

Wales Land Management Forum (WLMF) Sub Group on Agricultural Pollution

Minutes

Title of meeting:

Wales Land Management Forum (WLMF) Sub Group on Agricultural Pollution

Location: Microsoft Teams Meeting

Date of Meeting: 21st November 2022

Present:

Zoe Henderson, NRW (Chair)

Dennis Matheson, TFA

Marc Williams, NRW

James Ruggeri, HCC

Einir Williams, Farming Connect

Shane Thomas, Carmarthen Fishermen's Federation

Creighton Harvey, Carmarthen Fishermen's Federation

Mathew Walters, Welsh Government

Polina Cowley, Welsh Government

Sarah Jones, Dwr Cymru

Sarah Hetherington, NRW

Chris Thomas, NRW

Kate Snow, United Utilities

Bernard Griffiths, FUW

David Letellier, NRW

Katy Simmons, NRW

David Ball, AHDB

Chris Mills, WEL

Fraser McAuley, CLA

Ruth Johnstone, NRW

Additional Attendees Present:

Jeremy Walters, NRW

Sue Ginley, NRW (Item 6)

Dr Sue Byrne, NRW (Item 7)

Dr Morag Taite, NRW (Item 7)

Secretariat:

Bronwen Martin, NRW

Apologies:

Rachel Lewis-Davies, NFU Cymru

Delyth Lewis-Jones, AHDB

Item 1 Introductions, Apologies and Declaration of Interest

1. Zoe Henderson (NRW Board Member and WLMF Sub Group Chair) welcomed all to the Microsoft Teams meeting and noted apologies. Please note that the meeting is being recorded for the purpose of capturing the minutes and the digital file will be deleted once the meeting minutes have been approved.
2. No declarations of interest were raised in respect of agenda items.
 - NB: All members of the group have completed declaration of interest forms already but should also declare if they have an interest in anything on the agenda.

Item 2 Review of Minutes and actions

3. The Chair confirmed that once the meeting minutes have been reviewed and formally agreed by the group, they will be published on the NRW website for the public to access. Therefore, it is important that the minutes are an accurate record of the meetings.
4. The group reviewed the previous meeting minutes from 17th October 2022.
5. Zoe recalled an action and asked whether Matthew Walters, Welsh Government had found any information about under sowing maize and regrass. Matthew said he received the following information from a colleague:

‘Growing for the Environment is a new scheme that offers support towards the growing of crops which can result in improvements in the environmental performance of a farm business. These include cover crops, mixed leys, protein crops and unsprayed cereals.

The under sowing of maize has been included as an option to establish a cover crop within a growing maize crop. The requirements is to use a seed mixture to include a minimum of 2 crop species which are suitable for growing within the shade of a maize crop.

Ryegrass can be used as part of the mixture and is likely to be the most common species of seed used in this instance, but not at 100%.

The objectives of offering this option include:

- To prevent soil erosion by maintaining a sward cover post maize harvest.
- To protect and enhance water quality.
- Reduce nutrient loss and soil erosion during the winter
- Improve soil structure by breaking up compaction in the soil and encouraging water uptake.
- Increase soil organic matter, structure and mineral composition through aeration and locking in nitrogen, making it available to the following spring sown crop.
- Provide winter shelter and feeding areas for farmland birds and small mammals.

We do not support under sowing with maize.

We also do not support reseeding ryegrass only leys.

Our mixed ley option is being promoted as an option to replace mainly ryegrass monocultures, with the resultant environmental and biodiversity benefits’.

Further details of the scheme are available at: <https://gov.wales/growing-environment-rules-booklet>

6. Zoe mentioned that Creighton Harvey, CFF had contacted Bronwen Martin, NRW with some comments and suggested amendments for the October meeting minutes. Zoe asked whether this had been resolved. Creighton said this was regarding discussions with Einir Williams, Farming Connect about the agricultural pollution workshops being run by Farming Connect. It was agreed that the text was accurate of the discussion, but Bronwen has added some supplementary context which has been agreed by Einir and Creighton.
7. No other comments or suggested amendments were received in respect of the October meeting minutes.

Item 3 Matters Arising

8. Zoe welcomed the group to discuss any matters arising from the previous meeting minutes, relevant documents or recent topics.
9. Zoe recalled a discussion during the last meeting about AHDB’s Slurry Wizard Tool and asked whether there is a move within Wales to use this tool more holistically. Zoe mentioned that it seems to be an important tool used by the Environment Agency in

England, and we do not need to reinvent the wheel in Wales if there is a great tool already out there. David Ball, AHDB said the Slurry Wizard Tool has been adopted/endorsed by the Environment Agency where all the applicants to their slurry infrastructure grant are required to use it to demonstrate their storage capacity requirements. David said it will do exactly the same for The Water Resources (Control of Agricultural Pollution) (Wales) Regulations 2021. David mentioned the rainfall aspect of the tool, currently the rainfall data is accessed via a database using your statutory dialling code as a locator for the farm, which is not the most precise. The Environment Agency are working on a better system which should take it down to a more defined area. However, there is a facility in the tool to enter your own rainfall figures rather than access the embedded database. David said he understood that there are rainfall figures available on the Welsh Government website, so perhaps that can be accessed and entered manually into the tool. Matthew said there is a more detailed map on the [Lle](#) mapping portal for rainfall figures.

Dennis Matheson, TFA recalled ten years ago when he was looking up rainfall data to help work out what size effluent tank was needed for a silage clamp, he discovered there was a rainfall recording centre about half a mile away. Dennis suggested there are perhaps a lot of local weather stations which people are not aware of. David warned that if you use your own rainfall data (whether it is accessed from a website, database or recorded locally) not to use the average data because by definition 50% of the time you are going to get more rain than average.

Bernard Griffiths, FUW agreed that we do not need to reinvent the wheel and develop new models but at the same time, these issues are devolved to Wales and we have to be careful that there may be some differences between England and Wales. There is already considerable confusion within the farming community about the regulations, so we need to keep things as simple and easy as possible.

Sarah Hetherington, NRW mentioned that from an NRW perspective, we have worked with the Environment Agency and AHDB regarding the Slurry Wizard. The figures behind that are the M5 figures which is not the annual average, it is for 5-year return periods. That is what was specified under the current [The Water Resources \(Control of Pollution\) \(Silage, Slurry and Agricultural Fuel Oil\) \(England\) Regulations 2010](#) and is the baseline for the new Control of Agricultural Pollution Regulations. That data set is not available without a charge and that is why it has been embedded into Slurry Wizard, so it is accessible and free at the point of use rather than having to buy your data.

Chris Thomas, NRW mentioned between 850 and 900 dairy farms have been visited through the Dairy Project and they will have been given an individual rainfall figure through the NRW Hydrology Team. That data will be very accurate and up to date which helps those farmers.

10. Regarding the WLMF Sub Group Newsletter, Katy Simmons, NRW said she has shared a content list with Marc and Bronwen and currently, there are about eight stories. Katy asked members to send any last-minute articles to her by the 23rd November. It will then be translated and circulated.

AP November 01: Members to send any last-minute newsletter articles to Katy Simmons, NRW by the 23rd November.

11. Fraser McAuley, CLA asked Welsh Government about the time frame for a response regarding the Alternative Measures Report. Matthew said they are looking at this and Andrew Chambers will be coming back to help with this work. Matthew mentioned the development of the consultation on a licensing scheme. Matthew said they will provide an update when possible, but they are developing the process of assessing the Alternative Measures in order to come to solid conclusions. There are no definitive time scales on this yet. Zoe asked when the consultation will be ready. Matthew said it is being developed but he was not in a position to share timings.

Item 4 Presentation: 4 Rivers for LIFE Project

12. Chris Thomas, NRW to provide a presentation introducing the [NRW: 4 Rivers for LIFE Project](#).
13. The 4 Rivers for LIFE Project covers the improvement of four major Special Areas of Conservation (SAC) rivers in Wales: Teifi, Cleddau, Tywi and Usk. Chris showed a map indicating the location of the four rivers.
14. Chris gave an overview of the project which is for five years (running until the end of 2026) and has a budget of £9.11 million. The project is looking at all the special features of the SACs and will use long term nature-based solutions to improve the ecological quality of the four rivers such as, improving accessibility for migratory fish, improving habitat structure and function, and improving water quality.
15. Chris said his role within the project is mainly working with farmers to reduce sedimentation and nutrient inputs. There is a small budget for reducing invasive alien species (e.g., Himalayan balsam, knotweed etc.) and plastic.
16. Through the project, we are looking to demonstrate best practice in river restoration by taking what other projects have done (e.g., Dee LIFE project in North Wales) and trying to make further improvements.
17. The key partners and co-financiers are Dwr Cymru Welsh Water (DCWW) and Welsh Government, although a proportion of the money has come from Europe. The project also works with Coleg Sir Gar, The River Restoration Centre, Brecon Beacons National Park, and the Woodland Trust. Between all of the organisations, we are able to tap into a lot of advice, guidance, and knowledge.
18. Target species have been identified where the project will aim to improve their habitat and hopefully improve numbers. The target species include:
- Sea river and brook lamprey
 - Atlantic salmon
 - Bullhead
 - Freshwater pearl mussels
 - Twaite and allis shad
 - Otters
 - Ranunculus habitat

19. Chris gave an overview of some of the key aims of the project, including:

- C.1: Constraints to Fish Migration (12 barriers to be addressed, 5 on the Usk)
- C.2: Restoring riverine processes
- C.3: Re-meandering and floodplains
- C.4: Riparian Corridors
- C.5: Land management
- C.6 Freshwater Pearl Mussel re-introduction
- C.7 Control of Invasive Alien Species

20. A large part of the project is designed to monitor the baseline by taking all the information that we have got across all four rivers at the moment and then monitor the project actions to see what we have done, where and what the improvements are. This includes electrofishing surveys, specific Shad tracking, hydroacoustic surveys, basic kick sampling, water quality testing, habitat surveys and trialling of redox. Soil testing is also important, and we hope to see in certain areas (perhaps where P and K are too high) a gradual reduction down to something more sustainable

21. There is a requirement to look at the socio-economic impacts as well. It will look at the impacts on the local communities and economy and trying to create and help improve the sustainable local rural economy.

22. Chris said some of the most important work will be communications and engagement including community events, engagement with schools and stakeholders, and showcasing case studies. Chris said he would also like the team to go out with Farming Connect and engage with Agrisgôp groups. There is a section within the project called 'using available smart farming techniques' which allows us to look at the latest technology, developments and improvements in sustainable agriculture, to see what might be appropriate and how it can be applied.

23. Chris Mills, WEL mentioned that there has been quite a lot of work done on these rivers before, particularly the Usk and asked what amount of research has been done to find out what the current status is. Chris Thomas said when the project was written in 2018/2019 all of the River Restoration Plans were looked at along with all of the previous water quality data. One of the key partners is the Wye and Usk Foundation and we are also working closely with DCWW and their catchment teams. So, a group of organisations are all working together and sharing information. One of the key aims is to ensure that we are not going over old ground.

24. Sarah Hetherington recalled that the team are looking at different techniques across a range of portfolios. Sarah asked if you are trialling things within an innovative space, how do we make sure that we can adopt those as mainstream practices and have the evidence around it. Chris said they are currently working out what scale this can work at, whether it is on an individual farm scale or perhaps on a minor catchment scale. For example perhaps working with several farmers or landowners in an area, monitoring upstream and then monitoring the impact downstream. The challenge is that we will probably be carrying out several different works on each farm, so working out which

action or intervention provides a positive impact will be difficult. Chris said they are not there yet, but the team are trying to work out how this can be done.

25. Bernard recalled Chris saying he was pleasantly surprised with the uptake of farmers fencing off rivers and asked how much of that was on intensive land. Bernard also asked if there is a danger of falling into a trap of dual funding for this project. Chris said generally, the more extensive farms have actually done a lot of the fencing off work already and perhaps this might be a harder sell with the intensive arable and dairy farmers. With regards to double funding, Chris said that is something they have to be very careful of and they will do a contract with each land manager. The project is only funding capital investments, or we will pay for the fence, or pay for the trees. At the moment, there is no ongoing long-term funding. Our works should help the farmers get into the Sustainable Farming Scheme and into other projects but within the contract, there will be a requirement that they do not seek double funding. Sarah Hetherington asked if they are centrally collecting information about what has gone where. Chris said that is part of his role and he has several spreadsheets mapping, who, what, where etc.
26. Dennis discussed the Tan Lan Embankment and the current consultation. Dennis also mentioned the importance of listening to farmers with local knowledge because they know their land.

AP November 02: Chris Thomas, NRW to share a copy of his 4 Rivers for LIFE presentation.

Item 5: Presentation: Ammonia in Wales

27. Polina Cowley, Welsh Government continued the ammonia presentation series by discussing the environmental impacts of Ammonia in Wales (part 1) and new technologies including slurry treatments (part 2).
28. Polina began with Part 1 of the presentation discussing the 'critical levels' in Wales. Critical levels are concentrations of pollutants in the atmosphere below which direct adverse effects on receptors (such as humans, plants, ecosystems or materials) are not expected to occur. Ammonia (NH₃) concentrations exceeding the critical level of 1 µg m⁻³ (set to protect sensitive bryophytes and lichens) are increasing at the highest speed in Wales in comparison to England, Scotland or NI. The percentage of Welsh land where ammonia concentrations exceed critical levels has grown by 12% in the past 10 years. It means that 69% of Welsh land now does not allow lichens and mosses to exist healthily. This overall trend is reflected in the growth of percentage of nitrogen sensitive habitats, Special Areas of Conservation (SAC), Special Protected Areas (SPA) and Sites of Special Scientific Interest (SSSIs) where ammonia concentrations exceed critical levels of 1 µg m⁻³. SPAs have been affected the worst, there are now 20% more SPAs in Wales where NH₃ levels are above the critical level than there were in 2009.
29. The healthy life of Ancient Woodland is largely dependent on lichens. Polina identified the plant 'beneficiaries' and 'losers' of ammonia increase. When NH₃ falls on the landscape, it can interfere with terrestrial, freshwater and marine ecosystems. NH₃ can acidify soils and freshwaters, over-fertilising natural plant communities and is poisonous to lower plants, such as lichens and bryophytes. About 61% of Ancient Semi Natural Woodland in Wales is experiencing ammonia concentrations above the Critical

Level for lichen and bryophyte-rich ecosystems. A mature tree of an ancient woodland can capture the same number of pollutants in 1 year as a newly planted sapling in 30 years.

30. Polina said we all understand that planting trees is really good for climate change but there are also other important ecosystems for capturing carbon. Ammonia as a gas only stays in the atmosphere for a few hours once emitted. Deposition of ammonia to the environment, either as a gas (dry deposition) or in precipitation (wet deposition) can cause significant long-term harm to sensitive habitats. Peatlands are considered some of the most valuable ecosystems on the planet and can reduce greenhouse gases by locking away carbon. Research in Northern Ireland shows that wet deposition of nitrogen (this happens after ammonia gas is absorbed into the rain water) is damaging peatland in the areas of low atmospheric ammonia concentrations far away from the pollution sources. Rainwater is killing sphagnum mosses that take carbon out of the atmosphere and lock it into saltmarshes.
31. Dennis asked whether there has been any research on the amount of ammonia captured by extensively farmed permanent grassland (e.g., over a 50-year period) compared with trees planted now over a 50-year period. Essentially, is grassland better at capturing ammonia over 50 years than if it was planted with trees. Polina said no, the best way of capturing ammonia is saltmarshes, then peatland and then trees. Polina mentioned that the Sustainable Farming Scheme (SFS) plans to include tree belts around farms but is subject to future consultation. Research shows that if you have trees around an intensive farm, they capture the ammonia preventing it from being taken to sensitive habitats.
32. Ruth Johnston, NRW asked whether there has been any research, equivalent to the Irish research, about the Welsh peatlands and how they are being impacted by ammonia. Polina said it would be really brilliant if we had a study on this because our data might be different due to the Welsh landscape. Polina said she is not aware of any such research in Wales but there has been a lot of work on peatland restoration, so maybe there will be something on this in the future.
33. Bernard recalled Polina mentioning winners and losers, where some of the losers were sphagnum and calluna. Bernard asked do surveys such as the State of Nature Report support decline in those species over the same period as the ammonia has been rising. Polina said she was not aware of that report and asked for a link. Bernard mentioned the State of Nature report is an annual report which is published by Welsh Government [Senedd Research: The State of Nature 2019 Report](#).
34. Chris Mills recalled that lichens and bryophytes are affected by excess ammonia levels and asked are the actual trees within the ancient Woodlands also affected. Polina said the information that she received from the Welsh Government Forestry department is that they are particularly concerned about the critical levels above the 61%, but it might be hard to quantify some of the figures. Jeremy Walters, NRW said we are aware that as soon as you start losing lichens and bryophytes, the resilience of the whole woodland is affected. So yes, it does affect the woodland as a functioning woodland. Chris asked whether it affects the growth rate of trees or does it actually kill them. Jeremy said it will not kill the trees unless you get above 3 and then you start seeing effects on the trees. But all the species are interconnected, so you start losing

biodiversity and resilience. Polina said the level of 1 is where the lichens and bryophytes die. If it goes to the level of 3, that is where other plants start to die.

35. Part 2 of Polina's presentation was about new technologies in nutrient management (slurry and manure treatment). Polina mentioned the ministerial statement and technological solutions – 'We will also accelerate our work to encourage potential alternative technological solutions, using the Regulation 45 mechanism to do so where appropriate, including exploring the potential for treatments and processing of excess manures to be used in areas of nutrient deficiency and the potential for technology to reduce pollution risk and facilitate the most effective deployment of the regulations in future'.
36. Polina highlighted the different physical, biological, and chemical manure treatments available. This presentation covered only two from the list of 16 treatments: anaerobic digestion (biological) and acidification (chemical).
37. Anaerobic digestion associated with production of methane (CH₄) biogas reduces emissions of CH₄ from subsequent storage of the digestate, while substituting consumption of fossil energy. Ammonium content and pH in digested slurry are higher than in untreated slurry, increasing the potential for NH₃ emissions, requiring the use of covered stores and low-emission manure spreading. As part of an integrated package of measures, anaerobic digestion can reduce NH₃, nitrous oxide (N₂O) and nitrogen (N₂) losses, while providing an opportunity for advanced forms of nutrient recovery. The requirement for an impermeable base avoids nitrate leaching compared with storage of manure on permeable surfaces.
38. Polina described the acidification treatment process. Housing period acidification involves flushing slurry from the pits and adding acid to it until the desired pH is reached. Acidification of cattle slurry to pH 5.5 can reduce NH₃ emissions by more than 90% and at the same time reduce emissions of the greenhouse gas CH₄ (methane) by up to 96% and CO₂ by 67%. Acidification is widely used in Northern Europe (Germany, Netherlands, Estonia). It is cost effective for large purposefully built farms. Concerns about negative effect of acidified slurry on soils have been proven unsubstantiated by a number of studies. In the latest research funded by Defra, the number of worms per m³ is slightly higher in the acidified sample than in the control group.
39. Polina discussed the barriers to nutrient management in sustainable farming, including:
 - Not cost efficient to move slurries. High petrol costs.
 - Biosecurity. Due to TB restrictions animal by-products are often not allowed to be moved off holding.
 - Manures that are stored prior to a treatment are classified as waste. Waste regulations apply. It includes permitting or exemptions.
 - AD plants don't have grants/funding in Wales.
 - Treatments are cost effective only for large scale farms that include production of slurry and crop/grass fields where it can be applied. Need of 'hubs' for smaller holdings or for specialised farms.

40. David Ball recalled that ammonia was green on the pie chart of 'winners' and 'losers' regarding anaerobic digestion, suggesting that the treatment would favour ammonia emissions. However, in the text it suggested that the digestate was more at risk of emitting ammonia. Polina said well spotted, this is one of the contradictions which she found. Polina explained that if it is done in the integrated way, it is a 'winner' but if it is not, then it becomes a 'loser'. Polina referred to the latest [National Air Pollution Control Programme \(NAPCP\)](#).
41. Marc Williams, NRW asked whether Polina was aware of the work that N2 Applied have been doing where they are trialling some work at Gelli Aur College ([N2 Applied - Gelli Aur](#)). They have installed a container to take out ammonia and then fixing/attaching it back into the manure - [Tywi Farm Nutrient Partnership: N2 Applied Presentation](#). Polina said she is aware of the Gelli Aur work and she has encouraged them to count their ammonia missions, which they have not done yet. Polina mentioned that 1 of the 16 treatments is called dewatering which is essentially the separation of solids and liquids, which is what Gelli Aur does, so they are separating solids and water in two different ways and then processing it further. The dewatering process itself is not reducing ammonia. Marc said this is different, Gelli Aur has recently had a new container in the last month which was put in by N2 Applied. This different process is focussing on ammonia and stripping out that that gas and fixing it. Polina said she has got that information, but it is a separate treatment.
42. Polina said she is moving to another team within Welsh Government and thanked the group for the opportunity to talk about ammonia.

AP November 03: Polina Cowley, Welsh Government to share a copy of her ammonia presentations with the group.

Item 6 NRW Corporate Plan

43. Sue Ginley, NRW joined the meeting to provide a follow up update on NRW's Corporate Plan.
44. Further to the update in October, Sue said NRW have been working on a draft of the next NRW Corporate Plan. The draft will be coming out in due course and NRW will ask for your views on what we have come up with for our Well-being Objectives.
45. We also have a set of slides that we would like to share with you along with a short questionnaire. It should take you around 10-15 minutes to complete it. The information will be circulated via Bronwen as the Secretariat for this group. Sue requested that all members have a look, fill it in and then send it back to NRW.
46. Sue reminded the group that there is a very tight turn around and the return date is the 6th of December. This is so that we can go back to our Executive Team and our directors to discuss it again prior to going back to our NRW Board in January.
47. Sue said she really appreciates everyone's help and time regarding the NRW Corporate Plan and looks forward to hearing your views.

48. Zoe encouraged everybody to complete the survey because this is an opportunity to have your say on the NRW Corporate Plan which sets the direction of NRW for the next three to five years. We need to get as much input as possible.
49. Bernard asked whether NRW was looking for responses from organizations rather than individuals. Sue said yes, responses from organisations is what we are looking for.

AP November 04: Bronwen Martin, NRW to share the details of the NRW Corporate Plan (Survey and slides) when available.

Item 7 Citizen Presentation: Citizen Science

50. Dr Sue Byrne and Dr Morag Taite, NRW joined the meeting to provide a presentation about NRW's approach to Citizen Science.
51. Sue said Citizen Science is a huge area and organisations like NASA do a lot of it, but NRW is interested in environmental citizen science. NRW have a position statement on the website, but it is quite short, and it is part of our section on river water quality - [NRW - River water quality: our responses to your questions](#). It does flag up that we recognise that citizen science has a huge potential to help us to meet our evidence needs.
52. NRW has a long relationship with citizen science, especially on the biodiversity side of things. NRW support citizen science at a national level through the UK Environmental Observation Framework, who produce a lot of useful information. That includes a wide range of public bodies who have an interest in monitoring not just us but the Environment Agency, Natural England, UK space agency and the MET office. Through the Joint Nature Conservation Committee (JNCC) and through the National Biodiversity Network, there is a lot of support of specific biodiversity schemes and NRW do use some of those schemes to contribute to national statistics and national reporting.
53. Meeting our evidence needs is an important reason for NRW supporting citizen science. We also recognize that there are wider benefits than just the data, including getting people outside, getting people to understand more about their environment and contributing to education. It is worth getting involved with citizen science to better develop the methods and support that is available. That is particularly true on the water quality side which is perhaps less well established than the biodiversity side of citizen science.
54. In terms of generating useful data, NRW are particularly interested to encourage projects that meet NRW's evidence needs, in relation to the [State of Natural Resources Report \(SoNaRR\) for Wales 2020](#), more locally in relation to our [Area Statements](#) and also in relation to our evidence programmes. This is still developing, and these are not quite at the point where you can come along as a citizen science group and grab something off the shelf from these evidence needs and use them for your projects. But they are certainly worth taking a look at and are important to us in terms of deciding which projects are useful.
55. In terms of citizen science development, at a national level there are a few initiatives that are particularly key. We are engaging with the Catchment Systems Thinking Cooperative (CaSTCo) project. The funding for this project is around £7 million and it is

a two or three-year project. There is a huge potential to deliver citizen science in the water environment. The JNCC have the Terrestrial Surveillance Development and Analysis Partnership, where there is a lot of work on developing our use of citizen science data and not just the data from very structured blind diversity recording schemes but looking at advances in modelling a machine learning and sophisticated analytical approaches to make better use of citizen science data. Another JNCC initiative is the Terrestrial Evidence Partnership of Partnerships, which provide support to a wide range of organizations collecting citizen science data.

56. The key really useful piece of guidance comes from Scottish Environment Protection Agency (SEPA) around uses of citizen science because some projects might lend themselves very well to citizen science but not everything does. Regarding the UK Environmental Observation Framework, they have got a lot of resources for citizen science that are accessible to anybody to help people set up and deliver effective citizen science projects.
57. In terms of NRW advice, the top advice would be if you can find an established recording scheme (e.g., a biodiversity recording scheme) or find an established platform to hold your data, that is a good approach to a citizen science project. It makes it simpler and has a better chance of making sure your data is used. The second tip would be made sure that you get expert support around data analysis and interpretation, before anybody starts collecting data. It is easy to go out and collect a lot of information which might come in useful but then find when you come to analyse it, that it is not in quite the right format or the one key thing that would really have helped is the thing that you have not collected.
58. Regarding existing recording schemes, local record centres are a good place to start. There are a few apps and places you can look to link to existing recording schemes.
59. One of the most important things that citizen scientists can do for NRW is report pollution incidents for us through our hotline which is 24/7. Perhaps NRW might not go out to every report that is put in the system, but every report gets looked at and goes towards our information and helps us understand catchments.
60. Sue mentioned some additional schemes that are out there which potentially NRW could use, although NRW cannot guarantee at the moment how we will use the data. There is an app for recording algae, NRW have had some involvement with Riverflies and SmartR.
61. It is much more complex if you are looking at a bespoke investigation. The professional advice from the start is so important to make sure you are asking the right questions about your monitoring, that it is well designed.
62. Sue mentioned that NRW's resources on this are limited, so whilst we can provide some initial comments and advice, we would expect that projects would need input from other professionals.
63. Sue mentioned some bespoke projects that have worked well including the Oxford Bathing Water Project, which is using citizen science water quality data, but the analysis was carried out by Thames Water in their own laboratories. The UK Pollinator Monitoring Scheme is a really useful wide-ranging piece of citizen science monitoring.

This one was well resourced with a lot of government funding and involvement from universities to design the scheme.

64. The Holy Grail for bespoke investigations is designing some citizen science monitoring where the analysis is setup so that it is automated and ideally that the data is presented in an automatic way and is available for the people who have collected it to see the results of their labours.
65. Chris Mills said it was an interesting perspective that the presentation was about what NRW needs. Chris said to some extent the impression he got was that citizen science is carried out by less qualified people. The reality is that some of the citizen science that is being carried out at the moment is because there is a lot of dissatisfaction with the monitoring being carried out by NRW. Some of those carrying out the citizen science are ex-professionals etc. Chris suggested that we need to be careful because there are different audiences for citizen science. There is an audience out there who want to get involved and perhaps do need the guidance, but there is another, slightly more critical audience, who are challenging some of the work that is or is not being carried out at the moment. Sue agreed with some of Chris' points, certainly there are some extremely knowledgeable and expert people carrying out citizen science work. Sue said earlier on that people should get expert advice and acknowledged that sometimes that comes from the citizen science groups.
66. Bernard asked what steps are taken to make sure that the data is independent and whether there is any bias, for example validation of the data. Sue said it is easier to use a scheme that is already set up, so if you think about some of the biological recording schemes, they have got validation of the data and that is checked by experts. We are behind on the water quality side compared to where we are with the biodiversity side. Some of those biodiversity schemes have been going for a long time but it is about designed it at the start and getting that expert advice early on so that any issues are picked up and addressed at the start, not sort down the line when people have already started collected data. It is also important to understand what the objective of the scheme is and what the limitations of the scheme are.
67. Zoe said she had hoped that NRW would be talking about the projects that could support our lack of resources and help gather more information. But this is about what projects NRW could help support and are looking for other people to come up with projects and then maybe present them to NRW, rather than the other way around. Zoe questioned what are the areas that we could really do with bolstering (e.g., water quality). Some of the people out there are farmers and the majority of farmers will learn from it and will be very honest in their data collection. Zoe said there is an opportunity to gather more information. Sue recalled her slide around our NRW evidence needs, including our water evidence needs. We are interested in projects that support our evidence needs, but at the moment, it does boil down to getting schemes designed and NRW have got limited resources to be designing schemes right now. Sue mentioned that one of the reasons we have brought Morag in, is to have a look at what might be possible. At the moment we have only got until the end of March, but Morag will be taking a look at what the opportunities are for us to make better use of citizen science. But we just need to be realistic, it would be a shame to collect a lot of data and then find out that most of could not be used. We are interested in trying to focus on some specific things that really would be useful to NRW and that would be of interest to the groups who would be collecting the data. Zoe suggested that this could be picked up

with Marc and Bronwen to try and understand what sort of projects could be within this group that would also benefit NRW, farmers, fishermen and the rivers.

68. Creighton said he understood the need for citizen science, but also understood that limited there are limited resources within NRW and perhaps sometimes the information that is provided to you is not as informed as it might be. Creighton said he hoped to see that NRW would consider information received in terms of intelligence, so that you can focus your monitoring on where the problems lie and not dismiss comments or information provided by people who are not trained or experienced (e.g., about areas where there are repeated reports). Sue said this is one of the key benefits of a citizen science project. This is also linked to NRW's incident reporting system where we do record all of the information that is sent in and are able to look at it over the long term which helps to get an understanding of a catchment. If you are getting repeat reports from a particular area that helps us to target our work. Creighton mentioned that he has discussed this with various groups and always encourages people to report incidents to NRW. However, NRW does not always respond to an incident, so people do not have much faith in NRW. Creighton suggested that there should be better feedback to people who have report incidents so that they know what has happened to that information they have provided. If it is just for intelligence purposes at the moment, then you can say that it is used to focus monitoring work by NRW. Sue appreciated Creighton's comments.
69. Morag Taite, NRW said will be interesting to get peoples perspective on projects that they are interested in, what would be useful to them and how we can take the data. It is important to get people to think about how they collect data so that it can be useful to everyone.
70. Sue mentioned that Bronwen had suggested coming back to the group at a later date. Zoe agreed and said that would be a good follow up opportunity.

AP November 05: Bronwen Martin, NRW to circulate a copy of the Citizen Science presentation.

Item 8 Any Other Business

71. The next WLMF Sub Group Meeting is Monday 12th December 2022.

Close meeting