

METHOD (complete one survey form per pond)

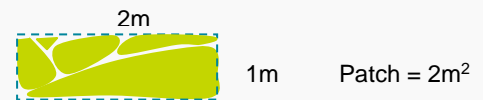
Aims: To find out whether Pondweed Leafhopper are i) present in the pond, ii) get an approximate idea of their abundance, iii) collect physical data about the pond that can be used to better understand the ecology of this species and to assess the reasons for any change recorded on future visits, and iv) look in any adjacent ponds to see if Pondweed Leafhopper are present or absent. There are currently only a handful of ponds known to support Pondweed Leafhopper in England. We will target these ponds for survey, but we are keen to raise awareness of the survey in general in the hope that new sites may be discovered.

- **Equipment:** A pair of binoculars is essential to survey for Pondweed Leafhopper. It's also helpful to take a camera to take confirmatory photos of Pondweed Leafhopper, to take photos of your survey pond for the record, and to take a photograph of your sketch maps if you don't have access to a scanner – alternatively you can post your survey forms to Freshwater Habitats Trust.
- **Survey timing:** Very little is known about the life cycle of the Pondweed Leafhopper; for example the location and timing of egg laying and larvae remain a mystery. Pondweed Leafhopper are highly responsive to the sun, becoming more active on hot still days. On dull or rainy days, the adults may disappear altogether, only to reappear on the next sunny day. We therefore recommend timing your visit to coincide with the best weather. Records for adult leafhopper have been received in late May through to early October, and we recommend undertaking several visits (e.g. 3-4 visits) to maximise the likelihood of a positive record in any one year.
- **Where to look:** The easiest way to spot Pondweed Leafhopper is to identify them when they on their food plant, Broad-leaved Pondweed *Potamogeton natans*. Their blue powder colour is quite distinctive once you get your eye in, but a pair of binoculars is needed to view any but the closest of pondweed leaves. **n.b.** The floating leaves of pondweeds are home to a multitude of other creatures including colourful beetles and many small flies; patience is needed to pick out Pondweed Leafhopper from the rest.
- **Survey the pond:** The pond we have selected for survey will have a previous record for Pondweed Leafhopper. Search in all areas of the pond you can easily see from the pond margin with binoculars and if Pondweed Leafhopper are found; record the number of individuals (see below) and fill out the pond habitat survey form for the pond.
- **How to estimate Pondweed Leafhopper abundance:** If Pondweed Leafhopper are found in the pond, make a record of the number of individuals and record the results as an abundance category overleaf. It can sometimes be hard to estimate abundance, especially if they are very numerous, or at different densities in different areas of the pond. The best approach is to count the individuals in a small area (e.g. 1 m²), and multiply this by the area of the pond. If Pondweed Leafhopper occur in different areas of the pond, make separate calculations for each area, and sum them to give a total (see table over page).

If Pondweed Leafhopper are **not found** at the pond, please record this, and continue to fill out the environmental sheet and search other ponds in the surrounds. The findings will help identify reasons for their absence from the pond.

- **Estimate the abundance of Broad-leaved Pondweed:** We would like you to estimate the area of Broad-leaved Pondweed in the pond as this is a vital food source for Pondweed Leafhoppers and they only occur when this plant is present. Record the total area of the Broad-leaved Pondweed growing in the pond (in m²). To do this, record the size of each patch of plants, e.g. (1m x 1m) + (1m x 2m) = 3m². It can help to record a number of patches by imagining them grouped together to make a square or rectangle.

Group-up small patches to make them easier to record



Broad-leaved Pondweed may occur at very different densities in each patch: sometimes growing close together, and at other sites more widely separated. You need to standardise the density. To do this imagine more sparsely growing plants are pushed together to grow at their maximum natural density.

- **Check other ponds and pools in the surrounds:** We are keen to find new ponds for Pondweed Leafhopper and would like you to look in other ponds to see if they can be discovered. Visit as many nearby ponds or pools as possible (depending on how much time you have available) to see whether Pondweed Leafhopper are present. **Complete a new PondNet survey form for each pond you visit.**

Once your survey is completed, enter your results online: www.freshwaterhabitats.org.uk/projects/waternet, or email your recording forms and maps to Freshwater Habitats Trust and we can enter the data for you: info@freshwaterhabitats.org.uk.

How to identify Pondweed Leafhopper: Pondweed Leafhopper is a small bug about 5mm in size and is exclusively found in ponds on its only food plant, Broad-leaved Pondweed. This diminutive invertebrate has a characteristic bright blue dusty coating which easily rubs off to reveal a dark blue undercoat.

n.b. It is worth remembering that several other leafhopper species live in the vegetation around ponds – these can be disturbed as you approach the pond and may fall into the water or onto pondweed leaves close to the pond margin. If these individuals are not blue in colour and or they head back to shore, they are unlikely to be Pondweed Leafhopper. Please collect a specimen or take a photo for confirmation.



Your name	<input style="width:95%;" type="text"/>	Date	<input style="width:95%;" type="text"/>
Square: 4 figure grid ref e.g. SP1243 (see your map)	<input style="width:95%;" type="text"/>	Pond: 8 figure grid ref e.g. SP 1235 4325 (see your map)	<input style="width:95%;" type="text"/>
Pond name (if known)	<input style="width:95%;" type="text"/>		
Determiner name (<i>optional</i> - if someone confirms the identity of the species you've recorded)	<input style="width:95%;" type="text"/>	Voucher material (<i>optional</i> - comment if you've taken a photo to confirm identification)	<input style="width:95%;" type="text"/>

If you find Pondweed Leafhopper please take a confirmatory photo. You can also take a photo of your pond or your maps (or scan them if you have a scanner) and upload them with the record www.freshwaterhabitats.org.uk/projects/waternet.

Number of Pondweed Leafhopper in your pond

If there are many individuals, count the number in a small area (i.e. 1m²) and multiply up. We've put a table below to help you keep track and make notes, but for the analysis **we only need a total**.

Areas where Pondweed Leafhopper were found (list): use this table to help with your number calculations, and so you/others can re-find the hoppers on future visits.	Number of individuals
1.	<input style="width:95%;" type="text"/>
2.	<input style="width:95%;" type="text"/>
3.	<input style="width:95%;" type="text"/>
4.	<input style="width:95%;" type="text"/>
5.	<input style="width:95%;" type="text"/>

Total number of Pondweed Leafhopper (total count)

Provide a single total for the whole pond based on an actual or estimated number of individuals recorded

Total number of Pondweed Leafhopper (abundance category)

Then record the number of Pondweed Leafhopper found in the pond using the following abundance categories:
1, 2-5, 6-10, 11-20, 21-50, 51-100, 101-200, 201-500, 501-1000, 1001-5000, 5001-10000, 10001-20000, 20001+

Pondweed Leafhopper looked for, but not found

Note: if you *don't* find evidence of Pondweed Leafhopper at the pond, this is an important result so please still enter these findings online (tick box if none found)

Abundance of Broad-leaved Pondweed

Total area of the Broad-leaved Pondweed growing in the pond
- an important variable for Pondweed Leafhopper

 m²

Pond sketch map: Make a sketch map of your ponds and draw on the area of Broad-leaved Pondweed and locations where Pondweed Leafhopper were seen.

Location map: Use this box to show the location of the pond and surrounding ponds you searched (or mark the information on the base map included in your site information pack).

Please complete a POND HABITAT SURVEY sheet at each pond surveyed.

This is a really important part of the survey at your pond. Please complete this form whether Pondweed Leafhopper is present or absent. Each variable provides information known to be linked to pond quality and community type, and can be used to investigate reasons for change in Pondweed Leafhopper occurrence.

Go to: www.freshwaterhabitats.org.uk/projects/pondnet/survey-options/habitats for survey guides and more information.

Is the pond new? (less than 10 yrs old)
yes, no, unknown

Year of creation?
date, decade, unknown

Pond Altitude
(m)

Area
 m²

Note: This is the *surface area of the pond when the water is at its highest level (usually in early spring)*. It will probably *not* be the current water level of the pond. The high water level line should be evident from wetland vegetation like rushes at the pond's outer edge. Measure by pacing (single pace = 0.8-1m) or use online maps.

Pond dries?

1 = never dries, **2 = rarely dries**: no more than two years in any ten year period, or only in drought, **3 = Sometimes dries**: dries between three years in ten to most years, **4 = Dries annually**. Deduce pond permanence from local knowledge (e.g. landowner) and personal judgement e.g. water level at the time of the survey. Ponds that dry out annually usually have a hard base.

Overhanging trees & shrubs

% of pond overhung by trees and shrubs

% pond margin overhung to at least 1m from the pond margin

This is an estimate of how much of the pond is *directly* overhung by trees and shrubs, i.e. that would be shaded if the sun was overhead (use the diagram (below) as a guide).

Waterfowl impact

1 = major
2 = minor
3 = none

Major = severe impact of waterfowl e.g. few or no submerged plants, water turbid, pond banks have patches where vegetation removed, feed put down; **Minor** = waterfowl present, but little impact on pond vegetation, pond still supports submerged plants and banks are not denuded of vegetation; **None** = no evidence of waterfowl impact (moorhens may be present).

Fish presence

1 = major
2 = minor
3 = possible
4 = absent

Major = dense populations of fish known to be present; **Minor** = small numbers of Crucian Carp, goldfish or stickleback known to be present; **Possible** = no evidence of fish, but local conditions suggest that they may be present; **Absent** = no records of fish stocking and no fish revealed during survey.

Disturbance by dogs

1 = major
2 = minor
3 = none

Major = dogs repeatedly use the pond, compacted edges with little vegetation, water very turbid; **Minor** = dogs use the pond, but little impact on pond vegetation, pond still supports submerged plants and banks are not denuded of vegetation; **None** = no evidence that dogs are using the pond.

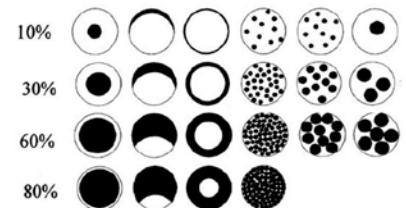
Aquatic vegetation: includes emergent, floating and submerged plants

 %

% of the whole pond (wet and dry) occupied by emergent vegetation – incl. plants like grasses, water mint and rushes, but not floating (e.g. pondweed) or submerged (e.g. water-crowfoot) species.

 %

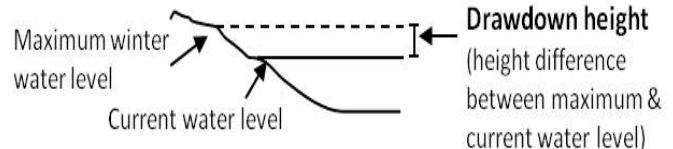
% of pond water surface area covered by all vegetation (emergent, floating (excl. duckweed) and submerged).


Water left in the pond
 %

% of water area in pond relative to maximum water level. This can be 0% if the pond has dried out.

 cm

Drawdown. The height drop from the maximum winter water level to current level (see diagram).


Grazing

Tick if there is evidence the pond is grazed by livestock. If **yes**, complete the following boxes:

 %

% of whole pond grazed (note: stock can wade into shallow ponds to graze).

 %

% of pond perimeter grazed (note: stock can wade into shallow ponds to graze otherwise inaccessible edges).

Grazing intensity: rank 1-5 (1=inrequent or low intensity to 5 = margins heavily poached and almost bare).

Pond management (tick): use tick boxes to list management within the last 12 months. Use 'other' box for any extra info.

 Fully dredged

 Partly dredged

 >5% vegetation removed

 <5% vegetation removed

 Trees planted

 Trees clear-felled

 Trees cut back / coppiced

 Pond changed shape / size

 Plants introduced

 Bank plants mown

 Structural work e.g. to dam

 Straw added

Add other or more detail

Water quality:

Turbidity / water clarity: Estimate turbidity looking down into c.20cm depth of water in the pond.

1 = clear; 2 = moderately clear; 3 = moderately turbid; 4 = turbid

Inflows and outflows: (tick if inflow or outflow present or leave blank)

Inflow present Outflow present

Water chemistry: If suitable kits and meters are available (or leave blank)

pH Conductivity ($\mu\text{S cm}^{-1}$)

Nitrate (NO_3^- -N ppm): PPW kits provided by FHT

(tick one from the following range categories)

<0.2 0.2-0.5 0.5-1 1-2 2-5 5-10 10 +

Phosphate (PO_4^{3-} -P ppm): PPW kits provided by FHT

(tick one from the following range categories)

<0.02 0.02-0.05 0.05-0.1 0.1-0.2 0.2-0.5 0.5-1 1 +

Pond base: This refers to the *geology* (i.e. rock-type) that immediately underlies the pond. You may know, or be able to see the underlying geology in the base or banks of the pond, especially in new ponds. If not, check a geology map or leave this section blank.

Choose one of the following to categorise the % composition of **each** of pond base: 1= 0-32%, 2= 33-66%, 3= 67-100%

Silt/ clay Sand, gravel, cobbles Hard rock Peat Other (please specify)

Surrounding land use: Estimate the *percentage* of surrounding land-use in distance zones from the pond perimeter (i.e. the maximum winter water level) used to assess pond area. In many ponds the 0-5m zone will include surrounding trees/scrub.

Habitat	0-5m	0-100m	Examples
Trees, woodland & scrub	%	%	Deciduous and coniferous woodland, individual trees, scrub and hedgerows.
Heath & moorland			Lowland and upland heathland, moorland and mountain; includes bracken.
Rank vegetation			Unmanaged grass, neglected and abandoned land, set-aside, verges and buffer strips.
Unimproved grassland			Herb-rich, calcareous and acid grassland (good quality plant indicators usually present). Low percentage of agricultural grasses. Not fertilised, little or no drainage.
Semi-improved grassland			A transition category. Grasslands modified by fertilisers, drainage, herbicides or intensive grazing, but retaining elements of natural grassland types in the area.
Improved grassland			Fertile agricultural grass, often bright green and lush; including parks and golf greens.
Arable			All crops. Includes flower and fruit crops (e.g. strawberries) and ploughed land.
Urban buildings & gardens			Areas in curtilage (associated with buildings); including glass-houses and farm yards.
Roads, tracks & paths			Including car-parks and footpaths.
Rock, stone & gravel			Cliffs, rock-outcrops, gravel-pits, quarries, areas of sand and gravel or stone.
Bog, fen, marsh & flush			Wetland vegetation and blanket bog.
Ponds & lakes			Permanent and seasonal waterbodies; including trackway pools.
Streams & ditches			Rivers, streams, ditches, springs and canals.
Other (state)			E.g. maritime vegetation, saltmarsh, sand-dune, orchards and railways.

Is the pond in a protected area? (e.g. nature reserve, SSSI, etc.) (choose one option - yes, no, unknown)

New Zealand Pigmyweed *Crassula helmsii*: This non-native weed may have an impact on this species.

% of drawdown zone occupied by New Zealand Pigmyweed

Identification of New Zealand Pigmyweed:

- Can be submerged, emergent and terrestrial.
- Forms dense mats below and above the water surface.
- The flowers it has, if any at all, are very small (less than 1cm) whitish-green to slightly pink with 4 petals.
- Leaves are up to 2cm long in opposite pairs - fleshy for emergent plants, but flatter for submerged parts of the plant.
- Similar species (such as the Water-starworts) do not have fleshy leaves. Water-starworts also have a notch at the leaf tip which is absent in New Zealand Pigmyweed.



Other invasive non-native species: (tick all that apply)

Parrot's Feather
Myriophyllum aquaticum

Floating Pennywort
Hydrocotyle ranunculoides

Water Fern
Azolla filiculoides

Non-native Pondweed, e.g.:
Canadian Pondweed *Elodea canadensis*,
Nuttall's Pondweed *Elodea nuttallii*,
Curly Waterweed *Lagarosiphon major*

How much of pond perimeter could be surveyed? Note areas of pond not accessible.

Comments box: e.g. new ownership, changes since previous visit, any other information about the pond or survey species.