

River Wye Pollution Update Summary

Emil Morfett

January 2022

Results from data collected by researchers who are modelling phosphorus (P) levels in the River Wye catchment indicate it is four times higher in the soils of the Wye Catchment than average for the UK and is causing poor water quality. This is very important news. They are advising the government on this and have concluded that major changes in farming practise is necessary. This includes the urgent need to stop spreading P fertiliser by 80% for poultry manure and 50% for cattle manure in the Wye catchment. Radical solutions to the problem need to be sought as a matter of urgency to avoid further degradation and complete loss of the river ecosystem.

An army of trained citizen scientists have been galvanised into action and now are monitoring the River Wye catchment. Four citizen science groups have collected over 4,000 samples in more than 267 sites during 2021. Working with the Environment Agency and Natural Resource Wales these groups are providing essential data, that one might expect to be gathered by government agencies. The data is being analysed by environmental scientists in the University of Cardiff.

The good news is that government agencies are now utilising data collected by citizen scientists. However, we continue to rely on these agencies to follow up anomalies, investigate the source, enforce the current laws and protect the river. The Wye is a Site of Special Scientific Interest (SSSI) and a Special Area of Conservation (SAC).

The latest Environment Audit Committee report, using the Wye as a Case Study, recommends:

- annual chemical assessment of soils in sensitive river catchments
- new DEFRA guidance on all intensive animal farming developments based on the nutrient balance of each river catchment
- increased agency monitoring of the sensitive river catchments.

It notes the potential to reduce nutrient levels by transporting waste out of catchment, treating it in anaerobic digestors, reducing phosphorous in feedstocks and reducing livestock levels. The Wye Catchment Partnership reports 250 farms (est. 10% of Herefordshire farms) have signed up for an audit of nutrient levels in feedstocks and soils. This is the first step in largescale nutrient reduction. However, it may be too little too late if left to self-regulation.

River Wye Pollution Update Full Report

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Collapse in River Biodiversity Understood but Water Quality Data is Lacking

The Nation's favourite river is dying from pollution. The two main pollution sources were identified in the Wye catchment: diffuse agricultural, accounting for two thirds, whilst just under one third is outflow from sewage treatment works. This is documented in [written evidence to the to the Audit Committee](#) by Friends of the Upper Wye, the Nutrient Management Board papers, Environment agency data and research by University of Lancaster (@RePhosKUs).

Environment Agency modelling gives the following percentages for the sources of Phosphate load:

1. Upper Wye sub-catchment - 66% agriculture, 25% sewage, 9% other.
 2. River Lugg sub-catchment - 66% agriculture, 25% sewage, 9% other.
 3. Lower Wye sub-catchment - 61% agriculture, 33% sewage, 6% other.
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- 66% of pollution enters the river watercourse during high rainfall as soil erosion, carrying excess phosphate which causes eutrophication (dense green algae) in the lower and middle reaches every summer. The resultant green algae kills the keystone species, water-crowfoot (ranunculus) by cutting out light and using up oxygen. The loss of crucial life-supporting annual aquatic plants in the river has diminished the cover and food for many dependent species of birds, mammals, insects and migratory fish. When it dies, this algal growth covers the rocks, gravels and sandy margins smothering its banks with a brown sludge over the layers of fine silt and soil from the fields.
 - 25% of pollution from sewage treatment plants occurs from release of untreated waste during intense rainfall. This is a function of the infrastructure designed to capture rainfall in Combined Sewage Overflows (CSO) and lack of system capacity. The solution to reduce outflows of untreated sewage requires long term investments and better plant design. This is work in progress for Welsh Water which is investing in phosphate strippers and increased capacity. The actions and results of phosphate from sewage release is the same as above.

The planned phosphate-strippers for sewage treatment works in the catchment will decrease the proportion of phosphorus coming from sewage thus increase agriculture's share.

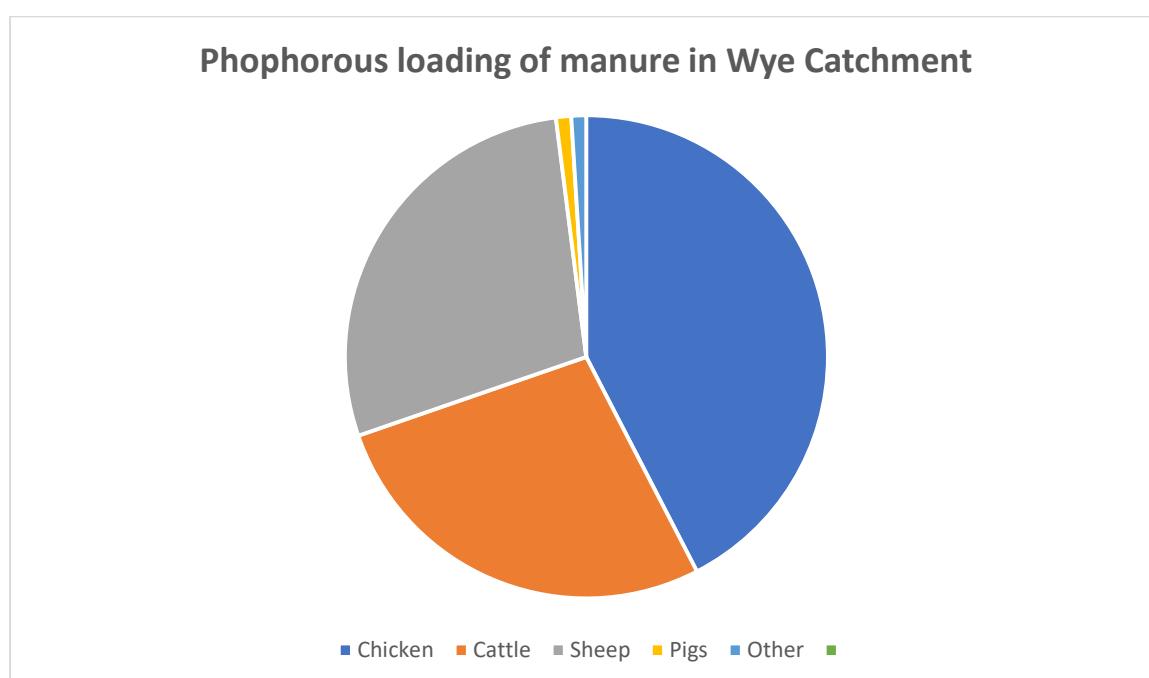
New Evidence Indicates Catchment Agricultural P Pollution is 50% Higher

Researchers advising the government and modelling phosphorus in the Wye catchment indicate it is four times higher than average soils causing poor water quality. This is very important because a major change in work practise is necessary to stop spreading P fertilisers including an 80% reduction of poultry manure and 50% of cattle manure. Radical solutions to the problem need to be sought as a matter of urgency to avoid further degradation and complete loss of the river ecosystem.

New updated data from Lancaster University on the phosphorus (P) Substance Flow Analysis (SFA) conducted in the Wye catchment as part of the RePhoKUs project <http://wp.lancs.ac.uk/rephokus/>

The poultry population data used in the initial catchment P SFA was based largely on the 2016 Defra census, however it was widely acknowledged that the poultry industry in the Wye catchment has seen a large expansion over the last few years. Estimates from local NGO's suggested a current population of ~20 million bird places based on planning applications which would be a significant increase on the Defra 2016 numbers of ~10 million.

Using the new data, an updated Substance Flow Analysis for the Wye catchment now shows that livestock feed inputs have increased to ~5,000 tonnes P, manure P has increased to ~6,100 tonnes P and that **poultry are now the dominant livestock** sector driving P flows in the catchment. The percentage contribution of livestock type to the manure loading in the catchment is illustrated below.



New P distribution calculated: Poultry (42%), Cattle (27%), Sheep (28%), Pigs (1%), Other (1%).

The annual P surplus accumulating in agricultural soils has increased to ca. 3,000 tonnes which is equivalent to a rate of 17 kg P/ha/yr. Bringing the catchment into a net-zero P balance will require significant change in P use practice roughly equivalent to not applying any P fertiliser, 80% of the poultry manure, and 50% of cattle manure. This was reported to the Parliamentary Audit Committee on Water Quality here: <https://committees.parliament.uk/writtenevidence/41331/pdf/>

Pollution in UK Rivers is a National Issue, and the Wye is Used as a Case study in this latest report to government

Hot off the press a new report on river pollution was published 13 January 2021. The River Wye is used in a case study in the [latest report to the Environmental Audit Committee on National River quality](#). Here are a few select points from the conclusions and recommendations:

Paul Withers, Professor of Catchment Biogeochemistry at Lancaster University, stated the phosphorus surplus in the Wye catchment is nearly 60% greater than the national average and is driven by the large amounts of livestock manure being produced locally. This scientific observation based on catchment modelling and analysis is refuted by the NFU.

The Chair of the NFU Environment Forum, Richard Bramley, disputed the link between high phosphorous concentrations in the Wye catchment and the poultry farms in the area. While the link between the expansion of poultry farms in the Wye catchment and water quality issues 'might seem plausible', it was 'just not supported by recent and reliable evidence.' The NFU cited an assessment published by Natural Resources Wales in January 2021 which stated that 'the overall pattern of failures in the Wye does not support the hypothesis that poultry units are the main or even a particularly important reason for nutrient failures on the Wye'. It would seem the farmers umbrella organisation the NFU has a major conflict of interest with insurance contracts for many of the farmers operations. Observations by the FOUW point out the inadequate sampling frequency and density of the Agencies responsible. Thank goodness the Citizen Scientists are stepping up to the challenge and gathering new evidence.

The report concludes that intensive livestock and poultry farming is putting enormous pressure on catchments feeding the river Wye running through Wales and the south-west Midlands. The number of chickens being reared increased significantly, and pollution from their waste is finding its way into river waters. The potential impact of intensive agricultural practices on river water quality must be fully acknowledged and the risks mitigated. **One means of doing this is through farming which is as sensitive as possible to its effect on water quality in catchments.**

The report also states Citizen science should not be seen as an alternative to adequately funded environmental monitoring by regulators, but it should be encouraged and recognised. The Audit Committee recommend that the Environment Agency explore how best to support the contribution of citizen science to environmental regulation and to incorporate citizen science analysis in its work wherever possible and appropriate.

In order to drive down further the excess levels of phosphate and nitrates on agricultural land, annual chemical assessments will be required. Where appropriate, farmers ought to be supported to assess the existing phosphorus and nitrogen status of their land before spreading either farmyard manure or sewage sludge from water companies. The new Environmental Land Management Scheme provides an opportunity to provide financial help to farmers for measures to reduce progressively the input of phosphates and nitrates that cannot be taken up by crops.

Development of catchment sensitive farming will require calculations of the overall nitrogen and phosphorous load for farmland and river catchments. The Audit Committee recommended DEFRA commission a periodic (five yearly) appraisal of catchment-wide nutrient flows across each of the major river catchments in England. Such appraisals should then be used by local authorities and planning authorities to **inform decisions on new housing developments and intensive livestock units, taking into account the cumulative impact of such developments on river catchments.**

They further recommended that **planning authorities in England establish a presumption against granting planning permission for new intensive poultry or other intensive livestock units** in catchments where the proposed development would exceed the catchment's nutrient budget, unless evidence is presented of robust mitigation plans in place that are demonstrably effective in reducing the accumulation of phosphate and nitrate loads in soils and river sediments within sensitive areas in the catchment.

The Wye Catchment Partnership formed in 2014 and now brings together 54 organisations, initiatives and individuals who have a shared interest in the catchment. It facilitates collaborative working to deliver improvements to water quality, quantity and wildlife. Despite seven years of

talking, advising farmers and collaboration, the river quality and wildlife continues to decline. We can only hope that the current initiative will bring rapid change, but the source of pollution will continue to grow until farmers change working practise. The Agencies are not fully funded to enforce current laws, and local government planning departments must stop permitting intensive poultry units.

The proliferation of industrial poultry units in the Wye catchment was carefully documented since 2015 by the **Campaign to Protect Rural Wales CPRW, Dr Alison Caffyn, Cardiff University and Campaign to Protect Rural England CPRE**. Their maps and statistics are an extraordinary record, illustrating the cumulative impact of the industry as it grew, unchecked, from 5 million to 20 million chickens in the catchment. It is still growing.

It was this research and the annual spectacle of eutrophic green river water that prompted the formation of local pressure groups and non-government organisations (NGO's) into action. The Wye anglers were led by the [Wye Salmon Association](#) to start the first Citizen Science Group in 2020, monitoring the pollution. This campaign along with that of the Wildlife Trust Wales [@SaveTheWye](#) and [CPRE](#) has greatly increased public awareness. Wild swimmer, [Angela Jones](#) dragged a coffin down the Wye and took the pressure groups to the Welsh Parliament.

The independent TV documentary, [Riverride, written and presented by George Monbiot](#), put the river crisis into perspective for many river users and galvanised the public into more action, joining local NGOs to try to force the hand of the politicians and government agencies. These actions and protests were covered by national news raising the profile of the river crisis from local to international levels.

[River Action UK](#) is an NGO formed to pressure governments and government Agencies to respond to the pollution crisis in our national rivers with initial emphasis on the River Wye. [Their 2021 campaign](#) focused on the main polluters in the Wye catchment: Avara, Noble Foods and the supermarkets, who depend on the concentration of industrial poultry units. They write open letters to the main industrial polluters and run a hard-hitting campaign on social media to embarrass government into action.

River Wye Catchment Water Quality-Citizen Science Project

The good news is that an army of trained citizen scientists now are monitoring the river Wye Catchment. These four citizen science groups monitor over 267 sites in the catchment and took over 4,000 samples in 2021. Working with the Environment Agency and Natural Resource Wales these groups are providing the essential data to monitor the River Wye Catchment, a Site of Special Scientific Interest (SSSI) and a Special Area of Conservation (SAC). It is up to the government Agencies to follow up anomalies, investigate pollution sources, enforce the current laws and protect the river.

The Citizen Science Group's activities are mostly funded by donations because government did not see the urgent need to save this ecosystem from collapse. MPs with constituencies along the Wye belatedly wrote to the Treasury at the end of September, last year, calling for £10-15 million to fund actions to deal with phosphate pollution in the Wye. The bid for direct government funding was unsuccessful. The same MPs are also calling for a cross boarder taskforce with little effect to date. We are therefore reliant on these fantastic voluntary organisations to identify pollution, but we still need the Agencies to follow up with investigation and enforcement.

Data from a year of citizen science in the Wye Catchment

Water samples from the catchment are tested for phosphates, nitrates, conductivity, turbidity, acidity, ammonia and temperature. These water quality samples will highlight the problem areas in the catchment and allow scientists to identify trends in pollution over the seasons.

A recent seminar for volunteers gave summaries from each group of recruitment, training and the sampling methodology. The presentation also explained the accuracy and precision of various techniques allowing rapid results and compared these to the slower and more costly lab sampling methods.

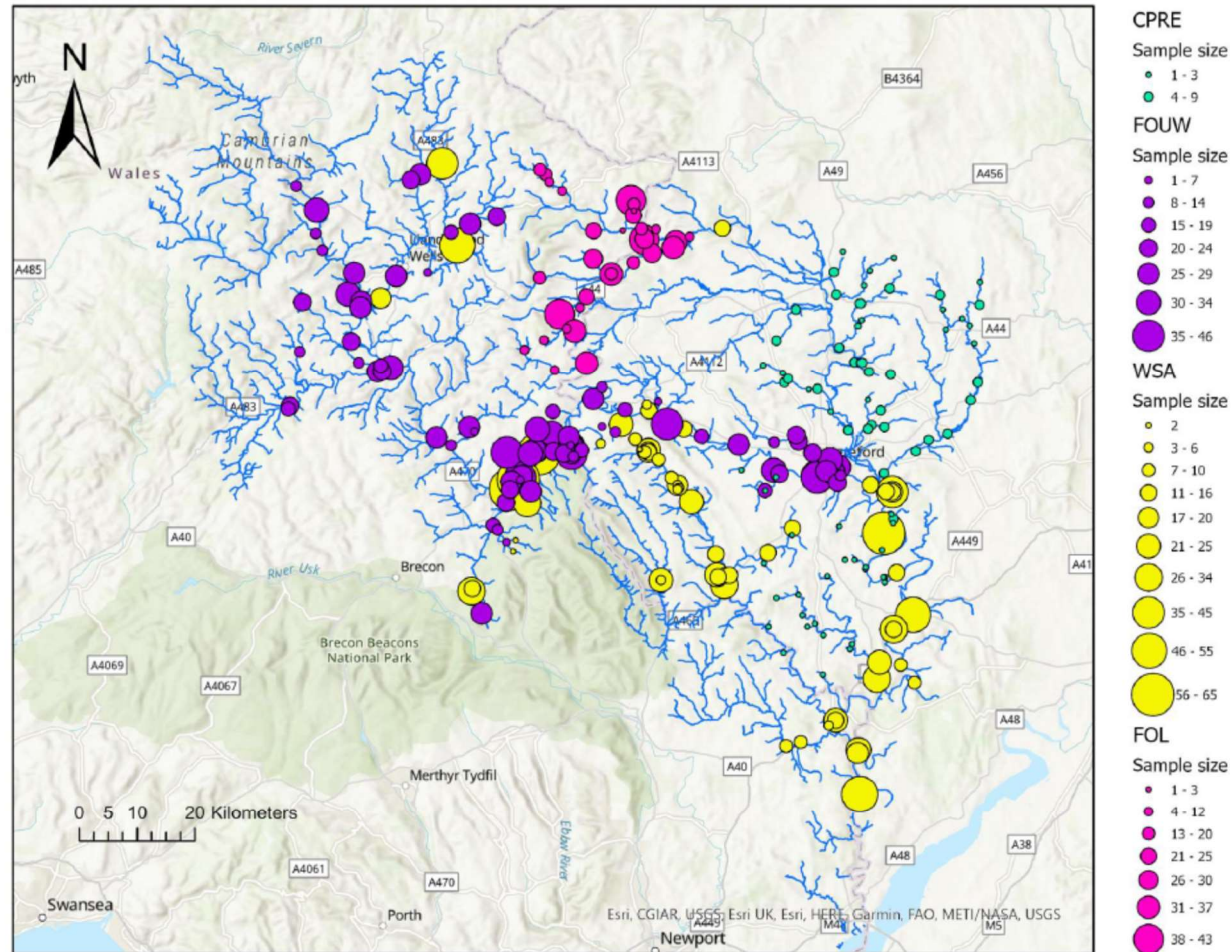
Slides of the mean phosphate and electrical conductivity (dissolved salts) graphically illustrate the tributaries and sections of the main channel that are polluted from agricultural run-off and sewage outfalls.

The proposed sampling sites and potential sources of pollution [are mapped here by CPRW](#) and provide a useful reference in the absence of any detailed data from government Agencies. These are very important for anyone to understand potential sources of pollution in their local area but not in a format that we can reproduce for newsletter images. We strongly suggest you download the data on google maps and explore your environment where public access is permitted.

Mapping pollution

The following maps are taken from slides which show the poor quality of water with high dissolved salts in the river Lugg and its tributaries associated with intensive animal farming and spreading of phosphate rich fertilisers. They also show the worst effected tributaries in Wales along the upper Wye catchment, associated with intensive poultry farming and combined sewage outlets.

Data from a year of citizen science in the Wye Catchment



Campaign to Protect Rural
England (CPRE)
→ 73 active sites
Started in September 2021

Friends of the Upper Wye
(FOUW)
→ 93 active sites
Started in June 2021

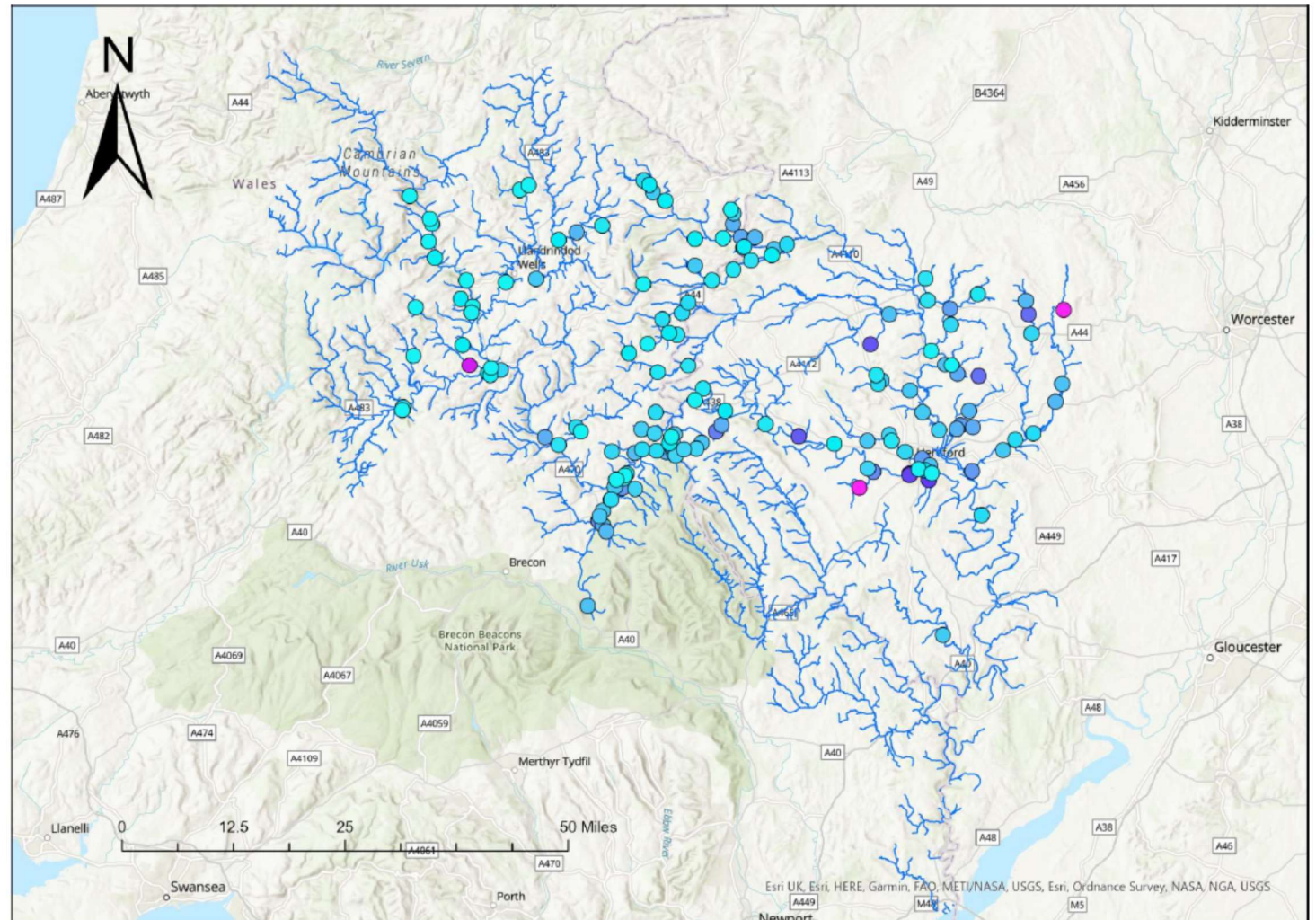
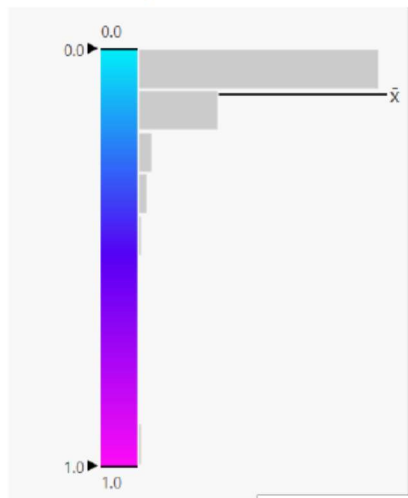
Wye Salmon Association
(WSA)
→ 69 active sites
Started in 2020

Friends of the Lugg
(FOL)
→ 33 active sites
Started in June 2021

Source: Data from Cardiff University Elle von Benzon presentation on Wye Citizen Science

Mean
Phosphate
(PO_4^{3-})
concentrations
in ppm

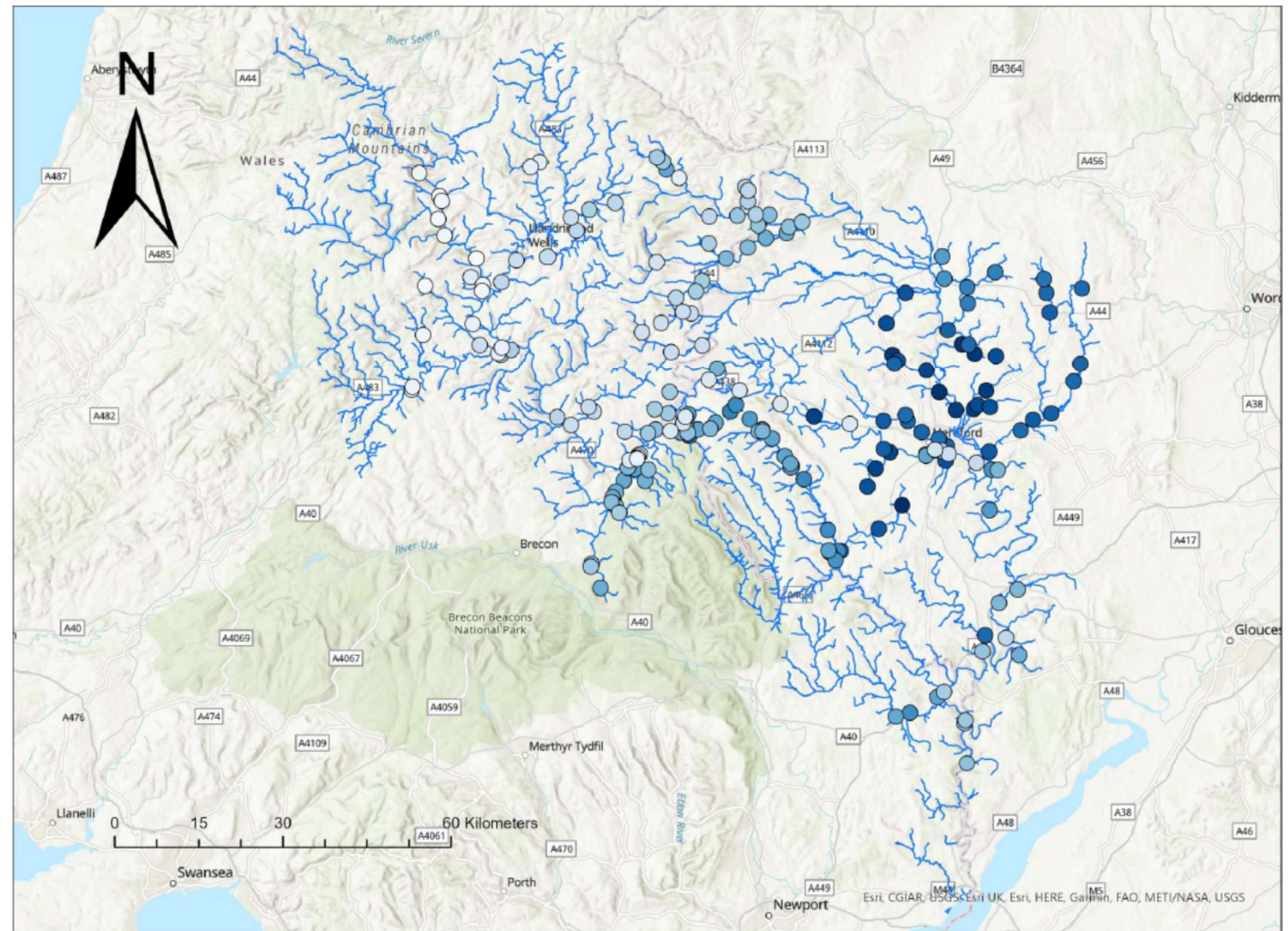
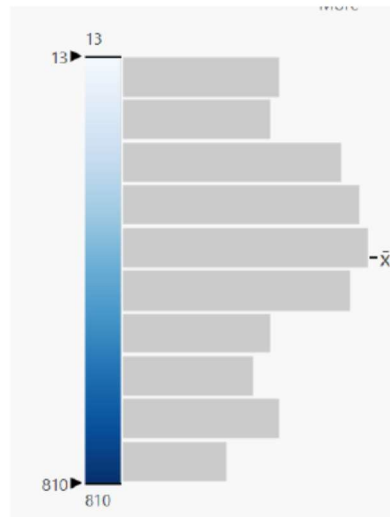
La Motte phosphate
test strips



Source: Data from Cardiff University Elle von Benzon presentation on Wye Citizen Science

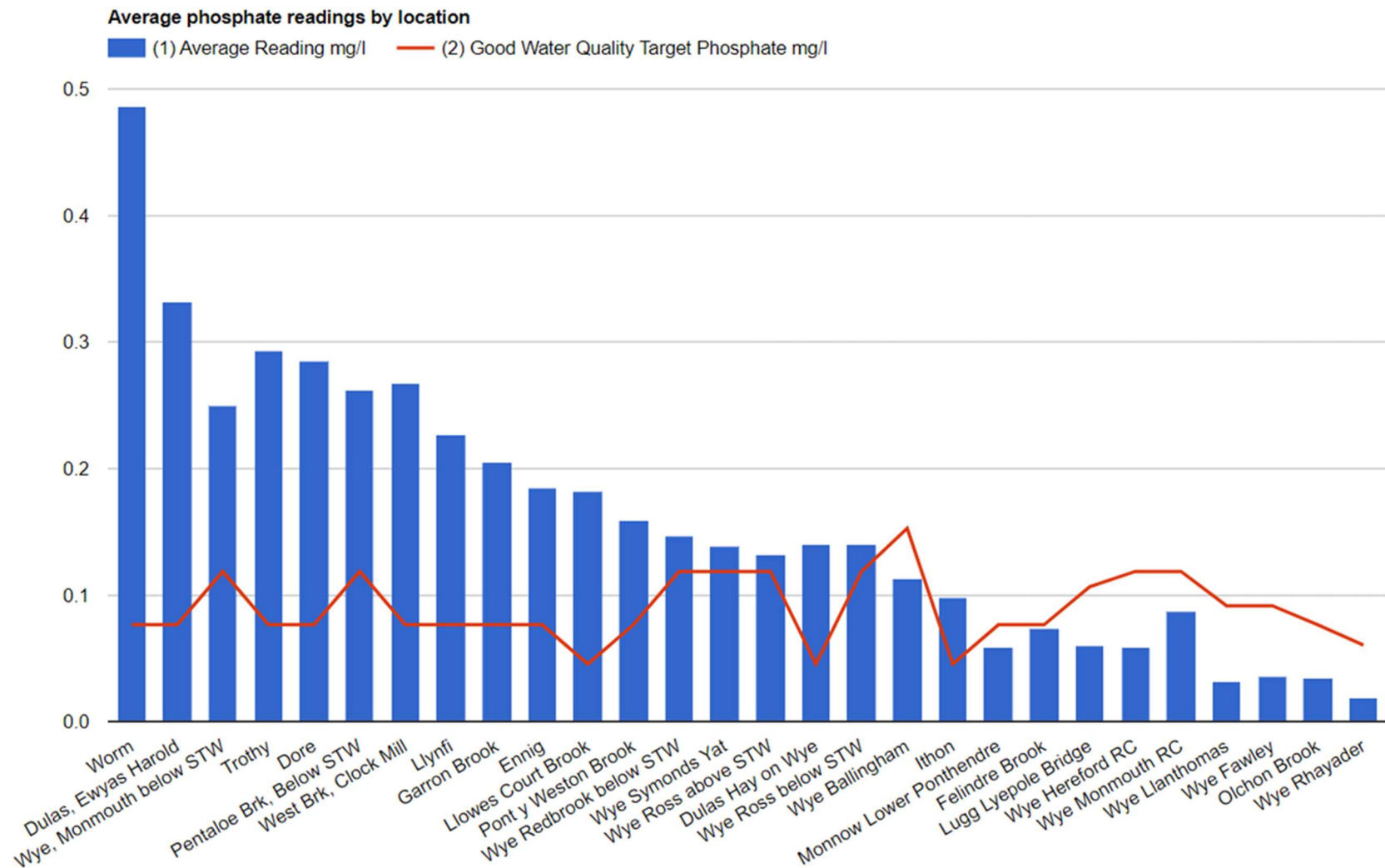
Mean Electrical Conductivity in Microsiemens μS

Using HM Digital EC-3 or TDS-3



Source: Data from Cardiff University Elle von Benzon presentation on Wye Citizen Science

The Wye Salmon Association data shows the failing tributaries and worst sections of the Wye



Source: Wye Salmon Association Website [public here](#).

The Wye and Usk Foundation (WUF) is working closely with stakeholders to identify and address the issue of agricultural run-off through The Wye Catchment Partnership (WCP). They operate as consultants to farmers and provide solutions to land and manure management issues. Another meeting of the Partnership was held last December. The good news is that many farmers now understand the serious impact of poor manure management, and 250 in Herefordshire are signed up to address the loss of soils and participate in a manure management audit. However, the time estimated to address the phosphate excess in the catchment is 10-15 years with no sign from DEFRA, NRW or the EA of any guidance to stop additional poultry shed developments.

The paucity of historic data on pollution levels is a result of the government reduction of Environment Agency funding, reduced by two thirds during the last ten years. Staff reductions and budget cuts reduced monitoring of many tributaries of the River Wye. The appalling decline in river water quality resulted in major public pressure to increase agency funding.

Recently new funding was announced on a national level and agency staffing increased to enable select monitoring of most polluted areas. Two automated water quality samplers were installed on the most polluted tributaries, funded by the Environment Agency to give real-time readings for a more complete analysis of pollution concentrations over time in relation to flow rates and water temperature. Given the Agencies failure to gather enough evidence to prosecute the polluters of the Afon Llynfi after the major fish kill, the funding staffing and operations had to be increased. The danger is that it's too little and too late.

The writing was on the walls, now it is up to government to act!

What are the solutions and how can you help?

Helen Stace CEO of Herefordshire Wildlife Trust sums up the situation in her recent blog.

The River Wye is now in a catastrophic state, and the regulatory framework needs a massive overhaul on multiple levels:

- The regulatory framework requires a complete review to ensure that these loopholes are closed and there are seamless assessments of new developments, both built and agricultural, covering every aspect of their impacts, individually and cumulatively.
- This includes abandoning voluntary codes of practise around the agricultural use of fertilisers, including manures and waste arisings from IPUs, in favour of firm regulation for example under Water Protection Zones
- Existing consents, including those for water companies, need to be reviewed to comply with more stringent standards
- The Treasury needs to restore and enhance funding for the Statutory Agencies to ensure that they have the staff and resources to monitor, inspect and enforce the legislation
- The Statutory Agencies need to have the political backing to take more prosecutions of those proven to be flaunting environmental regulations
- The Interim Office for Environmental Protection must be given the powers and funding to monitor the environmental and ensure proper monitoring and mitigation of any habitat assessments carried out under the regulations.

What can you do!

Herefordshire Wildlife Trust Members and supporters can help! Please:

- Join the Herefordshire Trust and work on improving local biodiversity
- Amplify our voice on social media by sharing our posts
- Sign relevant national petitions
- Join a Citizen Science group to monitor water quality
- Report any incidents you see on the River to the Environment Agency Action line 0800 807060, copying the information to Herefordshire Wildlife Trust.
- Buy your eggs from local small-scale producers and think about how often you eat chicken and the impact on our rivers.

Important Links to The Citizen Science Groups

You can find and join your local group through these links.

Wye Salmon Association: WSA <https://www.wyesalmon.com/phosphate-sampling/>

Friends of the Upper Wye: FOUW <https://www.fouw.org.uk/citizen-science>

Campaign to Protect Rural Wales CPRW https://www.brecon-and-radnor-cprw.wales/?page_id=2474

Campaign to Protect Rural England CPRE <https://www.cpreherefordshire.org.uk/news/join-our-citizen-science-project-to-restore-the-river-wye-to-health/>

Essential reading and background information on the Wye Pollution issues

File: WQR0104 - Water Quality in Rivers

<https://committees.parliament.uk/work/891/water-quality-in-rivers/publications/>

[Water Quality in Rivers- Report to Environmental Audit Committee January 2021](#)

<https://www.herefordshirewt.org/blog/helen-stace/wye-oh-wye>

Links to useful maps and data on intensive poultry farm units across Powys, Herefordshire and Shropshire:

https://www.brecon-and-radnor-cprw.wales/?page_id=2211

https://www.brecon-and-radnor-cprw.wales/?page_id=1513

https://www.brecon-and-radnor-cprw.wales/?page_id=2026

https://www.brecon-and-radnor-cprw.wales/?page_id=2152

<https://cprw.org.uk/cms-data/resources/A%20moratorium%20on%20intensive%20poultry%20units%20Final%20Sept%202020.docx.pdf>

You can find the latest news on collaborative actions on the Wye and Usk Foundation website:

<https://www.wyeuskfoundation.org/wcp-water-quality>

When looking for the results of citizen science sampling it is hard to find an integrated analysis. Its early days but the Wye Catchment Partnership has plans to share results on its data page.

<https://www.wyeuskfoundation.org/Pages/Site/wye-catchment-partnership/Category/wcp-data>

<https://www.wyeuskfoundation.org/join-a-citizen-science-group>