

Evenlode WaterBlitz Report

Autumn 2023

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Earthwatch Europe

On behalf of the Evenlode Catchment Partnership (ECP)

October 2023

Evenlode WaterBlitz Report: Autumn 2023

A huge thank you to the 102 volunteers who took part in our Autumn Evenlode WaterBlitz across the catchment in Oxfordshire and Gloucestershire on 15-18 September 2023 to help us collect as much water quality data as possible. We were delighted to see existing volunteers, alongside some brand-new faces taking part for the first time.

Events like this show just how meaningful our blue spaces are and these quotes reflect the motivation to get involved:

- 'Monitoring of waterways is vital to identifying their varying states and also potential sources of pollution.'
- 'I'm a wild swimmer and appalled by the recent decline in England waterways. I no longer feel comfortable swimming in any local rivers.'
- 'I live next to the river and want to help keep it clean.'
- 'To help evaluate how badly impacted our beautiful Evenlode has been. I used to swim in it as a kid and feel passionately that my own children should.'
- 'The condition of our rivers is unacceptable.'
- 'Because I am concerned about the impact of sewage pollution on the quality of water and the impact on wildlife.'
- 'Downstream from Bledington Sewage works - water is noticeably cloudier than when we first moved here 20 years ago. Frequently get large quantities of foam on the surface. River never runs clear anymore, even when there has been no rainfall.'

Summary

- 102 citizen scientists took part and collected 63 WaterBlitz surveys
- Nitrate levels remained almost identical to Autumn 2022 and Spring 2023 results:
 - 62% of surveys recorded high nitrate concentrations (2 mg/l or higher)
 - 0% of surveys recorded low nitrate concentrations (<0.5 mg/l)
- Phosphate concentrations were lower than Autumn 2022 but higher than Spring 2023:
 - 30% of surveys recorded high phosphate concentrations (0.1 mg/l or higher)
 - 59% of surveys recorded low phosphate concentrations (less than 0.05 mg/l)
- 92% of surveys were conducted on rivers or streams
- 54% of survey sites reflect agricultural land-use
- 81% of surveys report trees and shrubs amongst bank vegetation
- 5% of the surveys reported the presence of slurry in their river study site; 87% of surveys reported no algae, foam, oil or slurry at the water surface
- 40% reported water to be colourless; 29% reported brown water
- Overall ecological status of sites surveyed: 25% good, 27% moderate and 48% poor

WaterBlitz Survey Locations, Dates and Weather

- The survey locations were well distributed along the River Evenlode from its source down to discharge near the River Thames, with a few additional surveys taken along the Rivers Dorn and Glyme which are tributaries of the Evenlode.
- The surveys were spread across the dates of the WaterBlitz weekend as follows: 10% samples on 15 Sep, 27% on 16 Sep, 38% on 17 Sep and 25% on 18 Sep.
- The weather was mostly dry and sunny for the first two days of the WaterBlitz, before turning cooler with heavy thundery showers and rain for the second two days.

Nutrient Pollution in the Evenlode Catchment

As part of the WaterBlitz, citizen scientists were given nitrate and phosphate test kits and asked to record the nature of the land-use nearby. Nitrates and phosphates are nutrients that enter our waterbodies from two key sources: via wastewater and via agricultural runoff from fertilisers and livestock. Nutrients are needed for plants and algae to grow, but in high quantities can cause ‘eutrophication’ or ‘nutrient enrichment’. Without human impact, freshwaters typically have low concentrations of these nutrients. However, even small additions can lead to rapid algal growth and blooms, which use up oxygen as they decompose, threatening wider aquatic life. Algal blooms cover larger plants and gravel beds important for fish and freshwater invertebrates. High nutrient levels are an indication of poor ecological status, and the land-use surrounding the waterbody can explain the source of these pollutants.

Surveys conducted on or close to agricultural fertilised land may be more likely to record high nitrates. This is because artificial fertilisers are rich in nitrate and it is very soluble in water. Similarly, surveys near livestock or where there is slurry may record high phosphate or nitrate. Surveys in/near a residential area or by an outfall pipe may reflect that a waterbody is impacted by domestic or industrial effluent or sewage which is likely to be rich in both phosphate and nitrate.

Most surveys in the Evenlode WaterBlitz took place next to mixed agricultural land, grassland/shrub, or livestock, reflecting the rural nature of the Evenlode catchment (Figure 1).

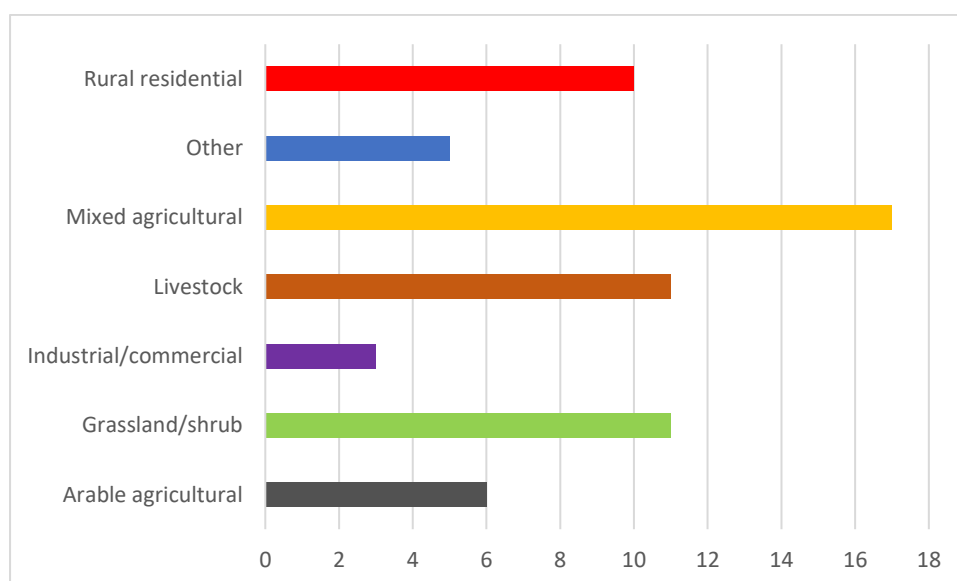


Figure 1. Bar chart showing the 50m surrounding land-use of the waterbodies surveyed in the Evenlode WaterBlitz Autumn 2023.

Nitrates above 2 mg/l and phosphates above 0.1 mg/l indicate poor ecological status. During the Evenlode WaterBlitz, 63% of surveys recorded nitrates 2 mg/l and higher and 30% surveys recorded phosphate concentrations of 0.1 mg/l and higher (Figure 2).

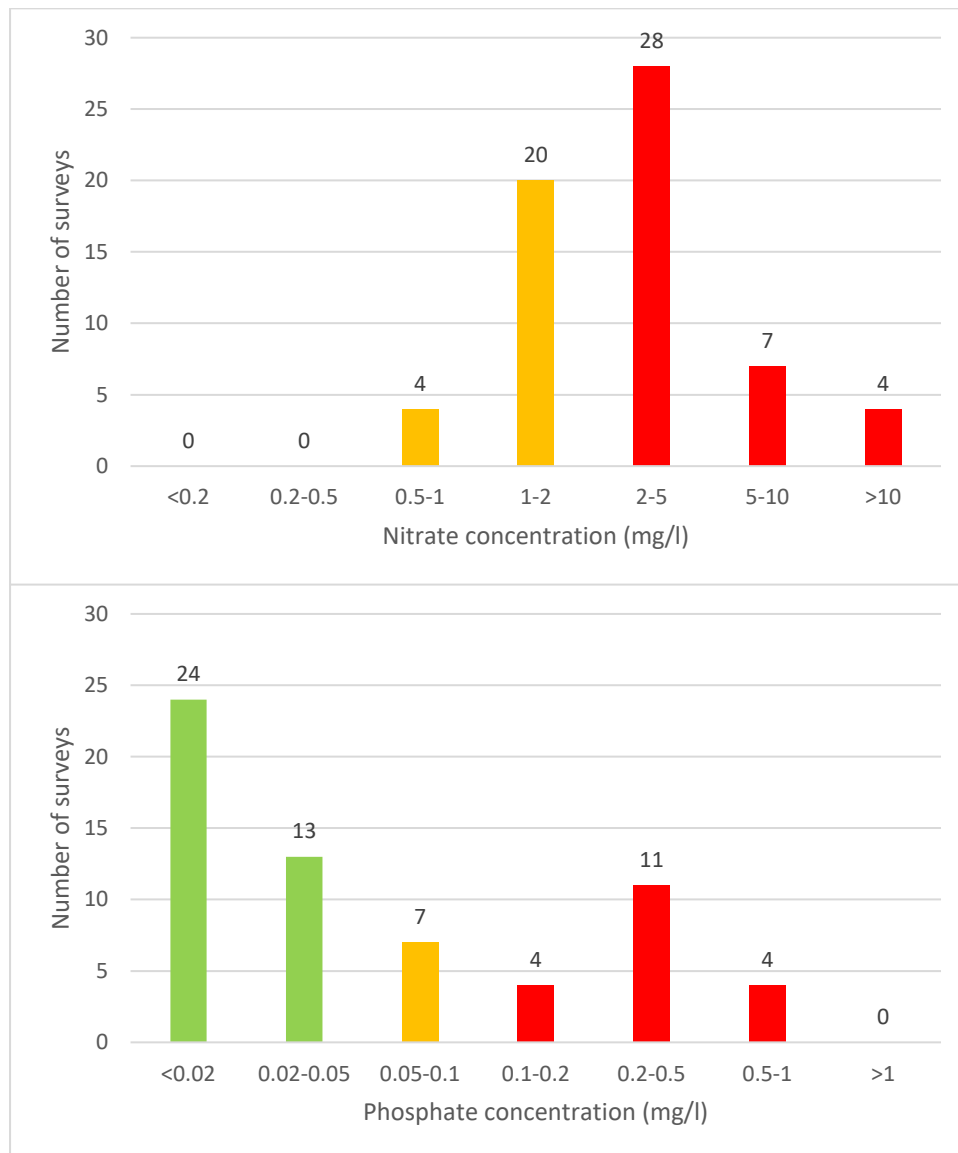


Figure 2. Bar charts showing the nitrate and phosphate concentrations recorded in the Evenlode WaterBlitz Autumn 2023. Green indicates low (good ecological status), orange indicates moderate and red indicates high (poor ecological status).

The high values of nitrates are perhaps not surprising in this rural catchment which is a designated Nitrate Vulnerable Zone (NVZ). 54% of Autumn WaterBlitz sites were surrounded by agricultural land-use, suggesting runoff from agricultural land is a contributor to nutrients here. NVZ designation seeks to manage land-use activities like fertiliser application to reduce the risk of nitrate pollution of waterbodies. However, a closer look at the nature of the sites with highest nitrate levels reveals a number of sources as discussed below.

High nitrate levels occur right across the catchment (Figure 3).

The highest levels (above 10 mg/l) were concentrated around 4 sites in the upper catchment. 2 of these surveys noted the presence of agricultural run-off and 2 noted discharging outfall pipes. The second highest levels (2-5 mg/l) were also seen around areas of the upper catchment such as Bledington, Daylesford, Sydenham, Moreton-in-Marsh and Broadwell, as well as in the middle reaches such as Bruern and Dean. Of these 7 surveys, 2 noted the presence of discharging outfall pipes, 1 was downstream of a sewage treatment works and 1 noted agricultural run-off and animal access. 28 surveys recorded the third highest nitrate levels of 2-5 mg/l and were distributed widely. 5 noted agricultural run-off, 4 noted outfall pipes, 1 noted road run-off, 2 noted slurry, 1 noted animal access and 1 was downstream of a sewage treatment works.

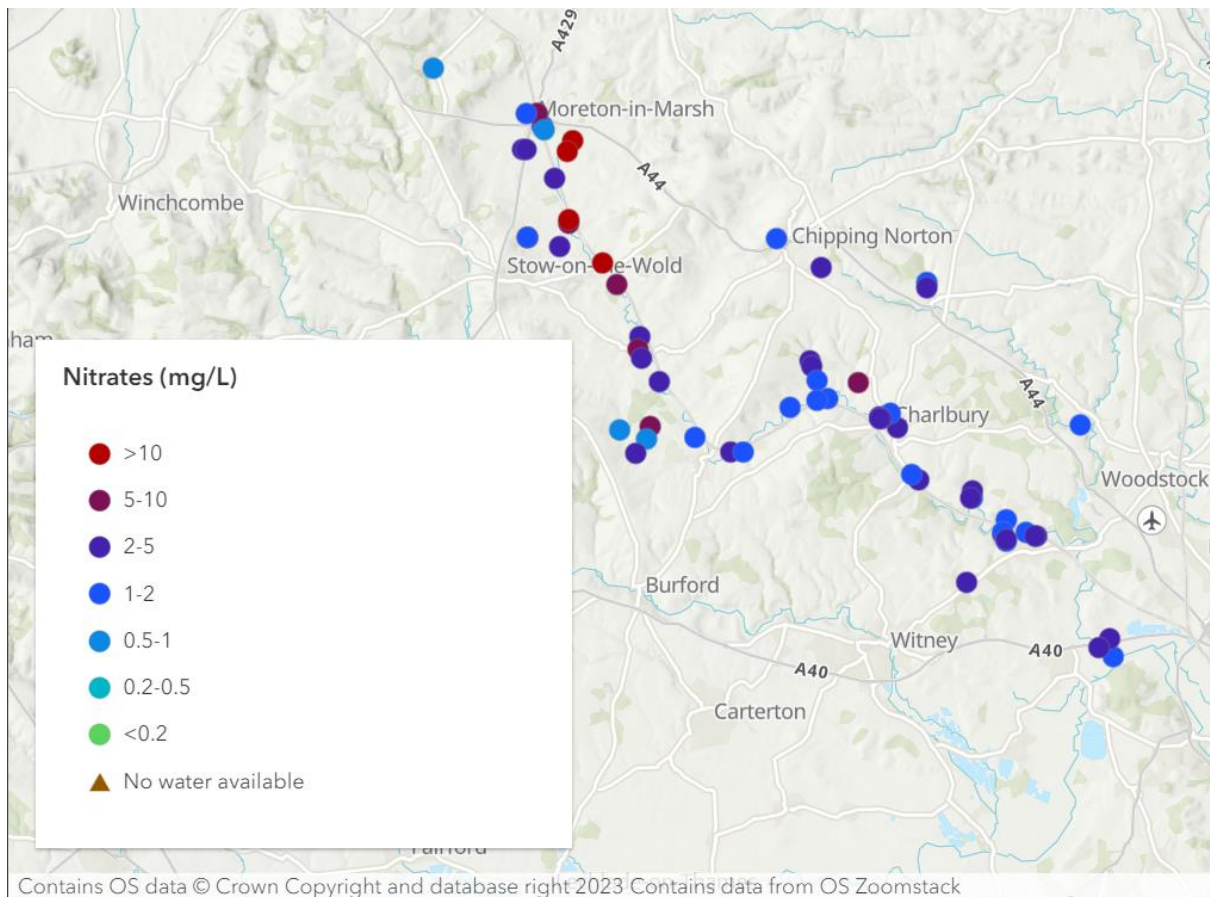


Figure 3. Map of nitrate concentrations recorded in the Evenlode WaterBlitz Autumn 2023.

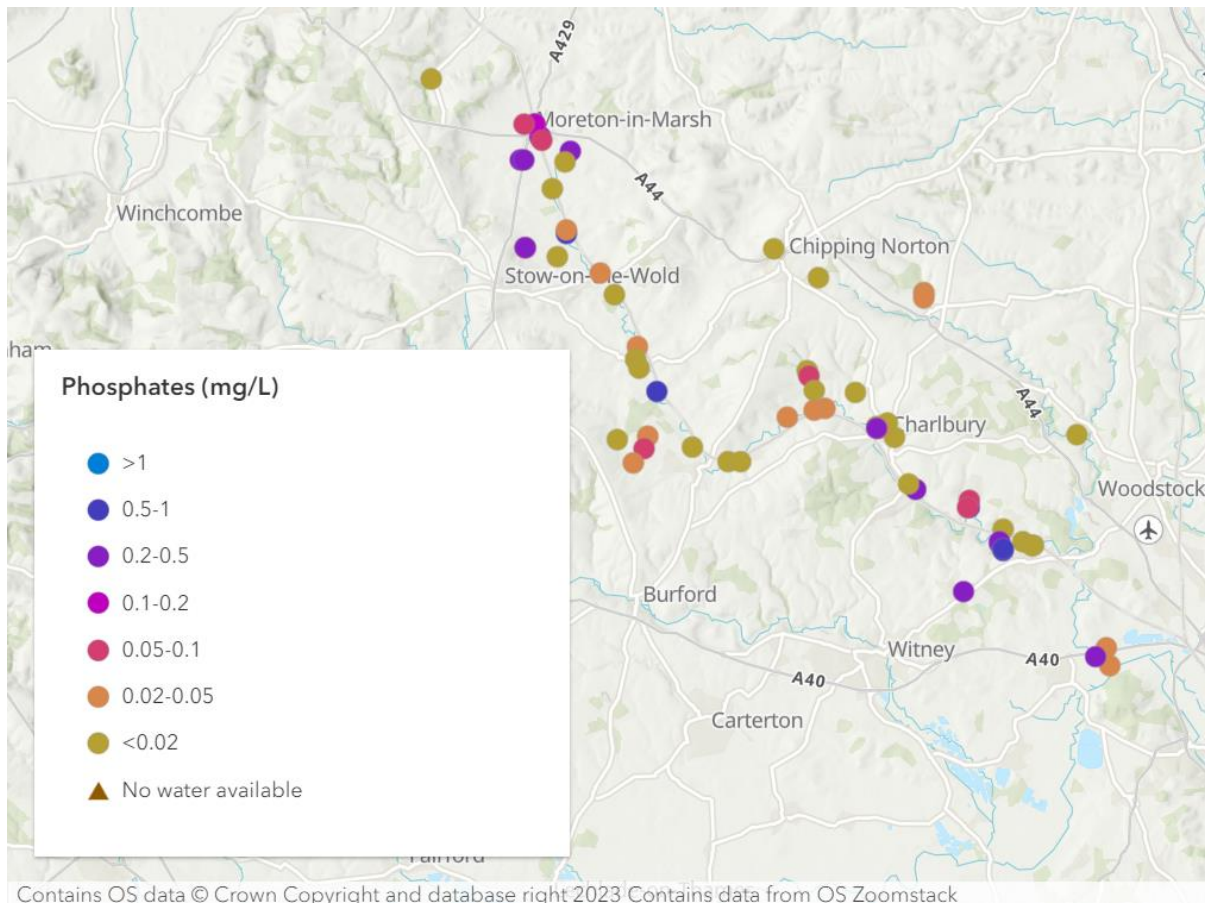


Figure 4. Map of phosphate concentrations recorded in the Evenlode WaterBlitz Autumn 2023.

High phosphate levels appear to occur at disparate and specific locations across the catchment (Figure 4).

The highest levels (0.5-1.0 mg/l) were concentrated around 4 survey sites, 3 of which also had high nitrate. One of these noted agricultural run-off. The second highest phosphate levels (0.2-0.5 mg/l) were seen at 11 survey sites, 8 of which also recorded high nitrate levels. 2 of these 11 surveys noted outfall pipes, 1 noted run-off and 1 noted slurry. The third highest phosphate levels (0.1-0.2 mg/l) were seen at 4 sites, 2 of which also had high nitrate levels. 3 of these 4 survey sites were industrial/commercial and 1 was rural residential. Of these 4 sites, 2 noted road-runoff and 2 noted discharging outfall pipes.

Heavy rain showers were recorded over the second half of the WaterBlitz weekend, which could have both increased the delivery of nutrients from surrounding land or increased the discharge from outfall pipes into the rivers, and by the same token, diluted nutrients present in the river. This is why regular monitoring is so important as it helps to identify and understand the complex processes of pollution over seasonal timescales. In addition, streams may be more vulnerable to pollution compared to larger rivers, due to their smaller flows and reduced ability to dilute nutrients.

Comparison with Previous WaterBlitzes

The % of surveys that recorded poor nitrate conditions (2 mg/l or higher) is extremely similar ($p=0.84$, $\alpha = 0.05$) to that recorded in Autumn 2022 and Spring 2023, suggesting a widespread legacy of nitrate pollution (Figure 5).

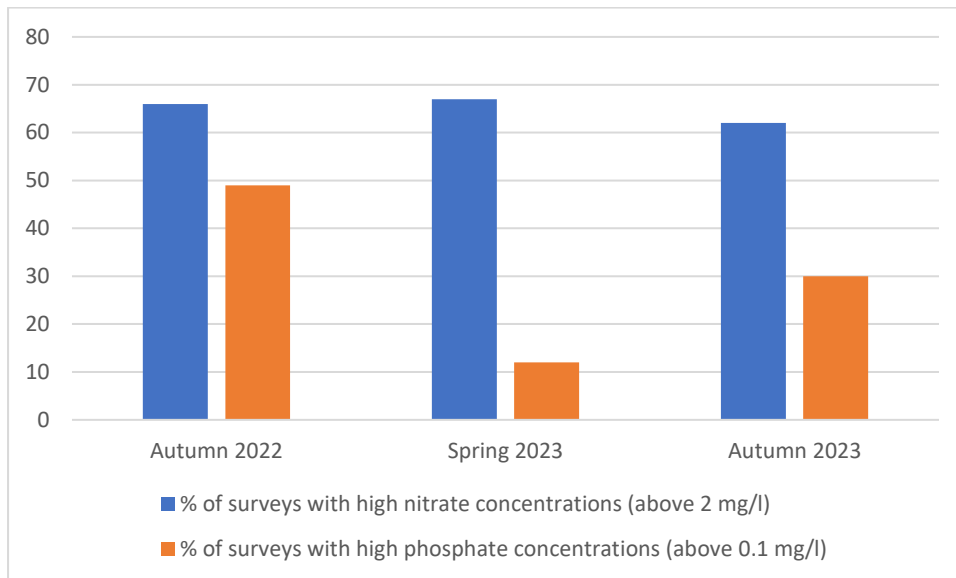


Figure 5. Bar charts showing the % of surveys with high nitrate and high phosphate concentrations recorded in Autumn and Spring WaterBlitzes in the Evenlode from 2022-2023.

The % of sites which recorded poor phosphate conditions (0.1 mg/l or higher) is lower than Autumn 2022 but higher than Spring 2023 WaterBlitzes (Figure 5) ($p < 0.05$). This may be due to the factor of different sites being monitored, but there is no significant difference between the average latitude and longitude of sites monitored ($p > 0.05$) for 2022 and 2023 and the general distribution is similar. The difference could also be due to the change in flow levels by year and season. There were extreme low flows of rivers throughout the Evenlode in 2022. Lower flows increase the concentration of pollutants by less dilution. In contrast, March 2023 saw very high rainfall throughout the UK, with the National River Flow Archive Hydrological Summary (UKCEH) recording above normal and exceptionally high river flows in the south and west of England during that period. Higher flows decrease the concentration of pollutants by more dilution. River flows and groundwater levels were largely in the normal range or above ([HS_202308.pdf \(ceh.ac.uk\)](#)) during August 2023, in the run-up to this September WaterBlitz.

This data points to the importance of regular monitoring, which helps pick out the seasonal influences on water quality and the need to understand how climate change may modify responses to nutrient pollution.

Why is Water Quality Monitoring So Important?

The data helps to identify areas most at risk and to inform where management and restoration would be most effective. A growing citizen science movement is showcasing the value of local stewardship and protection of our most valuable natural resource and ecosystem. The results of the Autumn 2023 WaterBlitz will be shared widely, including with our partners on the Evenlode Catchment Partnership. Citizen scientists are also encouraged to report any suspected pollution incidents to the Environment Agency incident hotline on 0800 80 70 60 and to request a case number.