SPECIES DOSSIER

Creating ponds for the Pondweed Leafhopper

MILLION PONDS PROJECT
Pond Conservation

A 50-YEAR PROJECT TO CREATE A NETWORK OF CLEAN WATER PONDS FOR FRESHWATER WILDLIFE

1. What is the Pondweed Leafhopper?

The Pondweed Leafhopper *Erotettix* (=*Macrosteles*) *cyane* is a very rare little bug, just 5mm in size(Figure 1), which is currently only found in three ponds in South East England (Figure 2). It is covered in a startling bright blue powder, but this coating rubs off easily when the leafhopper is caught or disturbed to reveal a dark blue colour beneath.

Rare species are very vulnerable. If conditions at just one of the ponds became unsuitable a third of the population would be lost. We hope that by creating new ponds within existing sites we can strengthen the population and buffer the Pondweed Leafhopper from extinction.

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Figure 1. The Pondweed Leafhopper on its favourite food plant Broad-Leaved Pondweed.

2. Habitat requirements

Adults and juveniles feed on the floating leaves of Broad-leaved Pondweed, *Potamogeton natans*. This host plant is relatively widespread but the Pondweed Leafhopper has apparently always been rare.

There are still a lot of unanswered questions about the habitat requirements of the Pondweed Leafhopper. The sites occupied include long established ponds, newly created ponds and a former brick works. Nothing is known about how the species disperses naturally and no-one has studied how it survives the winter or where it lays its eggs. This factsheet provides advice on how to create ponds based on the information we have so far.

Key messages

- **Create a complex of permanent ponds of different shapes and sizes, but with a depth of 0.75m to provide suitable conditions for the host plant.**
- **Locate ponds away from intensive land use. The rarity of the Pondweed Leafhopper suggests that it is probably dependent on good water quality.**
- **Locate ponds in sheltered sunny conditions. The adults are most often recorded on still warm days which may indicate a preference for warmer temperatures.**
- **Manage ponds using grazing animals at low-moderate stocking densities to prevent dominance of tall emergent plants.**
- **Monitor ponds to prevent the spread of invasive non-native plant species. Remove these plants before they become established.**

Data provided by Dr Alan Stewart

Figure 2. Current distribution for the Pondweed Leafhopper in the UK

3. Sites for Pondweed Leafhopper

When so little information is available on the exact requirements of a species, we must rely on replicating the characteristics of ponds which currently support populations.

Newdigate Brickpits, Surrey Wildlife Trust Reserve

This site was only discovered by J. Denton in 2002. Although the reserve has several ponds, the leafhopper has only been found in a large permanent rectangular pond (60x15x1.5m deep) which was originally dug to extract clay for the brickworks (Figure 3). The bug seems to favour deeper water, where it is found on an extensive floating mat of pondweed. The pond is sheltered by banks and trees, although it is not shaded. The shelter, shape and aspect of the pond (shortest width east-west) also limits the amount of wave wash. This site is only a few kilometres from a historical site, Holmwood Common, although the exact location of this earlier record is unknown.

Figure 3. Newdigate Brickpits, Surrey Wildlife Trust Reserve.

Dew pond on the Sussex Downs

This is the newest site for the Pondweed Leafhopper (P. Hodge 2007). It is a dew pond (16x16x0.75m deep) surrounded by sheep grazed chalk downland, although the pond itself is fenced off from grazing animals (Figure 4). In 2006 the pond was restored using an artificial liner covered with clay. Plants, including pondweed, were then transferred from other local sites. As a result, it is possible that other ponds in the area hold more populations of the Pondweed Leafhopper. As with many dew ponds, this pond has fluctuating water levels which does not seem to adversely affect the leafhopper, although very prolonged periods of drought may reduce the cover of the food plant.

Figure 4. Pondweed Leafhopper dew pond on the Sussex Downs.

Farm, near Heathfield, Sussex

The Pondweed Leafhopper was first recorded in this small (16x5x0.75m deep) pond in 2000 (Figure 5), but this is a long established farm pond and we have no way of knowing how long the leafhopper has been there. In fact, remarkably large numbers of the leafhopper have been recorded in this pond (200+) and the landowner is very interested in the rare bug which has chosen to make his pond its home. Bulbous Rush *Juncus bulbosus* was in danger of out-competing the pondweed host plant but this has been resolved by removing some of the *Juncus* and reprofiling a section of the pond to make it too deep for the rush to grow. This site is only c.4km from Dallington Forest (see below), although there is no information on the exact location of this former record.

Figure 5. Farm pond which is home to the Pondweed Leafhopper, Sussex.

Historical records

There are records from four historical (pre-1960) sites, supported by specimens in the Natural History Museum: Dallington Forest, Sussex; Loughton, Epping Forest, Essex; Holmwood Common, Surrey; Fifield, Surrey. The last location in a puzzle as there is no village of this name in Surrey. It is also impossible to know the exact location of the other ponds because we only have a place name and no grid reference.

4. Pond designs for Pondweed Leafhopper

With so few sites and a mixture of differing characteristics for the ponds with current records, we can look to the requirements of the host plant, Broad-leaved Pondweed, *Potamogeton natans*, to design ponds which may be suitable. However, Broad-leaved Pondweed is one of our most widespread aquatic plants. It can produce floating leaves in water between 0.3-1m deep, in water free from nutrients or in ponds which are nutrient rich, and can be found in both moderately acid and alkaline water.

Pond designs should therefore be based on the information we have about Pondweed Leafhopper but also on designs that will benefit a wide range of other pond species – i.e. ponds with high quality clean water.

Pond location

- To benefit existing populations, new ponds should be created adjacent to ponds (within the same site) with current records for Pondweed Leafhopper. If these projects prove successful, new ponds in other locations could be considered.
- Within these sites, create ponds in sheltered locations but with a sunny aspect; preferably south facing. Small ponds or those with a narrow shape will have less wave wash than larger ponds.
- Sites with some grazing will remain open and reduce the need for more major management works.
- Create a complex of ponds to maximise the available habitat for Pondweed Leafhopper.

Water source

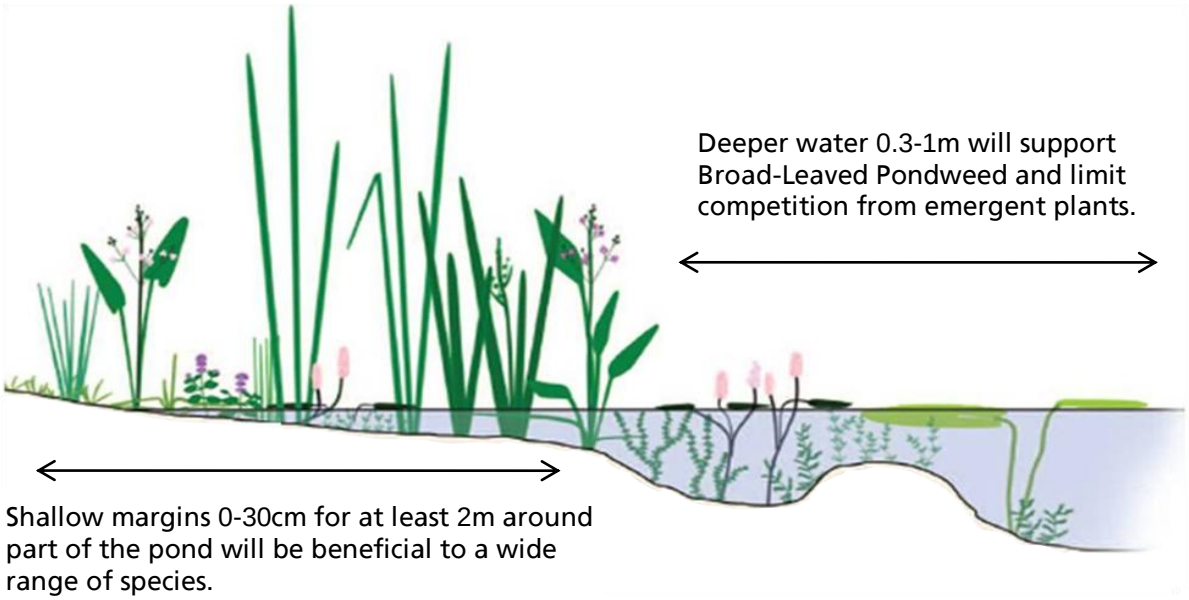
- The Pondweed Leafhopper has been recorded from both clay ponds and clay-lined chalk ponds, which suggests that it has a preference for circumneutral to mildly acidic ponds.
- Broad-leaved Pondweed can withstand some fluctuation in water levels but is generally found in more permanent ponds.
- Dew ponds require careful construction in order for them to hold water. They usually have fluctuating water levels and therefore will need to be relatively deep in the centre (~1m) in order for them to hold water some water during the summer.
- The rarity of the Pondweed Leafhopper may highlight its need for clean water ponds.

1. Look for a site which will provide the pond with an unpolluted water source. Choose areas like rough grassland or species poor chalk grassland. A pond in these habitats will add to the diversity of the site.
2. Ensure that there is no arable or other land where the ground is regularly disturbed or is likely to be high in nutrients. Avoid intensive grassland where fertilisers or pesticides could drain into the pond.
3. Avoid places likely to receive polluted run-off from roads, tracks, houses, yards or spoil heaps.

Pond size, depth, shape

- Create a range of pond sizes as it is unclear what the optimum dimensions are for the Pondweed Leafhopper. Most ponds should be at least 10m x 10m to allow sufficient depth to be reached whilst retaining shallow margins which will benefit a wide range of other species.
- Pond shape can be anything from circular to linear and any shape in-between. The greater the variety the better. In exposed areas, consider reducing the width of the pond to reduce the likelihood of wave wash.
- To benefit the greatest number of species it is worth designing ponds which include a broad shallow margin. Design at least one margin of the pond to have a water depth between 0-30cm which is at least 2m wide. In areas where space is limited the pond can have an asymmetric profile (see *Pond Creation Toolkit Factsheet 4*).
- Deeper water (0.3-1m) will support Broad-leaved Pondweed (Figure 6) and should be a minimum of 5x5m. There is little need for ponds to be deeper than 1m.
- Summer water depth may be 0.5m lower than winter water levels. Design ponds to have a deeper profile (0.5-1m) in the pond centre, to accommodate fluctuating water levels.

Figure 6. Creating the right pond profile for the Pondweed Leafhopper



Transplanting Broad-Leaved Pondweed

Planting up ponds should generally be avoided (see *Pond Creation Toolkit Factsheet 8*). If the right bank structure is created, appropriate plants will usually colonise within a few years. **However**, because these ponds are being created specifically for Pondweed Leafhopper it may be necessary to transplant pondweed from the ponds which currently support the population to new ponds.

Ponds should be allowed to become established for at least two years before Broad-leaved Pondweed is introduced. It needs a certain amount of organic sediment to be present before it can grow. Establish a stand of pondweed by transplanting seeds before introducing the Pondweed Leafhopper. These should be collected in late summer and scattered immediately (without the seed drying out) into 0.3-0.5m deep water in the new pond. Cold winter temperatures will break seed dormancy and new shoots will appear the following year.

It is not known how or where the Pondweed Leafhopper overwinters, although this is likely to be as an egg laid inside plant tissue. The best way to introduce the Pondweed Leafhopper is probably therefore by transplanting plant material at the end of the summer before the leaves and stems die back, but care must be taken to remove only a small proportion of the pondweed from the existing population.

5. Management and monitoring

Well designed clean-water ponds should need little management in later years (see *Pond Creation Toolkit Factsheet 4*). In the first few years following creation it is important to monitor ponds, to ensure that they do not become colonised by invasive alien plant species, particularly if they are present elsewhere on the site. If they are caught early enough they can be removed, but once established it is costly and difficult to keep them under control.

Host plant stands are often small and are vulnerable to inappropriate management. So consider any management carefully and in a complex of ponds only manage a part of the site at any one time. Grazing will be useful in controlling scrub and keeping the site open.

Large numbers of native fish and certainly non-native fish will be detrimental to the Pondweed Leafhopper as they will remove vegetation and increase turbidity. Ensure that fish are removed as soon as they are found.

We still don't know enough about the Pondweed Leafhopper. Work is needed to understand its ecology, true distribution and to determine whether pond creation schemes have been successful.

6. Further reading

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Surrey Wildlife Trust Reserve (accessed December 2010) Newdigate Brickworks. www.surreywildlifetrust.co.uk/reserves/show?id=32.

For further information about the Million Ponds Project and to consult other factsheets in the Pond Creation Toolkit, please visit *www.pondconservation.org.uk/millionponds* or email enquiries to *info@pondconservation.org.uk*

Pond Conservation
For life in fresh waters

This factsheet was prepared in consultation with Dr. Alan Stewart, University of Sussex and Dr. Jonty Denton, Ecological Entomologist.