. However, the definition of 'garden pond' is vague, and some of the ponds discharge to watercourses. We have therefore adopted the approach of engaging with the relevant pond owners and encouraging them to eradicate water primrose from their location. So far, this approach has proved cheap and successful. We have produced a 'toolkit' to facilitate a dialogue between our Area staff and the relevant landowners or site managers. The toolkit also provides an information resource for Area staff who become responsible for newly-found sites and have not been previously been acquainted with water primrose.

Programme coordination

Unlike fish eradication programmes, there is no dedicated team performing the control. The methods employed are not specialist skills and don't require a Home Office licence. Instead, each new record is allocated to a site coordinator, who is either an Environment Agency or Natural Resources Wales officer, or a project manager for a Local Action Group. The site coordinator liaises with the landowner to explain the need for removing the water primrose, and arrange its subsequent treatment and monitoring. Control is either performed by the landowner (often at their own expense) or the coordinating body.

There are both drawbacks and benefits to this approach. The dispersed network of coordinators provides less direct control over the programme. In the short-term this may slow the progress of control at some sites, however, the benefits are significant. It is hard to eradicate water primrose, and tiny regrowth can persist for a number of years (see image). A site coordinator is able to ensure the level of monitoring necessary to ensure that the control has achieved full eradication. Landowners are encouraged to share 'ownership' of the problem and therefore take an active interest in a successful outcome. Sites must be monitored and found to be free of water primrose for five years before the site is regarded as eradicated.

The devolved approach, engaging with landowners, volunteers and local officers, also increases the likelihood of finding satellite water primrose sites, managing the biosecurity on-site and potentially tracing the source of the infestation.

Methods of control

Most water primrose management has been performed using glyphosate-based herbicides, often in conjunction with adjuvants such as 'Topfilm'. This method has proved effective in reducing biomass, but requires repeated applications over a number of years and often results in tiny fragments surviving in the soil. Fluctuating water levels, particularly during the wet summer and autumn periods, complicates treatment and reduces efficacy.

Based on good practice in the Netherlands, mechanical removal is the preferred option for management, where the site conditions allow. Despite funding being available,

landowners are often reluctant to allow the disturbance associated with this control method, and disposal issues often complicate matters. The disposal issue has now been simplified by the adoption of a new Regulatory Position Statement allowing the burial of water primrose. In 2014, the largest infestation of water primrose was mechanically excavated, resulted in the removal of approximately 800 tonnes of silt, water primrose and *Crassula helmsii* from Braemore marsh SSSI. Water primrose has subsequently regrown at the site, but all new growth is being regularly manually removed or chemically treated and is limited to isolated plants.

Manual removal has proved effective in areas where water primrose has recently become established, but has had limited efficacy on larger sites, or where the plant is well-rooted or established amongst dense vegetation. Manual removal efficacy is improved if the roots are teased out with hand tools and other vegetation is cut back to allow good access and inspection.

Progress

Over the eight year period of the eradication programme, an additional 19 sites have been added to the 14 originally identified in 2009. Of those 33 sites, six have been confirmed as eradicated, having been inspected and found to be free of regrowth for a period of five years. A further eight sites are believed to be eradicated and are in their five-year inspection period. In addition to the 14 sites believed eradicated, a further 19 sites are in active management or are about to commence management. Most of those sites only have small areas of residual growth remaining.

Figure 2, below, describes the progress to date. There are various aspects of this graph that are encouraging. The blue line, total number of recorded sites (the sum of surviving and eradicated sites), is describing a declining trend, rather than the exponential increase normally associated with the distribution of an invasive non-native species. The red line, total number of surviving sites, appears to have plateaued and may be beginning to describe a slow decline, but it is too early to tell. The green line, the number of new sites, has declined. A positive interpretation of these trends would suggest that the combination of a ban on sale, improving public awareness, effective management and good biosecurity is resulting in a decline in the GB water primrose population. A less optimistic interpretation may interpret the reduced trend in new sites to less awareness of water primrose and the need to report its presence.

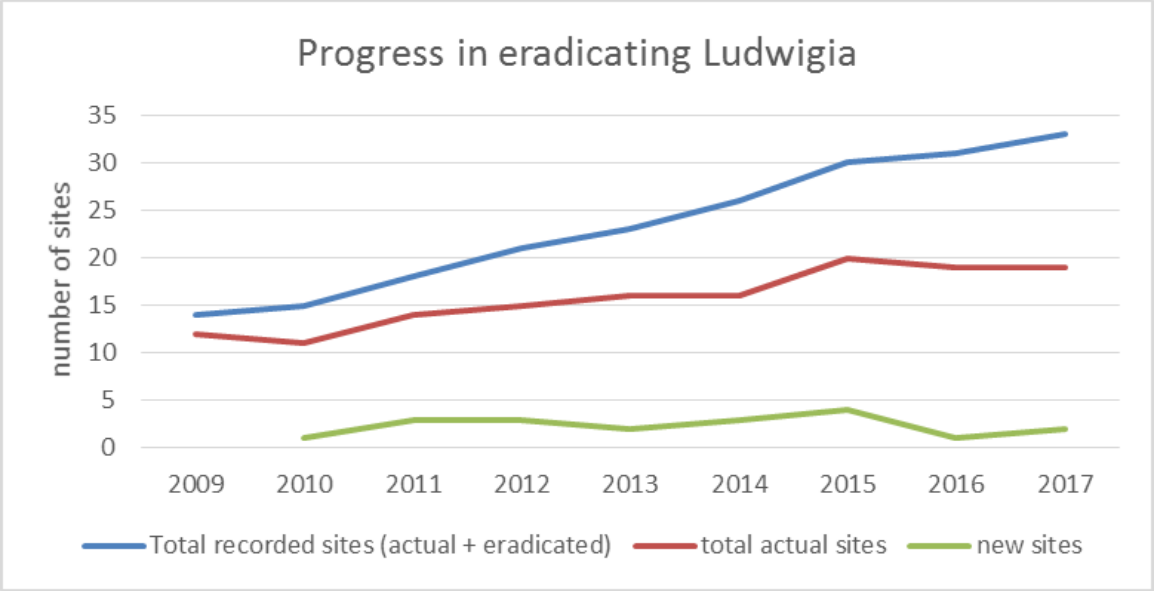


Figure 2. Progress of GB water primrose eradication programme

The total surface area of water primrose from known UK sites is 858.5 m^2. Of this area, 650 m^2 is due to a single fishery near Bridgwater, Somerset, discovered in 2017 and already undergoing treatment (below). The remaining 208.5 m^2 constitutes the total area of the other 18 sites in treatment, which is an area less than a tennis court.

In comparison, water primrose has achieved phenomenal spread elsewhere in its invaded range. In Japan, water primrose covered 30 ha of Lake Biwa in 2016 within seven years of its first arrival. At Marais Poitevin National Park, France, 1000 tons of water primrose was extracted four years after its initial establishment in 1994. Despite this effort, the authorities treated 1311km of primrose-infested riverbank in 2013 (Figure 3, next page).

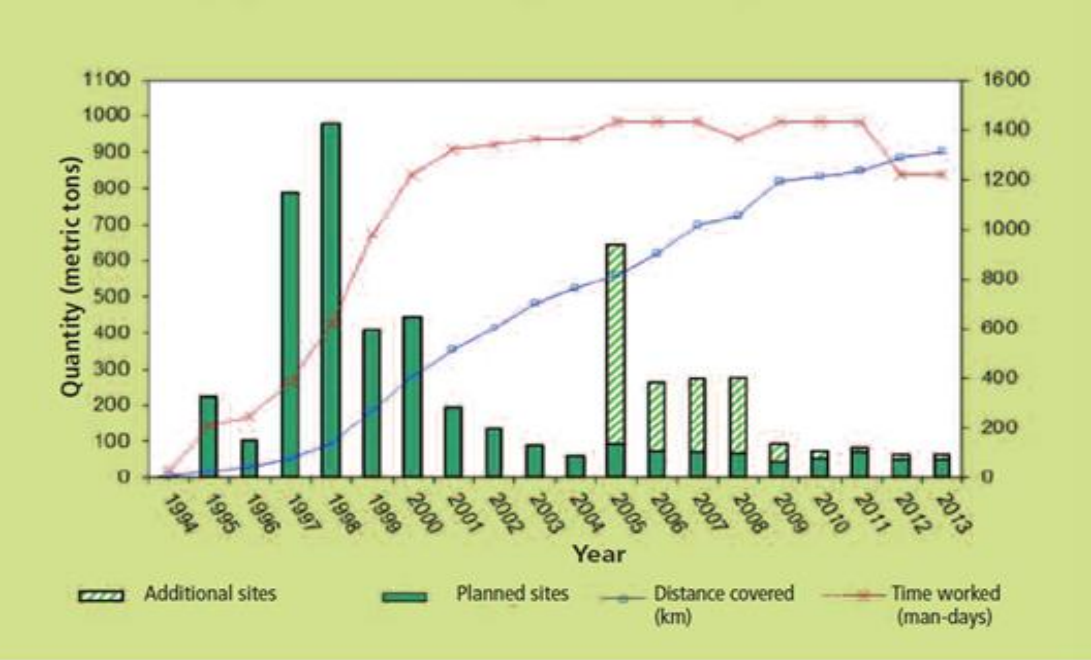


Figure 3: Water primrose management at Marais Poitevin National Park. Credit: Emilie Mazaubert, IIBSN

Whilst comparisons with water primrose elsewhere in its invaded range cannot be directly extrapolated to UK situations, these examples do demonstrate the potential for spread that water primrose has in novel territories.

Biosecurity

Preventing further spread is a crucial aspect of the programme. Each site has a biosecurity plan, reducing the risk of further spread and seeking to minimise propagule loss where sites discharge to watercourses. Management plans also have a biosecurity element, particularly if the work involves mechanical excavation and disposal. There is evidence to suggest that water primrose has the ability to produce viable seed, which is able to survive for at least four years. Previous studies had suggested that the production of viable seed in the UK population was unlikely. We are working with researchers to ascertain the importance of seed dispersal for water primrose spread.

Costs

In 2010, CABI were commissioned by Defra to produce an assessment of the economic impact of invasive non-native species in GB. The headline figures from the report stated that:

> *'it is estimated that the early eradication of the aquatic plant water primrose will cost £73 thousand compared to the £242 million that it might cost if the plant was to become fully established as it has on the continent in countries like France and Belgium.'*

We receive an annual budget of £10,000 as contribution towards the cost of managing water primrose. Our staff are in dialogue with the owners and managers of water primrose sites and bid for funds against this budget, if anticipated costs are likely to be beyond what the landowner is able to afford. This usually occurs either at the initial stage of site management, when the infestation is at its largest, or when mechanical excavation is planned. Our contribution is also used to match-fund against other suitable grant schemes. Most of the cost of management is borne by landowners. We also encourage the involvement of Local Action Groups, particularly with labour-intensive manual removal programmes.

Future planning

We anticipate that significant numbers of new water primrose sites will continue to be recorded for a number of years. The incidence of new sites will depend on the efficacy of the ban of sale, the level of public exposure to the 'be plant wise' campaign, the number of garden and ornamental ponds that currently have this plant (unknown), the efficacy of control and containment plans and the level of engagement in recording and reporting. Progress in eradicating sites will be dependant on future funding, but will also be influenced by the rate of spread, weather and evolving management techniques.

For the reasons above, it is too early to say how long the programme will need to continue to completely eradicate this plant. However, extrapolating from the current situation we might expect that the eradication programme might continue for another 15 years or more. This is a long-term commitment.

Thanks

I would like to record my thanks to everyone who has agreed to coordinate the eradication of one or more of the water primrose sites.

Recommendations

- Funding for control is secured for the duration of the eradication programme;
- The 'Be Plant Wise' campaign should be promoted amongst gardeners and the horticultural industry to reduce the incidence of disposal of water primrose, and other invasive non-native plants, into the wild;
- The 'Plant Tracker' phone app should be widely promoted to encourage better public participation in recording;
- Better public awareness of invasive species that are subject to eradication plans must form a core part of public engagement strategies.

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