METHOD (complete one survey form per pond)

Aims: To find out whether Tadpole Shrimp 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 Tadpole Shrimp are present or absent.

A protected species licence from Natural England is required to survey Tadpole Shrimp - ***our method is based on observation only*** - you do not need to net them or enter the water to take part, but you will still need training and a licence to undertake the survey.

There are currently only a handful of ponds known to support Tadpole Shrimp in England. We will survey these ponds as part of the PondNet project, but we are keen to raise awareness of the survey in general in the hope that new sites may be discovered.

- **Equipment:** It's helpful to take a camera to take confirmatory photos of Tadpole Shrimp, 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:** Tadpole Shrimps have a very unusual life cycle. They are restricted to temporary ponds which dry down once or several times a year, where they hatch from drought resistant cysts after ponds have dried out and then refilled with water. Late summer/early autumn can be a good time to visit, but any period of dry weather which results in the pond drying out, followed by rain and subsequent refilling, can cause them to hatch.

  The best time to search is when the Tadpole Shrimp are adults: about 2 weeks after the pond has refilled and before predation has a significant effect on the population. ***The survey window for Tadpole Shrimp is therefore between 2 and 4 weeks after the pond has filled with water.*** This is an approximate survey window to help standardise the survey between sites, but there is flexibility as you may not know exactly when the pond filled.

  You can also complete more than one survey each year, if the pond fills on multiple occasions. If the pond dries out before the survey window begins, you can submit the records but make a note of this in the species notes box overleaf.
- **Where to look:** Tadpole Shrimps are restricted to shallow temporary ponds. They grub around on the bottom of the pond and often give their presence away from the disturbance their activity causes to any vegetation emerging on the pond surface. Tadpole Shrimps distinctive form and size mean that they can often be seen by standing on the pond margin and looking down through the water, although it can require patience and practice to get your eye in.
- **Survey the pond:** Search in all areas of the pond you can easily see from the pond margin and if Tadpole Shrimp are found; estimate the number of individuals (see below) and fill out the pond habitat survey form for the pond.
- **How to estimate abundance:** If Tadpole Shrimp are found in the pond, make an estimate of the number of individuals present, and then record the results as an abundance category (over page).

  It can be hard to count the number of individuals, 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 m^2), and multiply this by the area of the pond. If Tadpole Shrimp occur in different areas or habitats in the pond, make separate calculations for each area, and sum them to give a total (see table over page).

  If Tadpole Shrimp are **not found** at the pond, please record this, and continue to fill out the pond habitat survey. The findings will help identify reasons for their absence from the pond. **Tadpole shrimp periodically shed their hard exoskeleton as they grow. You may find shed skins on the surface or edge of the pond. These can be noted in the comments section but should not count towards the total abundance**.
- **Check other ponds and pools in the surrounds:** We are keen to find new ponds for Tadpole Shrimp 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 Tadpole Shrimp 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.

Tadpole Shrimp ID tips: (a) Tadpole Shrimps look like miniature horseshoe crabs. It's hard to mistake them for anything else! The hard carapace protects them from predators in their temporary pond habitats. They can grow up to about 10cm in length, have a red brown colour, two long 'tails', and many legs and long feelers to help them find food in their muddy homes. (b) Close up you can see where they get their name. Triops can be translated as 3-eyed, two compound eyes and a central primitive light sensing organ (their third eye).

PondNet

Tadpole Shrimp (*Triops cancriformis*)
RARE SPECIES RECORDING FORM (PAGE 2 of 4)

Your name		**Date**	
Square: 4 figure grid ref e.g. *SP1243* (see your map)		**Pond: 8 figure grid ref** e.g. *SP 1235 4325 (see your map)*	
Pond name (if known)			
Determiner name (*optional* - if someone confirms the identity of the species you've recorded)		**Voucher material** (*optional* - comment if you've taken a photo to confirm identification)	

If you find Tadpole Shrimp 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 Tadpole Shrimp in your pond

If there are many individuals, count the number in a small area (i.e. 1m^2) 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 Tadpole Shrimp were found (list): use this table to help with your number calculations, and so you/others can re-find them on future visits.	**Number of individuals**
1.	
2.	
3.	
4.	
5.	

Total number of Tadpole Shrimp (total count)
Provide a single total for the whole pond based on an actual or estimated number of individuals recorded

Total number of Tadpole Shrimp (abundance category)
Then record the number of Tadpole Shrimp 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+

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

Pond sketch map: Make a sketch map of your ponds and draw on the area where Tadpole Shrimp 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).

heritage lottery fund
LOTTERY FUNDED

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 Tadpole Shrimp were 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 Tadpole Shrimp 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

[ ] m^2

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
3 = sometimes
4 = annually

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

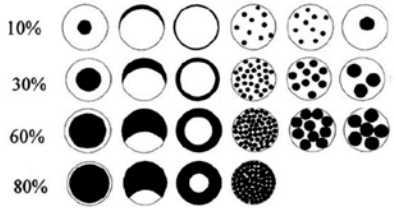
[ ]
1 = major
2 = minor
3 = none

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.

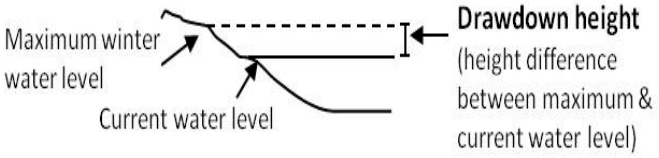
[ ] % of pond water surface area covered by all vegetation (emergent, floating (excl. duckweed) and submerged).



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=infrequent 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 (µS 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)

☐ Floating Pennywort *Hydrocotyle ranunculoides*

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

☐ Parrot's Feather *Myriophyllum aquaticum*

☐ Water Fern *Azolla filiculoides*

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.