

Citizen Science: Testing the Water Student Pack

Are the ponds, streams and rivers in your neighbourhood clean enough for wildlife?
Join in with our schools and communities survey and find out.

Freshwater wildlife needs clean unpolluted water to survive. Sadly, it only takes a little nutrient pollution to damage habitats like streams and ponds, and to harm the most sensitive plants and animals that call these places home.

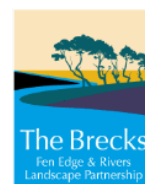
With your help, the Testing the Water survey aims to find the hidden gems – places which are free from nutrient pollution, and to discover for the first time the extent of nutrient pollution facing freshwater wildlife today.

Summary steps . . .

- **Record your location.** Identify where you are going to do the survey and mark it on a map.
- **Collect a water sample** from a local pond, lake, river, stream or ditch, your garden or your tap water.
- **Predict the results from your site.** Will it have high, medium or low levels of nutrients? Where does the water come from?
- **Use the nutrient test kits** to reveal the levels of nitrate and phosphate pollution. Were they what you expected? If not, why do you think they were different?
- **Enter your results online** through our Testing the Water Data Portal to contribute to our regional survey



This Project is part of the Lottery funded Brecks Fen Edge and Rivers LP scheme, for more information please visit www.brecks.org or contact bfer.admin@suffolk.gov.uk



W: freshwaterhabitats.org.uk/bfer-lps-citizen-science-testing-the-water
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Why is clean water important?

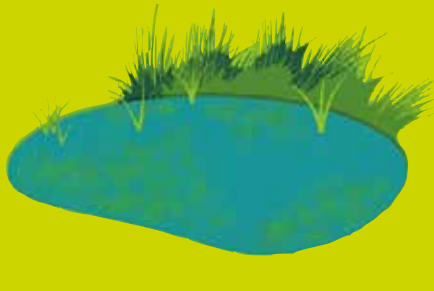
Clean water means water which is free from nutrient pollution. Without clean water, freshwater habitats like ponds, lakes, rivers, streams and ditches, can't support healthy plant and animal communities.

Clean freshwater habitats



- In clean freshwater habitats you'll find many different types of wetland plant including underwater, marginal and floating-leaved plants.
- Healthy ponds and streams support rich animal communities: water beetles, snails, dragonflies, mayflies, leeches, damselflies, and water boatman, to name a few.
- Clean freshwater habitats are home to rare plants and animals - these species have been lost from most sites in lowland England and Wales because of nutrient pollution.

Polluted freshwater habitats



- It only takes a small amount of pollution to see an impact.
- In polluted freshwater habitats, plants and animals start to decline and disappear.
- A few pollution tolerant plant and animal species take over - underwater plants and pollution sensitive insects are lost and uncommon species can't survive.
- In polluted ponds and streams you might see more leeches and fly larvae, and more algae and duckweeds - sometimes the water can even turn green.

When nutrient pollution occurs it can cause **profound changes** to plants and animals, and in the worst cases, the habitat becomes green. However, the changes can often be subtle. To start with, the **water may still look clear**, but an increase in the **invisible nutrients** means that sensitive species are lost and the habitat slowly becomes poorer in wildlife.

Water plants use nutrients as a food source to grow. They evolved over millions of years to cope with **naturally low nutrient levels**. When we add more, even the smallest amount, it acts like fertilizer. Some plant species, including algae, use these nutrients quickly and grow rapidly. This smothers slower growing and more delicate species, eventually killing them off.

Many polluted habitats will still have some wildlife, but they won't have the rich diversity or rare species of clean water.

Where do these nutrients come from?

There are two main nutrients that cause freshwater pollution - nitrates and phosphates.



Nitrate Pollution

The single largest source of nitrate pollution is fertilizer. Fertilizer is commonly used to improve crop growth in most arable fields and is added to some parks, golf courses and gardens. This seeps into freshwater through the ground and via runoff.



Phosphate Pollution

The main sources are detergents (soap) and sewage. Other sources are from agriculture and high density livestock farming.



Nutrients from the home

Waste water from sinks and toilets goes to treatment works to be filtered before it's released into the environment. Even this treated water is much higher in nutrients than the naturally low background levels that plants and animals need.

Sometimes the waste water bypasses the treatment works, going from the road drains directly into our rivers and streams, e.g. soap from washing your car, overflowing sewage drains during floods, or misconnections in old houses where the sink water flows into the road drains instead of the sewage drains.

Too many nutrients are bad news for wildlife



Where could you sample?

Freshwater habitats come in all shapes and sizes. Although pollution in some of our larger rivers, streams and lakes is monitored, we know nothing about nutrient pollution in 99% of our ponds, smaller streams, ditches and other freshwater habitats, where so much of our fantastic freshwater wildlife lives.



Ponds

A body of standing water up to 2ha in size (that's about two football pitches). They can hold water all year round or they may dry out in the summer. Their small size means that they can be found in areas which are free from nutrient pollution. Over 2/3rds of all wetland plants and animals live in ponds. Your own garden pond could be a fantastic clean water habitat.



Rivers

A body of running water that is fed by smaller streams (tributaries). They are shown as a double blue line on most printed maps. They often flow through large areas of land and can come into contact with many pollutants along the way. Rivers are home to many plants and animals, including many which are sensitive to nutrient pollution.



Streams

Small bodies of running water - they are shown as a single blue line on most printed maps. Streams provide habitat for lots of different plants and animals. Much like rivers then can flow through large areas of land and can come into contact with many pollutants, but they can also spring and flow through habitats which are free from pollution, e.g. woodlands and parks.



Ditches

Man-made waterbodies that are used to drain the landscape. They follow straight lines along field boundaries, often turning at right angles. There are over half a million kilometers of ditches through the British landscape. In old landscapes like flood meadows and coastal marshes, these ditch habitats can be free from pollution and may be very wildlife rich.



Lakes

Large standing waterbodies bigger than 2 football pitches (>2ha). They provide habitat for deep water plants and animals and those that need permanent still water. Like rivers and streams, they often drain large areas of land and can be vulnerable to nutrient pollution.

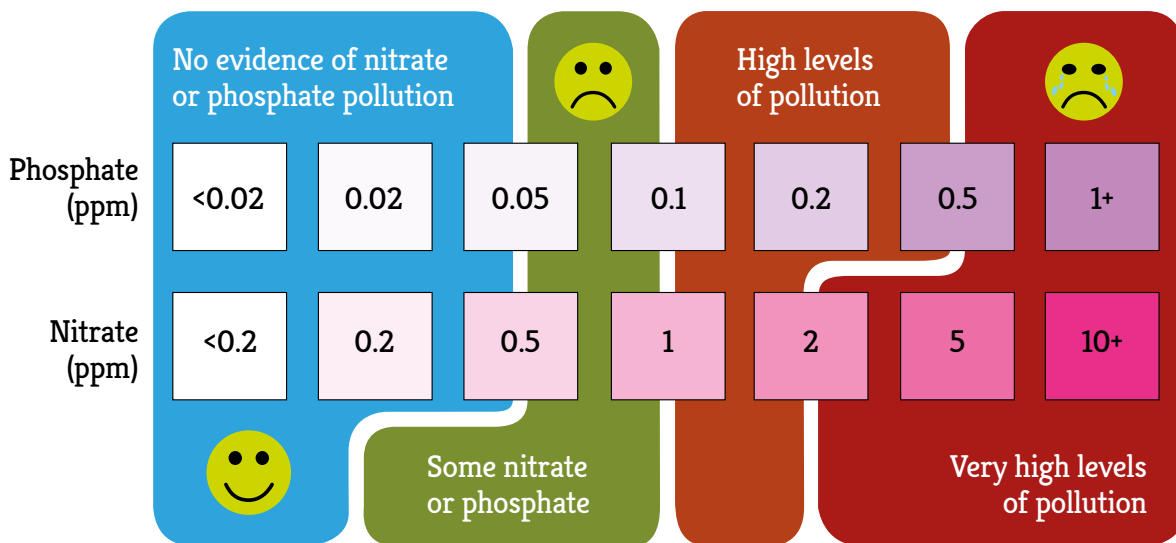
Other freshwater habitats and places where you might want to take a test: canals, garden water butts, springs, flushes, wet meadows, marshes, temporary ponds, even your kitchen tap.



What do your results mean?

Use the diagram and information below to discover what your results mean for wildlife

Both nitrate and phosphate can be damaging. To be a clean water habitat the sample must show no evidence of either phosphate or nitrate pollution. If the results for nitrate and phosphate show different levels of pollution, use the higher (more polluted) result to tell you how polluted your water body is overall. In other words, if you find evidence of pollution from either nitrate or phosphate the waterbody is polluted by nutrients.



No evidence of nutrient pollution

Fantastic! Water that's not polluted will show little or no colour change. So you've found a freshwater habitat that's free from both nitrate and phosphate pollution. That's great for wildlife! Why do you think your site was free of pollution? Think about where the water comes from and why there are no sources of pollution getting into the habitat. Have a look at Sheet 6 if you want to know the answers. You might want to collect the class results and compare them with a case study – sheets 7 and 8.



GENEVIEVE LEAPER

Evidence of nutrient pollution

Unfortunately you have found a waterbody that is affected by nutrient pollution at levels that will be damaging to the wildlife – it could be nitrate or phosphate pollution (or both). Places with some pollution will still have wildlife, but they won't have the wonderful richness of life, or rare species, that live in clean water habitats. More than half the plants and animals that should be present could have been lost. Why do some plants and animals struggle to survive when there is a modest increase in pollution?



WILL WATSON

High or very high levels of nutrient pollution

Oh no! You have found very high levels of either nitrate or phosphate (or both). Many plants and insects find it hard to make a home in habitats like this. Sometimes algae and duckweed grow across the surface and smother remaining plants and animals. The beauty and richness of clean water is lost. Why might this waterbody be so highly polluted? Remember that tap water can be safe for us to drink but may still have nutrient levels which are not good for wildlife.





Why are some habitats polluted?

Ponds in towns and the countryside

If a pond is in a heavily farmed or urban area, then nutrients added to the surrounding land as fertilisers can drain into the pond and pollute it. Not good for wildlife.

But you can find clean water ponds in towns and in the countryside, if they are not close to farmed fields or roads, and there are no drains or ditches going into them. You can often find ponds like this in woodlands, parks or heathlands.

Clean water ponds in our towns and the countryside are really important for wildlife.



WILL WATSON



EVAN JONES

Rivers, streams and ditches

These running water habitats collect water from huge areas, and almost always includes land where fertilisers (a big source of nutrient pollution) are used. They can also get nutrient pollution from drains which pipe water from our roads and waste water treatment plants into our rivers and streams. This water will have traces of sewage and detergents at levels too high for freshwater wildlife, even after it's been treated.

It is now very rare to find any rivers or large streams which aren't polluted by nutrients. The cleanest sites, with the least nutrients, tend to be small streams and ditches that start their life in woodlands, heathlands and other semi-natural habitats because they haven't yet had an opportunity to become polluted.

Garden ponds

When garden ponds are fed by rain water, perhaps stored in a water butt, they are very low in nutrients and can provide good wildlife habitats. Ponds filled by tap water can be high in nutrients and may show signs of pollution. Ponds with fish can also be high in nutrients from added fish food and fish poo.

Tap Water

In some areas, the water you get from your tap can be high in nutrients. Water companies ensure tap water is safe for human consumption, but these nutrient levels are not always low enough for wildlife to thrive. Remember - it only takes a very small increase in the levels of nutrients to see a change in pond quality.



PHOTO FROM BDS

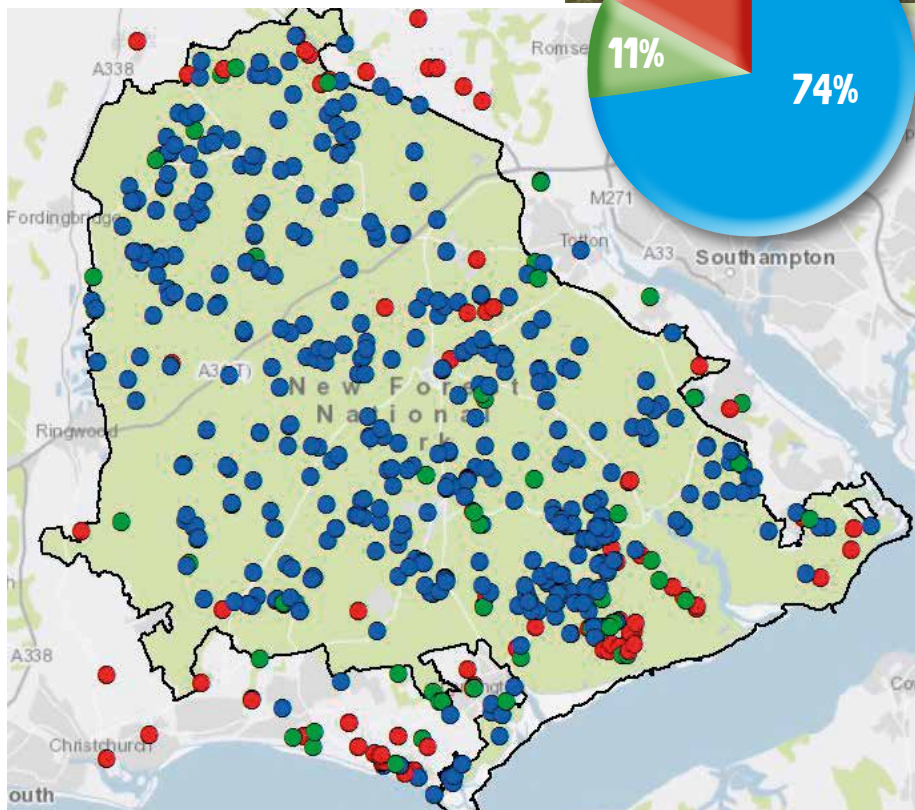


Case Study: The New Forest

A clean water catchment

The New Forest is one of the largest and most important areas for wildlife in England. It has lots of good habitats including heathlands, woodlands and grasslands and a lot of freshwater habitats – ponds, lakes, rivers, streams and ditches. In the New Forest you will see ponies, cows, donkeys and pigs grazing as they have done for hundreds of years. You won't see big farms, large towns or cities like you find in the rest of England.

Volunteers wanted to know what the water quality was like in this type of landscape. Can you guess what they found?



74%
of freshwater was
unpolluted

Over half of the clean water habitats were ponds (54%), but there were also many clean water streams (36%) and some clean water lakes and rivers. Almost all the polluted water we found was around the edge of the New Forest (red and green spots)

Key

- Unpolluted
- Some Pollution
- Highly Polluted

Explaining our findings

Within the New Forest the water is mostly clean and unpolluted as the land only has traditional low density grazing so very few nutrients are being added to the landscape. Any nutrient pollution comes mainly from the towns and villages. The New Forest is one of the few places in southern England where lots of the streams and rivers are still unpolluted. This is fantastic for wildlife, which has a huge choice of habitats to live in or move between. Not surprisingly the New Forest is home to

many of our most rare and threatened freshwater plants and animals.

Outside the New Forest it is a very different story. Here the land is farmed and the number of animals per field increases. This massively increases the amount of pollutants being added to the landscape and as a result many sites are highly polluted. Many freshwater plants and animals struggle to survive here, and the freshwater habitats are much poorer in wildlife.

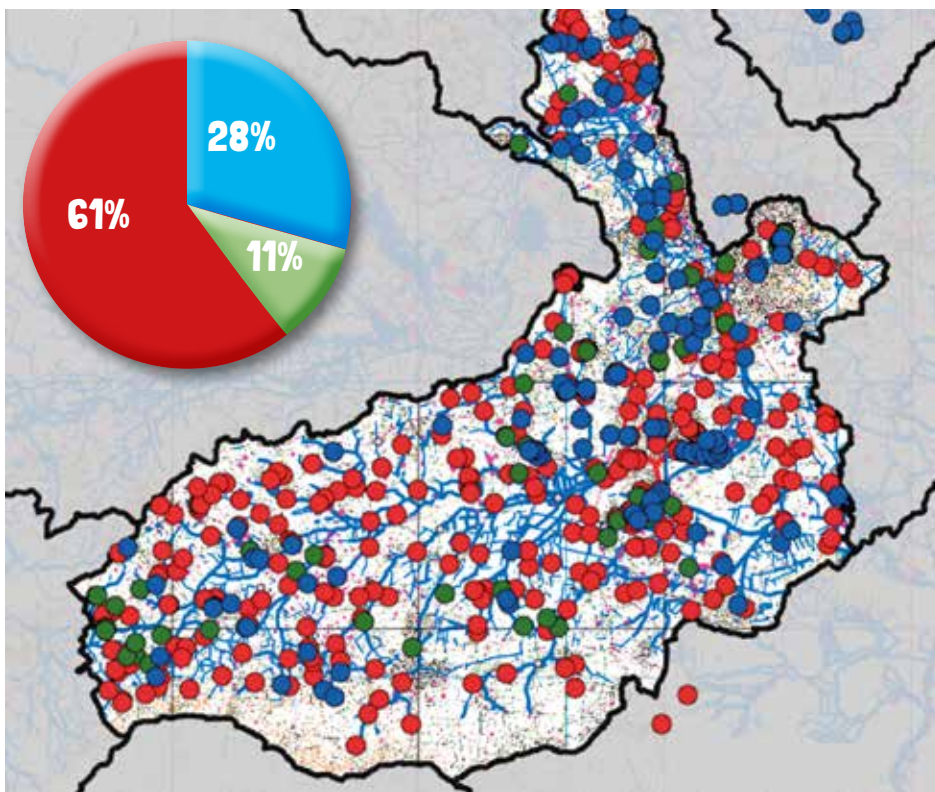


Case Study: The River Ock

A farmed catchment

The Ock is a river that drains into the River Thames in Oxfordshire. It mainly gets its water from areas of typical English countryside which is used heavily for modern industrial farming. Dotted through the area are small villages and country towns. But even here, there are some smaller areas of woodland, meadow and marshes whose history can be traced back for 5000 years. These are often protected and managed as wildlife nature reserves.

Volunteers wanted to know what the water quality was like in this type of landscape. Can you guess what they found?



28%
of freshwater was unpolluted

A small proportion of sites were unpolluted (28%). The majority of these clean water sites were ponds and lakes (68%). No rivers, and very few streams, were unpolluted.

Key _____

● Unpolluted ● Some Pollution ● Highly Polluted

Explaining our findings

Clean water in the Ock Catchment is found in just over a quarter of waterbodies, and almost all of these were ponds and lakes. Like most areas of lowland Britain, the majority of streams, ditches and all rivers, suffer serious nutrient pollution. This is not surprising because the network of rivers drain water from huge areas of land with multiple sources of pollution from urban and agricultural sources.

In contrast, some ponds can collect water from locally clean sources – small areas of land which aren't exposed to nutrient pollution. Of course some ponds are polluted – particularly if they occur in intensively farmed fields or drain water from roads. Some of the tiny streams and ditches can also escape pollution for a time if they start their life in woodland or within nature reserves. No extra nutrients are being added to these places and so they offer wildlife havens for species that depend on clean water.