

RIPARIAN EXAMINER



THE NEWSLETTER OF THE WYRE RIVERS TRUST
AND THE WYRE WATERS CATCHMENT PARTNERSHIP

ISSUE 04

Foreword

Dear Reader, welcome to Issue 4 of the Riparian Examiner, the newsletter of the Wyre Rivers Trust and our Catchment Partnership “Wyre Waters” which represents a wide range of community groups across the Wyre Catchment from Bowland to Bay.

It has been 3 difficult years since our last edition as we struggled through the COVID-19 Pandemic along with the rest of society, only now are we starting to see a full return to our normal activity levels, only to be faced with a new set of challenges as the world starts to see a return to high inflation and a frightening return of war upon the continent of Europe. The constant is the river, it has faced many challenges since the last ice age during which it was created more or less in the form that we see it today.

Notwithstanding these new external impacts our major threat to the river catchment is still climate change and the search for affordable energy. The Trust and our partners have still managed to grow the scale of ecological improvement works despite the best efforts of Pandemics and several more named storms during the last 2 years.

We now have a full-time team of 5 staff who with our small but valiant army of around 100 regular volunteers have continued to ramp up the scale of our practical interventions, all designed to help deliver our catchment plan of “GOOD” ecological status of the Wyre system by 2027.

You will find many examples of the projects that have been and are being delivered within the newsletter, we intend to win further grant awards to continue delivery along these lines under the guidance of our General Manager Tom Myerscough and our staff who are the driving force behind our growth.

The Trust is about to embark upon the first UK scheme, funded by the City to bring about the delivery of Natural Flood Management measures. It will demonstrate that direct investment in environmental solutions to prevent flooding, can deliver investment returns. A national pilot, this scheme will be delivered over the next 4 years and will be monitored up until 2030. It will mean another step change for our Trust and its partners whilst delivering parallel outputs of habitat improvement especially in the upper Wyre part of the catchment.

Please continue to enjoy our beautiful river whilst supporting the Trust via volunteering during which you can help deliver these important community benefits.

Philip Robson

Chairman

Wyre River Trust and Wyre Waters Catchment Partnership.

Contents

[Page 4 - In Brief](#)

[Page 5 - News](#)

[Page 6 - Smelt Tagging](#)

[Page 7 - School Visits](#)

[Page 8 - Wyre NFM](#)

[Page 10 - Catchment Partnership Activities](#)

[Page 14 - Woodland Creation](#)

[Page 16 - Safeguarding Drinking Water](#)

[Page 18 - Farm Wetland](#)

[Page 20 - King George's Playing Field](#)

[Page 22 - Damas Gill Improvement Works](#)

[Page 24 - Estuarine Surveys](#)

[Page 25 - Volunteering with the Wyre Rivers Trust](#)

[Page 26 - Plankton Surveys](#)

[Page 27 - Wyre Rivers Trust Events](#)



In Brief

Smelt Tagging

Once widespread in estuaries in the UK, European smelt (*Osmerus eperlanus*) (known as the cucumber fish due to its strong smell of cucumber) have declined considerably over the past 200 years. In 2019 the Wyre Estuary was designated along as a Marine Conservation Zone to protect known populations of smelt spawning in the Wyre. Despite this, not a lot is known about where the fish spawn. **General manager Thomas Myerscough explains how we have been trying to study the spawning activities of the smelt. Page 6**



Natural Flood Management

Since Natural Flood management Officer Sam Hopes joined the team in 2019, he has built 100's of leaky dams across the upper catchment to slow the flow of water of the hills and reduce downstream flood risk with the help of a team of volunteers. New funding will provide farmers with a long term source of income to host and maintain interventions such as leaky dams, tree planting and buffer strips. **Find out more on Page 8.**



Woodland Creation

Lancashire has under 6% tree cover – that's less than half the national average and one of the lowest of all the counties in the UK. In the lower catchment, Fleetwood has tree cover of 3%, much lower than the 15% cover recommended for coastal areas. But how did we get here and what can we do? **Our Woodland Officer Sam Marshall explains on Page 14.**



Franklaw Safeguard Zone

River water quality in the Franklaw drinking water Safeguard Zone has deteriorated in recent years due to pesticides making their way into the river. We've been monitoring this and looking for ways to engage with land managers. **Our Conservation and Engagement Officer Lucy Brookfield explains on Page 16.**



Estuary Surveys

Wyre Rivers Trust in conjunction Thames21 are piloting a new Citizen Science monitoring project which aims to assess the varied habitats of estuaries. By collecting and recording data on the habitats found within the Wyre Estuary, volunteers are helping to inform future conservation and restoration projects. **Science Officer Dr. Heather Stott explains on Page 24.**



News

River Champion Awarded by The River Restoration Centre

In October 2021, Jean Wilson accompanied by Tom Myerscough attended The River Restoration Centre annual conference at Harrogate where she was presented with a River Champion certificate. The award recognises and celebrates the outstanding efforts of individuals contributing to improving rivers for people and wildlife in their area. Jean has been member of the Steering Group of the Catchment Partnership hosted by WRT since its conception over 8 years ago representing the Estuary



Jean Wilson MBE receiving her award from Marin Janes (Managing Director – River Restoration Centre)

Group and the Royal Society of Biology. Jean has organised monthly beach cleans at Knott End for 8 years and was the instigator of the triennial BioBlitz's conducted on the Wyre Estuary. Our BioBlitz's have principally enabled identification and recording of species but have also encouraged the public involvement awareness in this Citizen Science project. The Hillylaid Wetland project idea was a result of work with her students when conducting an Environmental Impact Assessment at NPL and to see this creation is certainly a dream come true! Jean has also run ecology days at Knott End beach and Fleetwood Sand Dunes, organised the Ecology for All programme and assisted in Schools on the NFM project, as well as planting many trees!

Wyre Natural Flood Management Investment Readiness Project

Following two years of hard work, the Wyre Natural Flood Management Investment Readiness Project has been completed. From Spring 2022 onward, £1.5 Million will be invested in Natural Flood Management measures and tree planting in the upper Wyre catchment. The project was led by The Rivers Trust, Wyre Rivers Trust and Triodos Bank and was funded by the Environment Agency, DEFRA and The Esmée Fairbairn Foundation. The work was completed as part of four national pilot projects investigating opportunities for the mobilization of green investment into environmental projects, focusing on a wide variety of outcomes.



Project partners visit a woodland creation site within the Wyre Catchment as part of the project launch event

Smelt Tracking

Since 2016 the Wyre Rivers Trust has been collaborating with a range of organisations including Natural England and CEFAS to monitor populations of European smelt (*Osmerus eperlanus*) in the Wyre estuary and Wyre channel (Lancashire, UK) and to identify their spawning grounds within the upper estuary.

Following the identification of smelt populations at the mouth of the River Wyre and attempts to monitor fish using various netting techniques between 2017 and 2020, eighteen adult smelt were tagged by scientists from CEFAS during the spring of 2021 using Vemco V5-1h acoustic tags. Six smelt were tracked migrating up the river Wyre to spawn during March 2021, allowing us to gather data on their migration



Figure 1 A male smelt (*Osmerus eperlanus*) captured on the 7th of March



Figure 2 A heavily gravid female smelt (*Osmerus eperlanus*), captured on the 19th of March 2021.

habits and to tentatively identify the spawning grounds of the smelt within the estuary of the River Wyre for the first time.

During the study, we recorded the first instances of sexually mature male (Figure 1) and gravid (carrying eggs) female smelt (Figure 2) within the River Wyre and thus the first record of a pre-spawning aggregation of smelt in the catchment. The study has also proven that European smelt undertake spawning migrations within the river Wyre. Further study of spawning migrations is required to better understand the movements of the fish in the zone outlined as a likely spawning area.

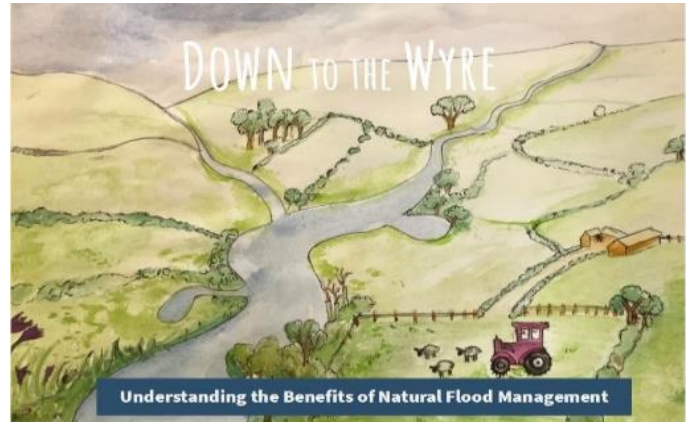
The study has provided valuable data to support the implementation of the Wyre-Lune MCZ and has led to a further eDNA study focusing on smelt in the Spring of 2022. It is expected that a recovery plan for the species will be developed using the data gathered in these valuable monitoring programmes.

School Workshops

“Down to the Wyre”, a hand illustrated book created in 2019 by the Trust’s Conservation and Engagement Officer, has been a useful tool to bring natural flood management to the classroom. The book starts with a map of the River Wyre which celebrates some notable elements of the catchment and is based on “Visions of the Wyre”, a series of workshops with stakeholders which was undertaken when the Catchment Partnership was first set up. Through interactive exercises the book looks at the benefits rivers provide and how human activities can affect the health of the river. It moves on to describe how natural flood management can be used to reduce flood risk, increase biodiversity and improve water quality.

Using the book as a basis, the Wyre Rivers Trust has delivered workshops fulfilling key aspects of the National Curriculum for both physical and human geography, discussing topics such as land use and distribution of natural resources. However, the work isn’t limited to geography and instead takes a holistic view of river management with discussions of wildlife and ecology, scientific processes, and the history of the area, putting ideas into context in the everyday lives of pupils. Videos and photographs of flood management interventions within the catchment are used to bring the book to life.

The workshops include the chance for pupils to get creative making their own dioramas displaying



examples of good and bad river management. More than one teacher has commented on how being so engaged had resulted in unusually good teamwork amongst peers.

For some schools the workshop is combined with a visit to the River Wyre and the opportunity to see aspects of river management in practice. For the schools who were restricted to the classroom, a sample of river life is brought along containing invertebrate larvae.

Workshops have now been delivered to 720 pupils at 16 primary schools across the Wyre catchment. Each of the students was able to take their copy of the book home with them, allowing parents in the catchment to also be inspired. CASTME, a board of trustees which links science, technology, engineering and mathematics (STEM) educators across the Commonwealth has also added the book to their website as a resource.

Overall, the book and workshops have fostered a sense of connection with the river and the local area amongst pupils and an understanding of natural flood management amongst the students, their teachers, and hopefully some parents too! The visits have given the chance for many budding scientists and geographers to work with professionals and get a taste of what we as a trust do.

Copies of the book can be downloaded on the resource section of our website. To book a workshop or get hold of hard copies of the book, contact lucy@wyriverstrust.org.



Natural Flood Management

In the UK, climate change is leading to more frequent and more intense periods of rainfall that are increasingly contributing to flooding. Flooding can damage homes and businesses, with 25% of people who have experienced flooding still facing associated mental health issues at least two years after the event.

Modelling of the River Wyre catchment as part of the Wyre Investment Readiness project has shown that development of approximately 70 hectares of NFM features may reduce the frequency of flooding to a number of properties in Churchtown. As well as protecting peoples homes and livelihoods, this would have a large potential cost saving to many organisations including United Utilities, the Environment Agency, local authorities, the insurance industry and local businesses. These cost savings could generate a long-term revenue stream for repayment of upfront investment in reduced flood risk. Farmers and landowners will therefore be paid to host and maintain a range of NFM interventions including tree planting, leaky barriers, wetlands and hedgerow planting.

What is natural flood management?

Natural flood management involves working with natural processes to reduce downstream flood risk. This is generally focussed on slowing down the flow of water or reducing the amount of water reaching the main river by storing water in the landscape. Used in combination with traditional methods, natural flood management can help to prevent damage to homes and businesses from flooding.



A leaky dam holds back snow melt

Why Natural Flood Management?

It's not just about reducing flood risk. Natural flood management has plenty of other benefits including improved water quality, water quantity, better habitats for wildlife and increased carbon storage. Some traditional flood defence approaches such as dredging can be extremely harmful to rivers and their flora and fauna. Whilst dredging can in very limited cases improve general land drainage, it has a negligible impact on reducing flooding due to the huge volumes of water involved.

Allowing the river to flood as it should in places (i.e. floodplains) where homes and businesses are not at risk, reduces the risk for people downstream as large volumes of water can be stored for short periods of time, reducing the flood peak. Aggregations of interventions such as leaky barriers, ponds and scrapes to hold water back at the top of the catchment can also help to reduce the flood peak by slowing the flow of water as it makes its way into the main river.



Volunteers from Glasdon helped to plant a hedgerow that will slow runoff of water from the fells

Natural Flood Management examples

- **Leaky barriers** - wooden structures in a watercourse that help to slow the flow of water during peak flow events, holding water back and helping to reduce downstream flood risk.
- **Fencing** - helps to keep livestock out of drains and watercourses, allowing vegetation to grow up and creating a buffer strip which intercepts water, slowing its path to the river, also reducing the likelihood of bank erosion.
- **Planting trees and hedgerows** - helps to disrupt the path of water as it flows into the river, slowing it down. Leaves and twigs break down in the soil to form organic matter, which holds water like a sponge.
- **Wetlands and ponds** - create additional areas where flood water can be stored during periods of intense rainfall and high flows.
- **Peat restoration** - peatlands make up nearly 10% of the UK's land cover but have historically been drained, reducing their capacity to hold water and store carbon.



Monitoring

We've been keeping an eye on everything we do to see where improvements can be made and check everything is working as it should. Rain gauges and level loggers help us to measure the amount of water that our interventions are holding back.

Wildlife cameras have been used to capture how the leaky dams respond to high flows.

We'll also be carrying out vegetation and wildlife surveys to see the effect our fencing and planting is having on wildlife.



Wyre Waters Catchment Partnership



The Wyre Waters Catchment Partnership was formed in 2013 supported by funding from the DEFRA Catchment Based Approach Initiative. The Wyre Rivers Trust was elected as the host organisation with partners including statutory agencies, local authorities and United

Utilities. The aim of the partnership is to promote collaborative working within the Wyre catchment to improve the status of all water bodies to “Good” under the Water Framework Directive by 2027.

The Wyre Estuary BioBlitz

In 2021 the Catchment Partnership undertook the third Wyre Estuary BioBlitz. A BioBlitz is an organised wildlife recording event where groups of scientists, naturalists and volunteers get together to survey a designated area in an attempt to record all the living species present.

The Wyre Estuary spans from Fleetwood and Knott end-on-sea up to its tidal limit at St Michaels. Freshwater and saltwater mix to form brackish water lined with diverse habitats such as saltmarsh, mudflats and wetlands which provide homes for a huge variety of animals and plants.

Over 20 experts undertook surveys for the event with specialisms in species such as bramble, of which there are over 700 varieties and true flies, which must be carefully preserved and studied under a microscope in order to identify them. Some are naturalists who have learnt their skills through years of fascination and observation, others have



lead successful careers in nature conservation and education. In total a massive **987 specimens** were identified to species level, with over 5500 observations recorded!

The BioBlitz event is not just about gathering robust scientific data to inform future management plans but also about inspiring and informing local people, raising awareness of the issues that our wildlife face and encouraging people to play a part in protecting it. Over 80 members of the general public were able to book on to the surveys to take part.



120 school **children** also joined in with hedgerow surveys, salt marsh walks and beach bingo.

The next BioBlitz will take place in 2024 and we hope to include an even wider range of surveys to capture the life in the Wyre Estuary.

More information about the BioBlitz can be found in our Bioblitzed!2021 booklet which can be downloaded from our website or picked up from the Wyre Estuary Country Park.

Wyre Waters Catchment Partnership Events



Working with watercourses– Forest of Bowland, Area of Outstanding Natural Beauty.

An online event about the work of the Wyre Rivers Trust was followed up with a River sampling day at Scorton looking at the magical underwater beasts and what they can tell us about the water quality of our rivers.

We found mayflies, caddisflies, stoneflies and freshwater shrimp all enjoying life in our river. This was part of Festival Bowland Programme of events – find out more on the Forest of Bowland AONB website.

Garstang Walking Festival– Friends of Garstang Walking Festival, Wyre Council.

An online event from the Wyre Rivers trust kicked off the 2022 Garstang Walking Festival – a varied programme of events celebrating the wildlife, history and people in our catchment. This year each day had a different base to take people to areas they may not have explored before– from the easily accessible Garstang to the remote and hilly Bleasdale and Dolphinholme. Walks delivered by the Catchment Partnership included a tour of our Natural Flood Management interventions in the upper catchment, a wildlife walk and a bat walk.



Abbeystead Estate School Science Days– Grosvenor Estates, Wyre Council.

Part of the reason our partnership work is so valuable is that it helps to reach wider audiences, allowing us to tell them about the work that partners deliver. In May, the Abbeystead Estate hosted two Schools Science days which we were asked to participate in. We led 240 children from Abbeystead, Dolphinholme and Preston in a river dipping activity where they learnt about water quality, habitats and flooding.

Details of our upcoming events can be found at www.wyriverstrust.org/events.

Ecology For All



When it comes to Catchment Partnership activities, Wyre Waters have found no better way of engagement than a BioBlitz. The Estuary Group of the WWCP, hosted by the Wyre Rivers Trust are a diverse group and include Wyre Council, Environment Agency, Royal Society of Biology, NPL Estates, Natural England, Keep Britain Tidy, RSPB, Fylde Bird Club, SeaLife Blackpool, Brinewatch and Catchment Sensitive Farming. The success of the BioBlitz's held by WWCP is undoubtedly due to the interest and enthusiasm of the members of the Estuary Group and has enabled the identification

and recording of hundreds of species within the Wyre Estuary ecosystem. Identification, however, for some species has been a real challenge and some habitats such as soils have been completely neglected. In preparation for the 2024 BioBlitz, it was proposed by the Royal Society of Biology Northwestern Branch to hold a series of daylong workshops where individuals would be trained through a programme of activities with the aim of enabling them to identify and record species within specific invertebrate groups. The Ecology Days have all been held at Wyre Estuary Country Park where the Riverside Room is converted into a lecture room and laboratory and the outdoor classroom is where discussions are held while enjoying the refreshments prepared by Liz Green and Jean Wilson. The sessions have been extremely well-received and this is directly due to the individual leaders, whose passion, enthusiasm, knowledge and understanding has been totally infectious, so we are incredibly grateful to those who have given their time for free and will continue to offer their support in our pursuit of providing experts for the future.



Left: A quadrat survey at Rossall Point to determine vegetation cover.

Right: Sexing and weighing a bank vole captured during the 2021 BioBlitz.



Previous ecology days in 2019 focused on iconic habitats in the River Wyre. Participants learnt about the wonders of the wildlife living in our catchment, from the underwater world of freshwater invertebrate larvae to the bank voles hidden away in the largest area of ungrazed salt marsh in the North West. The freshwater day uncovered an abundance of salmon, stone loach and eels, whilst a marine trawl revealed 27 species of fish, invertebrates and seaweeds including lobster, cuttlefish and a long-spined sea scorpion. All the data collected during the courses will add to long term monitoring data in the catchment to help inform future projects and better understand these unique habitats.

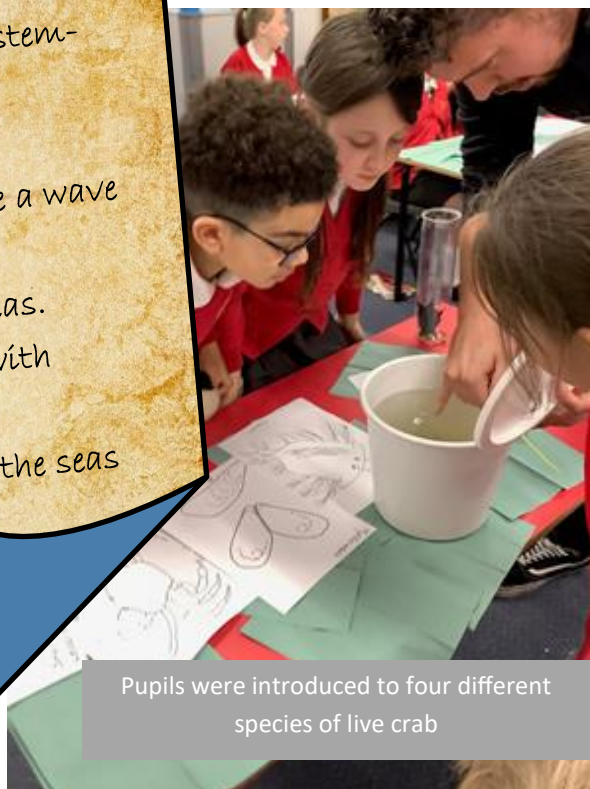


Beach Cleans

After eight years, our monthly beach cleans at Knott End Beach are still going strong, with a hardy group of volunteers braving the cold winds to keep up the good work over the winter months. Finds have included porpoises, anchors, angler fish skeletons and gas canisters. Unfortunately polystyrene, balloon strings and other plastic waste remains common, although our volunteers have noted that the situation is definitely getting better! Throughout the year we are joined by numerous groups including the Police Cadets and Preesall Fleetwood's Charity C of E Primary School who also had a visit from the Trust to tie in with their topic on marine plastics.

2022 dates for the beach cleans can be found on page 28 of this newsletter or on our website.

We are The Plastic Pirates. We aim to make system-shaking, sea-saving, convention-breaking, environmental change. From playgrounds to parliament, we want to create a wave of actions. Imagine sugar white beaches and vivid sapphire seas. Imagine the emerald forests of sea weed teeming with ocean life. Imagine a school of blue whales voyaging across the seas and their submarine song. We can choose to cherish or destroy. If we don't act now, who will?
Written by pupils from Preesall Fleetwood's Charity Primary School



Pupils were introduced to four different species of live crab

Woodland Creation



In light of climate change and our increasing awareness of depleting biodiversity, restoring native British woodland has never been so pressing.

Deforestation, however, has been increasing throughout the centuries to provide the food and homes needed for an ever growing population. Food prices have been driven down by an increasing supermarket culture and a consumer expectation of cheap food, meaning farming

practices have had to intensify to meet needs and compete with imported food. Larger fields, increased stock, fewer hedges, more fertilisers and chemicals are all a direct result of this. During the first World War when the need to provide for ourselves rather than import food became paramount and the push for timber to build ships led to deforestation of vast swathes of the UK's woodlands, the estimated woodland coverage fell as low as an estimated 5.6% in England.

The Forestry Commission was born from this near disaster and at first restocked the countryside with non-native spruces to satiate the need for quick growing timber. Our knowledge and appreciation of 'right tree, right place' has come a long way since then and the need for native woodlands as natural carbon sinks, vital habitat, flood mitigation and for simple human enjoyment are finally being realised. England's woodland coverage has increased to 13% since then, but we are still behind the European average of 36%.

Recent government funding now allows land owners to create woodland, usually in the less productive areas of their land such as on river banks and steep land. Landscape wide schemes are increasingly including grants for woodland creation. This brings an opportunity to restore the landscape to the maze of hedges, woodlands, wetlands and meadows that once formed the UK countryside, working with nature rather than against it to provide the food and ecosystem services that we need. Forestry commission guidelines ensure that the correct species are planted in the soils, altitude and environments that are most appropriate and aren't planted where they directly affect other protected habitats and species. A mix of species is recommended and some organisations are allowing up to 15% trees from typically warmer climates to allow for future climate change and make woodland habitats as resilient as possible.

So why is the Wyre Rivers Trust so interested in trees?

A healthy ecosystem needs each habitat within it to work effectively. When one is absent or damaged, others are often negatively affected. Riparian woodlands have several key impacts on river health and function. Firstly, tree roots support soil and therefore river banks, reducing erosion and sediment in the water. The trunks act as a physical barrier both during flood events, reducing damage and when run off travels to the river's edge, reducing the amount of fertilisers and chemicals that reach the river.

The branches, leaves and network of roots form important habitat for many invertebrate species that utilise the river at points of their lifecycle and for birds such as kingfishers and dippers that feed in the river. A riparian corridor of woodland also creates areas for important species such as otter to move out of sight of predators and access different areas of a watercourse, reducing the isolation of populations.



The addition of over 3,500 Trees along Smithy Beck and Sparrow Gill will improve habitat and water quality as well as helping to store water and carbon.

Shade from trees in spring and summer months reduces the temperature of the water, supporting a greater number of river species. When the leaves fall in autumn, different species' leaves decay at differing rates. For instance, bird cherry leaves decay quickly where as oak and beech decay very slowly. This creates food for invertebrates at the bottom of the food chain throughout the winter months and supports the whole ecosystem for the coming year. This decaying organic matter within watercourses is also what makes riparian land so productive. During flood events, this matter is deposited on grassland, naturally boosting the agricultural productivity.

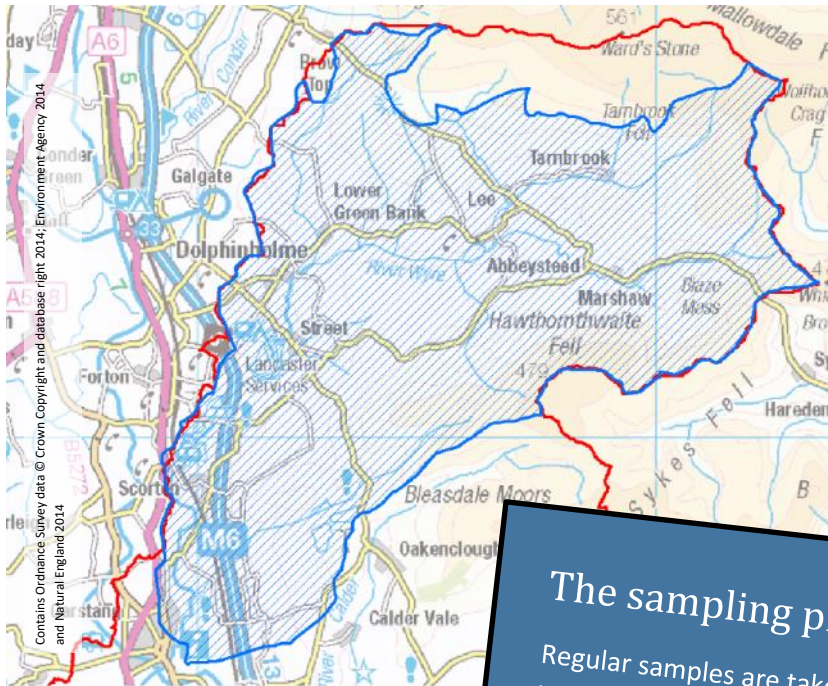
At the end of a trees life it still has an important role in a riparian setting. Dead wood in a river creates deeper pools and fast riffles. This variety in depth and speed of water is important habitat for many fish species including trout and salmon, particularly in the early stages of their lifecycle and slows the water down higher in the catchment, reducing flooding downstream.

Furthermore, riparian woodlands are important carbon sinks and increase the beauty and diversity of a landscape, providing interesting places to visit and great satisfaction for the local people involved with planting.

Opportunities for volunteering

You can plant trees too! We aim to plant more trees in the coming 22/23 season and we believe that local communities create real change, and have found that people passionate about making a difference do the job well. We will therefore be offering regular tree planting sessions during the planting season – October to March. Email lucy@wyriverstrust.org if you are interested in joining us for the 2022-23 planting season. We would love to accommodate all ages and abilities so do get in contact with any access needs or special requirements and we will be in touch to recommend days that would be suitable to join us. Equally if you are a landowner within the Wyre catchment that would like help creating a woodland please get in touch with sam.marshall@wyriverstrust.org to see if we can help.

Franklaw Safeguard Zone



Above - Franklaw Safeguard Zone

The River Wyre provides drinking water for a large number of people in Fylde, Preston and South Ribble.

In recent years concentrations of pesticide have been found in river water that exceed the EU drinking water quality standard. Although this water is treated at Franklaw water treatment works before reaching our taps, the removal process is costly and inefficient. Pesticides in the river are also harmful to the organisms living within it.

The sampling process

Regular samples are taken from April to September for common herbicides. Further samples are taken between September and November for Diazinon, a compound found in sheep dip.

Seven sites along the River Wyre were chosen for sampling when the project began in 2018. Samples taken from these sites are labelled up and dropped off at the United Utilities laboratory for testing.

When the results are returned we look to see where the highest concentrations are occurring and on the next sampling day target areas which are upstream of high concentrations so we can narrow down the source.

High concentrations of pesticides can occur regularly at the same sites. Sometimes high concentrations are a one off.

In 2015 a Drinking Water Safeguard Zone was designated as part of an action plan to reduce the amount of pesticides which are entering the River Wyre. From 2019 to 2021, in partnership with United Utilities, the Environment Agency and Catchment Sensitive Farming, the Wyre Rivers Trust undertook a programme of monitoring along the upper Wyre and its tributaries to understand more about the problem of pesticides in the catchment.

This has identified some key areas for us to focus interventions in to try and improve water quality. We are continuing our monitoring in 2022 and will be working with landowners to deliver interventions to reduce the amount of pesticides going into the Wyre and its tributaries.



What is a pesticide?

A pesticide is a substance used to kill insects or other organisms that are harmful to cultivated plants or livestock. This includes herbicides, fungicides and insecticides, among others. MCPA (a herbicide largely used for rush control) and diazinon (an insecticide used to protect sheep from parasites) are particularly common in the Wyre.



How do pesticides enter the river?

Herbicides may be washed off treated fields and gardens, roads and railways. Spillages can result in pesticides entering watercourses directly, or via surface water drains from pesticide handling areas such as those found in farmyards. Spray drift from applicator booms can also result in pesticides entering directly into watercourses. Diazinon often enters watercourses from leakages from sheep dip baths or drips from treated sheep or drainage pens. Improper disposal can also result in pollution of watercourses.

What we have found

High concentrations of herbicides were recorded within Street Brook, Hall Gill, Caw Brook and Holker's Gill, with concentrations as high as $4.717\mu\text{g/l}$ (nearly 50 times the permitted concentration for drinking water!). Diazinon is also widespread and there are clearly a number of sources impacting the river Wyre. Diazinon can impact the olfactory systems of migrating Atlantic Salmon and Sea Trout.

What comes next?

We are carrying out farm visits to give advice on pesticide handling and identifying issues landowners may have. United Utilities are funding drip trays for farmers in at risk areas, which will help to reduce run off from handling areas. Our pesticide sampling will continue and we are working with the Abbeystead estate to develop best practice and narrow down sources of pesticides. We are also working with a student from Lancaster University who will be looking into the effect of diazinon on stream invertebrates in the catchment.



Using Pesticides at Home

- ◇ Check that the product will control your problem before buying it.
- ◇ Work out exactly how much you will need and avoid buying more than you will use in a year.
 - ◇ Do not use within 5 m of a river, stream, ditch or drain.
- ◇ If you do find you have left over solution after spraying, find a patch of permitted plants or weeds to spray the excess onto. Don't pour it onto bare soil where it can build up in groundwater.
- ◇ Do not use surface water drains to dispose of unused and unwanted pesticide. They often lead straight to the river.
- ◇ Empty pesticide and weed killer containers should be rinsed three times, adding the washings to the final spray solution. The empty container can then be placed in the household waste.
 - ◇ Always keep chemicals in their original containers.
- ◇ Dispose of unwanted pesticides at your licensed local authority waste site.



The wetland when it was first created in June 2018 (left) and one year on when plants have had a chance to establish (right).

Tidal Wyre Farm Wetland

As part of the Tidal Wyre project supported by United Utilities, in 2016 ten farms were identified to receive funding for farm improvements to improve water quality in the lower Wyre catchment. As well as traditional methods such as fencing, guttering and concreting to prevent dirty water from polluting watercourses, on one farm the Trust created a farm wetland system which is designed to remove pollutants from farmyard runoff before it drains into the nearby watercourse. Monitoring undertaken in October 2019 showed significant decreases in phosphates, nitrates, ammonia and faecal indicator organisms (bacteria) after water has passed through the wetland. Reductions of up to 75% were seen in intestinal *Enterococci*, with greater than 50% reductions in *E. Coli* also recorded.

What's so great about wetlands?

87% of the world's wetlands have been lost in the last 300 years due to pollution, drainage and land conversion. "Wetlands" include rivers, lakes, marshes, estuaries and ponds. They offer a number of services:

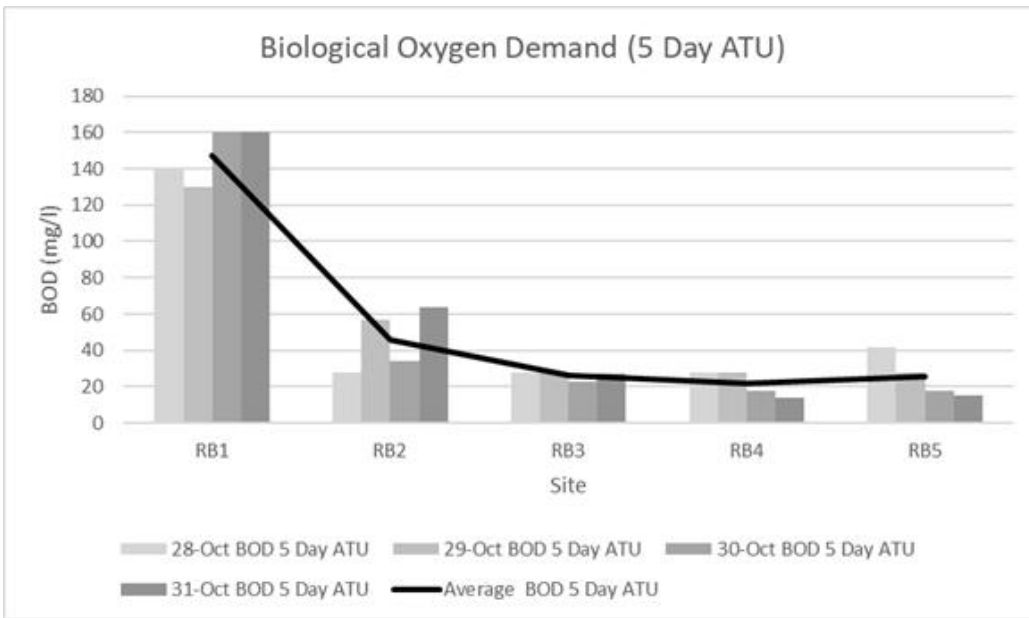
- ◇ Wetland plants trap pollutants and sediment, improving water quality.
- ◇ Wetlands store huge amounts of carbon in their soils. Protecting and revitalising them eliminates the huge amount of carbon dioxide and methane released if they dry out, helping the fight against climate change.
- ◇ Wetlands store and slowly release water during periods of high rainfall, reducing the risk of flooding.
- ◇ Wetlands are biodiversity hotspots. They contain a huge concentration of life including many rare species.

The differences in water quality can even be seen with the eye. This picture shows samples taken in the first cell of the wetland (left) and before leaving the wetland (right).

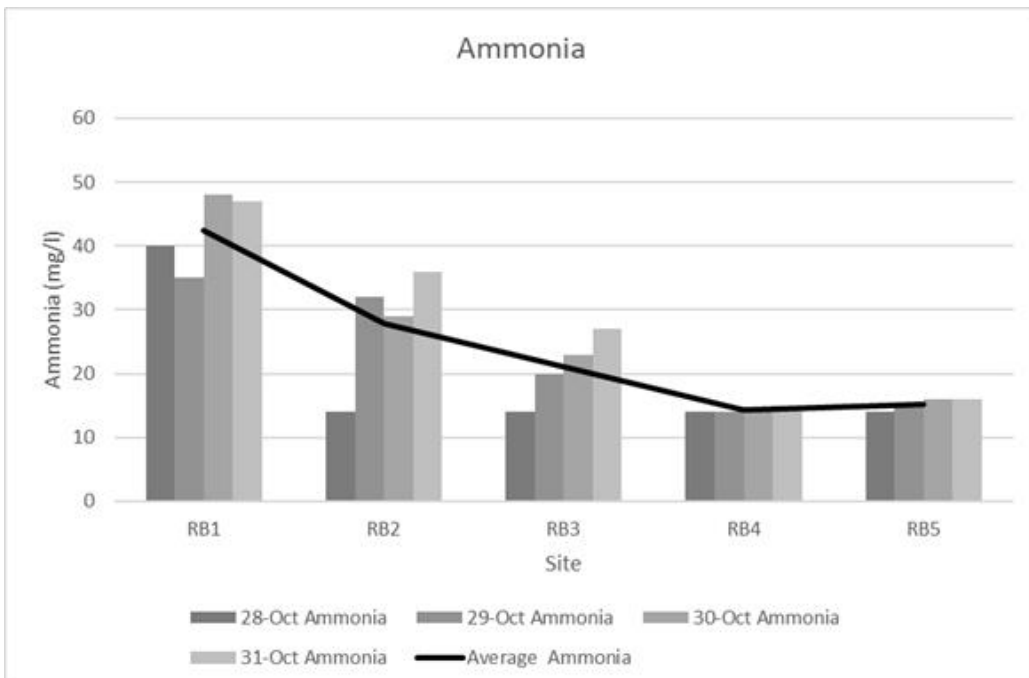


Since this project was completed we have worked on creating a number of wetlands as part of the Thornton Flood Risk Resilience Project

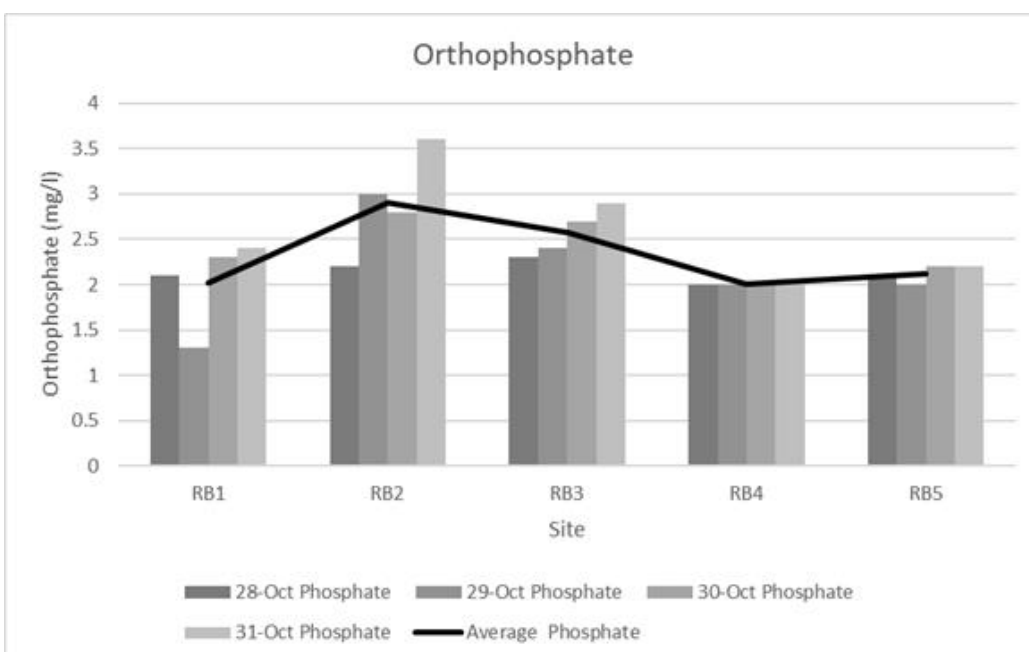
The wetland was monitored over four days in October 2019. Water samples were taken at five sites across the wetland complex, from RB1 within the first cell of the wetland to RB5 at the mouth of the last cell of the wetland.



Biological Oxygen Demand (BOD) is the amount of oxygen used by microorganisms to break down organic matter in the water. The more organic matter there is (e.g., in polluted bodies of water), the greater the BOD. The higher the BOD, the less oxygen is available for other animals such as fish. The results showed that treatment in the wetland lead to a dramatic decrease in the biological oxygen demand recorded in samples.



Ammonia
Ammonia in a watercourse can often come from fertilisers, organic matter or faecal matter. Some forms of ammonia are highly toxic to fish and other aquatic life.
Water samples taken from the wetland show a steep decrease in ammonia concentrations as the water moves through the wetland.



Orthophosphate
Orthophosphate is produced by natural processes and forms one of the key nutrients required for plant growth. However, runoff from farms and fertilisers causes higher concentrations to be present which can lead to algal blooms and eutrophication.
It can be seen that there are undulations in concentrations of orthophosphate within the wetland. Further investigation is needed to understand the reason for this.

King George's Playing Fields

We have been working with Wyre Council to improve biodiversity, water quality and access at King George's Playing fields in Thornton.

Rapid development of the Fylde Coast over the last 250 years has seen natural streams rapidly modified to make way for housing, industry and business development. Streams were culverted, straightened and disconnected from their floodplains. As land became more scarce, other freshwater habitats such as ponds, wetlands, marshes and mosses were drained to facilitate the post-war housing boom. This means that natural freshwater habitats are extremely limited on the Fylde Coast. An unintended consequence of changes to these habitats is flooding, with over 3000 houses at risk of flooding in the Thornton area.

As part of the King George's project we will re-meander a short stretch of Royles Brook, which will allow natural processes to take place in this reach for the first time in around 130 years! These processes will allow a much wider range of aquatic life to flourish in the area. It will also mean that Royles Brook is connected to some of its floodplain, ensuring that it can spill floodwaters, protecting properties downstream of the site.

Working with the community

We've been working with Thornton Flood Action

Group and local sports clubs to ensure the project provides benefit for the local community and increases use by the general public. We've also been working with local schools.

The future of the site

The site will be maintained by Wyre Council, its coast and countryside volunteer group and by the Wyre Rivers Trust and its volunteers.

What are the benefits of the project?

- **Improved water quality** - wetlands are excellent at absorbing nutrients, pollutants and bacteria
- **Improved biodiversity** - the additional habitats created will support a wide range of wildlife
- **Reducing flood risk** - the creation of wetlands, ponds and new channels will store water during periods of high flow
- **Carbon storage** - Trees and wetlands are excellent at locking up carbon and storing it
- **Improved Access** - a new footpath around the site will reduce the need to walk across sodden ground during or after rainfall
- **Improved drainage** for the playing fields



Currently the playing fields are regularly inundated with water



Pupils from Thornton Primary explore water quality in the Brook

Restoration Design

1. The **pond and wetland area** will capture the water that drains off the YMCA building, slowing the flow of water into Royles Brook during storms.

2. **Water storage areas** will hold water during storms, reducing the amount of rain going into Royles Brook.

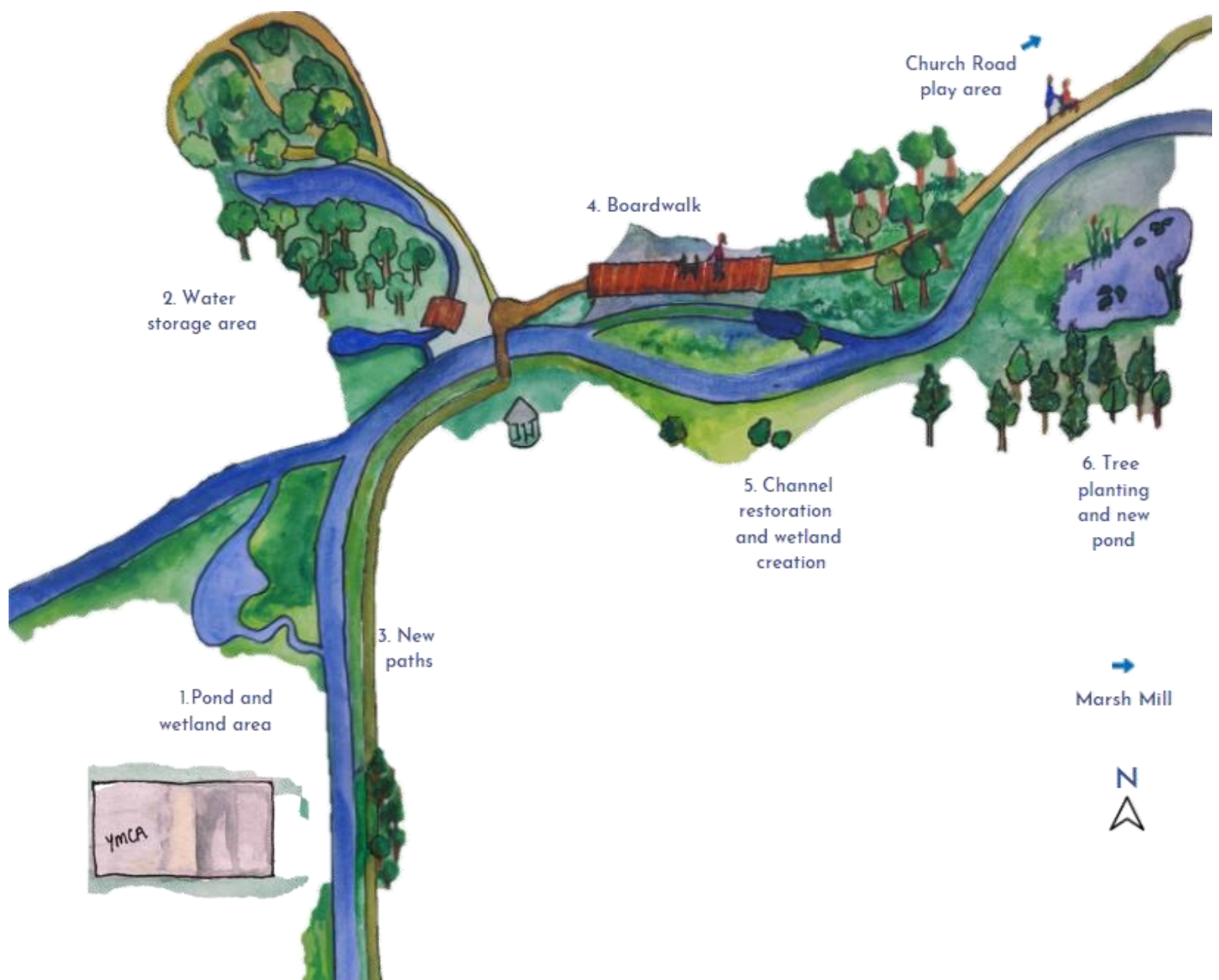
3. **New paths** will improve accessibility to King Georges Playing fields for all.

4. The **boardwalk** will provide access across

wet ground, as well as giving a unique perspective of the wetland area.

5. **Channel restoration** will slow the flow of water and restore natural habitat. A new **wetland** will provide habitat and colourful plants in summer.

6. A **pond** present on maps dating back to the 1800's will be reinstated close to its original position. **Trees** will be planted across the site.



Damas Gill Improvement Works



WILD TROUT TRUST



In 2019 we were awarded funding from the Environment Agency as part of their Fishery Improvement Programme (FIP). The funding was provided for the creation of a fish easement, the installation of large wood and the

installation of stock proof fencing, with each intervention set to be delivered on Damas Gill. Damas Gill is a short watercourse that flows from Damas Gill reservoir to Dolphinholme, where it meets the River Wyre. The gill is regarded as one of the best spawning areas for sea trout in the Wyre catchment. Like many watercourses, Damas Gill is impacted by physical modification; in this case the reach concerned was affected by a short culvert, which became almost impassable to fish during low flows. Owing to the success of partnership working in previous FIP projects, we decided to partner up with Jonny Grey at the Wild Trout Trust in order to help us deliver the project.

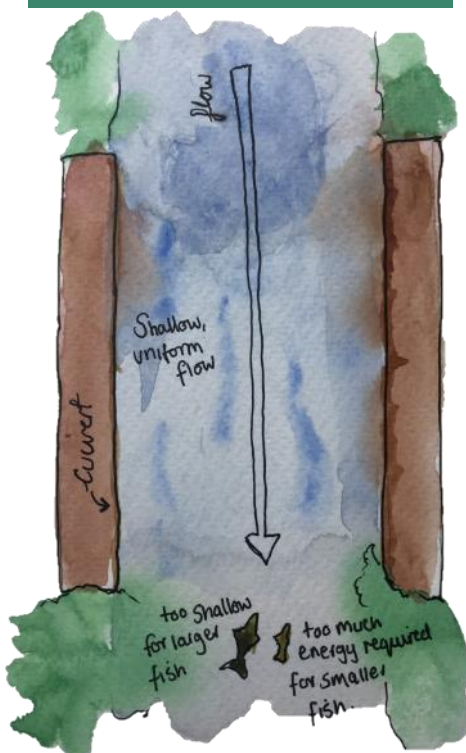
Fish Easement

Culverts are problematic for fish because they create shallow and uniform flows of water over a smooth surface, this presents a problem for fish because they are unable to maintain enough swimming speed to traverse the culvert in one go. If a fish fails to make it through the culvert, it has no option but to drop back downstream and attempt passage again. This can have a significant impact on the energy reserves of the fish and can lead to increased predation of fish whilst they recuperate below the culvert.

To assist fish ascending through the culvert, we decided to install a low-cost fish easement. The easement

consists of a series of wooden baffles that are secured to the bed of the culvert using stainless steel rods. The baffles are installed in a pattern (usually herringbone or similar) which causes the flow of the water to take a more sinuous (see diagram (left)) route through the culvert. This creates a more natural flow pattern which fish can take advantage of by using the pockets of slower flow to rest and recuperate whilst they move through the culvert. The baffles also increase the depth of the water, which is flowing over the river bed. This allows larger fish to move through the culvert and also results in the creation of refuge areas, which can be utilised by fish during their passage through the structure.

Before fish easement



After fish easement



Habitat Works



In March 2020 we delivered the habitat works on an area of rapidly eroding riverbank, around 1km upstream from the fish easement. In order to increase instream habitat and reduce erosion and we decided to take advantage of a number of *in situ* trees and move them into the channel. The tree trunks were winched into position and then tethered to the riverbank using stainless steel rope. Eight trees were placed in sequence along the eroding bank to create varied instream habitat, this will have huge benefits

for juvenile and adult fish within Damas Gill.

We also recycled around 60 Christmas Trees which were wedged behind the tree trunks to create a buffer which will dissipate the erosive force of high flows. Fine sediments will be deposited onto the Christmas trees which will result in further protection for the riverbank. Finally we installed a number of willow whips and stakes into the bank and the new habitat. The willow will take root and grow, providing the crucial living element in the structure, giving it further strength and providing a range of further benefits. In future years we will be able to return and lay some of the willow within the watercourse, providing further habitat.

The placement of trees into the channel will also force flood flows onto an area of floodplain which is mostly disconnected from the channel. By forcing flows onto the floodplain we will reduce the flood peak and dissipate the energy contained within the flood flows. This will reduce flood risk downstream and help to reduce the risk of high flows destroying the spawning redds (nests) of salmonid fish such as Atlantic salmon, sea trout and brown trout.

In February 2021, we planted around 500 native trees at the site within buffer strip created as part of the project. These trees will provide a raft of further benefits, in particular the trees will be crucial in helping to regulate the temperature of Damas Gill during summer months. The trees will also help to improve soil structure and alleviate soil compaction, they will also increase the surface roughness of the floodplain, further slowing flows which pass across it during high flow events.



MoRPh Estuaries - A Novel Habitat Assessment Tool

In 2021 the Wyre Rivers Trust was asked to take part in a pilot project to assess a new method to survey estuaries. The MoRPh Estuaries Survey was developed in response to the recognition that the existing Modular River Survey was not equipped to capture the unique properties of estuarine habitats.

Estuaries are unique dynamic habitats and the lower Wyre Estuary is home to the largest area of ungrazed salt marsh in North West England, supporting biodiversity, carbon storage, flood mitigation and pollution filtration.

Threats to the Wyre salt marshes include sea level rise and increased frequency and severity of storms and associated erosion due to climate change, as well as development and the physical modification of habitats. In the mid to upper estuary, pollution from sewage and agriculture causes damage, whilst further threats come from the presence of invasive species such as Himalayan Balsam (*Impatiens glandulifera*), which outcompete native species and leave the banks of estuaries more susceptible to erosion in winter.

The MoRPh surveys are designed to engage citizen scientists at a high level. 10 volunteers took part in intensive specialist training, including a four-hour online session, where the volunteers were introduced to the ecology of the Wyre Estuary, estuarine morphological theory and the survey components. In the second training session, the volunteers were guided through the survey in the field. The training sessions were also an opportunity for the survey developers to test their novel survey in the field for the first time. Many of the volunteers have since provided detailed feedback, leading to the identification of aspects of the survey which could be improved.

MoRPh surveys are structured to collect data on the i. Supratidal and Intertidal Vegetated Characteristics, ii. Unvegetated Intertidal and Subtidal Characteristics, iii. Bed Sediment Characteristics and iv. Whole Channel and Margin Pressures. The data are then assessed against selected indices, providing an



estuary habitat score (1 to 10) for each. A range of sites in the upper and lower estuary have been designated as MoRPh survey sites. In the first two months of the project, six of these sites have been surveyed by the citizen scientists, including Arm Hill. The MoRPh survey at this location, will provide an invaluable baseline dataset of physical habitat condition to support the delivery of the Arm Hill Restoration Project. Post project monitoring will allow for a robust assessment of the benefits that the restoration project on the salt marsh habitat. A suite of “bolt-on” surveys of vegetation, sediment, fish and invertebrate surveys will be conducted to integrate with the data collected through MoRPH to generate a complete picture of estuarine habitat functioning in the Wyre.

The MoRPh Estuaries Pilot Project was developed by Cartographer and Queen Mary University of London and supported through funding from the Environment Agency's Championing Coastal Communities Fund. Further information on the MoRPh Estuaries Survey can be found at <https://modularriversurvey.org/>

Volunteering Opportunities with the Wyre Rivers Trust

A personal account by Vicky Henderson, a WRT volunteer and work placement student



Surveying the vegetated intertidal zone during the MoRPH project at Shard Bidge, Wyre Estuary.

I started volunteering with the WRT in January 2022. During that time, I have been involved in a range of activities, including scientific monitoring and practical conservation projects.

I returned to education in 2019 to study an Animal Science and Management BTEC. As a mature student, the course provided an excellent foundation for me to enroll on my desired degree path – Marine Biology. At university I play an active role in the Student Union representing my friends and colleagues as the HE VP for Science and Engineering and as one of two Student Representatives on the Corporation Board at Blackpool and the Fylde College. I obtained my diving certification a few years ago and am a Marine Mammal Medic with the BDMLR and a Marine Mammal Surveyor with ORCA. I am also a student member of CIEEM. Outside of my studies I work part-time in retail. Furthermore, I enjoy conservation, history, travel, and an eclectic taste in music.

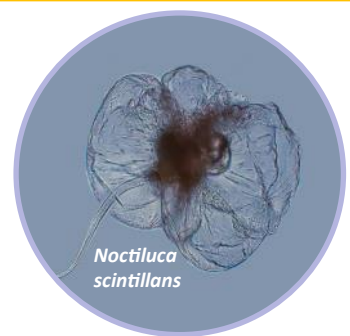
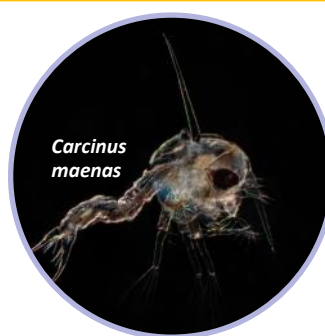
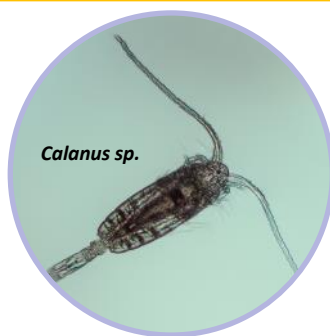
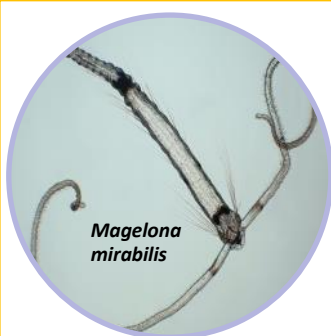
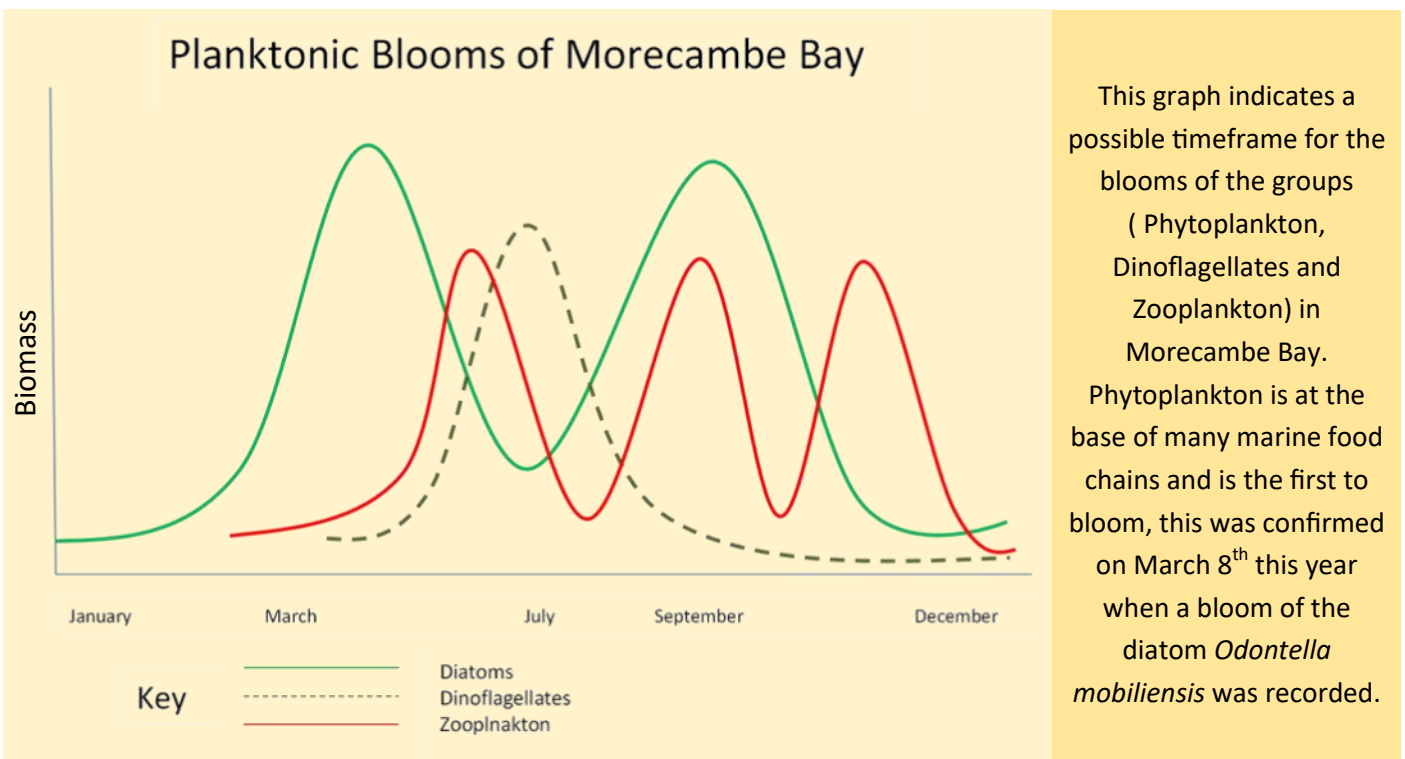
I first became aware of the Wyre Rivers Trust whilst looking for volunteering opportunities that would develop my awareness of aquatic environments and the species within those ecosystems. I signed up to volunteer and have taken part in riparian zone tree planting and surveying projects at various sites within the Wyre Catchment. Through volunteering, I have been fortunate to secure a work based learning placement and have been involved in a collaborative pilot study (MoRPH Estuaries) between the Wyre Rivers Trust and other agencies.

The MoRPH Estuaries project has enhanced my knowledge in the variation of natural systems intertwined in estuaries, how they evolve and what anthropogenic influences impact upon them. Regular field work has given me the chance to improve my practical skills in species ID and investigative procedures, while also contributing important scientific research to evidence and support environmental policies and regulations. The MoRPH pilot scheme is an evolving process, and I am excited to see where it leads and how it can be implemented in citizen science. The placement has engaged me, both academically and personally, and has provided an excellent team environment to adopt new skills whilst refining existing personal ones. Reflecting upon my learning experience, involvement in the scheme has given me a real-life insight into the identification, attainment, processing, and subsequent presentation of scientific data. It has helped me to identify and evaluate applications, integrate theoretical and practical processes, whilst also developing my field skills. The experience and transferable skills I have gained during my placement with WRT are beneficial to both, my learning and future job prospects. On completion of my degree, I am hoping to obtain employment in the marine science sector.

Plankton Surveys

From the middle of January 2022 Dr Mark Woombs, Dr Barry Kaye and Jean Wilson have collected samples of marine plankton trawled from the slipway at Knott End at high water on Spring Tides. Two sizes of plankton nets are pulled slowly along each side of the slipway at least 3 times and the contents dispensed into water-tight containers for transport to the 'laboratories'. Analysis of the sample will reveal species and qualitative figures. To enable exact quantities of species more

sophisticated techniques would need to be employed. The purpose of this exercise is to establish the appearance times of individual species of plankton and to gain an insight as to when particular groups of plankton bloom in the Bay. The word plankton is derived from the Greek word meaning drifter and although the conception is that plankton are microscopic, some are far from that, for example the jellyfish *Rhizostoma pulmo* can reach 90cm in diameter.



Captured on camera

The species collected this year have been expertly photographed by Mark using phase contrast microphotography. Larvae of *Carcinus maenas*, the shore crab, are transported by surface currents, going through four, temperature dependent stages before developing in to what we would recognize as a crab. *Noctiluca scintillans* can bioluminesce at night, causing spectacular blue light shows. The name comes from Latin; *noctiluca* means "light at night" and *scintillans* means "shining, throwing out flashes of light".

Upcoming Events 2022

Summer Shows - We will be present at a number of agricultural shows during the summer, look out for us at Great Eccleston Show, Garstang Show and the Lancashire Game and Country Fair.

23rd July - Crustacea Ecology Day

In this in-depth course you will learn about the underwater world of crustacea and how to identify some common groups to family level. Book through the Royal Society of Biology Northwestern Branch, where a range of other invertebrate courses can also be found.

12th September - Bat Walk, Scorton

Booking essential. For more information and to book please email lucy@wyriverstrust.org.

25th September - World Rivers Day Fun Day, Garstang

Celebrate world Rivers Day with the Wyre Rivers Trust at Garstang Millennium Green. Booking not required.



Knott End Beach Clean

Come along and join our team of beach cleaners at Knott End each month. We meet at Knott End car park on Quail Holme Road at 10.15am one Tuesday a month. Pickers, gloves and bags are provided! Dates for 2022 are:

7th June

13th September

5th July

18th October

2nd August

1st November

Wyre Rivers Trust Ambles

Join us for a pleasant walk around the fields and tracks of the countryside with the aim to blow away the cobwebs, share knowledge and enjoy nature. Easy walk, 3 miles in distance. Just turn up or contact Sam Marshall at Wyre Rivers Trust for more information: 07956712272.

All walks start at 11 am and finish at 1 pm.

7th June, 3rd August, 17th August, 31st August: Catterall
Meet at Catterall Village Hall, Garstang Road, Catterall, Preston, PR3 1XN

14th June: Preesall

Meet at Preesall Playing Fields, Lancaster Road, Preesall FY6 0DY

28th June, 27th July, 10th August, 24th August: Barton.

Meet at Car Park nr. Cricket Pavilion, Guys Thatched Hamlet, St Michaels Road, Bilsborrow PR3 0RS



Wyre Waters Catchment Partnership

Wyre Rivers Trust (Host), Catchment Sensitive Farming, Churchtown Flood Action Group, Environment Agency, Forest of Bowland Area of Outstanding Natural Beauty, The Friends of Garstang Walking Festival, Garstang Millennium Green Trust, Grosvenor Estates (Abbeystead), LOVEmyBEACH, The Lune and Wyre Fisheries Association, Royal Society of Biology, United Utilities, Wyre Council, The Wyresdale Anglers.

Our projects are supported by a wide variety of organisations including;

The Environment Agency, Natural England, United Utilities, The Forest of Bowland AONB, Wyre Council, The Wild Trout Trust, The Lancashire Environmental Fund, The Esmée Fairbairn Foundation, The Green Recovery Challenge Fund, LOVEmyBEACH and our highly valued volunteers.

We would like to thank them all for their continued support.

Our identification of new natural flood management projects and our Hillylaid Pool Wetland Project is funded through Natural Course, which is a Life Integrated Project.

Project Number: LIFE14 IPE UK 027

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The D.J Sidebottom/ Glasdon Charitable Programme

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