

## Pondwatch JE Level 2 handbook

Thank you for your interest in volunteering to be part of this project. Pondwatch JE is an island-wide effort to record Jersey's pondlife, with the aim of detecting changes in their conservation status. By taking part, you will also be helping us to improve our knowledge on the distribution and habitat requirements of Jersey's pond-dwelling wildlife. It's also a good opportunity for you to spend some time in nature too!

In this handbook you will find out everything you need to know to become a Pondwatch JE surveyor.

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### Level 2 pond surveys

*Please note that you must have completed training to carry out Level 2 pond surveys.*

### Where to survey

You can survey your own pond, a pond you are aware of and know the landowner, a pond the Natural Environment team require monitoring or another of your choice. If you survey a pond of your own choice, you will need to arrange landowner access (see below), whereas ponds provided by Natural Environment will already have landowner permission arranged. Ponds will be assigned to 1-km squares to help ensure there is a representative distribution of ponds being surveyed across the island and to allow results to be compared against previous years. However, multiple ponds per square can be surveyed (though you will need to fill out a separate set of forms for each pond).

If you intend to survey a pond that is mapped but then find that it is no longer in existence, please fill in as much detail about the pond including your contact details and the pond details and return it to your coordinator.

#### *Arranging landowner permission*

If you have chosen your own pond, you will need to identify and contact the landowner to arrange permission and fill out a [Landowner Survey Consent Form](#). Landowners can often be identified by making local enquiries or by speaking to Natural Environment. A template introductory letter for requesting landowner permission is available from Natural Environment. Speaking with the landowner will also give you an opportunity to identify car parking locations, safety issues, learn about the pond (e.g. if it is stocked with fish, how often it dries out) and to build a relationship with them. A long-term aim of Pondwatch JE is to gradually build the number of ponds that can be accessed and repeatedly surveyed each year. Do not survey a pond without the landowner's permission.

[Landowner Survey Consent Forms](#), [Volunteer Working Agreements](#), [Risk Assessment template](#), [Water testing instructions](#), [water testing forms](#) and [survey results forms](#) are all available separately on the [JARG website](#).

## When to survey

**Time of year:** The best time of year to survey ponds and other wetland areas is between January and May. This is when ponds are most likely to contain water and Jersey's amphibians are most likely to be seen in and around the water (although they can sometimes be found in ponds both earlier and later than this).

**Time of day:** The best time of day to spot amphibians depends on the condition of the pond and the methods being used. Therefore, we recommend carrying out surveys at different times of the day with different methods to maximise your chance of spotting them.

**Number of surveys:** You should aim to survey your pond **five** times between January and May at different times of the day using multiple methods. If you wish to, you can carry out more than five surveys.

## Which species to record

You can record any species seen in and around your survey pond. We are particularly interested any observations of Jersey's three native amphibians:

- western toad or crapaud (*Bufo spinosus*)
- palmate newt (*Lissotriton helveticus*)
- agile frog (*Rana dalmatina*)\*

\*Due to their restricted distribution, agile frogs may be encountered infrequently and so are additionally surveyed through other efforts.

If you see any non-native amphibians or reptiles (e.g. yellow-bellied toads, Japanese fire-bellied newts or terrapins) you should also record these.

If you have received training and feel sufficiently competent, you can opt-in to record some supplementary species. These consist of two groups:

1. Invasive Non-Native (INN) aquatic plants
  - a. Water fern (*Azolla filiculoides*)
  - b. New Zealand pigmyweed (*Crassula helmsii*)
  - c. Parrot's feather (*Myriophyllum aquaticum*)
  - d. Canadian pondweed (*Elodea canadensis*)
2. Dragonflies and damselflies (adults and nymphs)

## How to survey

### Equipment

You will need:

- a Pondwatch JE Level 2 survey form (available from <https://groups.arguk.org/jarg>)
- a pen or pencil
- a mobile phone (for use in the event of an emergency)
- a thermometer (for recording air temperature)\*
- a small safety torch (for getting around during night surveys)
- a high powered survey torch (500,000 to 1,000,000 candlepower)\*
- a pond net\*

Optional (recommended):

- a camera (a smart phone camera is fine)
- species ID guides
- map of survey site

\*Thermometers and pond nets can be borrowed and signed out from the Natural Environment team (Howard Davis Farm, Trinity). For difficult sites, high powered survey torches can also be borrowed but are limited in availability.

The camera will allow you to take pictures of anything you are not sure about, which can help others check the identification of what you record.

## Preparation

Once you have chosen your site and arranged landowner permission (if required), carry out the following:

**Step 1:** Read and complete the [Volunteer Working Agreement](#) form and return it to Natural Environment.

**Step 2:** Visit your chosen pond during the day to familiarise yourself with the site and assess any risks. Update the [risk assessment](#) as necessary.

**Step 3:** Record the pond details (name, location, [type and construction](#)).

**Step 4:** Carry out a pond [habitat suitability assessment](#). This assessment is based on a habitat suitability index (HSI) that was developed for the great crested newt in Britain (Oldham *et al.*, 2000). Though there are no great crested newts in Jersey, it is an effective and repeatable way of describing a pond and its surrounding habitats, and has shown to be a good indicator of palmate newt occupancy in Jersey. Pondwatch JE uses nine HSI measures and is described in detail on the survey form. Habitat suitability metrics are described in the [habitat assessment](#) section of this handbook, and in other [resources](#).

**Step 5:** Assess the [habitat surrounding the pond](#). To do this, you will need to identify the three most dominant habitat types occurring within a distance of 0–5 m of the pond perimeter, and 0–100 m of the pond perimeter. Habitat definitions are given on the survey form, and greater detail is available in the [habitat assessment](#) section of this handbook, and in other freely-available [resources](#).

## How to survey

Please complete **five** surveys if possible between January and May, carrying out the following steps:

**Step 1:** At the start of each survey first record the visit number, date, the start time, air temperature, whether or not there is bright moonlight (night surveys only) and if wind is disturbing the water. Also record the water clarity, rainfall (choosing the most recent applicable option) and which (if any) supplementary species you are recording.

**Step 2:** Spend 30–60 minutes using any of the following three methods to survey the pond, aiming to use all three methods across your multiple survey visits. **Remember**, much of Jersey's wildlife is protected by law, and should not be harmed, taken or possessed, nor should their breeding or resting sites be disturbed.

- **Visual search:** This involves walking once around the pond edge, looking for amphibians, their eggs and other pondlife. Toad spawn strings and frog spawn clumps are fairly easy to spot, but newt eggs will be folded in to leaves individually and may be harder to spot so keep an eye out for any folded leaves and inspect them for eggs. If the pond is too large to walk around, indicate the percentage of shoreline surveyed on the form.
- **Netting:** This is particularly useful for ponds with submerged vegetation. Work your way around the pond perimeter in two-metre sections; netting two metres of submerged vegetation then moving two metres along the perimeter before netting another two-metre section. Check the contents of the net after each section, identify any wildlife found, carefully return it to the pond and record what you found. Take pictures if you are not sure of a species identification.

Pond vegetation is often in patches rather than continuous, and netting in open water is less effective than in vegetation. Therefore, you may wish to select vegetated areas of the pond to net. Record the percentage of shoreline netted on the survey form.

- **Night time torchlight survey:** This technique requires visiting the pond after dusk using a high-powered (500,000 to 1,000,000 candlepower) torch. As with netting, you should split the bank in to two-metre sections, surveying as many accessible sections as possible and recording the percentage of pond perimeter searched on the survey form. At each two-metre section you should move the torch away from the bank and then back towards you in order to cover the area of pond within a segment determined by the two-metre stretch of bank. You can undertake a torchlight survey on the same or a different day as other survey methods have been used, but you must make sure that any netting earlier in the day has not resulted in silt being stirred up thereby reducing visibility for the torchlight survey.

**Step 3:** Record any wildlife you see (especially amphibians and supplementary species). Do not attempt to touch or handle any animals. When you encounter an animal during your survey, record as much of the following information as possible: the time, species, lifestage, sex, quantity and certainty of your identification (**C**=certain, **U**=uncertain). For spawn, frog egg clumps can be counted but it can be difficult to count toad spawn strings and palmate newt eggs. Similarly, tadpoles can be difficult to count. For these categories you should therefore estimate a range (e.g. 10–20) that you think is suitable.

*Note that both types of supplementary species (dragonflies and damselflies (excluding nymphs) and Invasive Non-Native aquatic plants) should only be recorded during the day. Further information on identification of the supplementary species is available [in this handbook](#) and in the additional [resources](#).*

**Step 4:** At the end of the survey you should record the end time, the percentage of shoreline that you surveyed and indicate which methods you used during the survey. If you used a net, you also need to record the percentage of shoreline netted.

**Step 5:** Once you have completed all of your surveys, record any supplementary information, including the date you first saw spawn in your pond (if applicable), if toads have been run over on nearby roads and if a grass snake has been seen in the pond.

**Step 6: OPTIONAL:** You can also carry out simple water quality tests at your pond (see the [Measuring water quality handbook](#) on the JARG website). Please indicate if you have done a water quality test at this pond.

**Step 7:** Submit your results, **even if you don't see anything**. Absence data is very useful.

## Safety

It is very important to make sure you are safe at all times during your survey. Working at night can present greater risk, so if you do want to look for pondlife at night you should make sure you first visit the pond during the day to assess any risks before visiting at night. If you have concerns, then you should not proceed with the survey. A [risk assessment template](#) is available on the [JARG website](#) which you should modify to your needs. You are under no obligation to participate or complete the survey.

Note that you do not need to enter the pond to conduct a survey and should only survey from accessible banks. Avoid surveying areas with steep banks or wet muddy ground. Carrying a fully charged mobile phone is also advisable in case of emergency.

It is best to do your survey with someone else, but if you are on your own then make sure you tell a responsible person where you will be and when you expect to be back. Lone working procedures are described in the [Volunteer Working Agreement](#).

## Biosecurity

Amphibians are globally at risk from amphibian diseases. Furthermore, ponds can contain Invasive Non-Native aquatic plants. Both diseases and invasive plants can easily be transferred on equipment, footwear, clothing or other surfaces. It is therefore important that equipment and other items are properly cleaned and disinfected between surveys and between ponds. For further advice, see [ARG UK Advice Note 4](#). [Amphibian disease precautions: A guide for UK fieldworkers](#) and the [Check Clean Dry](#) campaign.

## Submitting your results

Once you have finished your survey, make sure you submit your data. The preferred way is using the online forms at <http://jerseybiodiversitycentre.org.je>. Alternatively, you can email a copy of your form to [jbc@societe-jersiaise.org](mailto:jbc@societe-jersiaise.org) or post it to:

Pondwatch JE  
 Natural Environment, Growth Housing and Environment  
 Howard Davis Farm  
 Trinity  
 JE3 5JP

If you are carrying out a Level 2 survey, you will need to be invited to fill out the appropriate online forms by your coordinator.

Please only submit your data using one method, as submitting through multiple avenues can lead to information being duplicated.

## Resources

The survey forms, species ID guides and all other information needed for completing pond surveys are available on the Jersey Amphibian and Reptile Group (JARG) website: <https://groups.arguk.org/jarg/>.

Survey results can be submitted online to the Jersey Biodiversity Centre (JBC): <http://jerseybiodiversitycentre.org.je>.

### Useful links:

Species Identification

GB non-native species secretariat (Invasive Non-Native aquatic plants) - <http://www.nonnativespecies.org/home/index.cfm>

British Dragonfly Society (Dragonflies and Damselflies) - <https://british-dragonflies.org.uk/>

Insects of the Channel Islands Facebook group (Insects) - <https://www.facebook.com/groups/518340844961982/>

Jersey Wildlife Facebook group (all wildlife) - <https://www.facebook.com/groups/225539340841170/>

## Other

Amphibian and Reptile Groups of the UK (Up to date guidance for Amphibian and Reptile Groups) - <https://www.arguk.org>

ARG UK Advice Note 5 Great Crested Newt Habitat Suitability Index - <https://www.arguk.org/info-advice/advice-notes/9-great-crested-newt-habitat-suitability-index-arg-advice-note-5/file>

Jersey Amphibian and Reptile Group Surveyors Discussion Page (Facebook) - <https://www.facebook.com/groups/590112634750709/>

UK Habitat Classification (habitat classification documentation and guidance) - <http://ecountability.co.uk/ukhabworkinggroup-ukhab/>

## Habitat assessment

This section gives a detailed explanation of how habitat assessments should be carried out, and the habitat classifications and measurements that Pondwatch JE uses. This will help us compare surveys across years, assess changes in the habitat over time and calculate which habitats are best for which species.

### Pond type and construction

The survey form asks you to tick the most appropriate type and construction of pond from a list of multiple choices. These are described in more detail in Tables 1 and 2.

*Table 1 Description of pond types.*

Pond type	Description
Formal garden pond	Standing or still waters between 1m <sup>2</sup> and 2 ha in area which may be permanent or temporary. Includes both man-made and natural waterbodies occurring within a garden or within the boundary of your curtilage. The pond is heavily manicured.
Wild garden pond	As above but the pond is not heavily manicured.
Fish pond	Any standing or still waters between 1m <sup>2</sup> and 2 ha in area which may be permanent or temporary and are stocked with fish (e.g. goldfish or koi).
Farm pond	Any standing or still waters between 1m <sup>2</sup> and 2 ha in area which may be permanent or temporary occurring on a farm.
School pond	Any standing or still waters between 1m <sup>2</sup> and 2 ha in area which may be permanent or temporary occurring on school grounds.
Golf course pond	Any standing or still waters between 1m <sup>2</sup> and 2 ha in area which may be permanent or temporary occurring on a golf course.
Natural pond	Any standing or still waters between 1m <sup>2</sup> and 2 ha in area which may be permanent or temporary that occurs naturally (i.e. without human interference).
Lake	A body of still water >2 ha in area, includes reservoirs and gravel pits.

*Table 2 Description of pond construction types.*

Pond construction	Description
Liner	Water is retained by a liner (e.g. butyl).
Preformed plastic	Water is retained by a preformed plastic shell.
Concrete	Water is retained by a layer of concrete.
Clay	The pond has no liner but water is retained by clay.

## Habitat suitability

Pondwatch JE uses habitat suitability measurements developed for the great crested newt in Britain (Oldham *et al.*, 2000) that are considered to be a useful assessment of pond quality. Analysis of data from the National Amphibian and Reptile Recording Scheme (NARRS) in Jersey has also shown this index to be correlated with palmate newt occupancy.

## The habitat classifications

Pondwatch JE uses 18 habitat classes to define terrestrial and freshwater habitats (Table 3), as described in Level 3 of the UK Habitat Classification Scheme (UK Habitat Classification Working Group, 2018). Further detail on the habitat definitions, their development and relation to other habitat classification schemes are available online at <http://ecountability.co.uk/ukhabworkinggroup-ukhab/>.

## How to assess the habitats in and around the pond

To assess the habitat in and around the pond, follow the approach outlined in the steps below:

**Step 1:** Visit your survey site during the day, **before** carrying out your first survey and assess the risks associated with surveying it. If you are happy to continue then proceed to the next step.

**Step 2:** Recording habitat suitability measurements:

- a. Estimate the area of the pond in m<sup>2</sup> by first identifying the outer perimeter of the pond. This is the perimeter when the water is at its highest level (often in early spring), and may be identified by plants such as rushes present at the pond's outer edge. You can measure the pond using an online map or by measuring it in the field. To do this, it is easiest to consider the pond as a series of geometric shapes for which you individually calculate the area and then sum the shapes together. 'Regular' shaped ponds are therefore easier to calculate than irregular ponds. The length of a side can be estimated by pacing (where a single pace is ~0.8–1.0 metre).
- b. Working out how often the pond dries is best done by speaking with landowners or those familiar with the pond. Alternatively, you may have to make an informed guess based on the water levels when you carry out your surveys. Seasonality should also be factored in. For instance, a pond that is dry by late spring is likely to dry out most years.
- c. Water quality (not to be confused with water clarity) is measured on a subjective index of aquatic invertebrate diversity.
  - i. Bad quality is considered as being clearly polluted, containing only pollution-tolerant invertebrates (such as rat-tailed maggots), and with no submerged plants.
  - ii. Poor water quality contains low invertebrate diversity (e.g. species such as midge and mosquito larvae) and few submerged plants.
  - iii. Moderate water quality is associated to moderate invertebrate diversity.
  - iv. Good water quality is that which supports an abundant and diverse invertebrate community. Netting reveals handfuls of diverse invertebrates, including groups such as mayfly larvae and water shrimps.
- d. The percentage (%) of perimeter shaded is calculated as the area shaded where shading occurs up to at least 1m from the shore. Shading is usually from trees, but can also include buildings. However, it should not include emergent pond vegetation. This estimate should be made between May and the end of September.
- e. The impact of waterfowl (i.e. ducks, geese and swans) is measured across three categories:
  - i. Absent – No evidence of waterfowl impact though moorhens might be present.
  - ii. Minor – Waterfowl are present, but there is little indication of an impact on pond vegetation. The pond still supports submerged plants and banks are not denuded of vegetation.
  - iii. Major – There is a severe impact of waterfowl. There is also little or no evidence of submerged plants, the water is turbid, pond banks show patches where vegetation has been removed and there is evidence of waterfowl being fed.
- f. The presence and abundance of fish is measured across four categories, with information on their presence best gleaned from local knowledge and the surveyor's own observations. Pond owners are often aware of stocking with fish for commercial or aesthetic reasons. However,

stickleback (which can be significant predators of newt larvae, when present in large numbers) are unlikely to be deliberately introduced to a pond, but may arrive through other means. Netting is useful in detecting smaller fish, such as sticklebacks, or the fry of larger species.

- g. The number of ponds occurring within 1 km of the survey pond is an optional measure. The count should not include the survey pond itself, nor should it count ponds that are completely isolated from the survey pond (e.g. due to barriers such as main roads). If you are unsure, your survey coordinator may be able to calculate the number of ponds using map data held by Natural Environment.
- h. The scoring of terrestrial habitat is done over four categories, and requires the surveyor to have a good understanding of newt habitat quality. Though the metric was designed to consider great crested newt terrestrial habitat, we replace that with good terrestrial habitat for palmate newts. Good terrestrial habitat offers cover and foraging opportunities, and includes meadow, rough grassland, hedges, scrub and woodland. Again we do not consider terrestrial areas that are isolated from the survey pond by barriers to dispersal (e.g. by main roads or poor habitat). The four categories are:
  - i. Good – An extensive area of habitat that offers good opportunities for foraging and shelter completely surrounds the survey pond (e.g. rough grassland, scrub or woodland).
  - ii. Moderate – The terrestrial habitat offers opportunities for foraging and shelter, but may not be extensive in area and does not completely surround the survey pond.
  - iii. Poor – The terrestrial habitat has poor structure, offering limited opportunities for foraging and shelter (e.g. amenity grassland).
  - iv. None – There is clearly no suitable habitat around the survey pond (e.g. it is within a large expanse of bare terrestrial habitat).
- i. The final metric requires you to measure the cover of aquatic vegetation on the surface of the pond, including emergent plants, floating plants (excluding duckweed) and submerged plants that reach the surface. This should be estimated between March and May. Figure 1 can be used as a guide for estimating aquatic vegetation cover.

### Step 3: Assessing the habitats **around** the pond

**This part of the survey should be carried out on one of the April or May visits.**

- a. Identify the perimeter of the pond (as described in step 2a).
- b. Look at the habitat within 0–5 m of the pond perimeter, and tick the three most dominant habitat classifications that apply within this area. The habitat classifications are shown in Table 3 below and on the survey form. An example is shown in Figure 2.
- c. Repeat step 3b, this time assessing the habitat within 0–100 m of the pond perimeter.

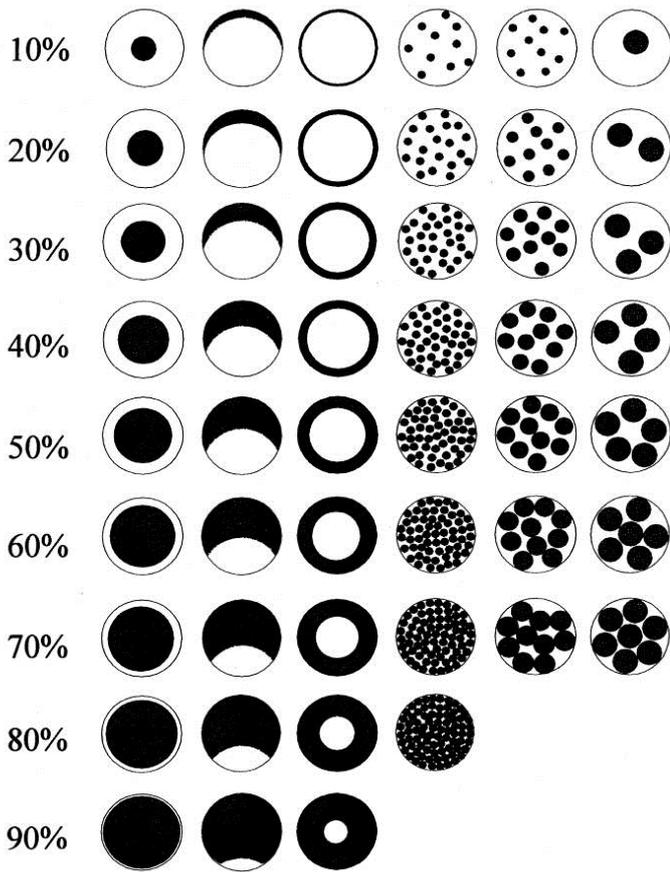


Figure 1 Visual guide for use in assessing the percentage of vegetation cover in a pond (ARG UK, 2010).

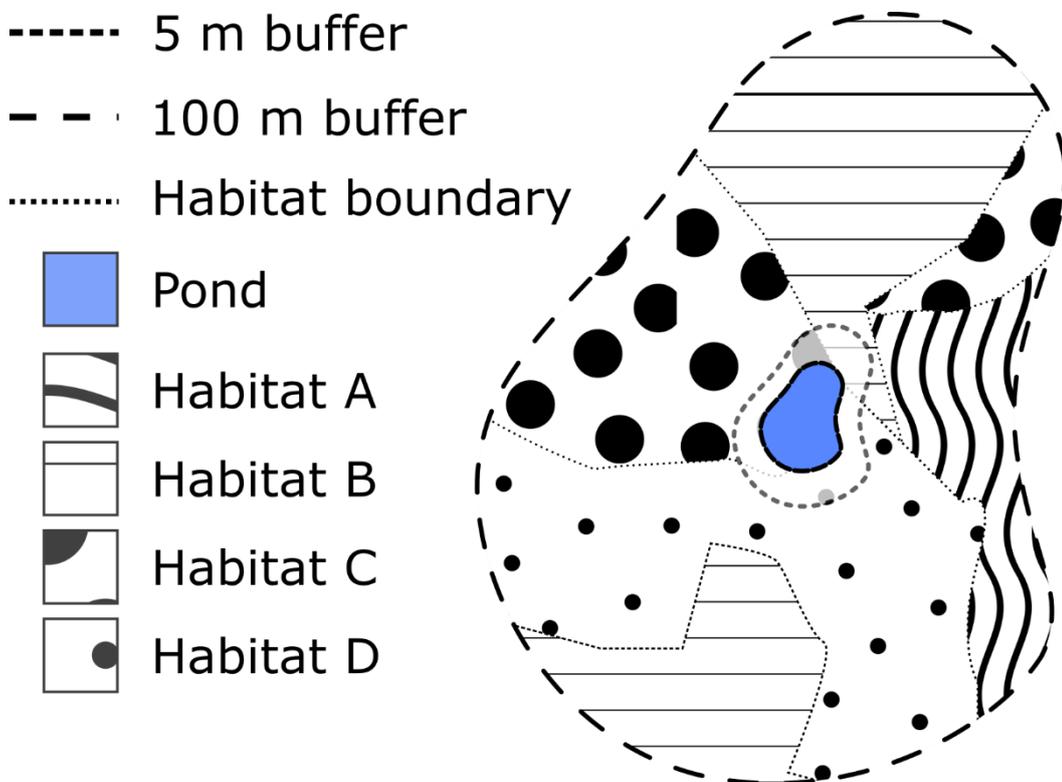


Figure 2 Example of habitats falling with 0–5 and 0–100 m buffer zones from the pond perimeter. In this example, habitats B, C and D are the most dominant in both the 5 metre and 100 metre buffer zones.

	Classification 2	Classification 3	Description
Terrestrial	Grassland	<b>g1:</b> Acid grassland	Vegetation dominated by grasses and herbs on a range of lime -deficient soils such as sands and gravels.
		<b>g2:</b> Calcareous grassland	Vegetation dominated by grasses and herbs (on shallow, well-drained soils (soils formed by weathering of chalk, limestone or base-rich rock).
		<b>g3:</b> Neutral grassland	Vegetation dominated by grasses and herbs on neutral soils (e.g. dry hay meadows, pastures and a range of grasslands which are periodically inundated with water or permanently moist).
		<b>g4:</b> Modified grassland	Fast-growing grasses on fertile, neutral soils. Often dominated by rye-grass and white clover. Typically managed as pasture or regularly mown for agriculture or recreation. This is an agricultural improved or semi improved grassland.
	Woodland and forest	<b>w1:</b> Broadleaved mixed and yew woodland	Vegetation dominated by trees (over 5m high when mature). Canopy cover over 25%. Contains at least 20% broadleaved tress (native and non-native) and yew.
		<b>w2:</b> Coniferous woodland	Vegetation dominated by trees (over 5m high when mature). Canopy cover over 20%. Contains at least 80% coniferous tress (native and non-native) with the exception of yew.
	Heathland and shrub	<b>h1:</b> Dwarf shrub heath	Vegetation has a greater than 25% cover of plant species from the heath family or dwarf gorse.
		<b>h2:</b> Hedgerows	A boundary line of shrubs.
		<b>h3:</b> Dense scrub	Patches of shrubs less than 5 meters tall (can contain occasional trees) with continuous (>90%) cover
	Wetland	<b>f1:</b> Bog	Rain fed inundated or waterlogged habitats where peat has formed in the past.
		<b>f2:</b> Fen marsh and swamp	Inundated or waterlogged lowland habitats where water is supplied by ground water or slow moving rain water as it flows through and peat doesn't form.
	Cropland	<b>c1:</b> Arable and horticulture	Arable cropland, commercial horticultural land (nurseries, commercial vegetable and flower plots), freshly ploughed land, annual leys, rotational set-aside and fallow.
	Urban	<b>u1:</b> Built-up areas and gardens	Urban and rural settlements, farm buildings, caravan parks and other man-made structures such as industrial estates, retail parks, urban parkland, waste or derelict ground and urban transport infrastructure
	Sparsely vegetated land	<b>s1:</b> Inland rock	Natural and artificial exposed rock surfaces such as: inland cliffs, caves, quarries and quarry waste.
		<b>s2:</b> Supralittoral Rock	Region of rocky shore including cliffs and slopes immediately above the highest water level.

		<b>s3:</b> Supralittoral Sediment	The region of shore immediately above the highest water level and subject to wetting by spray/wave splash (splash zone)
<b>Freshwater</b>	Rivers and lakes	<b>r1:</b> Standing open water and canals	Natural systems (lakes, meres, pools) and man-made waters (reservoirs, canals, ponds and gravel pits).
		<b>r2:</b> Rivers and streams	Rivers and streams from bank top to bank top.

Table 3 Habitat classifications for Pondwatch JE, adapted from the UK Habitat Classification (UK Habitat Classification Working Group, 2018). For more information on habitat definitions see the UK Habitat Classification Documents at <http://ecountability.co.uk/ukhabworkinggroup-ukhab/>.

Pictures of the grassland habitat examples are available in the [Pondwatch JE guide to grassland habitats](#).

## Identifying supplementary species:

### Invasive Non-Native aquatic plants

(This information has been sourced from the GB non-native species secretariat website. Learn more at <http://www.nonnativespecies.org>.)

Invasive non-native aquatic plants can be identified using resources from <http://www.nonnativespecies.org>. This includes a free e-learning course which includes a module on invasive freshwater plants. We recommend that you take this course before recording these species. The four species we are interested in are:

- [Water fern \(\*Azolla filiculoides\*\)](#)
- [New Zealand pigmyweed \(\*Crassula helmsii\*\)](#)
- [Parrot's feather \(\*Myriophyllum aquaticum\*\)](#)
- [Canadian pondweed / waterweed \(\*Elodea canadensis\*\)](#)

#### Species information summary

	Water fern	New Zealand pigmyweed	Parrot's feather	Canadian pondweed
Structure	Mats made up of many separate tiny plants, each approximately 2.5 cm long.	Forms thick mats underwater and on the margins of water bodies, with different growth forms: <ul style="list-style-type: none"> <li>• Terrestrial and emergent - short, thick stems and fleshy leaves.</li> <li>• Submerged - usually have thin stringy stems and flatter, less fleshy leaves.</li> </ul>	Emergent stems up to 2 m tall. Grow submerged and in an emergent form (i.e. growing up out of the water) in still or slowly flowing water.	Submerged aquatic species up to 3 m in length occurring in still or slow-flowing shallow or deep water.
Timing	May be seen most months of the year but are not very frost tolerant.	Perennial (found throughout the year).	Dies down in winter and can be found submerged throughout the year. Emergent shoots appear in spring. Flowers are present from May to August.	Perennial (found throughout the year). Flowers are produced June to September.
Flowers		Very small whitish-green to slightly pink flowers may be present, each with 4 petals.	Inconspicuous.	Tiny and inconspicuous and petals white or white tinged with red and borne on the end of a very long thread-like emergent stalk.

	Water fern	New Zealand pigmyweed	Parrot's feather	Canadian pondweed
Leaves	<p>Green during spring / summer, turning red during cold weather in autumn / winter.</p> <p>Have a rough, granular appearance and non-wettable surface.</p>	<p>Bases join around the stem forming a collar.</p> <p>Up to 2cm long, in opposite pairs around stem.</p>	<p>Blue-green in whorls (circular arrangement) of 4–6 around the stem.</p> <p>Each is finely divided, making them appear feather-like.</p> <p>Emergent leaves are more robust than those submerged.</p> <p>Stem breaks easily and has brown roots present around nodes.</p>	<p>Up to 2 cm long, in whorls of 3, widest at the middle and either pointed or rounded at the end.</p>
Similar species	<p><u>Duckweeds (<i>Lemna sp.</i>)</u>; small free-floating native plants which, similar to water fern, can cover still or slow-moving fresh water. Distinguished by their leaves and roots. Duckweed plants are much smaller (max. 5mm). Duckweed leaves are always vibrant green, small and flat. They also have single white to green roots that hang down from the leaves, unlike the clumps of dark roots seen in water fern.</p>	<p><u>Water starwort spp. (<i>Callitriche spp.</i>)</u>. This native can be distinguished as it has delicate non-fleshy leaves with flat or slightly notched tips. When removed from the water, water starwort's leaves and stems also readily flop whereas New Zealand pigmyweed remains more rigid. Water starwort forms rosettes of leaves which lie flat on the water's surface.</p>	<p><u><i>Myriophyllum</i> species</u>. This closely-related native can be distinguished as it does not have emergent leaves (though may produce short emergent flower spikes). Parrot's feather also usually grows from the bank in to a water body, whereas native <i>Myriophyllum</i> species usually grow up from the bed of the water body. Parrot's feather is typically more robust than the native species. Parrot's feather is rarely (if ever) found in fast-flowing water, unlike some native <i>Myriophyllum</i> species.</p> <p><u>Mare's-tail (<i>Hippuris vulgaris</i>)</u>; superficially resembles parrot's feather and grows in similar habitats. Can be distinguished as mare's-tail produces whorls of simple, undivided leaves unlike the feather-like leaves of parrot's feather. Although mare's-tail grows in ponds, streams, lake margins and other damp habitats, it grows in less dense colonies than parrot's feather.</p>	<p><u>Nuttall's waterweed (<i>Elodea nuttallii</i>)</u>; usually found in more nutrient-rich water than <i>E. canadensis</i>. It is difficult to distinguish between the two <i>Elodea</i> species. Nuttall's waterweed has leaves up to 3.5 cm long, in whorls of 3–4, widest at the base and tapering to a pointed end.</p> <p><u>Curly waterweed (<i>Lagarosiphon major</i>)</u>; a non-native which has leaves spiralled at the base, not in whorls. Leaves are up to 3 cm long, flowers are inconspicuous with reddish petals.</p>

## Dragonflies and damselflies

(This information has been sourced from the British Dragonfly Society website. Learn more at <https://www.british-dragonflies.org.uk/content/dragonfly-and-damselfly-identification-help>.) Also see the dragonfly and damselfly ID guide.

Dragonflies and damselflies can be recorded at three levels. In order of difficulty these are:

1. Was it a dragonfly or damselfly?
2. If a dragonfly, what sort of dragonfly?
  - Hawkers and similar species
  - Darters, chasers and skimmers
  - Emeralds
3. What species was it?

To help you identify adults, it is important to pay attention to head markings, eye colouration, markings on the thorax (side and dorsal), leg colouration, markings on the abdomen (side and dorsal), anal appendages and wing markings. Looking at the way that it flies and rests is also useful. Taking clear photos (one from above and one from the side) are the best way of checking the species is identified correctly, and can allow others to help you.

To identify nymphs, you should pay attention to the body shape and the rear appendages.

### Step 1. Dragonfly (suborder = Anisoptera) or damselfly (suborder = Zygoptera)?

Feature	Dragonfly	Damselfly
<b>ADULTS</b>		
Body	Robust	Thin and delicate
Wing position at rest	Open	Closed*
Wing shape	Different between front and back	Same between front and back
Eye position	Touching at the top of the head*	Not touching at the top of the head
Flight	Strong and purposeful	Weak and fluttering
<b>NYMPHS</b>		
Rear appendages	Stiff, short and spiky (x 5)	Soft and flexible gills (x 3)
Body	Stout	Long and slender

\* for most species

### Step 2. What sort of dragonfly (adults only)?

Hawkers and similar species	Darters, chasers and skimmers	Emeralds
Generally dark with bright spots or stripes. Some mostly brown. Can be brightly coloured with a thick black mid-line stripe. Never with dark wing marks other than the wingspots (rectangular marks at the tip). Generally large, robust but thin bodied.	Generally have a blue, red, yellow or brown body or a combination of some of these colours. Sometimes with black markings. Some with additional dark marks on the wings. Generally smaller and stout bodied.	Almost entirely emerald green coloured, usually metallic. Often bright green eyes. Sometimes with bronze tints.

### Step 3. What species (adults only)?

Compare your notes and photos against a guidebook or using the resources at <https://www.british-dragonflies.org.uk>.

## Sources

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