FreshWater Watch By earthwatch EUROPE



Great UK WaterBlitz Autumn 2026 Report


Afon Dulas at Abergarfan, Great UK WaterBlitz

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Thank you to our generous funders:
Avaaz
Cellnex UK
TBL Fire Protection
The Big Give
The Royal Society of Chemistry

Thank you to all the participants of the **Great UK WaterBlitz** who made this report possible.

This report should be cited as: Bannatyne, L., Richardson, A.K.,* Barron, L.P.,* Hayes, S., Loiselle, S., & Simmonds, K. (2026). The Great UK WaterBlitz Autumn 2026. Earthwatch Europe

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Executive summary

Freshwater is fundamental to life, supporting people, wildlife, and ecosystems across the UK. Yet many of our rivers, lakes, ponds, and streams are under increasing pressure from human activities.

Understanding the true scale of these challenges can be hampered by gaps in monitoring data, but citizen scientists are helping to bridge those gaps. Public interest in protecting freshwater environments has never been higher, as clearly demonstrated between 18th to 21st September 2026 when over 8,500 people visited their local waterbodies and monitored almost 4,500 freshwater sites, making this the biggest Great UK WaterBlitz ever. We partnered with Avaaz to highlight the need for water law reform, with more than 33,000 people signing their petition **Avaaz – BRING OUR RIVERS BACK TO LIFE**. We are grateful to everyone who donated their funding and active support for the Autumn 2026 Great UK WaterBlitz.

The decline of UK freshwater ecosystems is driven by multiple, overlapping sources of pollution which continue to affect water quality nationwide. This includes not only excess nutrients from wastewater discharges and agricultural activities, but also a cocktail of chemicals from urban runoff. By working with Imperial College London as part of the **UNSaFE project**, we have investigated the extent of per – and polyfluoroalkyl substance (PFAS) – "forever chemical" contamination in our waterways.

Addressing these issues requires significant investment in modern wastewater treatment systems including nature-based solutions, wider adoption of sustainable farming practices that reduce nutrient losses to waterways, and effective compliance enforcement. We urge policymakers, regulators, and environmental agencies to partner with communities and to embed citizen science within national freshwater monitoring programmes. Equally, we encourage volunteers to continue their engagement with and advocacy for the rivers, lakes, ponds, and streams that matter to them. By combining community action, scientific endeavour, and policy change we can drive meaningful improvements in water quality and work towards a future where healthy rivers thrive from source to sea.

A word about nutrients

Sources and impacts

Nitrates and phosphates are nutrients that occur naturally in the environment and are essential for plant growth. Nitrate is very soluble, associated mainly with agriculture and less with wastewater, and typically reaches watercourses as groundwater via the rocks and soil. It is a good indicator of human-influenced nutrient pressure on watercourses. Phosphate is far less soluble, tending to stick to sediment particles. It arrives in rivers by more overt routes, such as outfall pipes and muddy runoff. It is mainly associated with wastewater and less with agriculture, and is a good indicator of the ecological status of watercourses.

Overly high nutrient concentrations in freshwater bodies can trigger excess plant and algal growth, a process called **eutrophication** in which high levels of organic matter and bacterial activity lead to a decrease in oxygen levels. Eutrophication negatively impacts freshwater ecosystems but is less likely to occur when phosphate concentrations remain low, even when nitrate concentrations are high. This is why the FreshWater Watch approach measures both nitrate and phosphate.

Mission control, we have a problem…

As more and more results arrived over the Great UK WaterBlitz weekend, our quality control protocols picked up an unexpected trend: **phosphate concentrations were abnormally low compared with other Autumn Blitzes**. Many of you contacted us at water@earthwatch.org.uk to let us know that you had noticed the same thing. We knew that several factors could have caused phosphate concentrations to trend lower, including:

- Were more samples taken from ponds, lakes, and upland streams? These waterbodies tend to have low phosphate concentrations.
- Was it drought-related? Fewer storm overflows from sewage treatment works, plus no muddy runoff, would result in lower phosphate concentrations.
- Was there a problem with the phosphate test kit reagent? We check the accuracy of each batch as we receive it from our supplier. During the Blitz we tested an additional 100 kits – all performed well.

Although we could not isolate the exact cause, we became certain that there *was* a problem with phosphate measurements in this Blitz. **We therefore decided to exclude phosphate from the results of the Autumn 2026 Great UK WaterBlitz and to focus on nitrate concentrations.**

Measuring both nitrate and phosphate undoubtedly provides the most complete picture of nutrient pollution. However, nitrate alone is still a valuable and practical indicator of human pressure on freshwater ecosystems, particularly in agricultural landscapes where nitrogen losses can be substantial[1,2]. The Environment Agency[3] estimates that **agriculture** accounts for 50-60% of nitrate pollution in the water environment, whilst sewage effluent contributes about 25-30% of nitrates.

You can learn more about **nitrates and phosphates here.**



Key Findings for the Autumn 2026 Great UK WaterBlitz

- **The biggest Blitz!! 8,507 citizen scientists, including 1,441 children,** surveyed **4,456 sites** across the UK between the 18th and 21st September 2026.
- **2,400 KS2 learners and their teachers from over 60 schools** learned about freshwater through a linked **"Live Lesson" webinar** hosted by the Earthwatch education team.
- **152 PFAS samples** were analysed for four selected PFAS by our research partners Imperial College London, finding that **61%** of samples tested **contained one of these four PFAS: PFOA, PFOS, PFHxS, PFNA.**
- **56%** of sites sampled across the UK had **unacceptable nitrate concentrations that exceeded 1.0 ppm**.
- **Wales had the best national result**, with **94%** of sites showing **acceptable** nitrate concentrations.
- **England had the worst national result with** only **51%** of sites showing **acceptable** nitrate concentrations.
- **Good news!! Nitrate concentrations** for all four nations **show an overall decline** since June 2024.
- **Neagh Bann river basin district** in Northern Ireland had **95%** of surveys showing **acceptable** nitrate concentrations of **less than 1.0 ppm**. By contrast, in the **Thames river basin district** only **32%** of measurements showed **acceptable** nitrate concentrations.
- Eight **sub-basins** had **100% acceptable** nitrate concentrations: In Western Wales it was **Carmarthen Bay and the Gower**, **Llyn and Eyri**, **Conwy**, and **Ynys Mon**. In Scotland it was **North Highland**. In England it was **Lune** and **Derwent Northwest** in the North West District, and **Wharfe and Ouse Lower** in the Humber district.
- The Welsh, Northern Irish, and Scottish **counties** of **Gwynedd, West Glamorgan, Mid Glamorgan, Tyrone**, **Tweeddale**, **East Lothian**, **City of Glasgow**, **Inverness**, **Renfrewshire**, and **Wigtown** all had **100% acceptable** nitrate concentrations. No English counties scored 100%.
- The **counties** of **Bedfordshire** and **Cambridgeshire** had the **highest nitrate concentrations** in the UK, with only **20**% of measurements **below 1.0 ppm**.

What did Citizen Scientists measure?

In the Great UK WaterBlitz, citizen scientists measured the range of nitrate (N), and phosphate (P) in their local river, stream, pond, lake, ditch, canal, or other freshwater body. However, **due to the abnormally low phosphate measurements**, **we have only included the nitrate concentrations** recorded at each site in the analysis. Waterbodies with **acceptable** nitrate concentrations measured less than 1.0 ppm N. Waterbodies with **moderate and high** nitrate concentrations (>1.0 ppm N) were considered to be unacceptable (Figure 1).

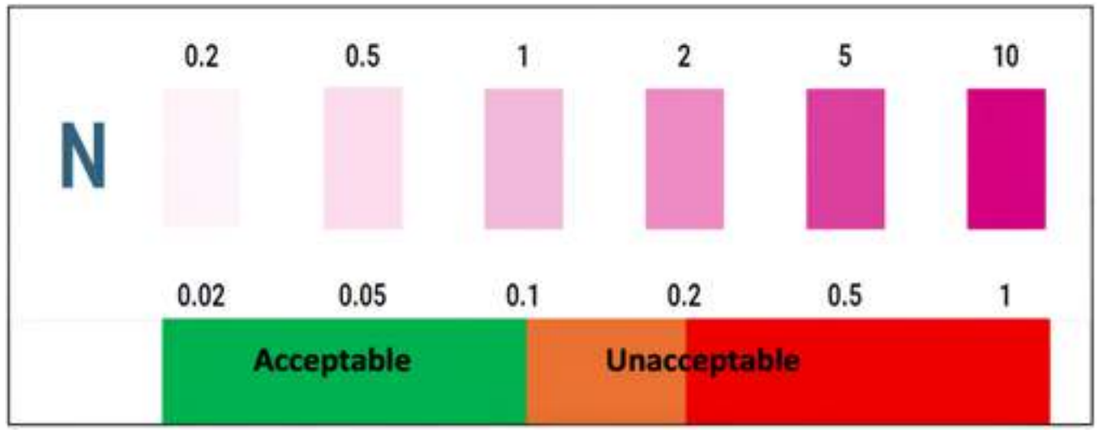


Figure 1. The range of nitrate concentrations measured 18th – 21st September 2026.

How is water quality officially monitored?

Responsibility for freshwater monitoring is divided among several agencies across the UK. In Northern Ireland, this role is carried out by the **Northern Ireland Environment Agency**; in Scotland by the **Scottish Environment Protection Agency**; in Wales by **Natural Resources Wales**; and in England by the **Environment Agency**. Each organisation oversees the assessment and management of water quality within its respective jurisdiction.

In England, for example, nitrate is routinely monitored by the Environment Agency to track nutrient pressures and long-term trends, with pollution risks managed through the Nitrates Directive and associated Nitrate Vulnerable Zones.



National results

Waterbodies

Citizen scientists uploaded 4,456 records over the four-day Great UK WaterBlitz (18th to 21st September 2026). They were asked to select the type of freshwater body they were investigating from a pre-determined list. Waterbody types with more than 5 samples taken are shown in Figure 2.

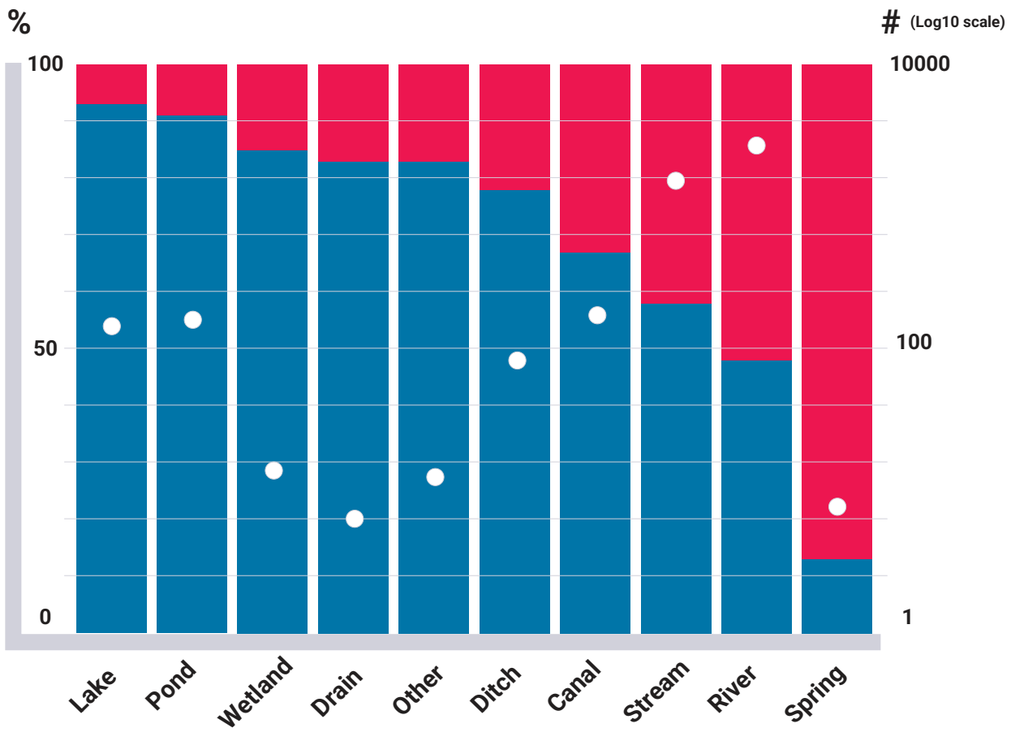


Figure 2. Water quality across the UK's freshwater bodies

A wide variety of waterbody types were sampled, although nearly **90% of participants chose to test a river or a stream**. The impact of nitrates on these channels is very clear in Figure 2 with streams faring only a little better than the **50% of all rivers** that **had unacceptable nitrate concentrations**. On the other hand, relatively few lakes, ponds and wetlands were sampled, but their importance is evident: **nitrate concentrations were below 1.0 ppm in ~90% of "still water" samples**. We had seen in previous Blitzes that springs had surprisingly low water quality, illustrating the high nitrate concentrations found in groundwater – this was again the case.

Nitrate concentrations in your country

Wales topped the charts (Figure 3): **94%** of the 240 samples collected from Welsh waterbodies had **acceptable** nitrate concentrations. Northern Ireland (61 samples) and Scotland (263 samples) were not too far behind, but **England**'s waterways (3892 samples) had a high nitrate burden with **half** of all tests showing **unacceptable** concentrations.

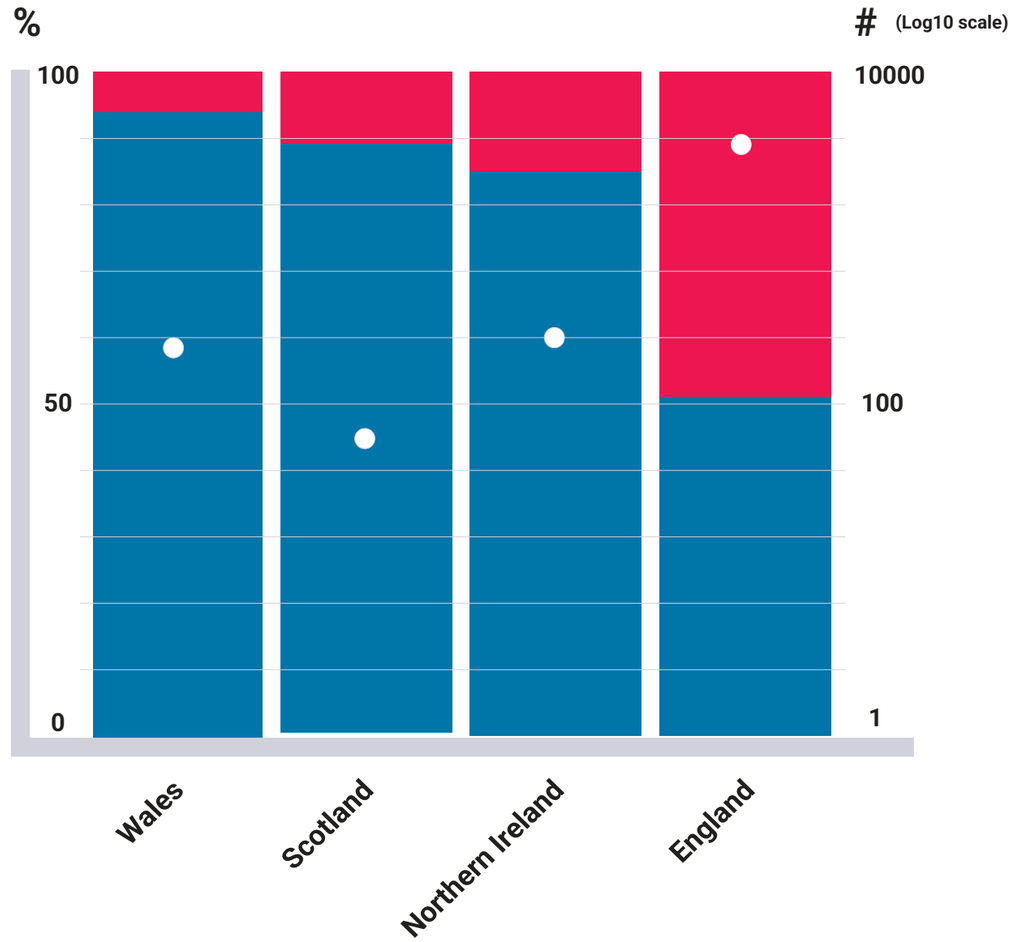


Figure 3. National nitrate concentrations

Nitrate concentrations over time

The Great UK WaterBlitz gives us a snapshot twice a year. However, thanks to the continued efforts of thousands of WaterBlitzers a picture is building up over several years. Figure 4 shows nitrate concentrations for all the Blitzes since June 2024, with the green line showing the average for each country.

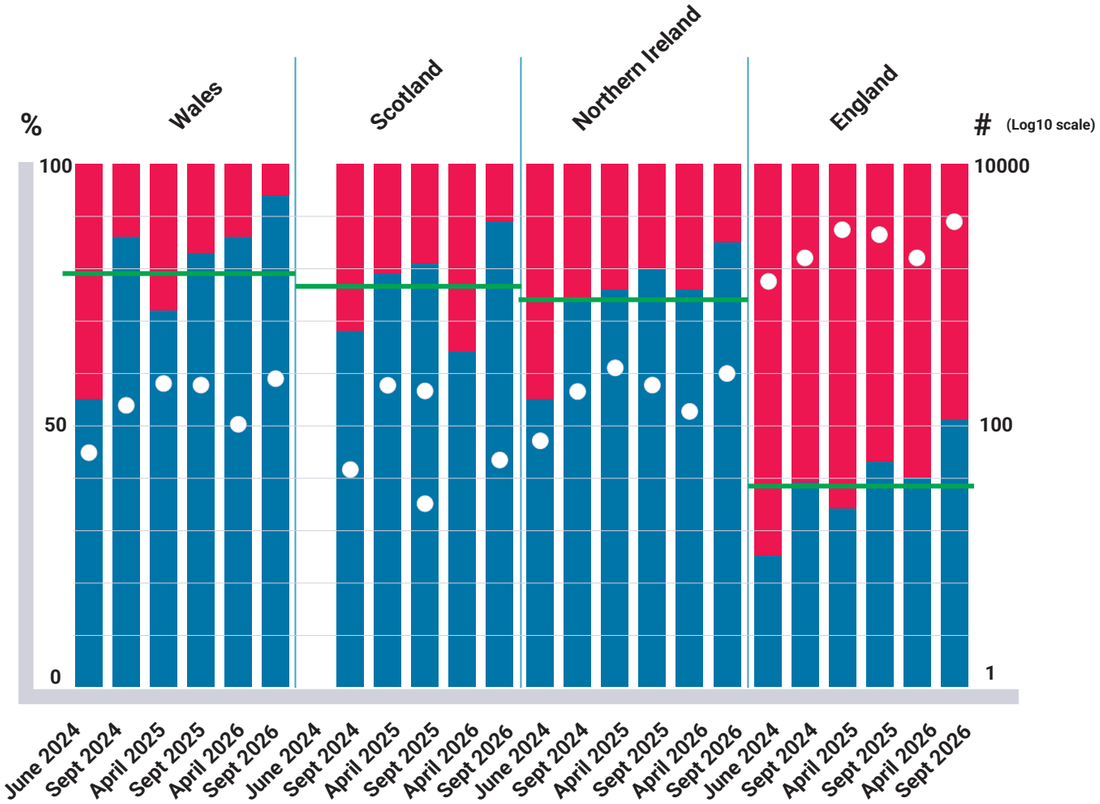


Figure 4. National nitrate concentrations over time, with average (green line) Acceptable Unacceptable # Datapoints

There's good news and not-so-good news in Figure 4. The good news is that there appears to be a decrease in the percentage of unacceptable nitrate concentrations in all four countries since 2024 – albeit with some wiggling around in Wales and Northern Ireland! Not-so-good? Even with a 30% improvement since 2024, England continues to lag far behind. These citizen science findings echo government reports – at national level there has been a shallow decline in nitrate concentrations since the 1970s[3], although trends for individual rivers vary. This overall improvement may be due to the decline in fertiliser use due to rising costs, more sustainable farming practices, and improvements in wastewater treatment[3].



Cuckmere River, Berwick, Great UK WaterBlitz

A more detailed picture

Which river basin districts have the highest nitrate concentrations?

A river basin (or drainage basin), is the area of land around a river from which all water is drained. A **river basin district** includes one or more river basins (Figure 5). Each river basin district has a river basin management plan that outlines the objectives, standards, and measures for managing water. River basin districts with more than ten measurements were included in this part of the analysis (Figure 6).

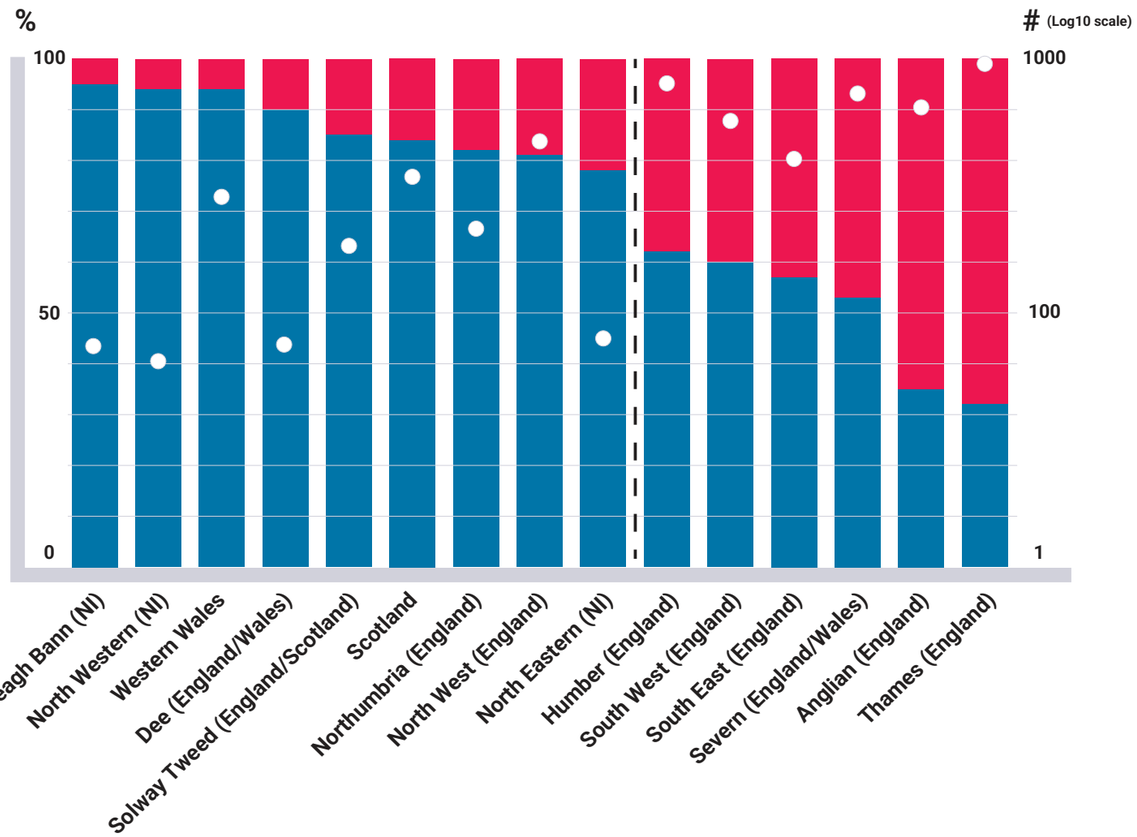


Figure 6. Nitrate concentrations by river basin district



Figure 5. River basin district map indicating the Tees-Exe line

The dashed line on Figures 5 and 6 indicates the so-called "Tees-Exe" line that geographers use to roughly divide the UK into upland (to the north and west) and lowland regions (to the south and east). The river basin districts in Figure 6 that are shown to the left of the dotted line lie to the north and north-west of the UK. Surveys undertaken in these river basin districts ranged between **95%** to **78%** acceptable nitrate concentrations, for the Northern Irish river basin districts of **Neagh Bann** and **North Eastern** respectively. To the right of the dotted line (to the south and east) samples from the **Humber** river basin district showed **62%** acceptable nitrate concentrations, whilst **Thames** recorded only **32%**.

These results from citizen science echo government findings. The Environment Agency reports that nitrate concentrations are lower in the wetter, upland, pastoral, more sparsely populated areas to the north of the UK[4] than in the drier, lowland, arable-dominated and more densely-populated southern and eastern parts of England.

Breaking it down basin by basin

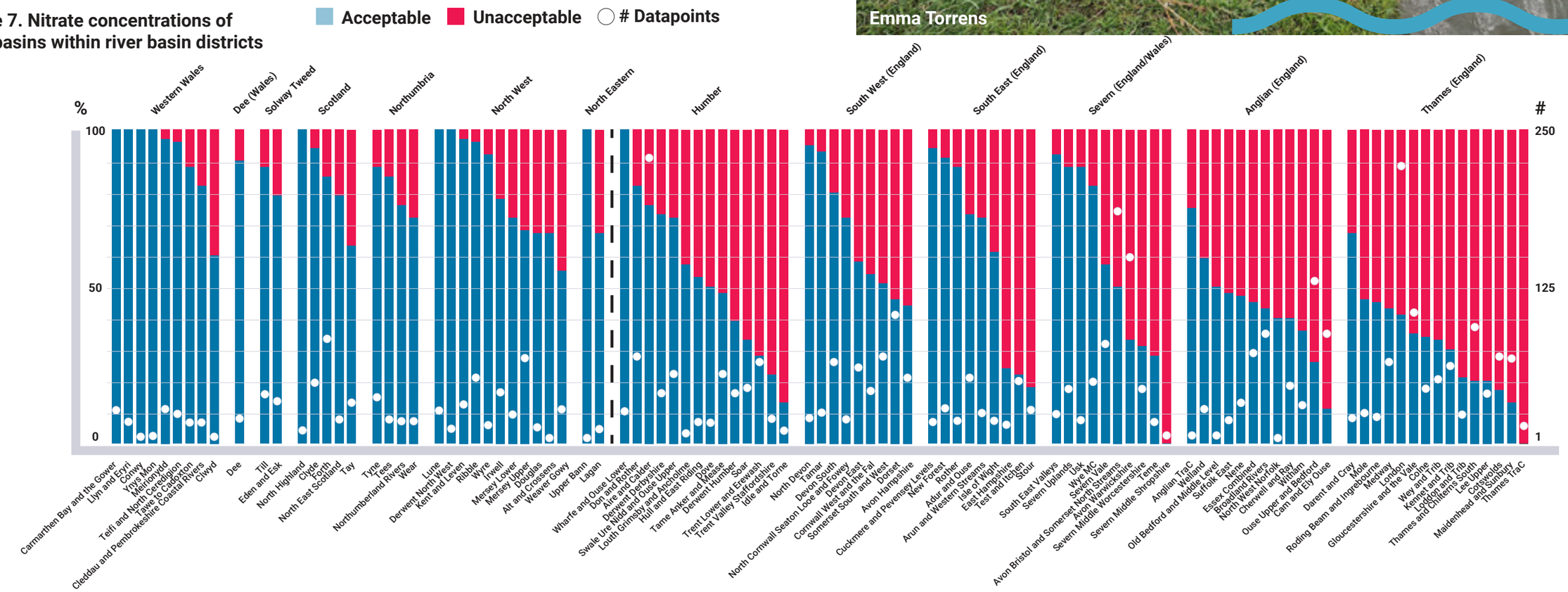
Each river basin district is made up of many smaller river basins, known as sub-basins. Keeping the river basin district order from Figure 6, we then ranked the 102 sub-basins that had at least five datapoints (Figure 7).

Nine river basins had **100% acceptable nitrate concentrations**: **Carmarthen Bay and the Gower**, **Llyn and Eryri**, **Conwy**, and **Ynys Mon** in Western Wales, **North Highland** in Scotland, **Upper Bann** in Northern Ireland, **Lune** and **Derwent North West** in the North West of England, and **Wharfe and Ouse Lower** in the Humber district. Again, we can see the difference north-west to south-east: to the left of the Tees-Exe line, the worst river basin was the **Weaver Gowey** with only **55%** of surveys showing acceptable nitrate concentrations. However, more than two-thirds of river basins to the right of the line were below 55%, with the worst overall being **Thames TraC** with **100%** of samples taken showing **unacceptable** nitrate concentrations.

This is why citizen science water quality data is so valuable – no formal water quality sampling programme equals this detailed UK-wide coverage provided by ordinary people who are concerned about their local waterbodies.



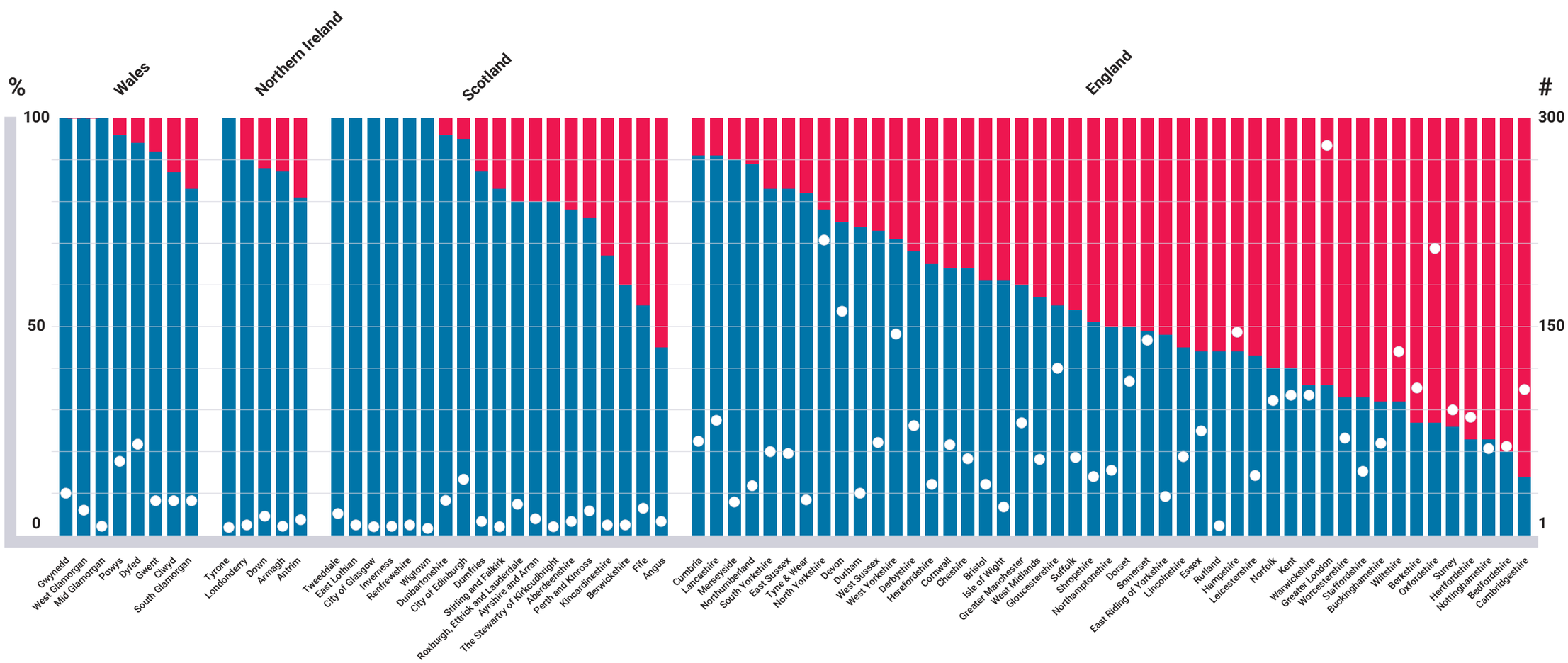
Figure 7. Nitrate concentrations of river basins within river basin districts



Nitrate concentrations in your county

Not everyone can name which river basin they live in, but (especially at election time!) most of us know our county. In this report we have used ceremonial counties, because local governmental legislation counties are continually updated, with boundaries that change over time. We have ranked the sixty-seven counties that had more than five data points by country so that you can see how nitrate concentrations in your county compare to others (Figure 8).

Figure 8. Nitrate concentrations by county ■ **Acceptable** ■ **Unacceptable** ◯ **# Datapoints**



Ten counties had **100% acceptable nitrate concentrations.** These were **Gwynedd**, **West Glamorgan** and **Mid Glamorgan** in Wales, **Tyrone** in Northern Ireland and **Tweedale**, **East Lothian**, **City of Glasgow**, **Inverness**, **Renfrewshire**, and **Wigtown** in Scotland. **Cumbria**, **Lancashire** and **Merseyside** were the three best counties in **England** with **~90% acceptable nitrate concentrations**.

Worst in their countries were **South Glamorgan** in Wales (**82%** of surveys showing acceptable nitrate concentrations), **Antrim** (**81%**) in Northern Ireland, and **Angus** (**45%**) in Scotland. **Cambridgeshire** (**14%**) had the **highest nitrate concentrations** in England and the UK as a whole. A shout out to the residents of **Greater London**, who took **279 measurements** – more than any other county!


Stephen Ogden

A first look at the PFAS results

Nitrate testing is straightforward, and the results provide valuable insight into the human pressures on waterways. However, there is a wide variety of complex and potentially harmful chemicals entering our rivers and streams from multiple sources, including municipal wastewater, urban runoff, industrial outfalls, landfill leachate, and agriculture, among others. The nature and extent of these contaminants is largely unknown. To find out more, selected citizen scientists collected **more than 150 additional water samples to be analysed for PFAS** by Professor Leon Barron, Dr Alexandra Richardson, and their team at Imperial College London as part of the UNSaFE Project. You can find out more about the UNSaFE project here: **Earthwatch Partners on £2M PFAS Pollution Research Project**

Per – and polyfluoroalkyl substances (PFAS) represent thousands of different **man-made chemicals** that have been used in a wide array of commercially available products and materials since the 1950s. They contain very strong carbon-fluorine bonds that do not break down easily, which has led them to become known as "**forever chemicals**". PFAS are often used because of their resistance to water, oil, heat, and stains. They are often found in **non-stick cookware, water – and stain-proof clothing, food packaging, firefighting foams, electronics and industrial materials** such as **coatings, seals, lubricants, and insulators**. Because of their widespread use for decades, PFAS have contaminated soil, air, water, wildlife, and people. They are persistent in the environment, and are bioaccumulative and toxic to humans and wildlife.

For the past three years, Earthwatch has partnered with Imperial College London for the Great UK WaterBlitz to conduct deeper chemical testing using advanced mass spectrometry instruments that can be used at large scale (Figure 9).

Together, we conducted the first national scale, citizen-led PFAS sample collection at more than 150 locations this year and as part of a UKRI funded project called UNSaFE (Figure 10).



Figure 9: Testing was conducted using liquid chromatography-mass spectrometry. The inset graph shows a peak, confirming the presence of PFOA in a sample collected in London

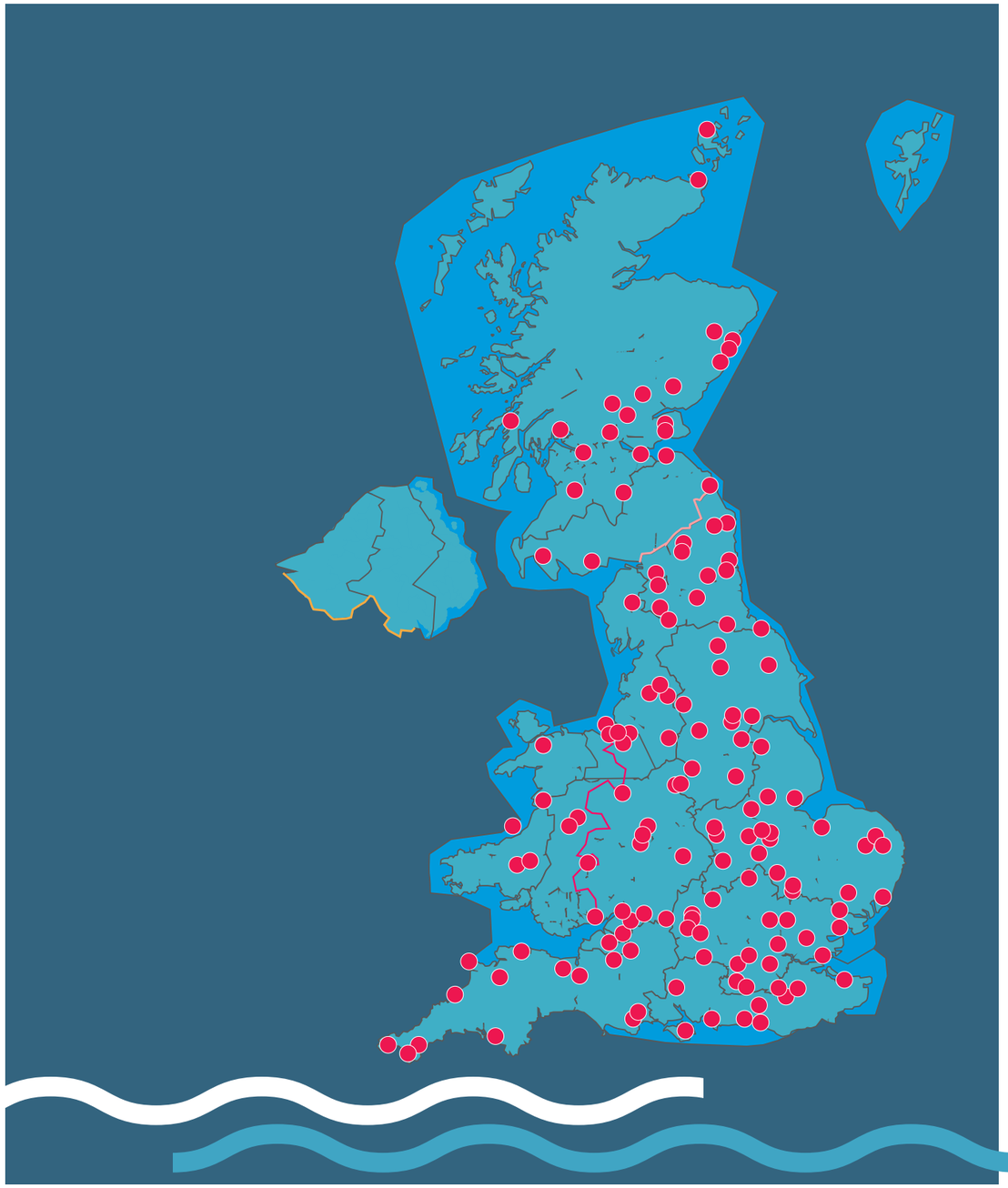


Figure 10: The 152 locations across Great Britain selected for PFAS testing

The results show a snapshot of the full dataset, recording the occurrence of four selected PFAS of concern: perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), perfluorohexanesulfonic acid (PFHxS) and perfluorononanoic acid (PFNA).

Across all locations sampled in September 2026, **61 % of samples tested contained at least one of these four PFAS**. PFOA was the most frequently detected PFAS, followed by PFOS, PFHxS and then PFNA (Figure 11).

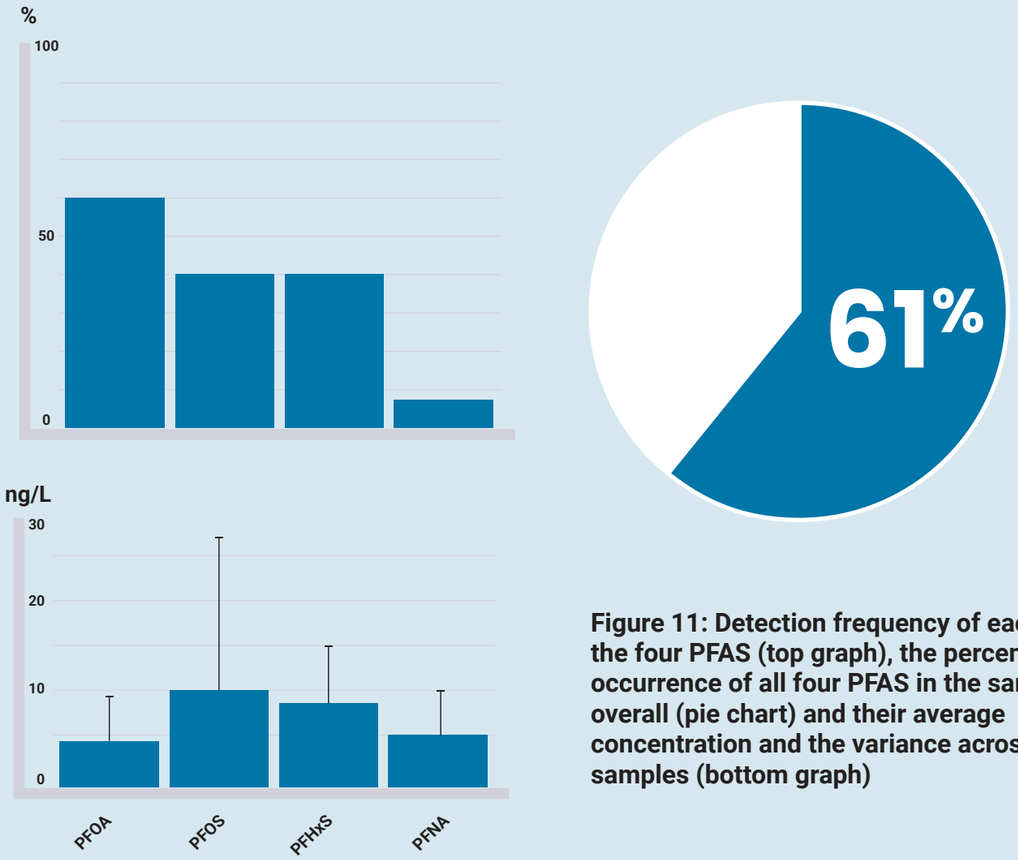


Figure 11: Detection frequency of each of the four PFAS (top graph), the percentage occurrence of all four PFAS in the samples overall (pie chart) and their average concentration and the variance across all samples (bottom graph)

Their concentrations were at or below 10 nanograms per litre on average, the equivalent of approximately one sugar cube in 160 Olympic sized swimming pools. A few locations with higher concentrations were located close to known major sources, such as airfields, industrial sites and wastewater treatment plants. We compared all PFAS concentrations measured in our samples with information on effects of these substances on aquatic organisms, to better understand what the levels we have measured mean. PFNA posed the highest risk to aquatic organisms of all four substances when found in a sample, while the other three substances posed a medium level of risk to aquatic organisms (Figure 12).

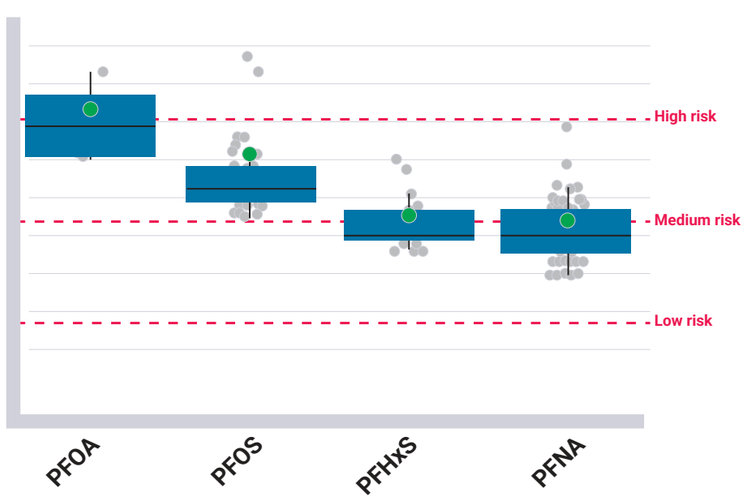


Figure 12: The environmental risk to aquatic wildlife for four selected PFAS in freshwater. Note: risk calculated by dividing the measured concentration of each PFAS in a sample by a threshold concentration, above which we would expect there to be an effect on aquatic organisms (taken from the Norman Ecotoxicology Database). The scale of this value is then categorized into low, medium and high risk.

People can reduce PFAS pollution by choosing products labelled PFAS-free, avoiding stain – or water-resistant treatments, using alternatives to non-stick cookware, and disposing of PFAS-containing waste responsibly. People should not pour chemicals or contaminated materials into drains or soil. Consumers can ask retailers for information about PFAS in their products, encouraging safer alternatives. Some PFAS-containing products, such as spot-on pet treatments or garden pesticides, are not clearly labelled as such, and may contaminate water.

The UK Government's PFAS Plan covers monitoring, regulation, waste management, public awareness and research[5,6]. In England, the Environment Agency has tested over 12,000 water samples for PFAS since 2021. The results of PFAS testing in the Great UK WaterBlitz will hopefully help evaluate how citizen-led datasets like these align and could support ongoing formal testing programmes.

You can find out more about the UNSaFE project focussing on PFAS at Imperial College London here: **https://www.imperial.ac.uk/school-public-health/environmental-research-group/unsafe--understanding-the-scale-sources-fate-and-effects-of-pfas-pollution/**



River Severn, Stourport-on-Severn, Great UK WaterBlitz

The power of partnerships

The Great UK WaterBlitz aims to connect people with their local freshwater environments, while the success of the Blitz rests on connections between different organisations. Empowering citizen scientists is foremost amongst these partnerships – how successful was this Blitz in those terms?

WaterBlitz experiences

Nearly 400 participants who took part in the WaterBlitz responded to our questionnaire about their experiences. This WaterBlitz brought many people into citizen science for the first time – only **28% had previously taken part in a WaterBlitz** event, with **almost half** the respondents saying that they **had not been involved in the environmental sector before** the WaterBlitz (welcome!). Most people who responded had wanted to do something for the environment (93%) and many had a personal interest in a local waterbody (52%). As in previous WaterBlitzes, many participants (70%) agreed that their understanding of water quality issues and river health was improved through taking part. **Overall, 89% of participants rated their experience as good or excellent, and an amazing 100% said they would take part in the Great UK WaterBlitz again. Thank you so much!**



Partnership with the future

Children are the heart of society – their early learnings and experiences will shape their role as the future custodians of the planet.

As part of STEM hub outreach, Earthwatch Europe partnered with Canterbury Christ Church University on the 17th September to present a curriculum-linked "live lesson" to KS2 students around the UK. In a busy, interactive hour, **2,400 learners** found out about the water cycle and the ways that humans impact it, became wildlife detectives, and asked *so* many questions that we needed to follow-up by email!

Over the WaterBlitz weekend, **1,441 children** went out with their parents, teachers, and group leaders to connect with their local green and blue spaces and become young citizen scientists.

Partnership with Avaaz

Avaaz is a global web movement that was formed in 2007 to help individual efforts to combine into a powerful collective force. Avaaz supported the Autumn Great UK WaterBlitz through funding and action, recruiting over 3,000 people and supporting their participation. Partnering with Avaaz gave a huge boost to the Autumn 2026 Great UK WaterBlitz, helping **8,507 citizen scientists** to survey **4,456 sites** across the UK between the 18th and 21st September 2026 – our biggest Blitz so far! The majority of surveys were undertaken in England (3,892); 263 were collected in Scotland; 240 in Wales; and 61 in Northern Ireland.

These figures would have been *even higher* but for the postal challenges we experienced: many people reached out to say that their kit had arrived late. Thank you to those who were kind enough to return it. We'll be working closely with our postal partners to try to avoid this in the future.

Partnership with Imperial

This is the third time that Earthwatch has collaborated with Imperial College London to empower citizen scientists to greatly expand what we know about chemical pollutants in freshwater. In September 2024 around 400 samples were collected, while over 1,500 samples were collected during the September 2025 Blitz. The analysis of all of these samples for 200 chemicals is almost complete and the findings are due for publication in the coming year. The team, based within the Environmental Research Group at Imperial, has a long track record of community engagement projects like this. Its research focuses on the impacts of the environment on health in the modern world, and is a leading provider of air, water and soil quality information and research in the UK. It is a designated World Health Organisation Collaborating Centre for Environmental Risks and Health. For more information on its work, please visit: **https://www.imperial.ac.uk/school-public-health/environmental-research-group/**.

Partnering with Imperial helps us to make citizen science even more impactful: this wealth of co-created knowledge will help to inform strategies to mitigate and remediate chemical pollution in future.

WaterBlitz Case Studies: Getting to Know Our Rivers



Esther Hyman

Esther Hyman, Mutton Brook, London

Esther Hyman has known Mutton Brook all her life, so she was keen to discover what was happening beneath its surface.

“I was delighted to have the opportunity to take part in this citizen science project in a field that I’m passionate about,” she says.

The brook rises just a couple of hundred metres east of her testing spot before joining the River Brent, which flows into the Thames system. Esther wanted to find out whether the water was polluted so far upstream.

She found the WaterBlitz kit easy to use and was surprised to discover high nitrate levels.

After testing, Esther took time to enjoy the surroundings and think about the brook’s history. It was once used to water grazing livestock, which is where its name, Mutton Brook, comes from. She hopes the results will help provide evidence for change. Her experience shows how a simple water test can help us learn more about a familiar place and inspire us to take action to protect it. “We have to start somewhere in cleaning up this mess we find ourselves in.”



Olivia Griffiths-Ingall

Olivia Griffiths-Ingall, River Severn, Shrewsbury, Shropshire

The River Severn is a huge part of life in Shrewsbury, with much of the town built around it. For Olivia Griffiths-Ingall, this made it the perfect place to take part in WaterBlitz. She wanted to help build a better understanding of local water quality and contribute to research that could make a positive difference. “I enjoyed carrying out the testing myself and a low nitrate concentration in my sample was really great to see!”

The low nitrate in Olivia’s sample was encouraging news. It was also rewarding to see how she could play a part in a much bigger project simply by testing water in her local area.

The WaterBlitz gives people the chance to do more than admire their rivers. By collecting samples and recording results, they can help scientists build a clearer picture of water quality across the country.

For Olivia, getting involved was a positive experience and a practical way to support a river that means so much to her town. Her story shows how local action can contribute to a bigger effort. Every sample adds another piece of information, helping us understand our rivers better and work towards healthier waterways for everyone.



Steven Swain

Steven Swain, River Shep, Shepreth, South Cambridgeshire

Steven Swain is Chairman of Friends of the River Shep, a local conservation group working to protect the River Shep, a special type of river known as a chalk stream. He has been encouraging people in his village to use WaterBlitz kits to test their local water. He decided to carry out a test himself, too, to set an example.

Steven is keen to get more people interested in the river and show them that they can play a part in looking after it and The Great UK WaterBlitz offers a simple way to get involved. By testing the water and sharing results, local people can help build a better understanding of the river's health.

Steven is also encouraging villagers to share their stories and experiences on the Friends of the River Shep Facebook group, so people can learn from one another. For him, protecting the river is a team effort. The more people who take an interest, the more opportunities there are to learn about the waterway and support its future.

His involvement shows how a local conservation group can use citizen science to bring people together, encourage curiosity and inspire action. By leading by example, Steven hopes to help more people discover the value of their local chalk stream and join the effort to protect it.



Ana Martins

Ana Martins, River Wey

For Ana Martins, the WaterBlitz has become a family activity. She has now taken part three times with her little sister, who loves getting involved in the testing and finding out what the results mean. "This is the third time I've now participated with my little sister," Ana explains.

The sisters enjoy learning how their local river's water quality changes over time. Testing the water gives them a chance to ask questions, explore the results and discover more about the environment around them.

Ana says: "Our little stream flows through the town and is an important part of our local environment, so being able to get involved in monitoring the health of it has been a really great experience to share."

For Ana, it is a great way to spend time with her sister while doing something useful for their community.

Their story shows that science doesn't have to happen in a classroom. With a simple testing kit, young people can explore their local environment and help gather information about the health of their river. And because the sisters have returned to WaterBlitz three times, they can keep learning as they go.



Garry McIlwaine, Knockoneill River, Upperlands, County Londonderry

At the Knockoneill River in Upperlands, a group of Year 6 pupils got stuck into the WaterBlitz, testing their local water and discovering more about the river on their doorstep.

Garry McIlwaine, working with Ampertaine Primary School and Upperlands Community Development, was delighted by their enthusiasm. “The behaviour and enthusiasm of these 10/11 years olds were fantastic. All were willing to participate, ask questions, offer ideas and share in a beautiful village-centre location.”

The children already had plenty of stories about playing in or near the stream and walking alongside it with their families. The Great UK WaterBlitz gave them a new way to explore a place they knew well. The results were exciting, too. Their local river turned out to be fairly clear of pollutants, which made the youngsters very happy!

It was a brilliant opportunity to see how science can help us learn more about the natural world around us. The children could get involved themselves, ask questions and discover what their results meant.

Best of all, the experience left them wanting more. “They all want to come back to the river more often now,” Garry says.

Their enthusiasm shows how a hands-on activity can spark a real interest in the environment. By testing their local river, the children discovered that science can be fun and closely connected to everyday life.



Freddie Fisk, River Sid, Sidbury, Sidmouth, Devon

Freddie Fisk had wanted to know more about the health of his local River Sid, which flows into the sea where he likes to swim. The river is also a popular place for pupils from his school to paddle, so keeping it clean matters to him.

Freddie decided to take part in The Great UK WaterBlitz to help find out more about the water quality, saying: “It felt really good to collect and send data, so I knew that all UK’s rivers were being taken care of.”

The results from his sample were encouraging. Freddie found that the River Sid was acceptably clean at the spot where pupils from his school like to paddle. This was good news for a place that young people enjoy and that connects the river with the sea.

Freddie’s experience shows how water testing can help turn concerns about pollution into useful information. Rather than simply worrying about the state of our rivers, people can get involved and contribute to a better understanding of their condition.

For Freddie, taking part meant doing something practical for a river that matters to him and his schoolmates.

What else can you do?

Droughts, floods, and pollution may feel like overwhelming pressures on our waterways that are beyond us as individuals – but there are many actions that we can each take as that will add up and ease the pressure on our freshwater systems. You could consider:

- **Using less water:** Shorter showers, full washing loads and turning off taps all help reduce the burden on rivers as suppliers of domestic water.
- **Installing a water butt:** Collect rainwater from your roof for garden use and to reduce pressure on sewage systems.
- **Keeping gardens green and choosing permeable surfaces:** Retain planted areas and use gravel or permeable paving so that rainwater can soak into the ground instead of running to stormwater drains.
- **Using water off-peak:** Where practical, avoid heavy water use during busy morning and evening periods.
- **Protecting your drains:** Never flush wipes, sanitary or personal care items, and never pour fats, oils, medicines or harmful chemicals down sinks or toilets.
- **Choosing safer products:** Look for eco-friendly cosmetics and cleaning products, and avoid products containing PFAS where possible.
- **Washing synthetic fabrics less often:** This helps reduce microplastic fibres entering waterways.

Remember: what we pour down our sinks cycles back to our drinks!



Frances Roundtree

Where do we go from here?

Earthwatch Europe believes in the power of data for change.

We believe in open, transparent data. It's why all our graphs have been plotted to include the number of datapoints; so that you can see how large a dataset has been used to draw conclusions, and why all our data sources and methods are carefully documented at the end of this report. We want to see the same level of transparency and, indeed, accountability from all types of polluters: from agriculture, urban runoff and sewage overflows.

We want to see the **law enforced**, so that pollution from all sources – sewage, agriculture and road runoff – becomes **unprofitable**.
We want to see government monitoring and mitigation focused on **ecologically sensitive areas** including protected nature sites and chalk streams; and for **nature-based solutions** to be prioritised. We want to see Government take action to **engage and empower communities** to monitor and protect their local freshwaters.



Ned Hutt-Williams

Make citizen data count!

We know that citizen scientists can provide extensive, accurate, and timely information on local water quality with national coverage[7]. We've shown that our participants can generate robust datasets, and reliable status reports on how seasonal variations can impact pollution dynamics and water quality[8, 9].

While acknowledging that the Environment Agency has steadily increased the number of water quality measurements they take annually, Earthwatch adds their voice to the growing movement calling for government and regulators to take advantage of the Water Reform process and recognise the power of citizen science for freshwater monitoring at a national scale. **We believe that citizen-generated data should be integrated into statutory freshwater monitoring frameworks** to provide much-needed weight of evidence to assist the Environment Agency to identify and prioritise poor water quality hotspots for high-level compliance monitoring and enforcement. The Environment Agency is working with partners towards developing a standardised approach to citizen science water quality monitoring. You can find out more about the Environment Agency's Technical Advisory Framework here: **Supporting Citizen Science – Technical Advisory Framework | Citizen Science – Working together! | Engage Environment Agency**

A healthy freshwater future starts today, with each and every one of us being better informed through monitoring, and able to knowledgeably advocate for our local water bodies.

Please join us in April 2027 for our next Spring WaterBlitz and continue the fight for healthy freshwater through citizen data.

Methods

Participant recruitment and feedback

Citizen scientists were recruited by Earthwatch and Avaaz through existing contacts and promotional campaigns on social media. Following the WaterBlitz, participants were sent a follow-up questionnaire to report on their experience of the WaterBlitz and their knowledge, attitudes and behaviours towards nature.

Nitrate testing

The FreshWater Watch nitrate measurement is made colourimetrically in a closed tube using a standard plastic cuvette for a fixed volume of 1.5 mL. A colour development period of three minutes is timed following the introduction of the sample. Nitrate measurements are based on the Griess reaction, with a reduction reaction using zinc, which reduces the nitrate ($N\text{-}NO_3^-$) to nitrite (NO_2^-) and a colourimetric reaction for the determination of nitrite.

Participants submitted data via the ArcGIS Survey123 app, the FWW platform or via paper copy. All data uploaded from the 18th of September until 1.30pm on the 22nd of September were included in the analysis (following quality control). Additional data uploaded outside of this period were not included in the analysis but can still be visualised on the public map and will form part of the overall FWW database.

Data analysis

On closing the survey, the data were exported, and quality control was undertaken. This included checking locational accuracy, with automated emails sent directly to participants to correct their own geolocation. Quality control also included the removal of incomplete and duplicate records, and the removal of saltwater surveys as indicated through visual inspection of their location and in participant notes (e.g., “sea”, “harbour”, “tidal river at high tide” etc.). Each record/survey result was then enriched with nitrate pollution ratings based on the measured concentrations, from which in turn the acceptable/unacceptable nitrate concentration classification was generated (based on the thresholds mentioned earlier in the report). Lastly, our FWW narrative water quality feedback was generated for each survey, using a matrix based on the nitrate measurements and the observed parameters. Citizen scientists were provided with qualitative information and feedback about their waterbody via email.

The spatial analysis of our dataset was supported by using geospatial layers including Open OS Boundaries, WFD (Water Framework Directive) for England and Wales, and SEPA (Scottish Environment Agency) for surface water catchments. Elevation data was added using LIDAR Composite Digital Terrain Model – 1m produced by the Environment Agency in 2025.

Polygons for spatial analysis

The following polygons were used for spatial analysis:

- Country, from Ordnance Survey Boundary-Line™ consisting of the ‘Country Region’ shapefile and can be found at https://osdatahub.os.uk/downloads/open/BoundaryLine
- County, from
    - Ordnance Survey Boundary-Line™ consisting of the ‘Boundaryline ceremonial counties region’ shapefile for England, Scotland and Wales, which can be found at https://osdatahub.os.uk/downloads/open/BoundaryLine
    - “Northern Ireland, County, Boundaries’ shapefile. This data was collected by Ordnance Survey Northern Ireland and can be found at https://www.opendatani.gov.uk/ on the open data NI portal.
- River basin districts/management area (using RBID_NAME) field as defined by the WFD Surface water management catchments (Cycle 2) database.

River basin (using MNCAT_NAME) field as defined by the Water Framework Directive (WFD) Surface water management catchments (Cycle 2) database, enhanced by Welsh sub-regions (field name ManCatID, and ManCatName) from WFD River Waterbody Catchments Cycle 2.

- Geolocation quality control: Using Building and ImportantBuilding shaped file polygons from OS Openmap https://osdatahub.os.uk/downloads/open/OpenMapLocal to determine points that were recorded at a building instead of a waterbody. This was then checked against distance from SurfaceWater waterbody shape file polygons and lines from the following sources – OS Open Rivers https://osdatahub.os.uk/downloads/open/OpenRivers OpenStreetMap https://www.openstreetmap.org/ and regional extracts from Geofabrik https://download.geofabrik.de/europe/united-kingdom-latest.osm.pbf. Geolocations were then corrected accordingly.

Datapoints per polygon

The number of datapoints per polygon was determined to assess the representativity of the data. All datapoints were included in the overall, and national analyses. All the river basin districts had more than 10 datapoints and were included in the analysis. River basins and counties with fewer than 5 datapoints were excluded from analysis at those levels.

Of the 157 river basins defined by the WFD Surface Water Management Catchments Cycle 2 polygons (see *Polygons for spatial analysis* above), 147 were sampled, and 103 had more than 5 data points. These river basins contained 98.3% of the 4,456 datapoints that were collected by citizen scientists during the WaterBlitz.

Of the 97 counties defined by boundary shapefiles (see *Polygons for spatial analysis* above), all but Shetland were sampled, and 79 had more than 5 data points. These 79 counties contained 99.2 % of the 4,456 datapoints that were collected by citizen scientists during the WaterBlitz.

Data sources

- Earthwatch – Great UK WaterBlitz September 2026
- OS Open Boundaries Data source link
- OS OpenMap Local Data source link
- OS Open Rivers Data source link
- OpenStreetMap via Geofabrik Data source link
- SEPA River Basin Districts Data source link
- Water Framework Directive (WFD) River Basin Districts Cycle 2 Data source link
- WFD Surface Water Management Catchments Cycle 2 Data source link

Tools used

- ESRI ArcGIS Python API
- ESRI ArcGIS Online and Python Notebooks
- ESRI ArcGIS Pro
- Microsoft Excel (Microsoft Office 365)
- Microsoft Visual Studio Code
- Pandas library

Data curation

Phosphate concentrations for the Autumn 2026 Great UK WaterBlitz were removed from the global database but were retained separately.

PFAS testing

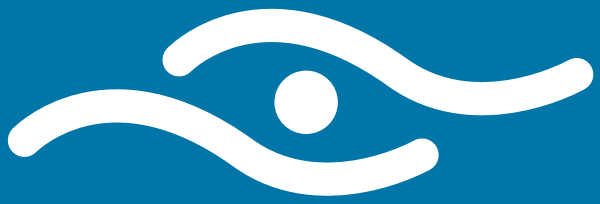
Citizen scientists were sent paired (duplicate) samples as well as a field control sample to Earthwatch Europe for freezing, after which the samples were transported to Imperial College London. Upon arrival at Imperial College, samples were checked for damage and one sample from each pair was selected for analysis, whilst the other kept as a spare. The code on each sample was linked to the GPS coordinates provided by the participant who had collected the sample. The samples were then analysed using a technique called liquid chromatography tandem mass spectrometry (LC-MS/MS), according to Richardson et al10. Briefly, a 900 µL aliquot of the sample was taken to a second tube and spiked with a range of internal standards to help with quantification. A volume of 10 µL was injected directly onto the LC-MS/MS in triplicate. The instrument and a set of specific ion fragmentation transitions for the four PFAS were targeted, and provided multiple reaction monitoring (MRM) with a minimum of two transitions per compound. The detection limit for the PFAS ranged from 2.5 to 5.0 ng/L (nanograms per litre). Comparing the retention time and MRM with those recorded for the same substances in a library allowed us to identify the substance. The intensity of the signals obtained was then used to derive the measured environmental concentration (MEC) of the substance by comparison with a calibration series of the compounds prepared using artificial freshwater. For environmental risk assessment, the lowest predicted no-effect concentration (PNEC) of each compound was taken from the NORMAN Ecotoxicology database11 to calculate a risk quotient, i.e., MEC/PNEC. Risk quotients of <0.1 pose an insignificant risk; 0.1-1.0 represent low risk; 1.0-10 are medium risk and >10 are high risk. Collating all the risk quotients together allowed their presentation as Figure 12, where the blue boxes show the range within which the middle 50% of measurements fall for each species. The black line inside each box marks the middle value (median), while the green dot shows the average value. The whiskers extend to the 5th and 95th percentiles, indicating the spread of most observations. Grey dots beyond the whiskers represent unusually high or low values (outliers) that fall outside the range of most measurements.


Dee Reynolds

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