

THAMES WATERBLITZ 2020

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A MESSAGE FROM EARTHWATCH

Dear Citizen Scientists,

Thank you so much for taking part in our latest Thames WaterBlitz! In total, an incredible 879 volunteers took part, recording a staggering 966 measurements across the Thames valley. This brings our current total number of global FreshWater Watch records to over 25,000. Thank you all for making this achievement possible with your valuable data contributions.

The WaterBlitz Team, Earthwatch

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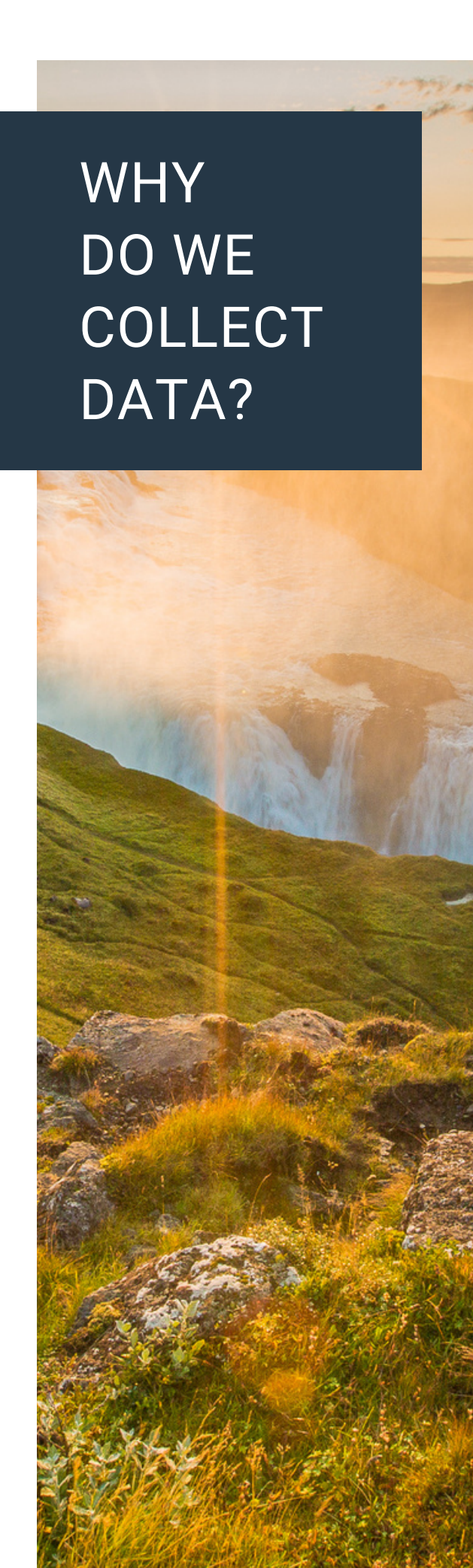
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WHY DO WE COLLECT DATA?

CHANGE REQUIRES DATA

In order to get answers to our questions which meet scientific standards, we need a huge amount of data. This is so that we can minimise 'noise' in a data set.

'Noise' refers to the many factors which might affect your measurements. For example, heavy rain, or even a passing boat disturbing a water body. Collecting your measurements over a short period of time can help us to minimise this 'noise'. It also allows us to see a snapshot of water quality across the whole catchment, and to identify where pollution levels are significantly high or low during that particular time.

Measurements collected in this way are referred to as 'spatial' data, as we are collecting a large amount of information over a set 'space' or area.

LONG-TERM MONITORING

Through our FreshWater Watch project, we are also collecting 'temporal' data, which are measurements taken regularly from a specific water body over long periods of time. This helps to minimise the 'noise' for a particular site, as we can compare unusually high or low readings to previous measurements that have been collected there. This long-term data helps us to determine what is 'usual' for a site, and which 'unusual' readings require further investigation.

Temporal data is collected by organisations such as the Environment Agency, from sites that are visited regularly over many years. However, organisations such as these simply don't have enough employees on the ground to monitor the same scale of sites that we can achieve using hundreds of willing members of the public, like you, as volunteers. We are working closely with the EA to combine both of our data sets, complementing statutory monitoring with our citizen science data.

NUTRIENT POLLUTION

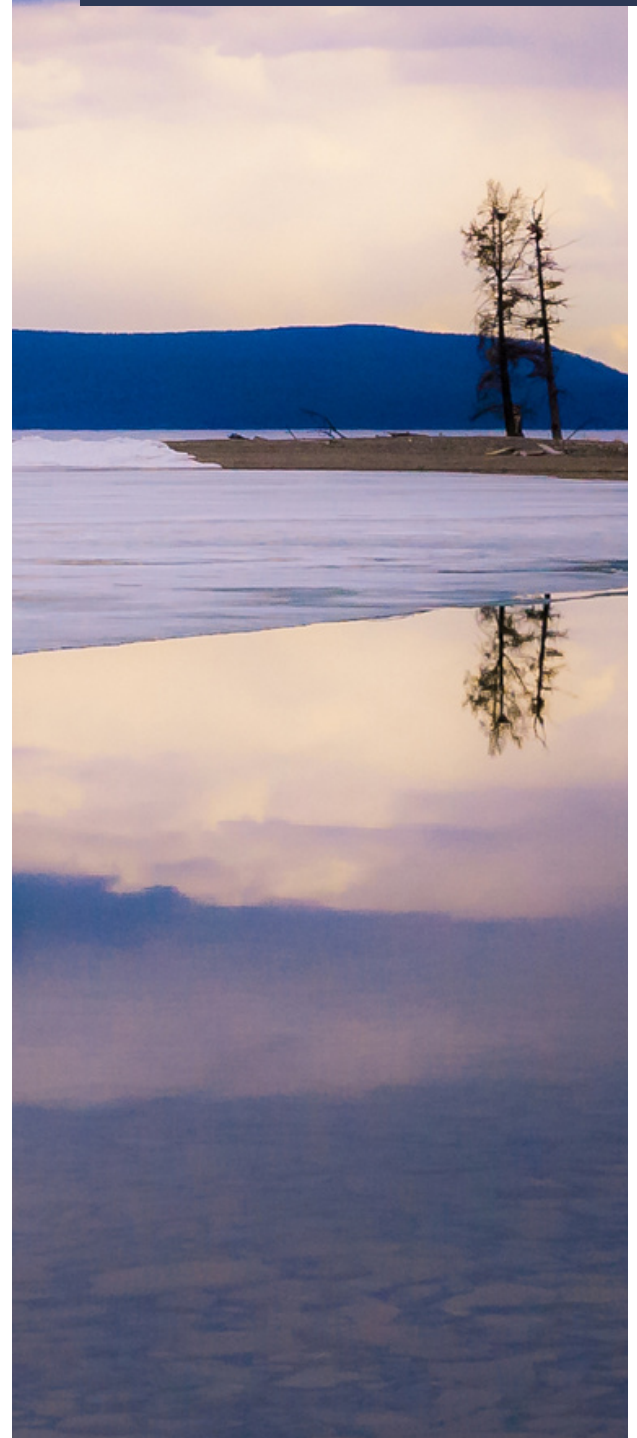
Our water quality kits contain tests for nitrate and phosphate. Nitrates and phosphates are nutrients that enter our water bodies through the use of fertilizers, untreated sewage and waste. In large quantities, this can cause 'eutrophication', where the oxygen in a water body is severely depleted. This means that aquatic species can no longer call these habitats their home.

The loss of animals and plants that result from nutrient pollution is of course sad in itself - we lose amazing species, and the beauty of natural spaces. But it is also economically and socially damaging. Many of these species play important roles, in cleaning our fresh water, providing food, providing structure to our river banks, preventing flooding and erosion. The loss of these species can have widespread negative impacts on our lives, our health, well-being, and the future health of our planet. It's important that we protect them.

Measuring nitrates and phosphates helps us to understand which freshwater environments are in danger of future nutrient pollution, or are already polluted and in need of clean-up efforts. It also helps us to identify which freshwater bodies are in good health, and what levels of protection are required to ensure that they stay that way.



WHAT DO WE MEASURE AND WHY?



YOUR DATA

REPORT HIGHLIGHTS

FLOWING WATER

Rivers, streams, ditches, etc.



6%

Good condition

Just 6% had low concentrations of both phosphates and nitrates*

78%

High nitrates*

Nitrate levels may be particularly high at this time of year as rain washes fertilisers off the land

27%

High phosphates*

Phosphates tend to come from organic matter like manure and sewage

5%

Floating algae

Running waters are less susceptible to algal blooms than still waters, though they do still occur

14%

Litter

Litter and plastic pollution can harm wildlife

STILL WATER

Lakes, ponds, wetlands, etc.



53%

Good condition

53% had low concentrations of both phosphates and nitrates*

17%

High nitrates*

Compared to rivers, a lower proportion of still waters had high nitrate concentrations

21%

High phosphates*

Still waters with high phosphates are particularly susceptible to algal blooms

26%

Floating algae

Where phosphates and nitrates were elevated in still waters, algal blooms were frequently observed

18%

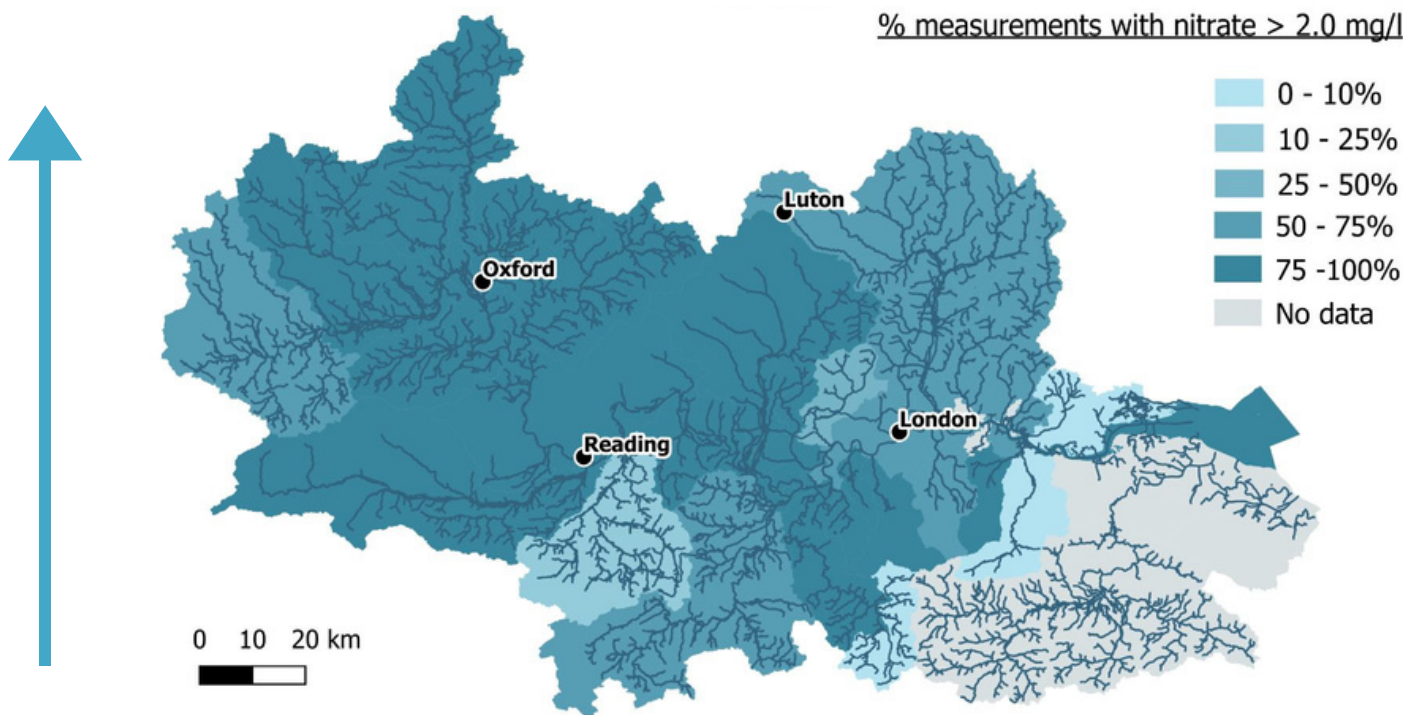
Litter

Litter was more common in still waters than running waters

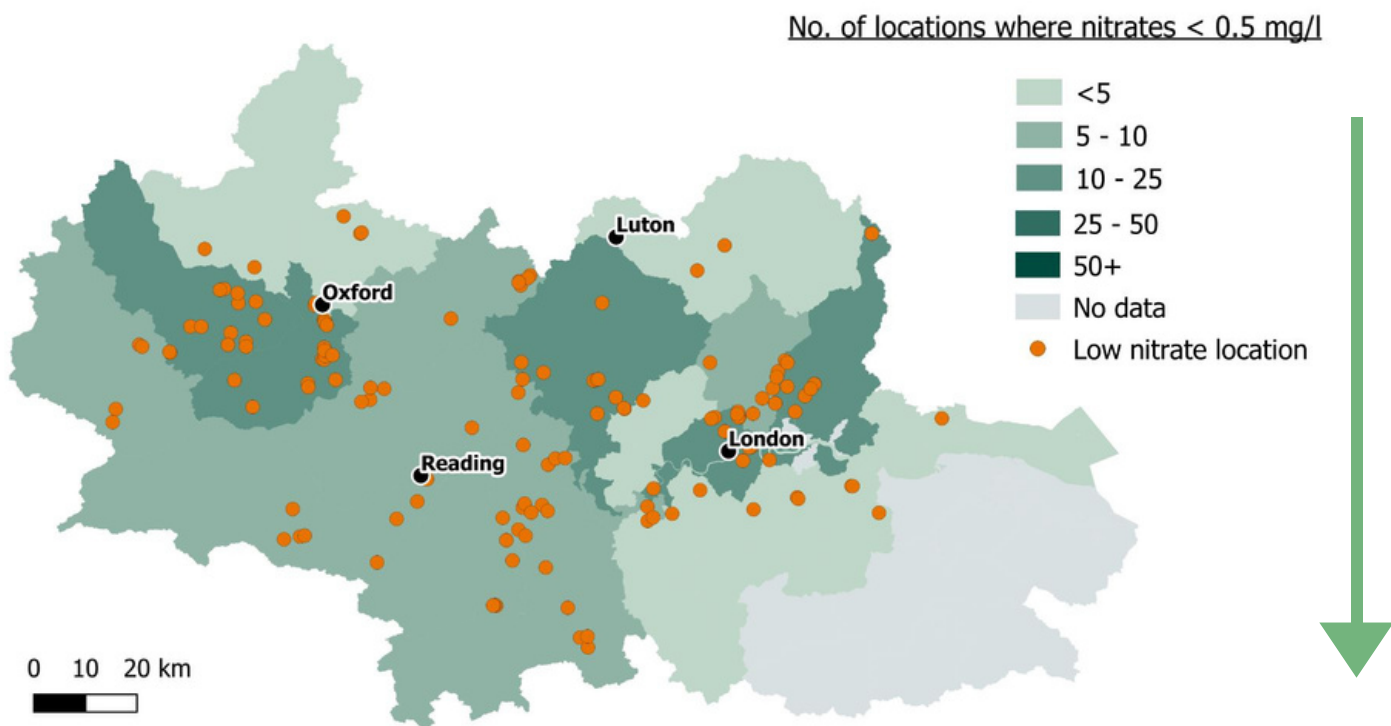
* Phosphates and nitrates are nutrients that occur naturally in the environment. When present in high concentrations, they can cause algal blooms, reduce oxygen in the water, and lead to 'dead zones'. For the purposes of the WaterBlitz, nitrates were considered 'low' below 0.5 mg/l and 'high' above 2.0 mg/l. Phosphates were considered 'low' below 0.05 mg/l and 'high' above 0.1 mg/l.

NITRATES: ACROSS THE CATCHMENT

This blue map shows the areas of the Thames catchment where percentages of high nitrate readings were found in flowing waters, showing the impacts specifically on rivers. Darker blue colours represent the highest percentages. Nitrates in fertilisers that are not used to support life on land are eventually washed away by rainfall and end up in rivers. High nitrate measurements in rivers were common in rural regions.

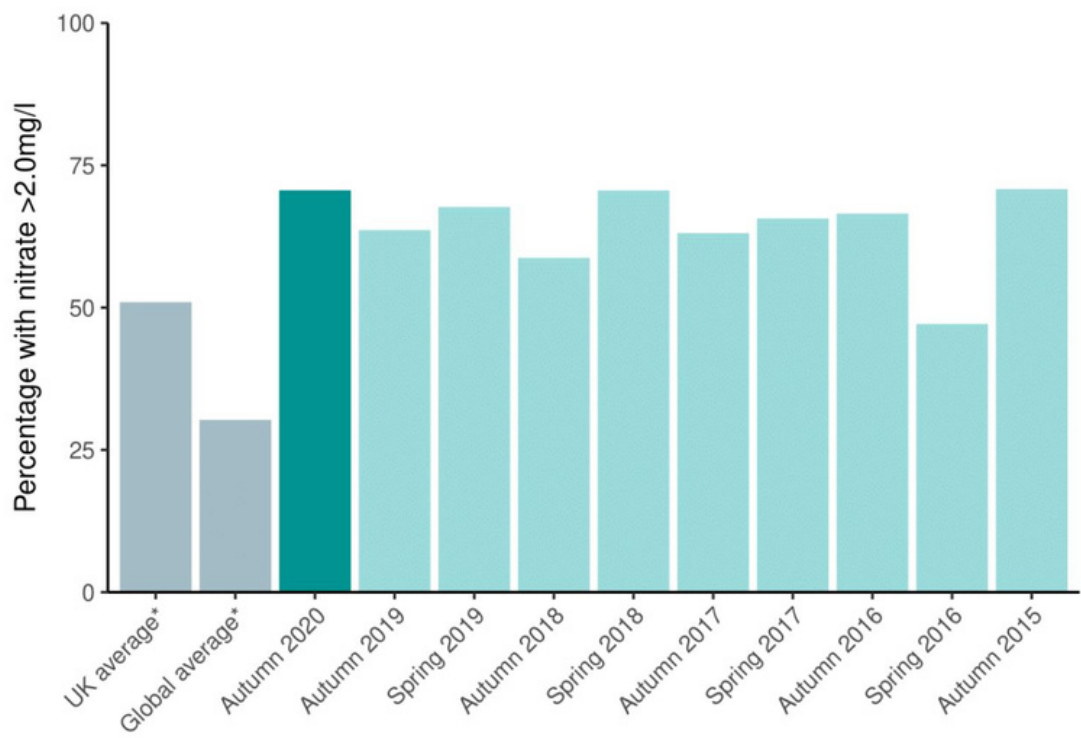


This green map shows which areas have the lowest nitrate readings, with the orange dots representing very low nitrate locations.



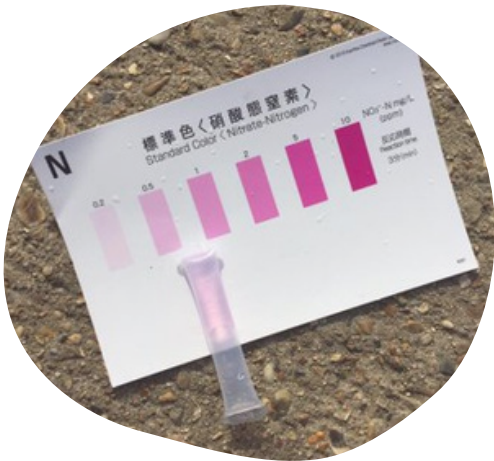
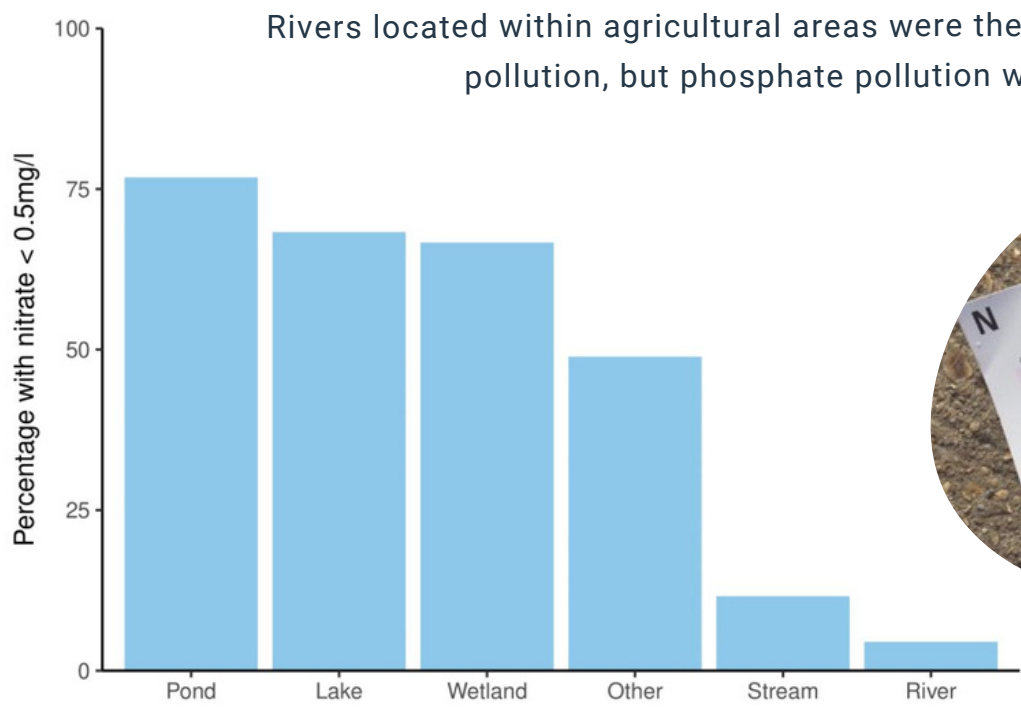
NITRATES: HOW DO YOUR RESULTS MEASURE UP?

Like past WaterBlitz events, nitrates were high across all waterbody types, compared to global averages. A high measure of nitrate is considered to be any reading over 2mg/l. The chart below shows the percentage of measurements collected during our WaterBlitz events that have a high nitrate score. The Thames catchment area regularly comes out higher than the rest of the UK, with close to 75% of water bodies showing high nitrate levels.



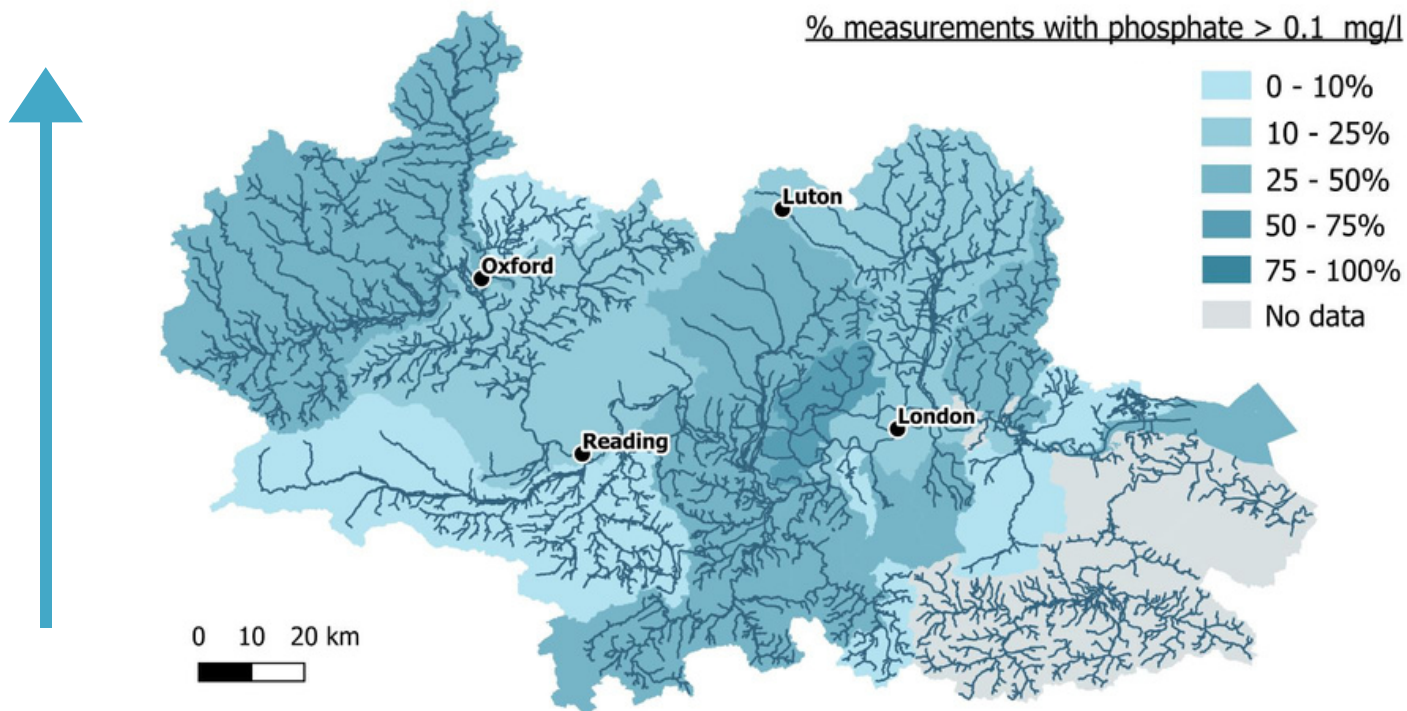
A low measure of nitrate is considered to be any reading below 0.5mg/l. Still waters, like ponds and lakes, showed the highest percentage of low nitrate measurements.

Rivers located within agricultural areas were the most affected by nitrate pollution, but phosphate pollution was much more localised.

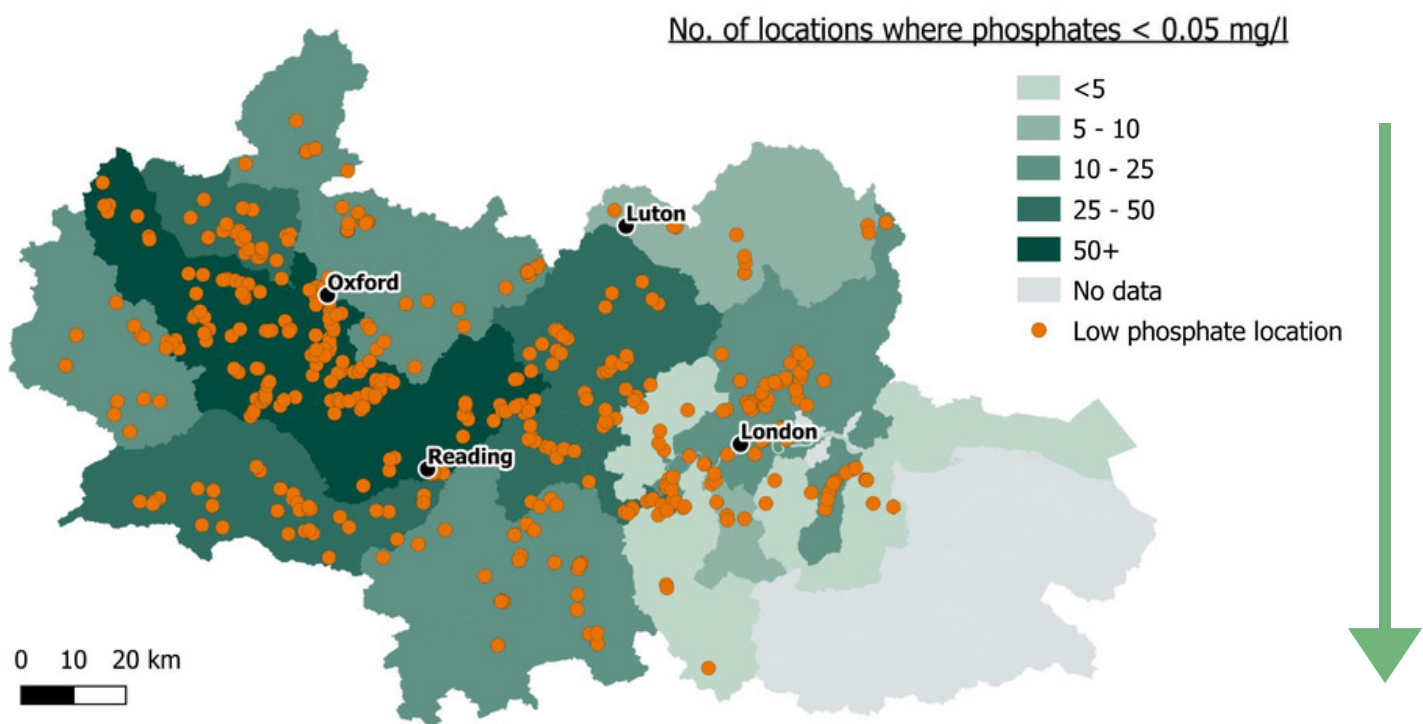


PHOSPHATES: ACROSS THE CATCHMENT

This blue map below shows the areas of the Thames catchment where percentages of high phosphate readings were found. The darker blue colours show the highest percentages.

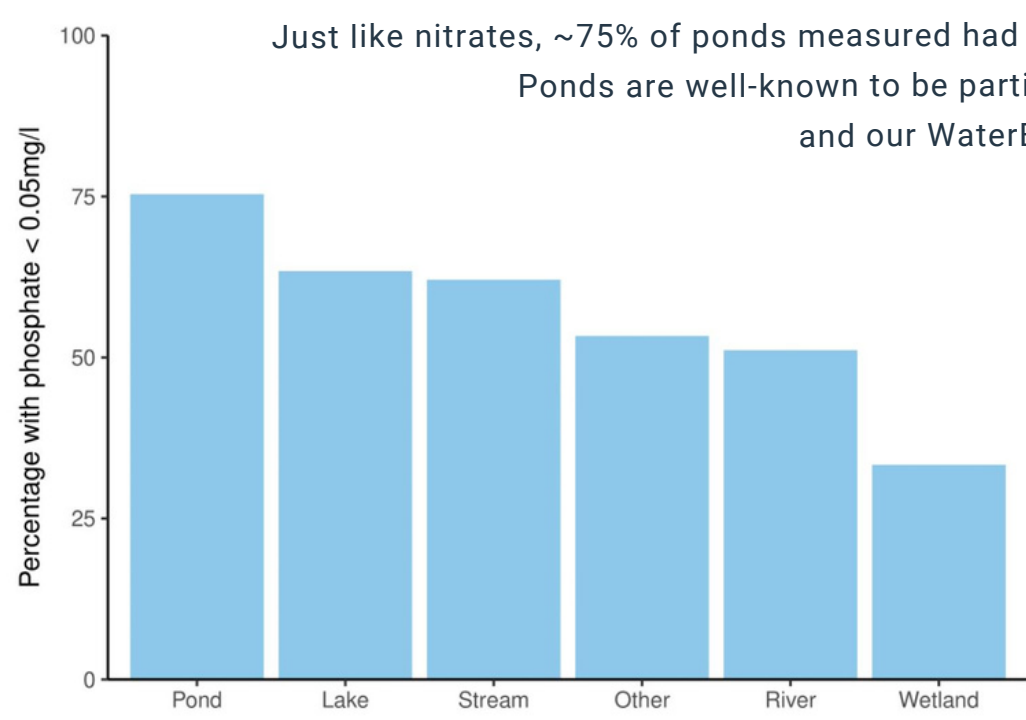
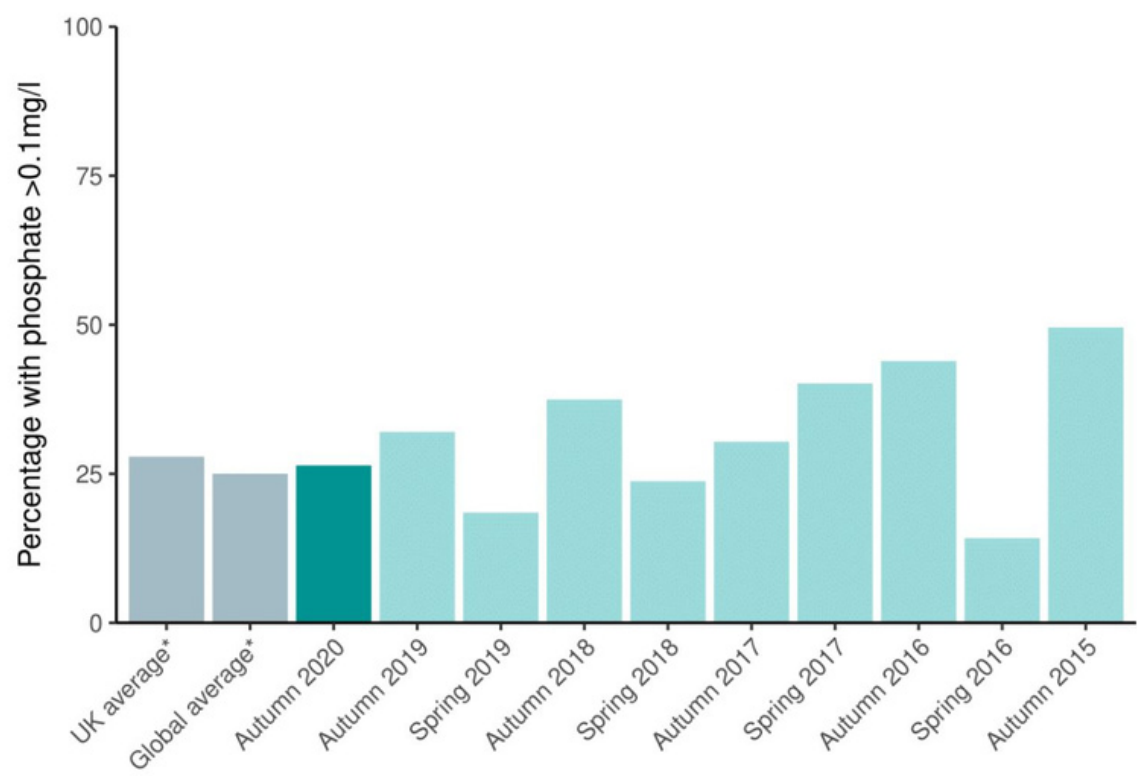


This green map below shows which areas have the lowest phosphate readings. Very low phosphate measurements are highlighted in orange, and show that there are waterbodies with low phosphates across the entire region. These cleaner habitats can provide 'refugia' for wildlife escaping pollution and are particularly important areas to conserve and protect.



PHOSPHATES: HOW DO YOUR RESULTS MEASURE UP?

The UK average for phosphate pollution is similar to our global measurements, although it has fluctuated a bit more throughout our past WaterBlitz events. This is likely linked to changing weather patterns. The chart below shows the percentage of measurements that have a high phosphate score, using data collected during previous events. A high measure of phosphate is considered to be any reading above 0.1mg/l.



Just like nitrates, ~75% of ponds measured had low phosphate readings. Ponds are well-known to be particularly healthy habitats, and our WaterBlitz results support this.



THE RIVERFLY PARTNERSHIP

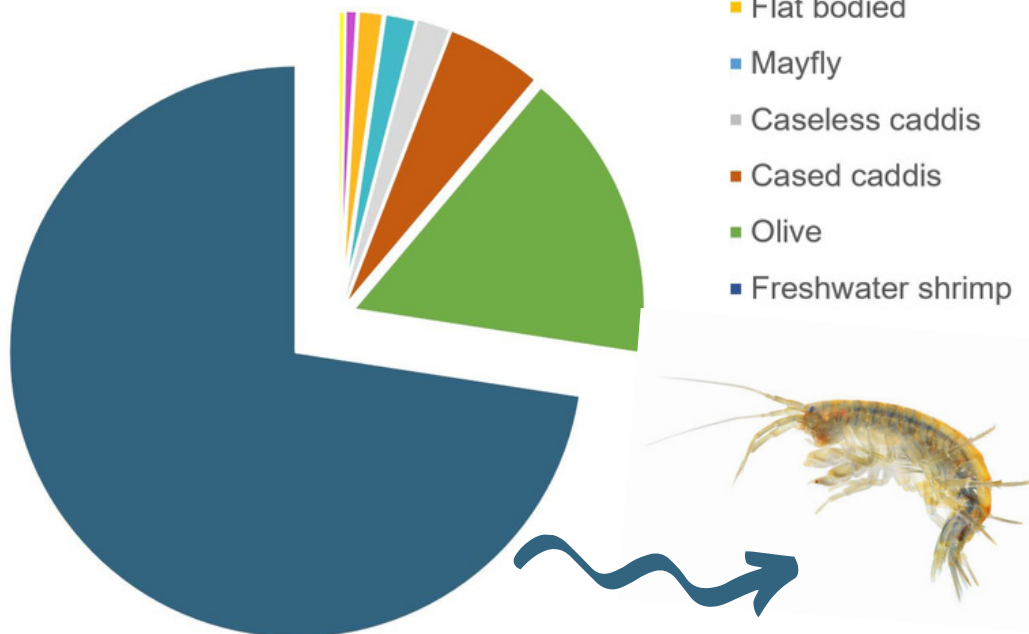


The Riverfly Partnership have teams of citizen scientists looking at riverflies - the larvae of flies that spend part of their lives in rivers - and other aquatic invertebrates. The presence of these animals can provide a reliable indication of water quality and biodiversity. Rivers are awarded 'riverfly scores' based on how many invertebrates are present, and if a score falls below a set threshold, the Environment Agency are contacted.

For the WaterBlitz this year, we collaborated with 48 of the UK Riverfly participants located within the Thames catchment area to collect both WaterBlitz data and Riverfly data at the same time.

WHAT DID THEY FIND?

- FRESHWATER SHRIMP WERE THE MOST COMMON SPECIES**



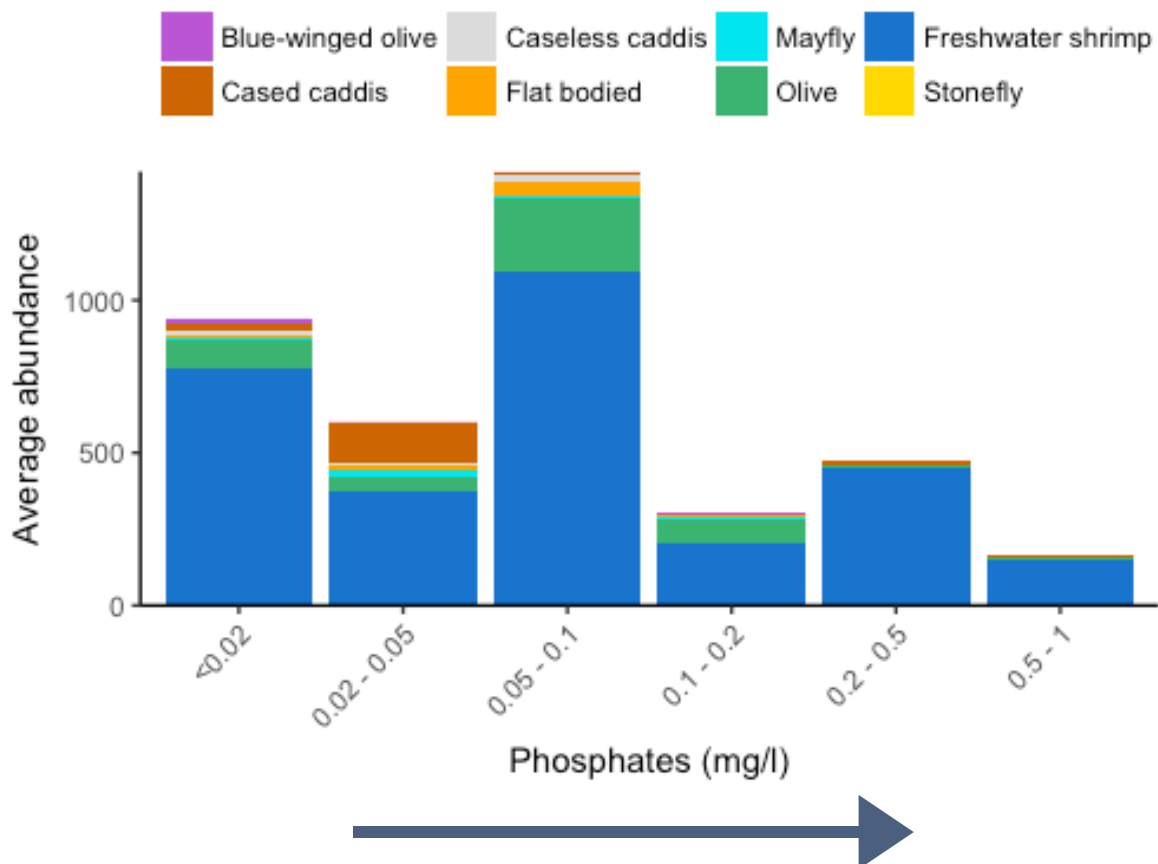
Freshwater shrimp were present in all but one of the 59 locations measured. One Riverfly monitor counted over 4,500 of them! They are common across the whole of the UK and are a valuable source of food for freshwater fish species.

WHAT ELSE DID THEY FIND?

- INVERTEBRATE DIVERSITY WAS HIGHEST WHERE PHOSPHATES WERE LOW**

Invertebrates were found in higher numbers where phosphates were below 0.1mg/l. Sites with lower phosphates also had more species than sites where phosphates were high.

Mayflies, stoneflies, cased caddis and blue-winged olives were particularly associated with lower phosphates. These species are all known to be sensitive to pollution.



WHAT NEXT?

Translating this data into meaningful changes for your water body is not a simple process. The main challenge, for volunteers taking part, and for those of us who work in water quality research every day, is that change can be really slow. We can't take the information from your measurement and fix your site, and it is rarely possible to definitively say exactly where problems are coming from. But there are lots of steps that we are taking to make sure that the data you collected will be put to good use. We will be diving deeper into this data and using it alongside our WaterBlitz data, to help us produce a more complete picture of what is happening across the Thames valley and to determine how water quality levels affect invertebrate populations. To find out more about the important work of The Riverfly Partnership, visit their website here: <https://www.riverflies.org/>

MODULAR RIVER SURVEY

The Modular River Survey ('MoRPh') enables river enthusiasts and citizen scientists in the UK to get involved with recording and assessing the physical habitat of their local rivers and streams. Trained MoRPh specialists measured the range of habitats along two rivers during this WaterBlitz - the River Cray and the River Brent - collecting 11 measurements.

Many rivers have been modified from their natural form as they have been built around. Channelised rivers, for example, might have more uniform riverbeds than natural rivers. This means that there are fewer different habitats available to support different types of wildlife.

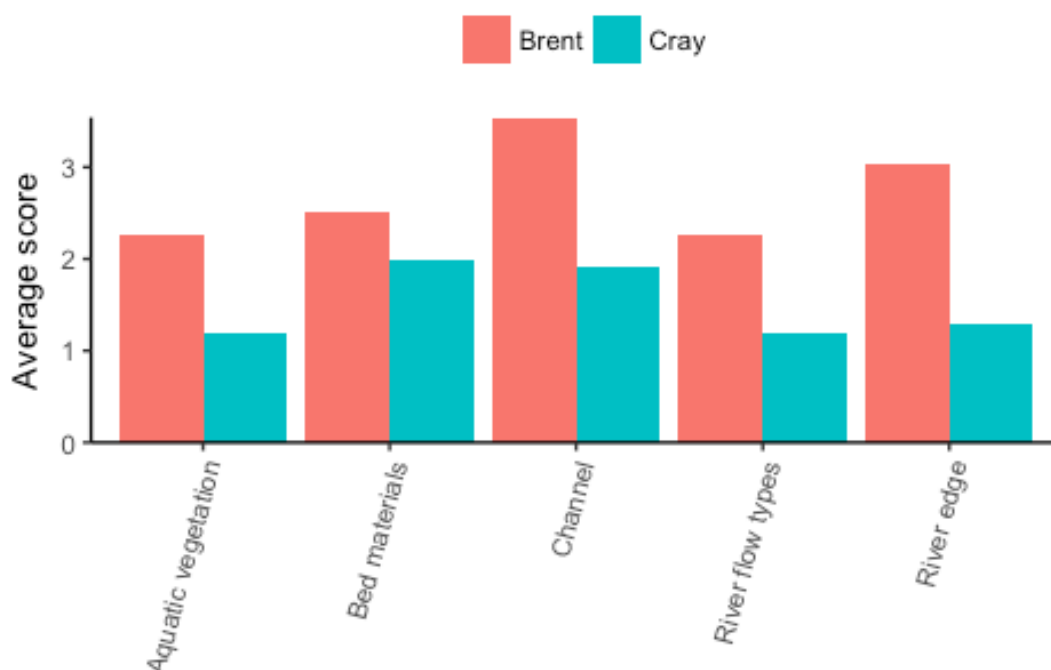
WHAT DID THEY FIND?

- **THE RIVER BRENT HAD MORE DIVERSE HABITATS THAN THE RIVER CRAY**



Modular River Survey

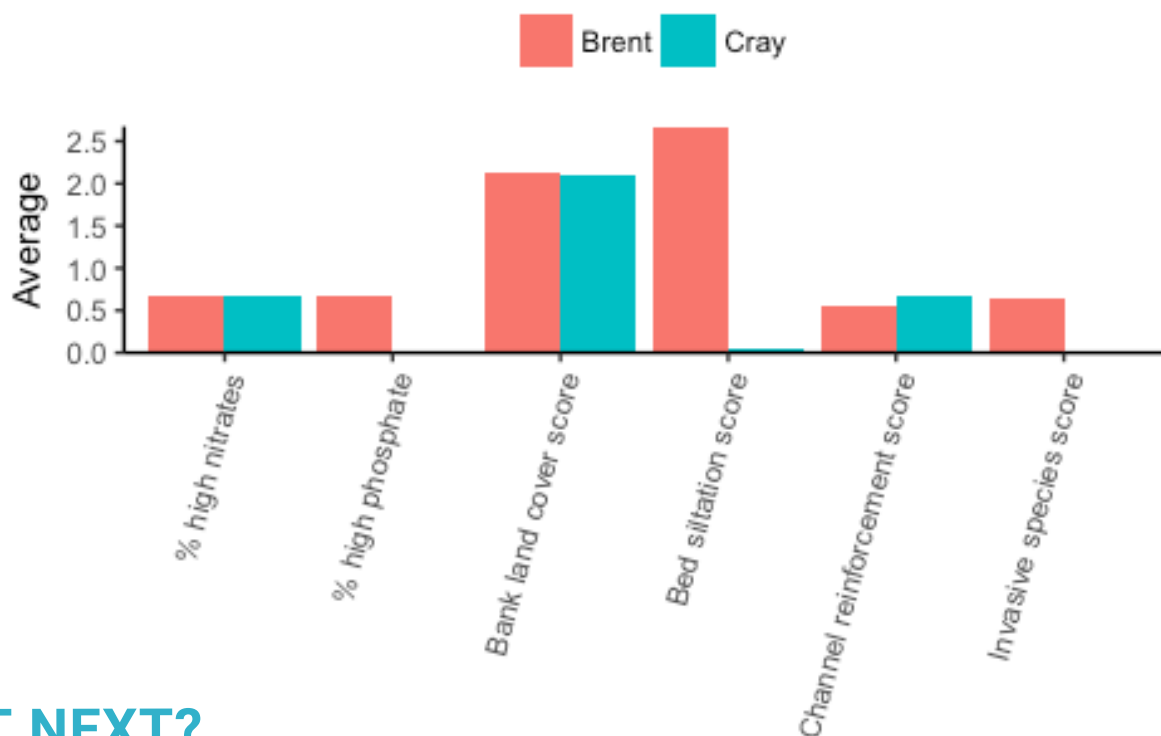
Different habitats for wildlife can be found in different areas within a river, including in the riverbed, the channel, and associated with different water flow speeds. Higher scores mean that there is a greater variety in these habitat types, meaning the river has the potential to support more creatures that live in a diverse range of conditions.



WHAT ELSE DID THEY FIND?

- BOTH RIVERS ARE EXPERIENCING DIFFERENT PRESSURES**

The pressures identified by both FreshWater Watch volunteers and MoRPh volunteers were different in each river. The River Brent had higher phosphates, more invasive species, and more evidence of silt from the land getting into the river. The channel of the River Cray has been reinforced more heavily, meaning that it is less natural.



WHAT NEXT?

On the River Cray, some volunteers measured nutrients, the presence of riverflies, and habitats all at once. In these collective measurements, there is no single stand-out factor that influences the abundance or diversity of the invertebrates found. However, there are three that stand out as potentially important: phosphates, bed materials, and siltation.



Further analysis of this data and longer-term study will help us to better understand whether these trends are repeated elsewhere. To find out more about the important work of MoRPh specialists, visit their website here: <https://modularriversurvey.org/>

YOUR DATA IS THE FIRST STEP

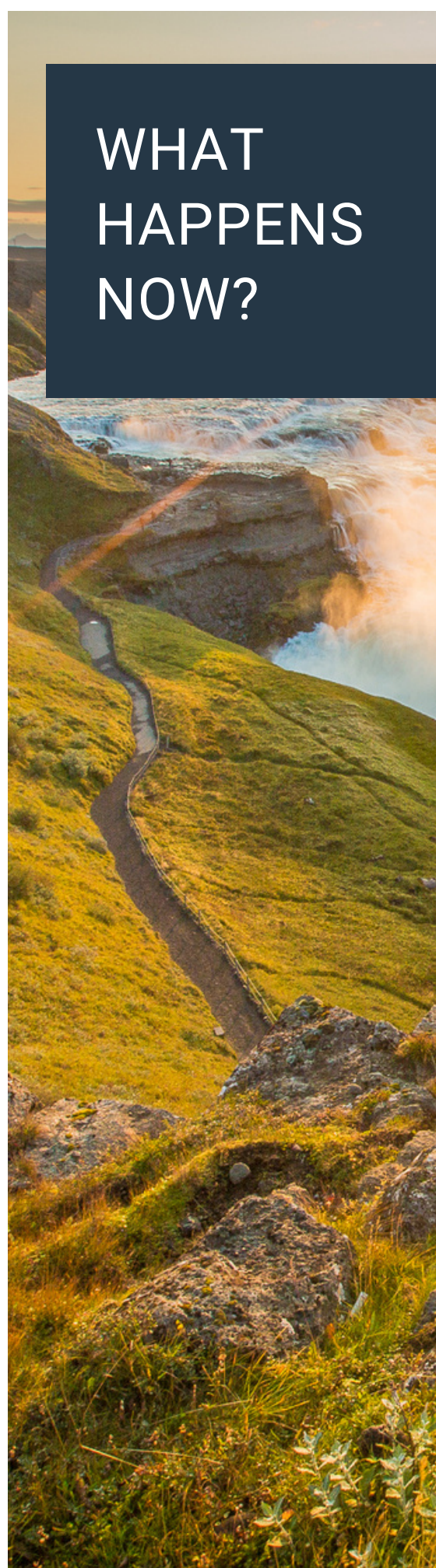
Many sources of freshwater pollution come from services that we all need - our methods of food production, water provision and sewage treatment can all have negative effects on freshwater quality. It's important to keep in mind that we all need to work together to find solutions, and that there is no 'quick fix'. Changes to policy and law are usually the most effective, but these changes require a lot of evidence before they can be actioned, which is why collecting as much research data as possible is so vitally important.

Every one of our data points counts, and whilst we cannot always pinpoint an exact source of pollution from one measurement alone, collectively this data has real power to effect change.

Earthwatch is collaborating with the Environment Agency and the UK Centre for Ecology & Hydrology (CEH) on a new project called Sentinel. The aim of the project is to create a monitoring network across the UK, which will help us to collect and collate data to better understand freshwater issues and to find effective solutions. Earthwatch is working with UK CEH to create an integrated map, where citizen science data (such as your WaterBlitz data) and Environment Agency data will sit side by side, and be open to all, to help inform management plans, create restoration solutions, and ultimately lead to protection of our precious freshwater ecosystems.



WHAT HAPPENS NOW?



WHAT ELSE IS EARTHWATCH DOING?

WE'RE TRANSLATING SCIENCE INTO ACTION

Most of our FreshWater Watch measurements come from our stewardship groups - these are members of a local community who regularly monitor the water quality of a specific water body over a period of months or years. Most of our stewardship groups are set up to study a particular issue, or to help us work towards action for water on a local or global scale.

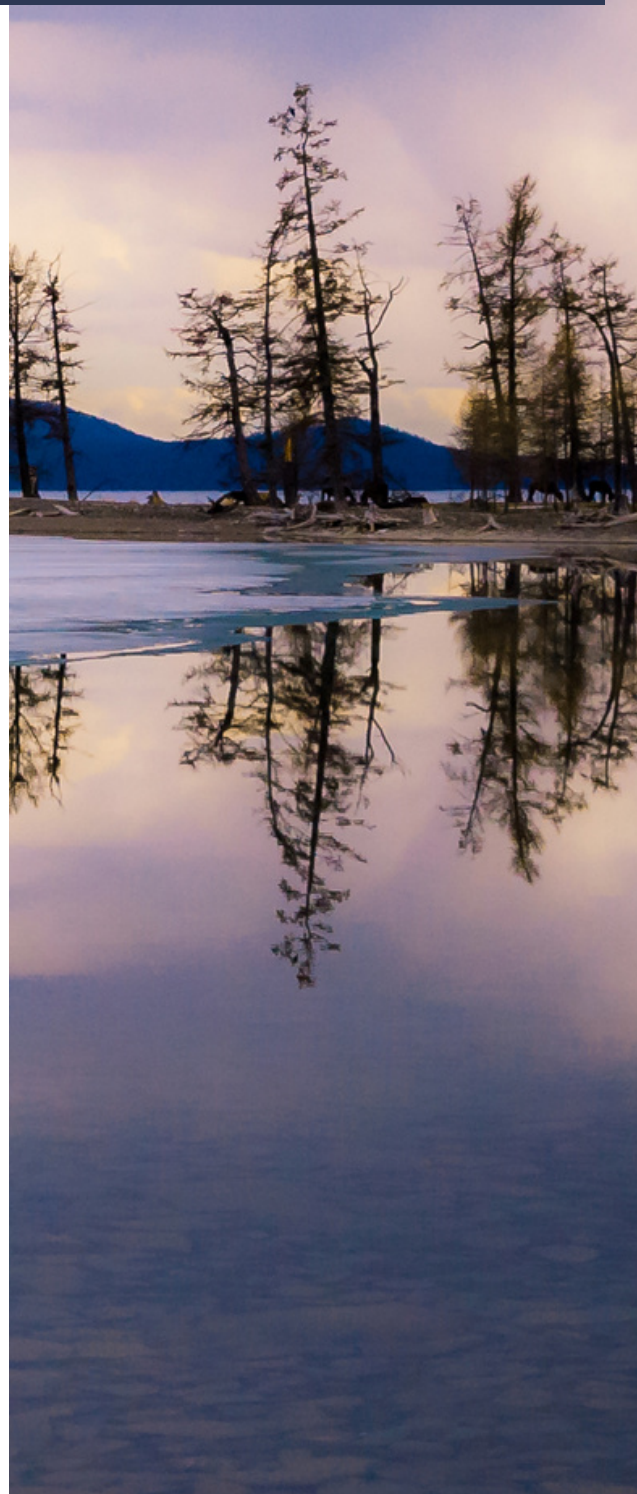
• STEWARDSHIP IN IRELAND

Professor Fiona Regan and Dr Susan Hegarty of Dublin City University are coordinating a group of citizen scientists in Dublin to monitor the impact of rainfall events on the urban rivers Liffey and Dodder. Employees from the Royal Bank of Canada (RBC) and paddleboard clubs monitor these rivers once a month, and take additional measurements after heavy rainfall. The group captured the imaginations of Dubliners during the 2019 WaterBlitz.

• STEWARDSHIP IN ZAMBIA

The Zambian government's Water Resources Management Authority (WARMA) are working in collaboration with WWF Zambia to help communities and schools across the Kafue river basin (a tributary of the Zambesi). As WARMA begin to set up formal monitoring of water quality in Zambia, they are exploring how FreshWater Watch data can complement this new monitoring system and give communities the opportunity to monitor and protect the water bodies that are most important to them.

We are keen to establish as many stewardship groups as possible. Find out more [here](#).



WHAT CAN YOU DO?

If you are concerned about a local water body, writing to local MPs and other government representatives can be very helpful. If they know that their constituents care about an issue, they are more likely to do something about it. Explain what the issue is and how you want it to change - you could even include your WaterBlitz results to highlight the problem.

There are also many effective actions that you can take at home, outside, and in your local community. Here are just a few suggestions:

Conserve the water you use on a daily basis

Reduce the chemicals you use at home

Install a rainwater butt outside your home

Buy food from organic sustainable farms

Support litter and pollution campaigns

Report pollution to the Environment Agency

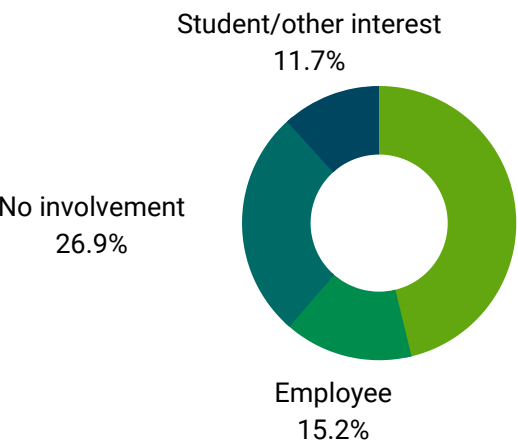
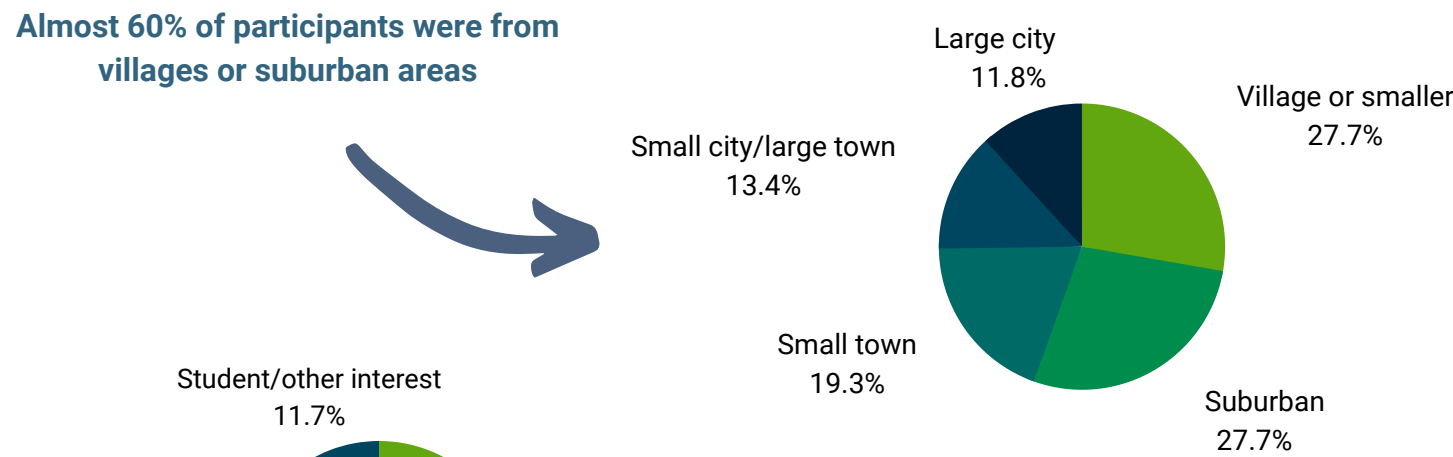
And keep volunteering! You can visit our [Earthwatch website](#) for more ways to get involved and make a difference through data collection. We have free projects like Naturehood that empower local communities to take positive action for wildlife, including a step-by-step guide for how to create and maintain a pond in a small space. You can also check out these 'Get Involved' pages if you're interested in becoming a [Riverfly](#) or [MoRPh](#) volunteer.



YOUR FEEDBACK

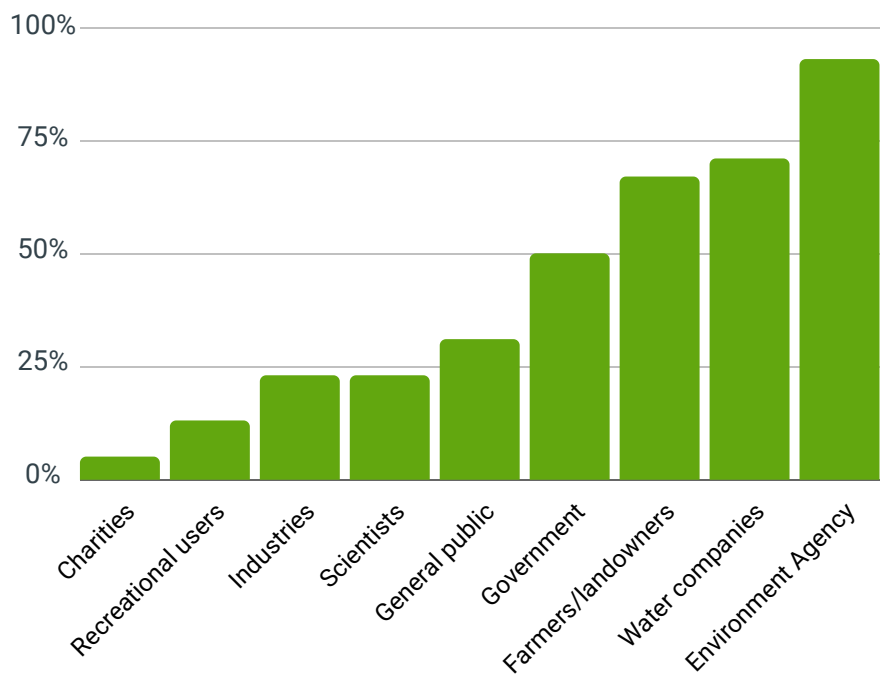
Thank you to everyone who contributed answers to our feedback survey. We were interested in who was taking part in our WaterBlitz, and here is a summary of your feedback below:

Almost 60% of participants were from villages or suburban areas



Almost half had previous involvement in the environmental sector as volunteers, although over a quarter had no previous involvement at all

The majority of participants thought that the Environment Agency has the highest responsibility for protecting and improving our waters, and charities have the lowest



YOUR PHOTOS



Thank you to all of our amazing WaterBlitzers!

