



COISCÉIM CONSULTING
Ecology and Hydromorphology services



**Mayo National Schools
Blue Dot Catchments
Stream Sampling sessions
May 2023**



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1. INTRODUCTION

A Kick Sampling session for 6 Primary Schools in Co. Mayo was commissioned by LAWPRO and undertaken with students from 5th and 6th class in each school. We also carried out a session with the Agricultural Science classes in 3 secondary schools.

The event aimed to raise awareness of the Blue Dot Catchments in the area and involved a kick sampling session and an investigation on river invertebrates as water quality indicators.

Dr Niamh Burke for Coiscéim Consulting facilitated the sessions.

Students enjoyed the sessions at their rivers and lakes and had a go at:

- 1. Taking kick samples.*
- 2. Examining the invertebrates found in each sample.*
- 3. Discovering the relationship between water quality and our sample specimens*

The children learned about the different families of invertebrates present and about those that are most and least tolerant to pollution.



2. PROJECT AIMS

LAWPRO commissioned the session for the schools to encourage awareness of our Blue Dot Catchments, to understand water quality indices using stream invertebrates, and to encourage enthusiasm for biodiversity and nature in the students.

The study also ties in well with the Primary School Science Curriculum and the Strand Unit: 'Living Things' (*Plants and Animals and Processes of Life*).



Tom Carolan – LAWPRO Community Waters Officer – explaining the Blue Dot concept to Carn NS students.

'Look Deep into Nature, and then you will understand everything better'

Albert Einstein

3. WHAT WE DID

In each case the river or lake sampled was within walking distance of the school, suitable access points were used as the site from which to carry out the pond dipping exercise.

Tom Carolan, LAWPRO Community Water Officer for Mayo and North Roscommon, introduced the concept of the Blue Dot Catchments and highlighted the importance of each site and the wider Mayo catchments as near-pristine and highly valuable habitats in both the National and International context.

Niamh then explained the link between good water quality and the types of invertebrates that may be found in such high-quality Blue Dot streams. The concept of using those stream invertebrates as gauges of water quality more generally was also discussed. The kick sampling method of collecting river invertebrates was explained and the group readied themselves to collect river samples with nets, after a brief demonstration.

FIELD GEAR

Niamh showed the students the field equipment that they would use during their field study. The items included nets, trays and field guides with a full list of items needed below:

- Invertebrate Hand Nets (small mesh size so no insects / mini-beasts escape)
- Wellies (for wading into river margins and retrieving sample)
- Sampling trays – to examine the samples once collected
- Field guide - of common freshwater invertebrates found in Ireland
- Tweezers (to manipulate sample)
- Spoon (to manipulate sample)
- Small Perspex pot / jars (to examine underside of specimen if needed)
- Alco-gel (to disinfect hands after the session)

Kick sampling

Niamh demonstrated the 1-minute kick sampling technique to the students to enable the collection of samples. The technique involved disturbing the substrate (gravel) by kicking and then sweeping up the dislodged invertebrates into the net which had a fine mesh. The river flow ensured a continuous flow into the net which prevented invertebrates from escaping.

The areas chosen and most likely to harbour sensitive insects and other fauna were in the shallow, faster flowing areas on river 'riffles', of the gravel/ cobble river bed.

Once the kick samples were taken, some large cobble-sized stones from the river were overturned and inspected for any further insects/ invertebrates clinging to the underside (also known as a hand search).



Demonstration of collection of invertebrate samples at Owenmore near Moygownagh with Carn NS pupils

All of the students had a go at collecting specimens. 12 samples were collected in total in each site to ensure each pair / group of three of children had a sample tray of invertebrates to investigate.



Bohola NS.

SAMPLE ANALYSIS AND INVERTEBRATE IDENTIFICATION

Pairs / trios of students inspected their sample trays for invertebrates and counted the numbers of each type.



Students from Gortnor Abbey Secondary school examining their samples at Lough Conn.

Using a field guide (*Field Studies Council – The Freshwater Name Trail*), the students matched the creatures found in their samples with the specimens shown in the guide by following the keys provided in the guide.

On carrying out this exercise, the students learnt to identify the distinguishing features of each type of invertebrate.



Students inspecting their samples and using ID field key

Common species found in the samples were Mayfly, (including the Flattened Mayfly), Stonefly, Cased caddisfly larvae (small tubes made from twigs or sand particles with the insect sometimes poking its head out!). Several juvenile eel were also retrieved from the rivers in several samples. All of these species would be indicative of a high river water quality.



Stream Super-Sleuths



How many 'Good' guys? ... and How many 'Bad' guys can you find?

	Indicator Animal	Score	Tick if Present!	Add the scores for those ticked to get your score!
Excellent	Stonefly nymph	10		
	Mayfly nymph	10		
	Flattened mayfly nymph	10		
Good	Cased Caddis	9		
	Caseless Caddis	8		
Ok	Freshwater Shrimp	5		
Not so Good	Snail	1		
	Water louse	1		
	Leech	1		
				Sample Total:



Stream inverts scoring chart as devised by Coiscéim



Calculating the Citizen Science Stream Index

Recorder name:	Stream name:
Date:	GPS/location:

The Citizen Science Stream Index (CSSI) is based on the presence or absence of six key aquatic invertebrates. Three pollution-sensitive invertebrates ('good guys') are commonly found in clean streams and three pollution-tolerant invertebrates ('bad guys') are commonly found in polluted streams.

Citizens use a pond net to take three 30-second kick-samples (the three samples should be a few metres apart) from a shallow (<20cm), gravelly, fast-flowing part of the stream. The invertebrates captured in each sample are examined in a white tray on the bankside. The six key invertebrates are easily spotted amongst the many other species in the tray, by their characteristic shape, colour or movement.

The citizen will score each sample depending on which, if any, of the six key invertebrates occur in the tray. The three 'good guys' have a score of +1 each and the three 'bad guys' have a score of -1 each.

The score for each kick-sample can range from +3 (all three good guys and no bad guys) to -3 (all three bad guys and no good guys). When the scores from all three samples are added together, the CSSI ranges from +9 to -9.

	Sample 1	Sample 2	Sample 3			
Stonefly (+1)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Citizens should also take a good, clear photo of one of the 3 samples, including a label in the tray, with information on the date, stream name, location and recorder.		
Flattened mayfly (+1)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Green caddisfly (+1)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Snail (-1)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CSSI Scores can be a 'traffic light' for water quality CSSI score -9 to -5 Poor CSSI Score -4 to +4 Moderate CSSI Score +5 to +9 Good		
Leech (-1)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Waterlouse (-1)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Sum of scores 1	<input type="text"/>	Sum of scores 2	<input type="text"/>	Sum of scores 3	<input type="text"/>	Total score for the 3 samples = CSSI Score

Any observations (eg. excessive algae or fine sediment, cattle access nearby, surface foam, presence of trout/salmon etc):

Citizen Science Stream index by Dr Harrison of UCC

The index and scoring systems used were simplified versions of the Q-Value index used by the EPA (Environmental Protection Agency) and other European government agencies to test the water quality of their rivers and lakes.

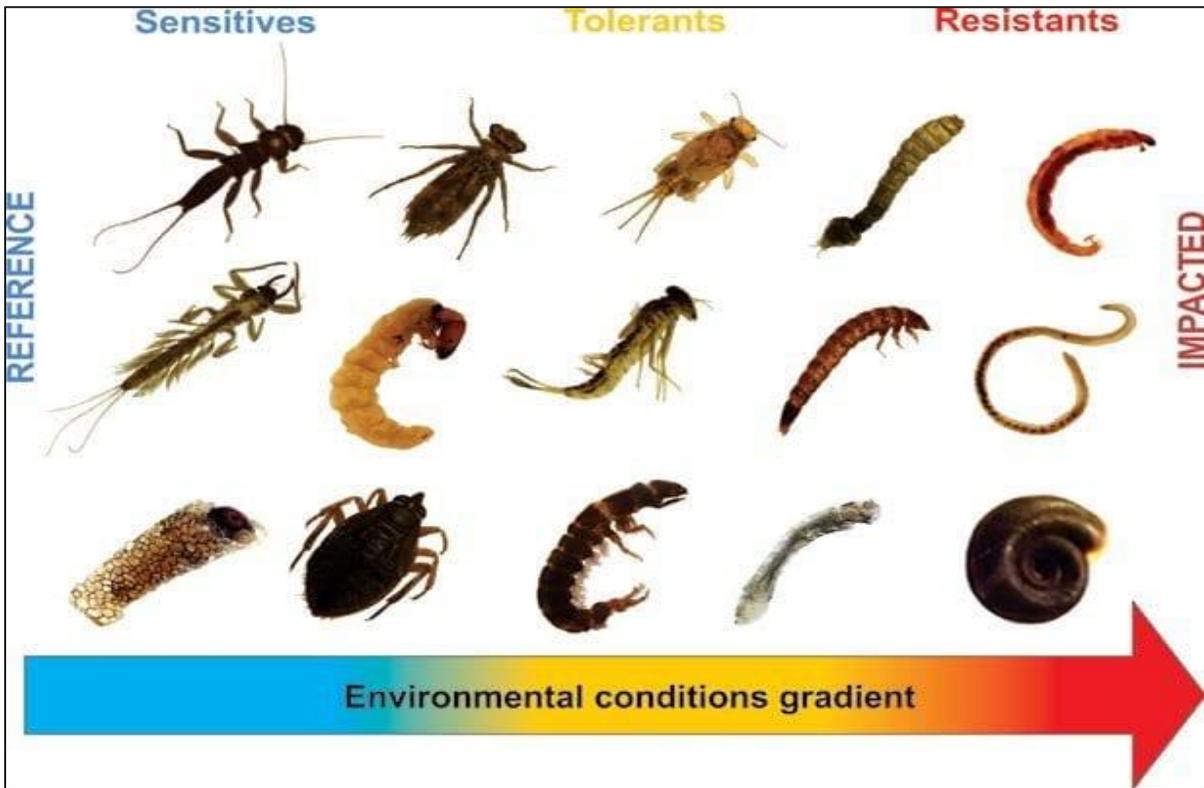


Chart showing invertebrate species tolerance – grading from sensitive to tolerant



Juvenile eel found in a sample



Flattened Mayfly larva

4. LEARNING OUTCOMES

The students learnt some ecological techniques for freshwater sampling of invertebrates.

They also learnt to identify some common invertebrate species currently occupying the Blue Dot sites by using a field guide.

From this, they learnt that these animals are representative of a range of tolerances, and from adding up the scores attributed to each species on the water quality index, understood that the water in at each site is of very good quality.

The children also seemed to have lots of fun, which will hopefully reinforce their enjoyment and interest in the natural world.



RELEVANCE TO SCIENCE CURRICULUM

The student's River Kick Sampling session has relevance to the Primary Schools Science (SESE) curriculum in the following ways:

The exercise has enabled the students to:

- Become familiar with the life cycles of common plants and animals.
- Observe, identify and explore a variety of living things in local habitats and environments.
- Identify common insects and minibeasts of freshwater habitats.
- Develop some awareness of animals from wider environments.
- Recognise and describe the parts of some living things.
- Group and compare living things into sets according to their similarities and differences.
- Observe, identify and examine the animals and plants that live in local habitats and environments (*local stream, river or pond, rock pool, seashore*)
- Develop an increasing awareness of plants and animals from wider environments.
- Identify the interrelationships and interdependence between plants and animals in local and other habitats.
- Observe and explore some ways in which plant and animal behaviour is influenced by, or adapted to, environmental conditions.
- Location factors for plant and animal habitats, including food supply and physical conditions.
- Become familiar with the characteristics of some major groups of living things (*mammals, insects, arachnids, amphibians, fish, birds, reptiles flowering and non-flowering plants, fungi and bacteria*)
- Construct and use simple keys to identify locally occurring species of plants and animals.

A learning outcome of the Senior Cycle's Agricultural Science Curriculum is that students must be able to recognize the impacts of various agricultural practices on the environment.

- The student's lake Sweep Sampling session has relevance to the Senior Cycle Agricultural Science curriculum as it has enabled students to:
- Conduct an open-ended investigation
- Collect, organise and interpret primary and secondary data
- Describe relationships between sets of data
- Become familiar with freshwater invertebrates that can be used as water quality indicators
- Develop an increasing awareness of animals from wider environments
- Identify the interrelationships and interdependence between freshwater invertebrates, water quality and agricultural practices
- Appreciate the challenges of sustainable intensification and how agriculture may negatively impact water quality due to poor soil management, nutrient overload, or livestock faecal contamination

5. USEFUL REFERENCES

FIELD GEAR AND GUIDES

<https://www.nhbs.com/equipment> A great website with endless choice in field gear/ equipment.

<https://www.field-studies-council.org/shop> Fold out guides for water invertebrates and many others.

<https://www.theorganiccentre.ie/shop> field guides and books on nature and environment

<https://biodiversityireland.ie/shop/> A variety of nice (child-sized) hand held field guides

LINKS TO ONLINE EDUCATIONAL RESOURCES

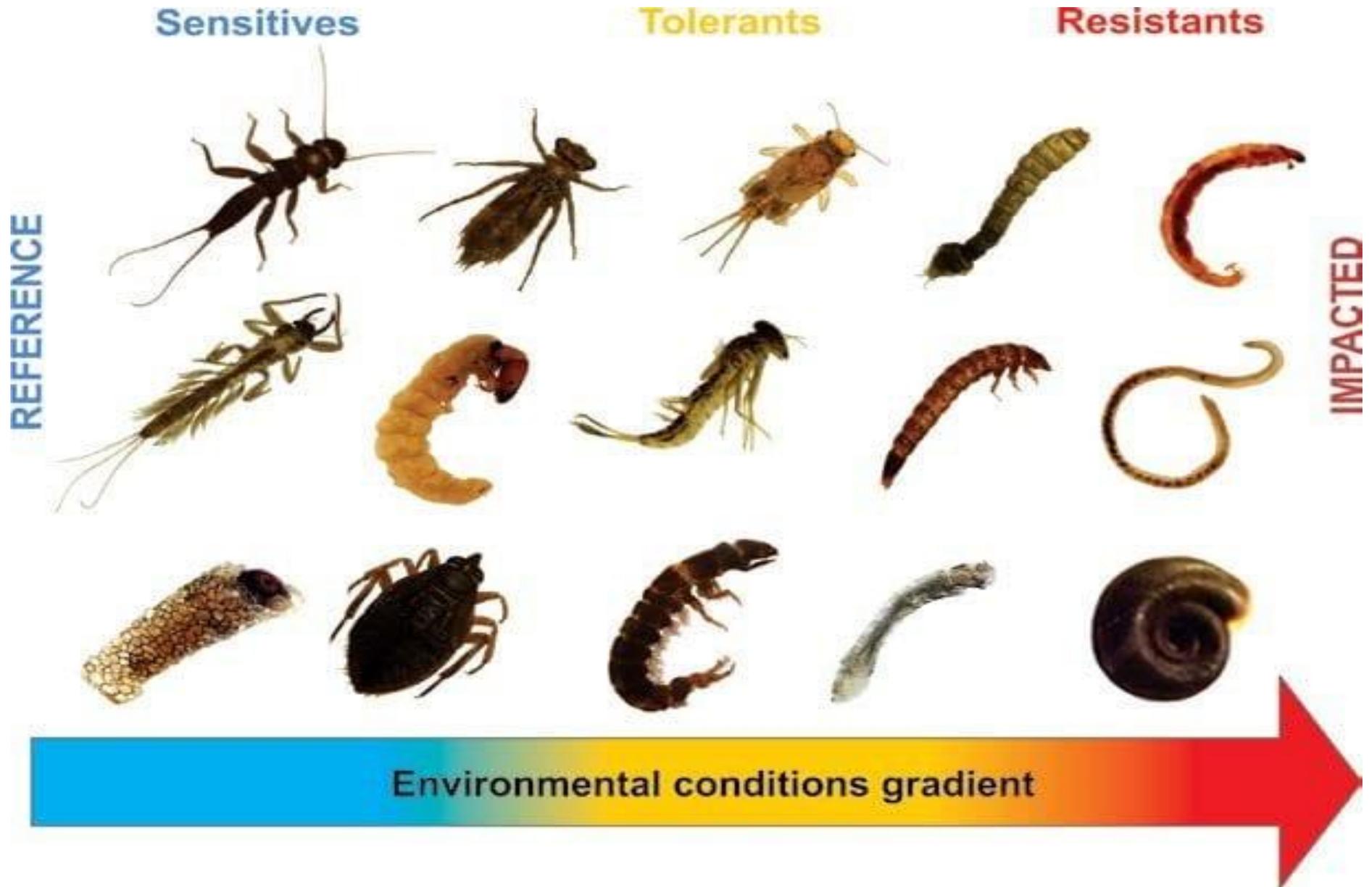
<https://www.wildlifetrusts.org/actions/how-build-pond>

https://invasivespeciesireland.com/wp-content/uploads/2017/10/AQUATICS_BOOK5.pdf

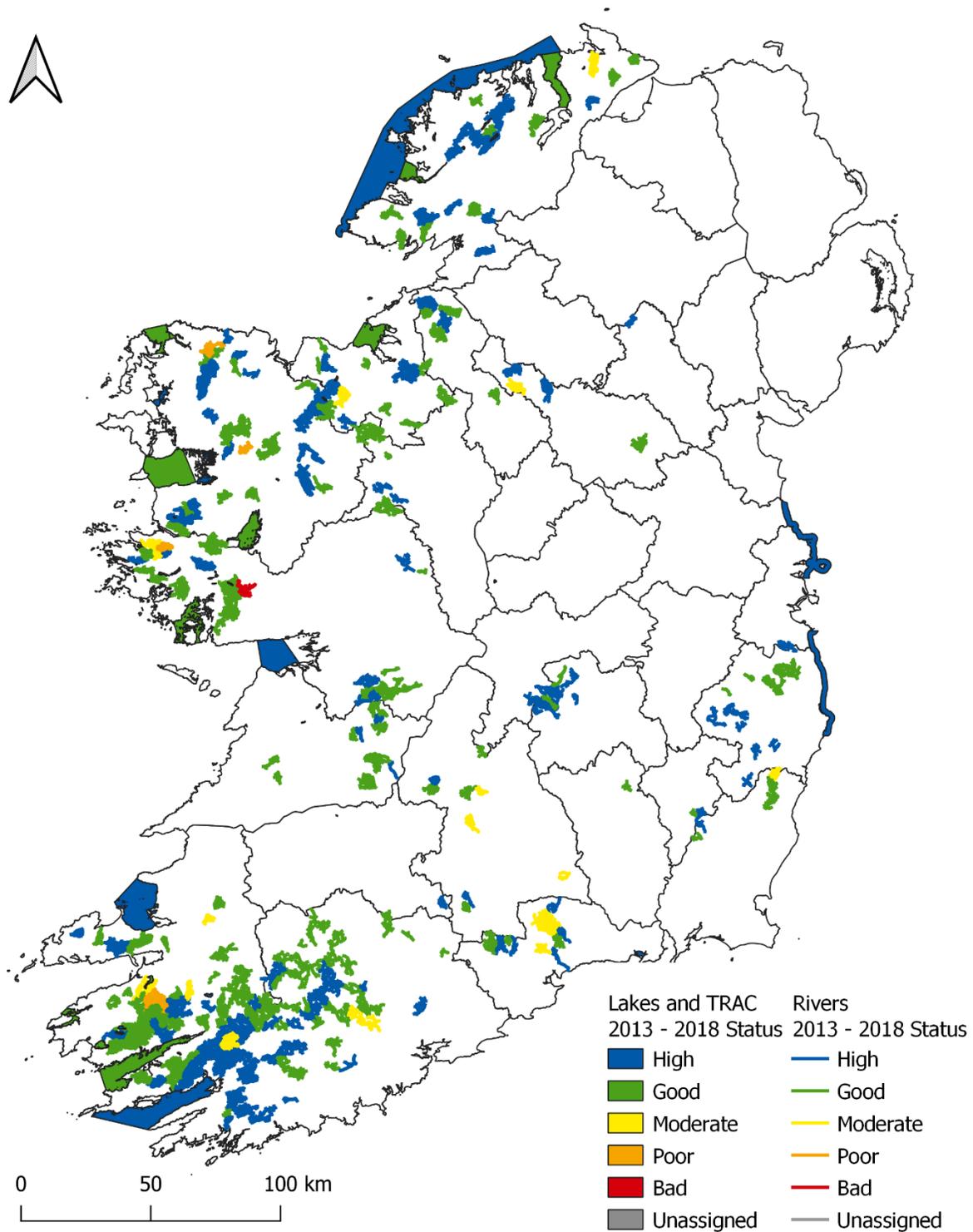
<https://freshwaterhabitats.org.uk/get-involved-2/big-pond-dip/>

<https://biodiversityireland.ie/>

APPENDIX A - STREAM INDICES



Appendix B Map of Blue Dot Catchments in Ireland



Appendix C Event Photographs



Tourmakeady NS



Parke NS







An Roinn Tithíochta,
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