

PondNet guidance:

How to survey ponds for aquatic macroinvertebrate families

Aim of the invertebrate survey

- To obtain, within the available sampling time (3 minutes), **as many invertebrate families as possible from the pond.**

Survey region and sampling period

Invertebrate surveys should be undertaken in the **summer** season (June, July or August). If a PSYM analysis is being undertaken, the survey site needs to be located in mainland England, Wales or the Isle of Wight¹

Selecting mesohabitats for invertebrate surveys

All the main mesohabitats in the pond should be sampled so that as many invertebrate families are collected from the site as possible.

Mesohabitats are identified during an initial walk around the pond examining vegetation stands and other relevant features: this can be combined with a plant survey, if one is being undertaken.

As a rough guide, the average pond might contain 3-8 mesohabitats, depending on its size and variety. If there are very few mesohabitats then divide-up the bank area e.g. for a square pond, identify each of the four banks as a mesohabitat.

Examples of typical mesohabitats

- Marginal grasses & low-growing herbs
- Stands of sedge
- Stands of bulrush
- Areas overhung by willows, including submerged tree-roots
- Stands submerged aquatic plants
- Floating-leaved plants (e.g. water-lily)
- Gravel- or sandy-bottomed shallows
- Inflow areas.

Tips:

- **Concentrate on identifying mesohabitats in the edge areas:** the aim of the survey is to maximise the list of invertebrate families found, the very shallow edge areas (often only a few cm deep), are usually by far the richest area of a pond.
- **Don't spend too much time sampling open water:** open water is usually quite a species-poor area.
- Consider vegetation **structure and water depth** as well as plant species composition, when selecting mesohabitats. For example, you could identify habitats consisting of soft floating leaves and stiff emergent stems or shallow-water bulrush and deep-water bulrush etc. rather than making each different plant species a separate habitat.
- If there are only very **small areas of a distinct habitat type** (e.g. a couple of water-lily leaves), which are not extensive enough to be a habitat on their own, then try to **include them by sampling them as part of another habitat type.**

¹ Sites in Scotland, Ireland, the channel isles or Isle of Man cannot be analysed using PSYM because the database underlying PSYM does not include ponds from these areas.

Sampling method

The pond should be sampled for 3 minutes in total. The 3 minutes refers to net-in-the-water time when you are actively trying to catch animals. It does not include time moving between adjacent netting areas. In practice it often takes 30 minutes to an hour to collect this sample depending on how large and complex the pond is.

The three-minute (180 seconds) sampling time is divided equally between the number of mesohabitats recorded: e.g. for six mesohabitats, each will be sampled for 30 seconds.

Try to get around the whole pond and all parts of each mesohabitat during your sample collection. For example, if there are marginal grasses in different parts of the pond, sample as many patches of grass as possible for a few seconds each.

Number of meso-habitats in the pond	Sampling time per meso-habitat
3	60 seconds
4	45 seconds
5	36 seconds
6	30 seconds
7	26 seconds
8	22 seconds

How to net a pond

There is considerable skill in collecting invertebrates from a pond, and it is both harder and very different, from sampling streams and rivers.

The aim of netting is to dislodge and collect animals without also collecting lots of silt or vegetation i.e. you want to collect the maximum number of invertebrate families for the minimum amount of material you put in the bucket. If you are inexperienced, it is important to practice first – frequently looking in the net to see what you are catching.

When netting, each mesohabitat is agitated vigorously, ending with a scooping motion to ensure that dislodged animals are collected in the net. Use both hands on the net handle to give the net greater manoeuvrability and power.

Occasionally, where there are stony or sandy substrate, they can be lightly 'kick-sampled' with your heel, before being scooped up with the net. However, avoid deep silty bottom sediment: very few macroinvertebrates live in sediment more than a few mm deep, and lots of silt makes later sorting extremely difficult: the netted sample should be as clean and silt-free as possible, so at most, just skim the surface of bottom sediments.

Tips:

- Focus on **sampling amongst plants**, especially in shallow water, since these are the richest areas.
- Netting at the pond edge should include even the **very shallowest water** areas (less than 1 cm deep) – because water beetles and other creatures often lurk in the extreme shallows.
- When you are netting, if you misjudge it, and end up with a net full of silt, then **return the netted sample to the pond and collect another**.
- If the sample is unavoidably silty, agitate the net to **wash water through the sides of the net bag** to remove as much as possible before it goes in the bucket.
- **Empty the net into your bucket frequently** – so if you do have to discard a net-full you don't have to re-collect too much.
- **Avoid collecting large accumulations of plant material**, root masses, and the like: the idea is to dislodge and capture the animals without collecting an unmanageable sample.
- If **plants are hanging from the net** after collection, the rule of thumb is to **discard them**.
- **Look in the net as you go-along** to see what you are finding – it will improve your netting skills and you'll quickly find out for yourself what makes a good pond.

Ponds covered in duckweed or algae

Ponds covered with a surface layer of duckweed, algae or water fern are very tricky to sample, because it is extremely hard to avoid collecting huge amounts of plant material. There is no easy solution, and the best approach is to minimise the amount of plants collected by gently moving surface layers of the floating plants away to create an area of open water, then netting the water *beneath* the floating layer.

Sampling grassy mats in areas that are nearly dry

Sometimes grassy areas at the edge of a pond look dry but are still waterlogged. These areas are often very rich in water beetles, and are well worth sampling. There are two techniques for doing this:

- If the grasses form a thick waterlogged mat, you can often create small pools around the depression created by your boots as you tread on the mat. After 20-30 seconds, water beetles will usually begin to come to the water surface for air and can be netted.
- If the grass mat is thin, and the ground hard and not too uneven you may be able to 'glide-sample' by rapidly running the flat end of the net along the ground with a firm pushing motion. This creates a small wave in front of the net which, when captured, is usually rich in beetles.

Timing your sample

The best way to time your 3 minute sample is to count the seconds in your head. It might seem tempting to have a colleague time you with a stopwatch – but because pond samples are collected in short bursts of a few seconds, experience shows that it's easier and more accurate if you time yourself.

The main thing is to ensure that you can count seconds accurately. So practice with a watch before every pond. Most people count 1 to 10 with a spacer (e.g. 1 elephant, 2 elephant, 3 elephant), to help get the timing right. Numbers above 10 are easier to time correctly.

Additional invertebrate sampling

Spend a further 1 minute (total time, **not** net-in-the-water time) searching for animals which may otherwise be missed in the 3-minute sample. Areas which might be searched include the water surface (for whirligig beetles, pond skaters etc.), and under stones and logs (for limpets, snails, leeches, flatworms etc.). These additional species are added to the main 3-minute sample. It's a good idea to start this collection when you first get to the pond – before the whirligigs and skaters get wise to you! You can continue to check logs and other areas for new animals as you go around the pond.

Storage of invertebrate samples prior to sorting

Take your sample home in a sealed, labelled bucket. But before leaving the pond, remove as much water as possible: if necessary drain water out through your net. Water left in the bucket will slosh around damaging animals, and allowing predators free reign.

Once home, samples should be sorted **as soon as possible** after collection since they deteriorate quickly, and animals which have died in the bucket (a) don't move so are harder to spot and therefore more likely to be missed, and (b) are likely to quickly begin rotting, and so be more difficult to identify. In addition, predators in the sample may eat their way through many of your other captured specimens. If the sample cannot be sorted immediately upon return from the field it should be kept in cold storage in a refrigerator or a refrigerated cold room. It is important that all samples are sorted within three days of collection, and more rapidly if the sample was collected in hot weather and not cooled soon after collection.

Another option for storing samples

Sorting pond samples is time-consuming. An alternative, if you are short of time over the summer, is to collect a PondNet sample and then preserve it for sorting later in the year. Freshwater Habitats Trust uses 70% alcohol (IMS: Industrial Methylated Spirits) to preserve samples, so if you would like to take this option please contact your regional project officer who may be able to arrange provision of IMS. Note that this is an option suitable for surveyors who already have some considerable previous experience of sorting samples. This is because it is easy to miss animals in preserved samples, where there is no animal movement to help you see cased caddis-flies and other cryptic creatures.

Sorting and identifying macroinvertebrate samples

Preparing the sample for sorting

Wash the sample **very gently** in a fine sieve (0.5mm mesh or less), removing as much mud and fine detritus as possible whilst ensuring the retention of delicate bodied invertebrates such as mayflies. Alternatively, fill the sample bucket with water to loosen the sample and dilute any silt, and then gradually remove portions to sort.

Sorting the sample

Place a small (e.g. a walnut sized) amount of material to be sorted in a white tray with a very shallow depth of water (approximately 3-10 mm). Spreading this material out across the tray and sort through it carefully using forceps or tweezers (fine, curved forceps, will make the sorting faster and easier). Identify the animals seen **to family level** and record the results on the PondNet survey form. NOTE: Don't count individuals, you just need to record presence or absence of each family. Discard the sorted material; fill the tray up with clean water and sort the next bit of sample. Continue in this way until the entire sample has been sorted.

Entering your data

Enter your data online to automatically calculate the pond's quality indicators, and find additional information to help you interpret your results
www.freshwaterhabitats.org.uk/projects/waternet.