

# Wye citizen science water quality monitoring field guide



## Friends of the Upper Wye

### Reminders:

- Please try to monitor twice a week at your agreed sampling site
- Check the health and safety guidance before and during every trip you take out into the field
- Record your results in the field via the Epicollect app (FOUW) or on a paper copy of the form (to later upload online) after every survey
- Contact us with any issues you have

### Need to contact us?

✉ [science@fouw.org.uk](mailto:science@fouw.org.uk)

☎ Will Bullough: 01497 831416

☎ Tom Tibbits: 01497 831366 / 07786 07569



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## Things to take out into the field...

<b>The basic water quality test kit*</b> <i>These items will be supplied to you</i>	<b>Other important things to take with you</b> <i>You'll need to source these items yourself</i>
<ul style="list-style-type: none"><li><input type="checkbox"/> HM Digital EC-3 Probe</li><li><input type="checkbox"/> La Motte Phosphate test strips</li><li><input type="checkbox"/> Hach Nitrate test strips</li><li><input type="checkbox"/> Turbidity tube</li><li><input type="checkbox"/> Syringe</li></ul>	<ul style="list-style-type: none"><li><input type="checkbox"/> 1 litre sample vessel</li><li><input type="checkbox"/> Kitchen roll or clean lint cloth</li><li><input type="checkbox"/> Mobile phone</li><li><input type="checkbox"/> Paper form and pen (as back up)</li><li><input type="checkbox"/> Hand sanitiser or plastic gloves</li><li><input type="checkbox"/> Rubbish bag and waste bottle</li><li><input type="checkbox"/> Tweezers</li></ul>

\*Some volunteers may be using more advanced equipment, if advised or requested to do so by their volunteer coordinators. Instructions for using any other kit will be provided separately

## Collecting a Water Sample

1. Identify a safe place to collect your sample, where the water is free-flowing.
2. Perform a 'triple rinse' of your sampling container, by filling your container and then emptying it down-stream of your collection point, three times. Also rinse any other monitoring equipment (syringes, test tubes etc.) in river water before using them.
3. Lower your sampling container into the water and aim to collect a sample from just below the surface.
4. Transport your sample to a suitable site nearby to carry out the field tests.



Take care not to disturb sediment from the riverbank or riverbed as you collect your sample from the river as this is likely to affect your results



Avoid taking samples from stagnant or slow moving parts of the river as this is not representative of the main flow of the river

## Performing water quality tests and recording your data



- Perform water quality tests on your sample in the following order:  
sensor measurements → nutrient tests → turbidity measurement
- Carefully follow the step-by-step instructions provided for each test to ensure accurate data collection – detailed instructions are available in your training resources and are summarised over the next few pages
- Ensure you understand your groups' health and safety guidance for carrying out each test
- Do not carry out testing if for any reason it is not thought to be safe to do so on the day
- Know the general range in results you should expect to get at your sampling site and, if readings look particularly out, consider repeating the test(s)
- Carefully record your data in the field on your group's Epicollect or paper survey form



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## Electrical conductivity and temperature - HM Digital EC-3

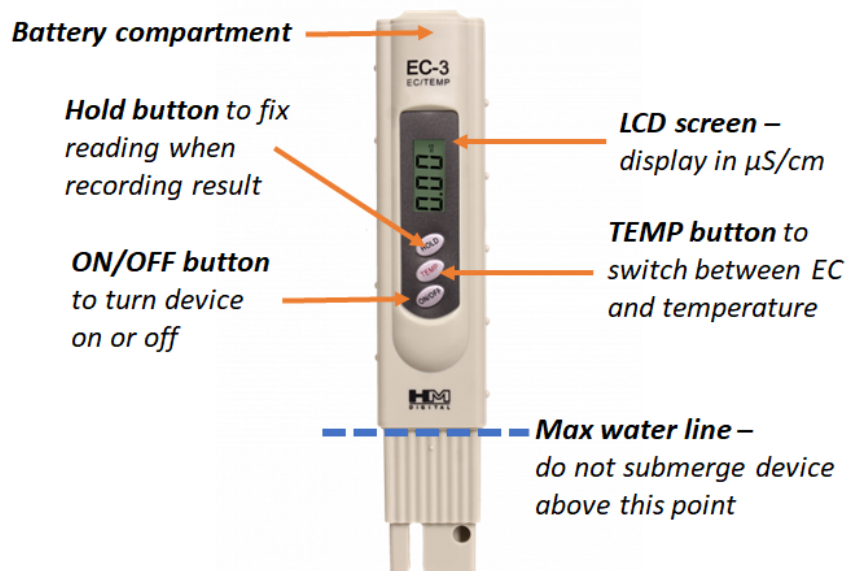
1. Remove the protective cap from the device and check it is clean and dry.
2. Turn the meter ON and lower the device into the water sample, **taking care not to submerge the device above the maximum water line.**
3. Gently stir the meter in the sample and wait for the reading to stabilise, which can take some time.
4. Press the HOLD button so you can fix the reading and view it out of the water.
5. Record the EC value displayed (in  $\mu\text{S}/\text{cm}$ ).
6. Press the HOLD button again to release the fixed reading.
7. Press the TEMP button and lower the device into the water sample a second time.
8. Wait for the temperature reading to stabilise and press the HOLD button again.
9. Record the temperature value displayed (in  $^{\circ}\text{C}$ ). (If required, press the TEMP button once more to switch to  $^{\circ}\text{F}$  or twice more to switch back to EC.)

### After recording your result

- Gently shake excess water off, use a lint cloth or soft paper towel to ensure the sensor is dry
- If the sensor appears to be dirty, you may need to rinse it in tap water when you return home
- Ensure the sensor is clean and dry when you put it away for storage
- Store the device in a cool, dry place

### Long-term maintenance

- If any error codes appear on the display screen, look to the instruction manual provided or ask your volunteer coordinator for advice
- If you think a battery change or recalibration is required, contact your volunteer coordinator



HM Digital EC-3 Meter



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## Phosphate - La Motte test strips

1. Rinse the test tube provided (and syringe, if using) with river water.
2. Fill the test tube with your sample water (to the 10ml mark) - either directly or using a clean syringe.
3. Carefully remove a test strip from the bottle, and immediately replace the bottle cap - **avoiding getting wet fingers or moisture inside the bottle** (use tweezers if helpful).
4. Gently bend the test strip in half with the pads facing inwards and secure the strip inside the cap of the test tube.
5. Securely replace the test tube cap, then gently and slowly invert the test tube completely five times (ensuring that the bubble rises completely to the top of the tube on each inversion).
6. Remove the test tube cap (including the attached test strip).
7. Place the bottom of the test tube on white squares below the colour chart on the test strip bottle and look down through the sample to compare the colour of your reacted sample to the chart.
8. Select the colour and associated concentration that best matches your reacted sample and record this value.

## After recording your result

- Dispose of the used strip responsibly (i.e. take it home and/or place in a litter bin)
- Dispose of your reacted sample water responsibly (e.g. pour the water into a green space where the reagents will biodegrade, not back into the river)
- Ensure the test tube and syringe are clean and dry when you store them
- Store strips at home in a cool, dry place - away from extreme heat or sunlight



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## Nitrate - Hach test strips

1. Carefully remove a test strip from the bottle, and immediately replace the bottle cap - **avoiding getting wet fingers or moisture in the bottle** (use tweezers if helpful).
2. Dip the strip into your water sample for one second. Do not shake off excess water.
3. Hold the strip horizontally with the pad facing up for 30 seconds.
4. Compare the colour of the top pad on the test strip with the top (nitrate) colour chart on the test strip bottle by holding them next to each other.
5. Select the colour and associated nitrate concentration on the colour chart that best matches the pad and record this value.

### After recording your result

- Dispose of the used strip responsibly (i.e. take it home and/or place in a litter bin)
- Store strips at home in a cool, dry place - away from extreme heat or sunlight



## STOP THE SPREAD of invasive non-native species

**CHECK**

**Check** your equipment and clothing for live organisms - particularly in areas that are damp or hard to inspect.

**CLEAN**

**Clean** and wash all equipment, footwear and clothing thoroughly.

If you do come across any organisms, leave them at the water body where you found them.

**DRY**

**Dry** all equipment and clothing - some species can live for many days in moist conditions.

Make sure you don't transfer water elsewhere.

For more information go to <http://www.nonnativespecies.org/checkcleandry/>



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## Turbidity - Secchi tube

1. Position yourself standing or kneeling over the vertically positioned Secchi tube so that you can clearly see the black and white disc at the bottom.
2. Slowly fill the tube with water from your river sample (try to avoid creating bubbles), keep watching as you pour and the disc becomes less and less clear.
3. Stop pouring water into the tube at the point the disc disappears from sight.
4. At the point when the disc is no longer visible, change position so that you can see the side of the tube.
5. Read the number from the scale which matches the level of water in the tube. Record your result.
6. If the water reaches the top of the tube and the disc is still visible then record the result as less than 12 (<12), if the disc is obscured before you reach the first number then record the result as greater than 240 (>240).

**Tip:** To ensure you can see the black and white disc as clearly as possible on a sunny day, position yourself with your back to the sun (so that the tube is in your shadow) and make sure that you're not wearing sunglasses

## After recording your result

- Pour the water back into the river or into a 'green space' nearby
- Rinse out your Secchi tube at home with tap water if it appears to be dirty after testing



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## Further support and guidance

Videos demonstrating how to use each piece of kit are available on the Friends of the Upper Wye YouTube channel.

Further detailed guidance is available via our website:

<https://www.fouw.org.uk/citizen-science-training>

If you are still stuck, don't hesitate to contact us by email at [science@fouw.org.uk](mailto:science@fouw.org.uk), or via phone on 01497 831416 (Will Bullough) or 01497 831366 / 07786 07569 (Tom Tibbits).

## Recording and submitting your survey results

As well as recording water quality data, please remember to fill out the rest of the survey details in the form provided – and take a photo of the river at your sampling site from the same fixed point each time.

It is essential you record the date, time and location of your survey as prompted to at the start of the form.

The other survey questions in the form are very useful in helping us to better understand the water quality data you collect – please complete all that you can. Be sure to record anything unusual you observe and highlight any issues you had carrying out your survey.

When recording your survey via our form on the Epicollect app on your phone, the project you need to add is called "FOUW". Don't forget to hit the upload icon to submit the form once you've completed it.

## Identifying and reporting signs of pollution

If you see any signs of river pollution, or an algal bloom, please record them as part of your survey and include photos where possible. The next few pages include a guide to some of the most common, easy-to-spot signs of pollution found in UK rivers and streams for you to use as reference when out in the field.

If you see any significant signs of pollution, please report it to the relevant statutory authority on their pollution hotline:

- If in England – call the Environment Agency – 0800 807 060
- If in Wales – call Natural Resources Wales – 0300 065 3000
- If you see a combined sewer overflow (CSO) discharging raw sewage, you can also report this to Dwr Cymru / Welsh Water (0800 085 3968) and the relevant regulator

**Remember only ever look at or smell something you think might be a sign of water pollution – never touch it!**



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## Common signs of river pollution to look out for...

### Sewage fungus

'Sewage fungus' is actually a mass of a particular type of filamentous bacteria, not a fungus. It grows in high nutrient environments, such as those around sewage discharges and is a sign of a medium to long-term contamination issue. It is usually grey-brown in appearance and can grow on almost any surface in a river channel.



### Oily sheens

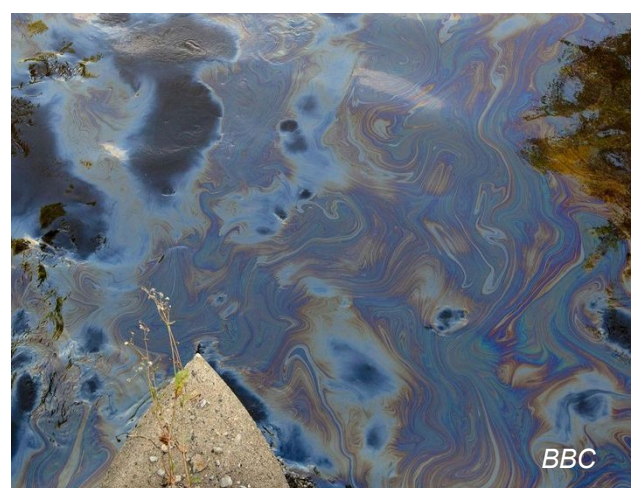
Many oily sheens found in rivers are formed as a result of naturally occurring iron oxidizing bacteria, and do not pose a threat to the environment. However, some oil sheens are formed as a result of petroleum entering the water and are toxic to wildlife and humans.

A quick and easy way to tell the difference between naturally occurring oil sheens and those that indicate pollution is to use a stick to poke, or - if you can't reach - throw a small rock at, the oil sheen. If the sheen is bacterial - it will break into smaller bits when disturbed which will then stay separated. If the oil sheen is petroleum - it will swirl together when disturbed and quickly reform. Polluting sheens will also smell like petroleum, whereas bacterial sheens won't.

#### ***Bacterial oil sheen***



#### ***Petroleum oil sheen***





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## Foam

Foam found in rivers can be naturally occurring, forming due to the break-down of organic matter combined with increased flow or turbulence. However, foam can also be formed as a result of synthetic substances, such as detergents, entering the water. Foam from natural sources is usually light brown in colour, may smell earthy and is usually dispersed over a large area. It forms in places with high turbulence and collects in slow moving parts of the river. Foam from human sources is usually bright white in colour, may smell soapy and will usually accumulate near the source.

***Foam from natural source***



***Foam from synthetic source***



## Sewage waste, odours and discolouration

Sewage related litter or waste – including cotton buds, sanitary products, nappies, wet wipes, dental floss, hair balls and more - are a strong indicator that sewage pollution has entered a river. This is likely to be the result of untreated sewage entering from a combined sewage overflow (CSO).

Chemical or detergent-like smells and grey water in rivers can also indicate sewage pollution. You can often track these signs of pollution to their source – a contaminated surface water drain entering the river. This is commonly seen in urban catchments suffering from residential plumbing misconnections, but can also indicate contamination from industrial sources or road run-off. If you smell something unnatural in the water, try and figure out what it smells like as this can often help detect the source of pollution (e.g. sewage, agricultural, urban or industrial).



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## Algal blooms

Algae describes a wide range of different photosynthetic organisms that live in water. When one type of microscopic algae or algae-like bacteria grows out of control, due to excess nutrients in the water, it causes an algal bloom. Algal blooms have the negative effect of reducing the amount of light able to penetrate through the water column and therefore the amount of oxygen in water. Some algal blooms also produce toxins harmful to both aquatic life and humans.

Cyanobacteria (a group of photosynthetic bacteria, also known as blue-green algae) are the most common culprit of toxic algal blooms in freshwaters. Not all cyanobacteria will produce toxins, but it's impossible to tell just by looking at it whether or not it will. Cyanobacteria can only be seen when they clump together in blooms. It's these sorts of algal bloom you need to look out for, but they can occur in different colours, shapes and sizes. The images below, provided with descriptions by the Centre for Ecology and Hydrology (CEH), should help you identify them but it can be tricky so please try and take a photo too. Duckweed and filamentous algae can also cover the water in 'blooms' but these are not harmful. They are often mistaken for cyanobacteria, so it's good to know what they look like too.

CEH also suggest poking the scum with a stick to see whether it breaks into small particles or irregularly shaped lumps – if it does it's likely cyanobacteria. If not, and you see tiny (2-4mm) leaves it's probably duckweed, or if you see clumps of hairlike strands or soft tubes it's probably filamentous algae. Take a look at CEH's Bloomin' Algae app (free) or website for more photos, info and tips!

### ***Cyanobacteria (blue-green algae) can appear as wisps or as a foam in water***

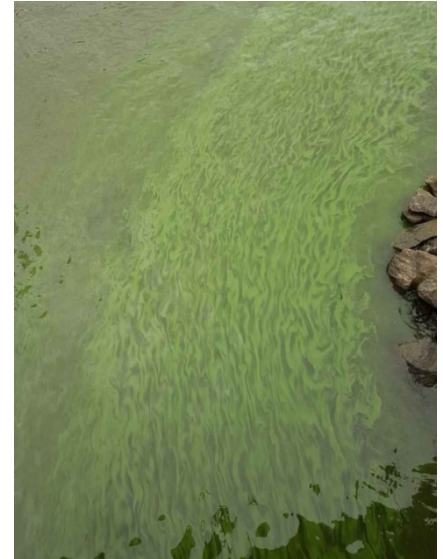


### ***Blue-green algae can be a range of colours and sometimes appears lumpy***



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***Blue-green algae can appear thick and paint-like or as a cloudy haze in water***



***Duckweed (left) and filamentous algae (right) can look like blue-green algae***



## **Other things to look out for...**

Diffuse pollution entering rivers from agricultural land can often be difficult to spot. However, there are some common signs of poor land management to look out for across rural catchments that mean diffuse pollution is more likely to enter a river during heavy rainfall events. These signs include river bank 'poaching', done by farm animals as they access river water to drink, and fields left bare between cropping or due to overgrazing. Chemicals and nutrients applied to farmland enter the river during rainfall events via surface water run-off and can have a significant impact on water quality.

Slurry entering rivers as a result of leaks from slurry pits, or leachate draining from uncovered manure piles, can also be a serious form of pollution in agricultural areas. You may be able to spot slurry or leachate entering a river because it is usually a distinctly different colour (and smell) from the soil carried by surface run-off.

### ***Slurry entering a river***



*Lancashire Telegraph*



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## FRIENDS OF THE UPPER WYE HEALTH AND SAFETY GUIDELINES

**DO NOT CONTINUE WITH A SURVEY IF ANY OF THE SAFETY GUIDELINES ARE NOT MET**

### Before you leave home

- Check the Risk Assessment
- Make sure it's safe and legal for you to access the river, stream or lake.
- Is someone going with you? If not, let someone know where you're going and when you'll be back. Make sure you take your mobile phone and can call for help if needed.
- Are you wearing the right footwear? Waterproof with good grip is best.
- Check the weather: you'll need sun cream, a hat and some water in hot weather, several layers of clothing in cold weather – and waterproofs if it looks like it's going to rain.
- Consider whether recent heavy rain might have made river or riverbank conditions more dangerous.

### When you arrive at the sampling site

- Are you standing somewhere stable with good footing?
- Is there a safe area to complete the water quality tests, away from the water and other hazards such as livestock or traffic?

### When carrying out the survey

- The site you have chosen should enable a sample to be collected without the need to enter the watercourse.
- If sampling from the edge, try not to lean over the water.
- Ensure your chosen sampler device enables you to take a water sample safely – for example an open milk bottle secured to a stick is a good option if you're sampling from a bank.

**River water can contain harmful bacteria that can cause ill health and potentially serious diseases such as Weil's disease (also known as Leptospirosis). You should be aware of Weil's disease and, if you feel unwell, should mention it to your doctor. For this reason – and for sample integrity – try to minimise personal contact with water to be tested. By using a suitable sample container and the syringe provided there should be no need to immerse hands or fingers in the sample. Do not carry out sampling with open cuts or wounds and make sure to wash hands thoroughly between sampling and handling food. We supply a bottle of hand sanitiser gel for while you're out and about.**

**Any questions about health and safety?** Email [science@fouw.org.uk](mailto:science@fouw.org.uk)

