

This document contains guidance on the monitoring tools available and processes involved for local groups to participate in SmartRivers citizen science.

What is SmartRivers?

SmartRivers is our scientifically robust citizen science toolkit. It empowers local communities to collect professional-grade data and take action to protect wild fish and their habitats.

We offer comprehensive training and support for local organisations to conduct professionally comparable ecological monitoring with volunteers.

Our approach generates data that matches the standards used by regulatory bodies, bridging critical gaps in UK river monitoring caused by ongoing resource constraints.

Why choose 'smart' citizen science?

Armed with their data, our groups have helped protect rivers across the UK, from tracking vital populations of species, to flagging water quality stress hotspots.

Defining history

Establish high-quality historical benchmarks so future generations won't have to guess what once lived in our rivers.

Measuring impact

Plan with confidence by gathering detailed pre and post monitoring data for interventions in or around rivers.

Scoring river health

Assess water quality and biodiversity in the places that matter most to you.

Making waves

Present your data to local stakeholders and regulators to drive action – with WildFish by your side.

Our core monitoring tool:

Invertebrate fingerprinting



This entails the collection of invertebrate samples in spring and autumn annually.

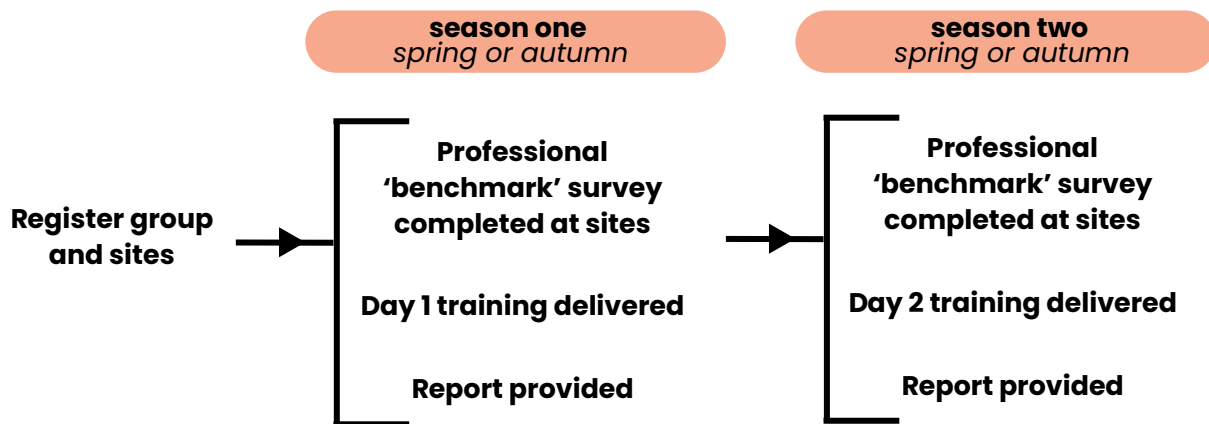
Samples are collected using the industry standard methodology (three minute kick-sweep and one minute hand search method). Each sample is preserved away from the river bank and, where possible, analysed to species-level.

This monitoring allows changes in invertebrate diversity and abundance to be assessed, highlighting trends and areas at risk. Water quality 'scorecards' are also generated, grading the impact of five common water quality stress types. Reduced flows, chemicals, sediment, phosphorus and organic pollution.

The next few pages detail the process of establishing and operating SmartRivers invertebrate fingerprinting.

Setting up a group

Year one



Register group and sites

Local host organisations sign up here to establish a SmartRivers monitoring group in their area. Each group has a lead, who is the main point of liaison. They typically choose five suitable sample sites depending on the group's objectives – research, restoration and/or activism. These sites can be changed over time upon consultation with WildFish.

Benchmark surveys & training

For all new groups, samples are collected and analysed by professional ecologists in the first year.

Volunteers complete two days of training in conjunction with the collection of these 'benchmark' samples. During the first training day, expert ecologists teach volunteers how to take a sample at one of their chosen sites. There is a strong focus on correct net placement and accurately capturing all available aquatic habitats.

On the second training day the group are introduced to microscopes, the SmartRivers 'family finder' tools and their exclusive 'expected species list'. SmartRivers uses a high-resolution picture matching technique, rather than traditional dichotomous keys, for invertebrate analysis. The aim is to teach bespoke identification (ID) of the invertebrates the group can expect to find at their sites.

Operating a group

Year two and onwards

Choose your analysis pathway

Hybrid

Samples are volunteer collected but professionally analysed (also known as 'sample and send').

Process

Volunteers collect spring/autumn samples



Package up samples



Contact us to book collection and delivery to analyst



Analyst uploads data to database



WildFish produce report

Volunteer

Samples collected and analysed by volunteers with additional support from WildFish and quality control included.

Process

Volunteers collect spring/autumn samples



Volunteers receive follow up training on self-ID administration



Volunteers work through sorting and identifying the samples



Unknown species photos and specimens are verified by WildFish



Group lead uploads data to database



Quality control sample collected by WildFish and processed



WildFish produce report and update groups expected species list

These pathways are flexible and a combination of the two is possible!

Making the best pathway choice

The hybrid pathway only requires sample collection by volunteers at the five sites twice a year, so is the easiest and fastest option. Most groups opt for this pathway or combine it with volunteer ID.

For groups willing to undertake volunteer ID we strongly recommend submitting a proportion of your samples for professional ID to reduce volunteer load and improve confidence. This is flexible and can be adapted each season.

Volunteer ID is the most challenging and time consuming option, but as the samples are preserved groups can work through analysis at their own pace until the next season. There is no fixed process for groups to organise their ID, but we recommend a set up in our follow up training.

It is the responsibility of the group lead to coordinate sample collection and ID meet ups with support from the SmartRivers Project Manager.

Quality control (for the volunteer ID pathway)

Groups must keep all their substrate and animals (separately) for each site until a quality control is selected. The selected sample is posted to an analyst who conducts a full professional ID. The results for this are added to a template alongside the volunteers ID attempt to identify areas where additional training is required. Each group completing any volume of volunteer ID is subject to one quality control sample analysis a season.

Specimens believed to be outside of the animals included in a group's expected species list must be independently verified by an approved ecologist. Expected species lists are updated twice a year so newly verified species are added in at these times.

In the first season of independent ID, WildFish aims to send a qualified representative along to support the group. Further online training is provided on invertebrate ID with experts in the SmartRivers network. The content of this is based on volunteer feedback.

Group longevity

We recommend a minimum of three years monitoring for data to be the most meaningful. But as with all biological data, the longer the time series the better! Once multiple years of data are available, WildFish produce timeline reporting of the dataset to look for trends and points of interest.

We also discuss with groups possible site additions or alterations. It's important to us that you don't remain stuck monitoring the same fixed sites if there are other locations that may be more useful for you to cover.

Additional tools:

eDNA benchmarking



Every living organism sheds genetic material into the environment around it.

With kits provided by our specialist partner, Trace Biomonitoring, SmartRivers groups can use this environmental DNA (eDNA) to assess presence and absence across 33 taxonomic groups, from bacteria to vertebrates.

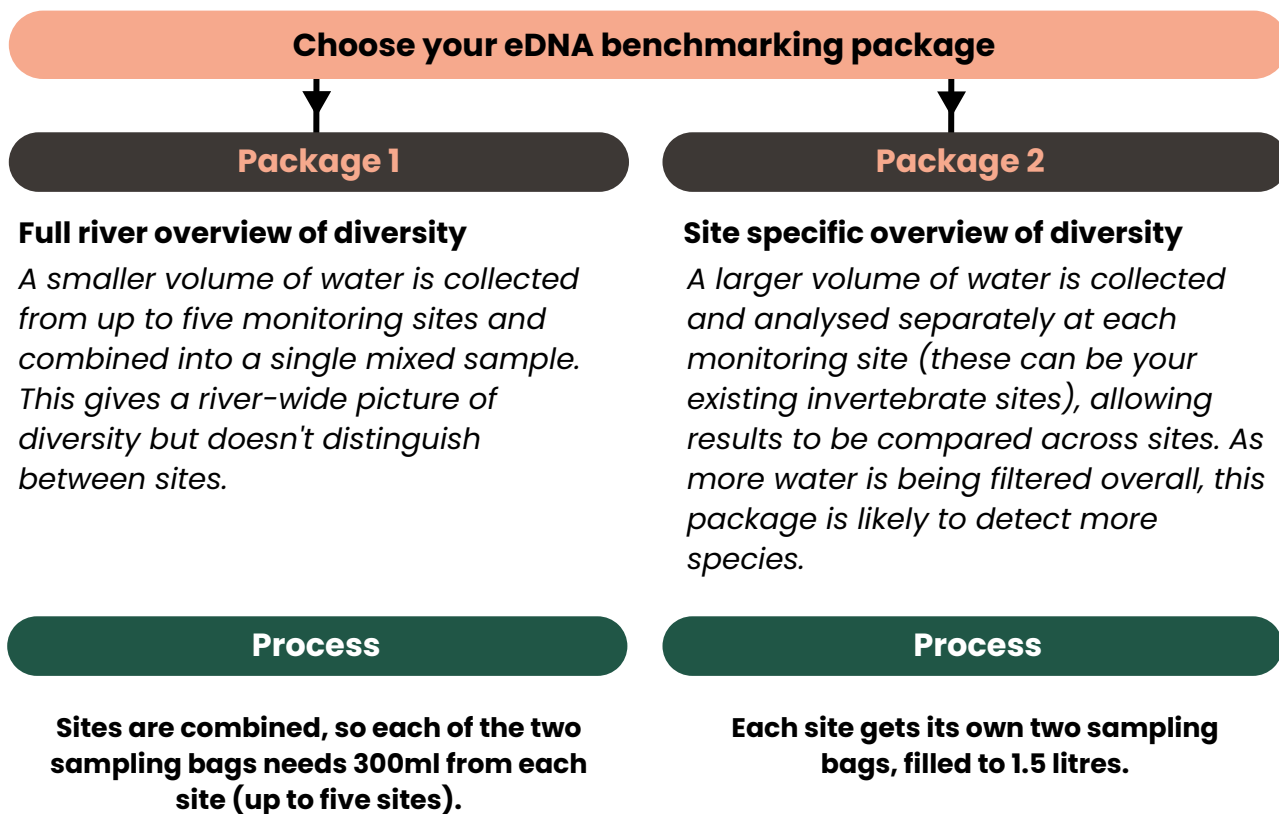
This monitoring entails collecting water samples and filtering them, before sending them back to the lab for sequencing.

Further information on the logistics of SmartRivers groups undertaking eDNA benchmarking is on the next page.

eDNA benchmarking logistics

Signing up

The group lead completes this registration form. Prior to registration the group needs to have decided which eDNA package to use.



After registration, the invoice will be shared with the group lead and kit posted out to the address provided in the form.

Sample timing and frequency

There is no hard and fast rule on when to sample. Some seasonal differences can occur, but a single collection will still provide valuable taxonomic knowledge. Trace Biomonitoring staff are available to advise on best practice around timing and environmental considerations.

We recommend using eDNA as a one-off benchmarking tool rather than an annual exercise. That said, it isn't limited to a single use, groups may want to revisit it, for example to evaluate a river intervention before and after it takes place.

Collection method

Each kit includes full instructions. Every sample uses two duplicate filters to improve accuracy, with 1.5 litres of water filtered per filter.

Water is collected in sampling bags (process varying by package). Water should be collected from a range of spots across the site rather than from one spot near the bank, which reduces the diversity detected.

Working in pairs is recommended, so both filters can be collected at once without the second filter picking up extra sediment from water already waded through.

Water is pushed through the filter using the syringe provided. The full 1.5 litres should be pushed through where possible; if the filter clogs with sediment, record how much water was filtered before stopping. The filter is then dried by pushing air through the syringe and preserved with the solution provided. Each filter has its own bag and site details form, which should be kept together to avoid mix-ups.

Samples should be sent back the same day, or stored in a fridge overnight and sent the next day, using the box and returns label provided.

Reporting

Data turnaround is set at four weeks from when samples reach the lab to results being ready. Findings are presented on Trace Biomonitoring's Shiny app, with a link sent to the group lead when ready. Trace and WildFish are happy to go through the findings with groups where useful.

Costs

Invertebrate fingerprinting

WildFish cover the cost of professional sample collection and analysis in the first year. The host organisation is responsible for covering the groups training cost and providing a training venue. The **training is £1950** in total. This is for both days, with 10 volunteer slots. We bring equipment for the training.

From year two and onwards, groups are responsible for procuring their own equipment. However, WildFish provide two digital microscopes to those pursuing volunteer ID.

The volunteer analysis pathway has no direct ongoing cost for groups, but has a considerable time implication. For hybrid samples (volunteer collected but sent for professional analysis) groups are responsible for covering the analysis cost (**£185 exc VAT per sample**), although WildFish will help wherever possible. WildFish cover all sample transportation costs.

All quality control costs are covered by WildFish. There are no additional costs for WildFish support or reporting.

Groups can secure funding for SmartRivers through various sources:

Including grant-giving trusts, local community funds, and private or business donors

eDNA benchmarking

Groups are responsible for all eDNA costs. Figures cover equipment, analysis and reporting. They are VAT inclusive.

There's no ongoing subscription – each round of eDNA benchmarking is a one-off cost. If a group wishes to repeat it in a different season or year, they'll need to pay again.

Package 1:
£492 + £30
postage

Package 2:
Number of
sites x £492 +
£45 postage

Get in touch:

smartrivers@wildfish.org
www.wildfish.org