

# RIVER MONITORING

## SUPPORT MATERIALS

INSIDE

+

RIVERSIDE

It's time to get your wellies on as we head to the river to explore different invertebrate species and their sensitivities to water pollution!

### OVERVIEW

This workshop is designed to bring a widely used river monitoring technique to learners in a way that's fun and engaging. We take learning to either your local river or another accessible river for this workshop. We will be exploring all the tiny things that live in our rivers that make up a very important part of our river ecosystems.

**Subjects: Science, Geography**

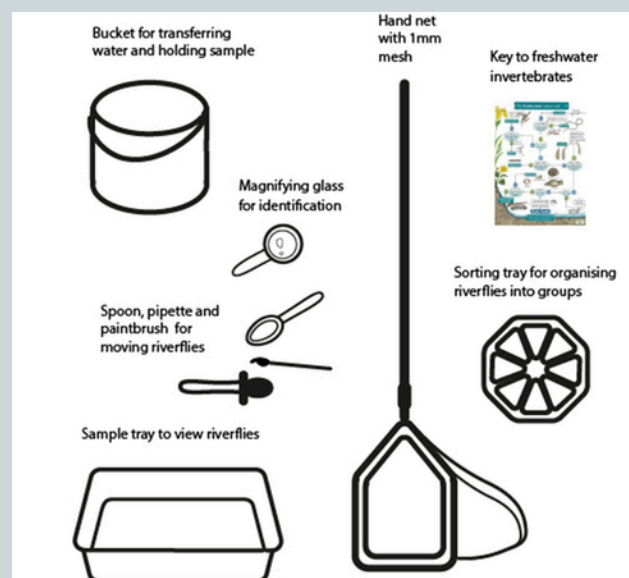
**Age Range: 7-10 years**

**Location: Riverside**

**Time required: 1-2 hours**

### KIT LIST

- Site risk assessment - [\[LINK\]](#)
- Outdoor clothing including wellies
- Bucket and tray (1 per group)
- Nets (equal to the maximum number of learners in the water you'd like)
- Sorting tray (8 compartment dip tray)
- Spoons, paintbrushes and turkey basters for invertebrate sorting
- Riverfly sorting tray underlays - [\[Print here\]](#)
- WildID: Freshwater invertebrate name guide - [\[Purchase here\]](#)



### PREP

This is a field trip workshop; therefore, a site visit and risk assessment will need to be reviewed once a suitable riverside site has been found.

These resources are designed to follow along an introductory powerpoint presentation, but also to be taken onto site to provide a step-by-step guide on the practical elements of this workshop.

We recommend completing this workshop only if providers are competent in water safety. Training courses are provided by WWRT if further confidence is required.



## PREP

## Choosing your sight

Ideally, learners are taken to their local river. However, this is not always possible due to accessibility issues. Here are a few things to consider when selecting your river site:

**Health and Safety**

A Generic Risk Assessment example has been provided by WWRT, however a site-specific Dynamic Risk Assessment will need to be completed before the activity. This is to include any site-specific hazards, weather and water conditions. Do not carry out this activity after heavy rainfall if it has affected the flow speed and depth of the river. You must visit your site before taking your learners.

**Access**

**River access:** The river needs to be accessible. This means it needs to be on publicly accessible land, or that land owner permission has been given for access. Access into the river needs to be safe. A shallow gradient entry is required. If the bank edge is steep, not visible or unclear is not suitable. The water level must not be above wellie height at any point.

**Parking access:** Check for suitable site parking. Do not leave vehicles in laybys or farm gateways. If taking a coach full of learners, bus access and parking will need to be considered.

Additional Access: Statutory body land, National Trust, or National Park areas are often a good choice of location as there is more likely access to parking and toilets. These areas are often more accessible due to made pathways and bridges to the river. However, always seek permission for river entry before arrival.



© Nick Underdown

**Water Quality & Biosecurity**

Consider recent rainfall, any nearby slurry spreading and sewage network locations. Consider not sampling if water quality is poor, and sickness risk is high. Gloves can be worn as PPE. Unsure that hands and equipment are washed thoroughly after sampling.



## 1 Workshop Intro Slides - River Invertebrates


In this section, we will be learning how to identify 7 species of river invertebrates that we will be searching for once we get into our river. The slides will guide you through where the invertebrates can be found and key identification features of each,

### Slide 1: Our River Ecosystem

Our river ecosystem contains many different animals.

 Can the learners name any?

These animals are linked to one another, and each is very important to our river ecosystem. However, there is one type of animal that is arguably the most important for our river ecosystem.

 What animal do the learners think this might be?

A clue - What would be at the bottom of most of our river food chains?

Our river invertebrates (bugs) feed our fish, which feed our birds and mammals. So, if we don't have many invertebrates in our river, we are unlikely to have much other life in our river either.

### Slide 2: Our River Invertebrates

Therefore, we monitor the number of river invertebrates in a river to give us an idea of the overall health of the river ecosystem.

### Slide 3: Our 7 Key River Invertebrates

Specifically, we are going to look at 7 key river invertebrates as these 7 have distinguishable identification features and varying sensitivities to water pollution.

 What is water pollution?

Anything that has entered the water that can cause harm to the environment. E.g, Litter, excess nutrients from slurry and sewage, or oil and excess mud.

### Slide 4: It's time for ID - what do these 7 species look like?

Top Tip: Tails and legs are going to be a key feature to help us.

We will now go through each of the 7 species and their key identification features in the order that each is sensitive to pollution (from most to least). This section can be skipped should you think it is too advanced for your learners. ID skills can be enjoyed instead once you have your sample at the river using your ID guides.



## 1 Workshop Slides - River Invertebrates

### Slide 5: Stonefly

Stoneflies are our only key invertebrate species with two tails. These invertebrates are the most sensitive to river pollution, so are a rarer find in our rivers. If you find one of these, it's a good sign your river is doing ok!



### Slide 6: Flat Bodies Upwing

These are identifiable from their large, broad and flattened head. They have 3 tails, and large gills that stick out the side of their body. Their legs are also flattened and the front distinguishably face forward - **Slide 7: Some say they resemble a scorpion?**



### Slide 8: Olive

These are the trickier ones to identify. It will be important to watch these in the water, and they are the fast swimmers often 'darting' across your tray. Their head is more distinctive from their body, with thin legs and gills that stand up on the back of their body. They have 3 tails, sometimes the middle one being shorter and some species have stripes on their legs, but not all!



### Slide 9: Mayfly

This Nymph has large feathery gills along its back that you'll be able to see moving very quickly in the water. If you look closely, they have tusk-like mouth parts in the centre of two antennae. They have short, powerful legs with strong claws at the end you'll need to look closely to see.



### Slide 10: Caseless Caddis

The head of the caseless caddis more easily blends into its body, creating a maggot-like structure. Their gills are very small, hardly visible like with the others. They have no legs in the long mid-section of their bodies, and are most distinguishable by looking at their tails. Their tails can resemble tiny hooks or sometimes look like they are little feathers. When you watch them move, wiggling their bums around it as though they are doing some feather dusting!



## 1 Workshop Slides - River Invertebrates

### Slide 11: Cased Caddis

How do these differ from the Caseless Caddis?

This nymph has decided to live in a case for its entire juvenile phase, rather than just creating one to moult in.

Different species use different substrate (stones, sand, shells, wood and plant material) so create their protective case.

You'll need to look extra carefully to find these as they could be hiding in their case. Look out for sticks moving on their own, or tiny legs sticking out the end of the substrate.



### Slide 12: Freshwater Shrimp

The most identifiable of our seven invertebrates, the freshwater shrimp has many many legs, extra mouth parts and a curved spine. Watch these guys swim in the water, they swim in every direction, and at every angle looking as though they don't know which way is up! This is the only one of our invertebrates that stays in this stage for its whole life cycle, so you'll find both juvenile and adult shrimp. These are the least sensitive to pollution out of all our seven invertebrates, so you'll likely find the most of these.



### Slide 13: Pollution sensitivity scale

Each of these invertebrates have different sensitivities to pollution. Meaning for some it takes dirtier water to be killed than for others. The cleaner your water, the more of these invertebrates you should collect.

Most → Least Sensitive

- Stoneflies (Plecoptera) – very sensitive
- True Mayflies (Ephemeroidea etc.) – sensitive
- Flat Bodies Upwing (Heptageniidae) – sensitive
- Blue Olive (Baetis species group) – moderately sensitive
- Olive (Baetidae in general) – moderately tolerant
- Cased Caddis (Trichoptera with cases) – moderately tolerant
- Caseless Caddis (Hydropsychidae etc.) – more tolerant
- Freshwater Shrimp (Gammarus) – quite tolerant



## 2 Finding the invertebrates

### Slide 14: Collecting your sample

Where do the river invertebrates live?

Our river invertebrates live at the bottom of the river, hiding under the substrate, be that gravel, rocks or sand.

### Slide 14: Collecting your sample

How are we going to get them into our nets?

### Slide 15: Collecting your sample

Using a technique called 'kick sampling' we will be entering the river in our wellies (not too deep, or you'll get wet), and moving the riverbed with our feet to cause the invertebrates to come out and flow into our nets.

## 3 At the river - preparation

### Slide 16: At the river - preparation

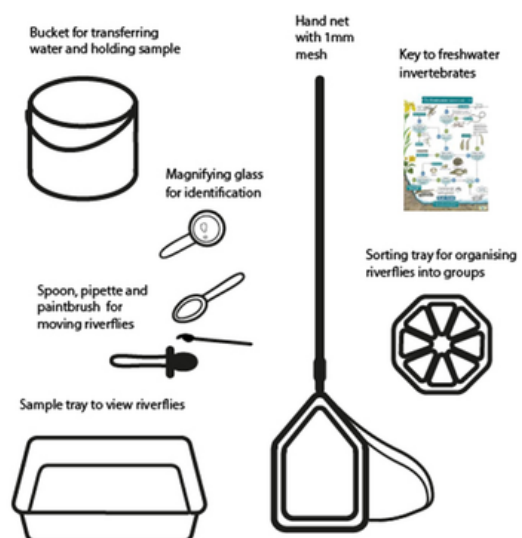
We need to be cautious while spending time by a river as it can be a dangerous environment. Its important the learners are:

- Very aware and cautious of their surroundings
- They take note of how deep the water is before entering, only entering if its below ellie height.
- Enter at a safe, flat gradient entry point

### Slide 17: At the river - preparation

Layout all the kit your going to need once you have collected your sample, on safe, flat ground away from the river. You'll need these items per group:

- 1 Bucket (dont forget to put some river water in it before you get your sample - not too much!)
- 1 flat tray and 1 8-part sorting tray
- 1 spoon, paitinbrush or turkey baster per person
- Any ID guides




## 4

**Collecting your sample****Slide 18-20: Collecting your sample**

Sort the learners into groups of 3. With one set of kit per group. Each bucket should end up with a total of 3-minutes of sampling in it. So split the sampling time between learners appropriately. Here is a video to explain the following process - [\[WATCH HERE\]](#)

1. First you'll be instructing the learners to get into the river with their net. We recommend no more than 5 learners at a time. Have an adult in the water at the same time standing downstream. Head into the river - no deeper than ankle deep (or you'll get wet!)
2. Instruct the learners to hold their net facing upstream, so that the river water is flowing into their net, keeping it open.
 

 Which way is the water flowing?  
Place the net downstream of you and hold on tight.
3. Instruct the learners to stand directly in front of their net opening. This is so that when they begin kicking, it increases the chances of the invertebrates not missing the net. Stand directly in front of your net as though you were blocking the entrance.
4. Have a timer ready (we recommend doing around 1 minute per-person). Then instruct all the learners to start at the same time, kicking their feet and moving the substrate. Be careful not to kick substrate into the net, this could break the net and make your sample difficult to see. When instructed and the timer starts, begin digging a hole with your feet into the bottom of the river, moving the substrate out the way.
5. After the 1-minute is up, instruct your learners to stop and bring their nets to their buckets. Once the time is up, pick up your net and take it to your groups bucket.
6. Assist the learners in emptying their nets into the buckets. Empty your net into your bucket. You'll need to use your hands to scrape all the bugs off carefully into the water.
7. Double check that all living things have come off your net, then rinse your net in the river before passing it to the next person. Repeat this process until all learners have had their turn.

You may wish to make the learners who are waiting their turn responsible for doing the timer, kit preparation or bucket filling.



## 5 Sorting your sample

### Slide 21-22: Sorting your sample

Once the samples are in the buckets, we transfer the sample into a tray to make identification easier. Support will be needed in this section with helping the learners to use the correct tools, and identify the invertebrates correctly,

- Take your bucket of bugs to your tray. (This will be heavy so you may need to ask an adult).
- Empty the contents of your bucket very **slowly** and **carefully** into your flat tray. Make sure not to fill your tray too high, or spill your bugs everywhere.
- Now you have your sample in your tray you can put your ID skills to use and start sorting your bugs into the correct sorting compartment in your sorting tray.

Paintbrushes and spoons are for gently moving the bugs across. The turkey basters are for moving water only - otherwise the bugs get stuck.

If you printed the Riverfly underlay, these sit underneath your 8-section sorting trays. Each type of invertebrate is now to be sorted from the large, flat tray into the sections of the sorting tray. Ensure there is water in the sorting tray first. If an invertebrate that isn't one of our 7 species is found, this gets placed into the middle tray.

To simplify things, we have categorised Olives and Blue-winged olives together, however the underlay will have them on separately.

Remember - look at number of tails, gill shape and the way they swim to identify!

## 6 Counting your sample

Work sheets have been provided for completion at this point. Count how many of each invertebrate was found, and score them accordingly:

Add up all the scores to give you your rivers 'health score'.

This is where it is important that only 3 minutes of sampling is in any one bucket. Not to worry if not, it will just mean your score won't be comparable to official Riverfly scoring.

Invert count	Score
1-9	1
10-99	2
100-999	3
Over 1000	4



## 7 Discussion

What was the invertebrate that you found most of?

What is this invertebrate's sensitivity like for water pollution?

It is likely the invertebrate you found least of is lightly sensitive to pollution.

What invertebrate did you find the least of?

What is this invertebrate's sensitivity like for water pollution?

It is likely the invertebrate you found least of is highly sensitive to pollution.

Did we get a high or low score?

What is considered a 'high score' varies between rivers, however a score below 10 can be considered a low score, below 5 a very low score.

What does this mean for the health of the river?

Hopefully you found some interesting things in your river. The more things you found, the more likely your river is healthy.

## 8 Packing away

At the end of the activity, all of the water and invertebrates need to be carefully returned to the river. It is advised that the water in trays is returned to the buckets first for transportation to the river to avoid spillages. Rinse all equipment carefully in the river to ensure all bugs and debris are washed off.

Ensure all equipment is properly clean and dry before using at a different river. We do not want to spread any invasive species or diseases around our rivers.

## 2 Conclusions

The key take-aways from this workshop:

- Learners can identify 7 main river invertebrates ✓
- Learners know how to collect a kick-sample ✓
- Learners understand how invertebrates can be used as an indicator of river health ✓

