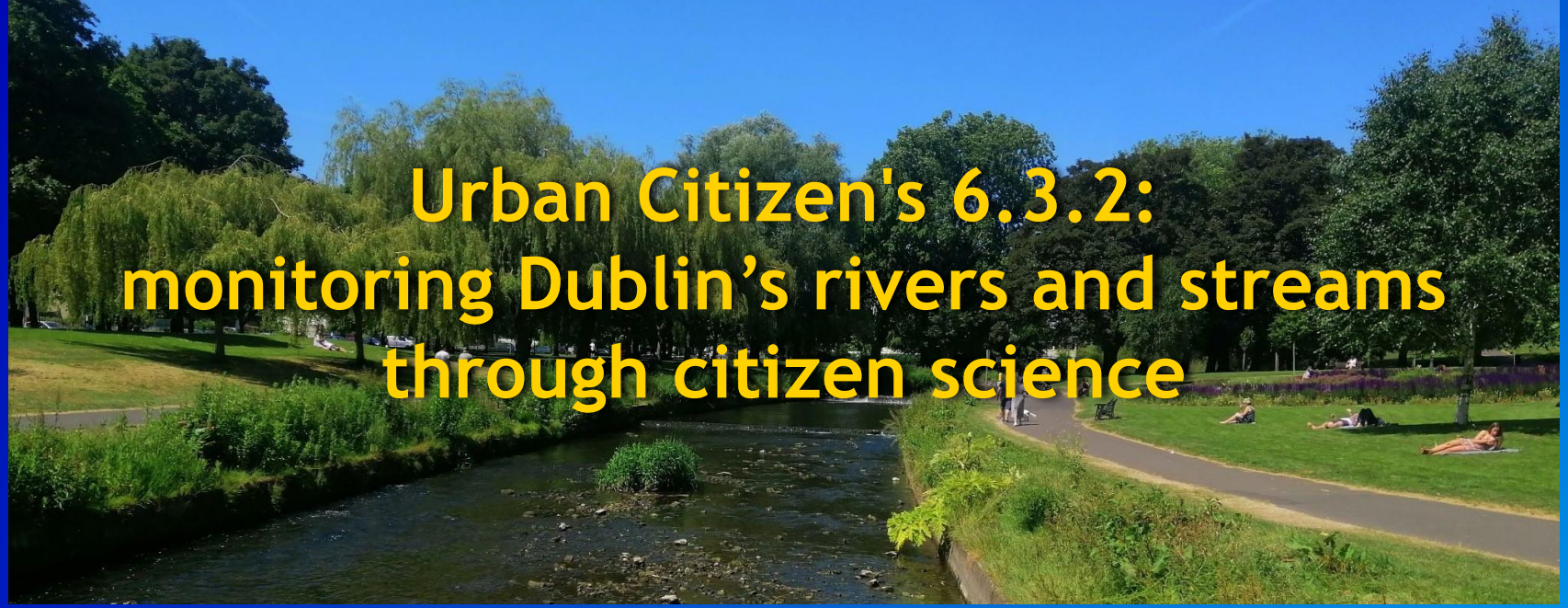
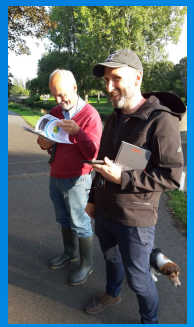


Urban Citizen's 6.3.2: monitoring Dublin's rivers and streams through citizen science

Laura Ribero, Susan Hegarty, Fiona Regan, Ruth Clinton (Dublin City University)

RRC Annual Conference
24th – 26th April 2024



DCU Institiúid Uisce DCU DCU Water Institute

FRESHWATER Watch earthwatch EUROPE

Dublin City Baile Átha Cliath

IRISH RESEARCH COUNCIL An Chomhairle um Thaighde in Éirinn

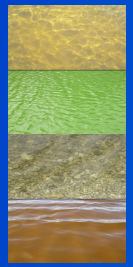
→ **Citizen Scientists gather data on water quality of rivers and streams, especially where there is currently a data gap**

- Built on the experience of **previous DCU projects** (BACKDROP, Water Blitz events; in collaboration with Freshwater Watch)
- **Interdisciplinary team**, led by Susan Hegarty (geographer, PI), and Fiona Regan (chemist, co-PI)
- **Monthly surveys**, data collected over **18 months** **(July 2023 - January 2025)**
- Inspired by **Indicator 6.3.2** (**SDG6**):
  "proportion of water bodies with good ambient water quality"

1. Visual Observations

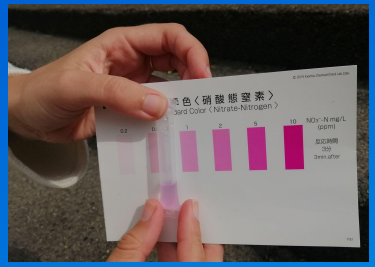
- **Ecological Information**
  (surrounding land use, water surface, algae, bank vegetation, signs of pollution, water uses, aquatic life)
- **Hydrological Information**
  (rain, water flow)
- **Optical Information**
  (river width, turbidity, water colour)





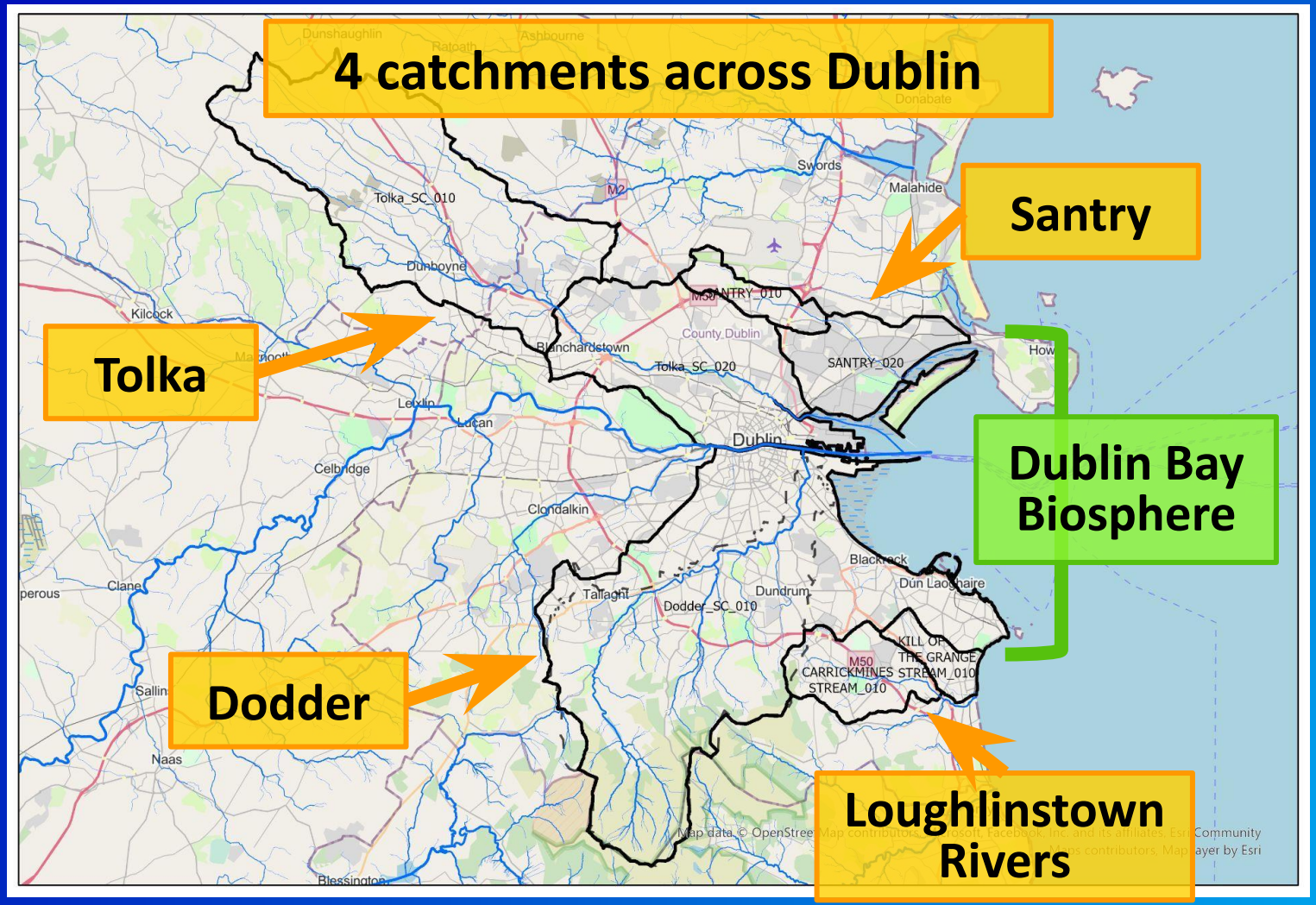

2. Nutrients Test

- Nitrate
- Phosphate



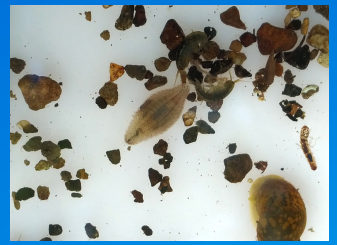
3. Macroinvertebrates Monitoring

- CSSI method (Citizen Science Stream Index)


4 catchments across Dublin
Santry
Tolka
Dublin Bay Biosphere
Dodder
Loughlinstown Rivers
Tolka_SC_010
SANTRY_010
Tolka_SC_020
SANTRY_020
Dodder_SC_010
KILL OF THE GRANGE STREAM_010
CARRICKMINES STREAM_010
Dunshaughlin
Ratoath
Ashbourne
Donabate
Swords
Malahide
Dunboyne
Kilcock
Blanchardstown
County Dublin
Leixlip
Lucan
Dublin
Celbridge
Clondalkin
Blackrock
Dún Laoghaire
Dundrum
Tallaght
Clane
Sallins
Naas
Blessington
M2
M50

Citizen Science Stream Index (CSSI)

is a **biotic index** recently developed in Ireland
by the team of Dr. Simon Harrison (University College Cork) &
LAWPRO (Local Authority Waters Programme)



- Developed specifically for **Citizen Science projects**
- Based on the **presence/absence of 6 macroinvertebrate taxa**

  → **"easy"** to identify by non-specialists

  → **good indicators** of unpolluted/polluted conditions (organic pollution and habitat degradation)

  → **common** in Irish rivers and streams

CSSI: the 6 taxonomic groups

"The good guys"
[found in **good** ecological conditions]

- **Stoneflies**
  (Order Plecoptera)
- **Flattened Mayflies**
  (Order Ephemeroptera, Family Heptageniidae)
- **Green Caddisflies**
  (Order Trichoptera, Family Rhyacophilidae)

"The bad guys"
[found in **bad** ecological conditions]

- **Snails**
  (Class Gastropoda)
- **Leeches**
  (Sub-Class Hirudinea)
- **Waterlouse**
  (Genus *Asellus* spp.)

CSSI: calculating the index

Calculating the Citizen Science Stream Index

ne:	Stream name:
	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)	+1		
Flattened mayfly (+1)			
Green caddisfly (+1)			
Snail (-1)	-1		
Leech (-1)			
Waterlouse (-1)			
	Sum of scores 1	Sum of scores 2	Sum of scores 3

Citizens should also take a good, clear photo of one of the 3 samples, including a label in the tray, with stream name, lo

CSSI Scores ca water quality
CSSI score -9 t
Poor
CSSI Score -4 t
Moderate
CSSI Score +5 t
Good

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

CSSI Scores can be a 'traffic light' for water quality

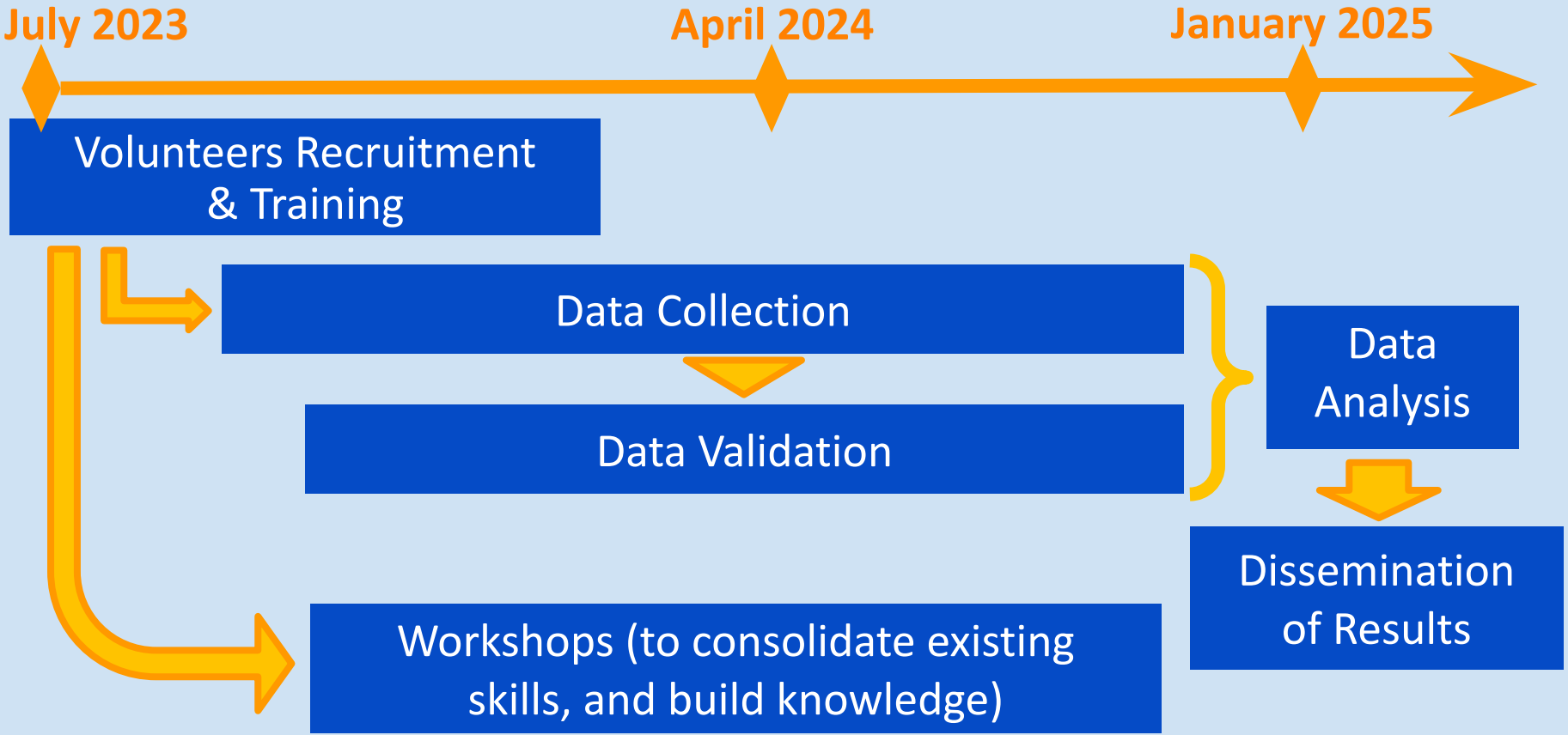
CSSI score -9 to -5
Poor

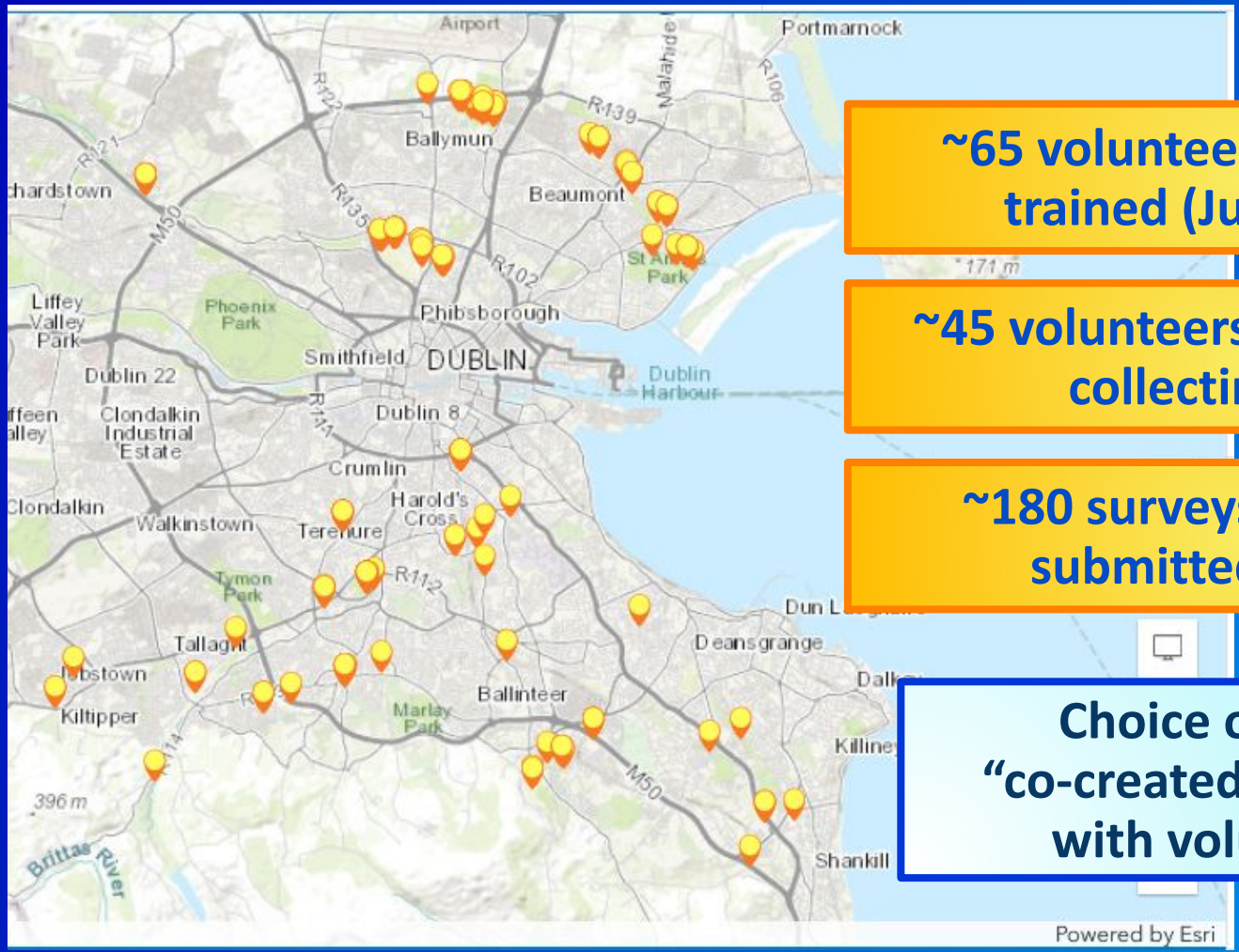
CSSI Score -4 to +4
Moderate

CSSI Score +5 to +9
Good

- This method allows people to approach these animals **gradually**
- Subsequently, people can learn further, through **extra workshops** (e.g. other taxonomic groups, ecology, conservation)

Project structure and progress





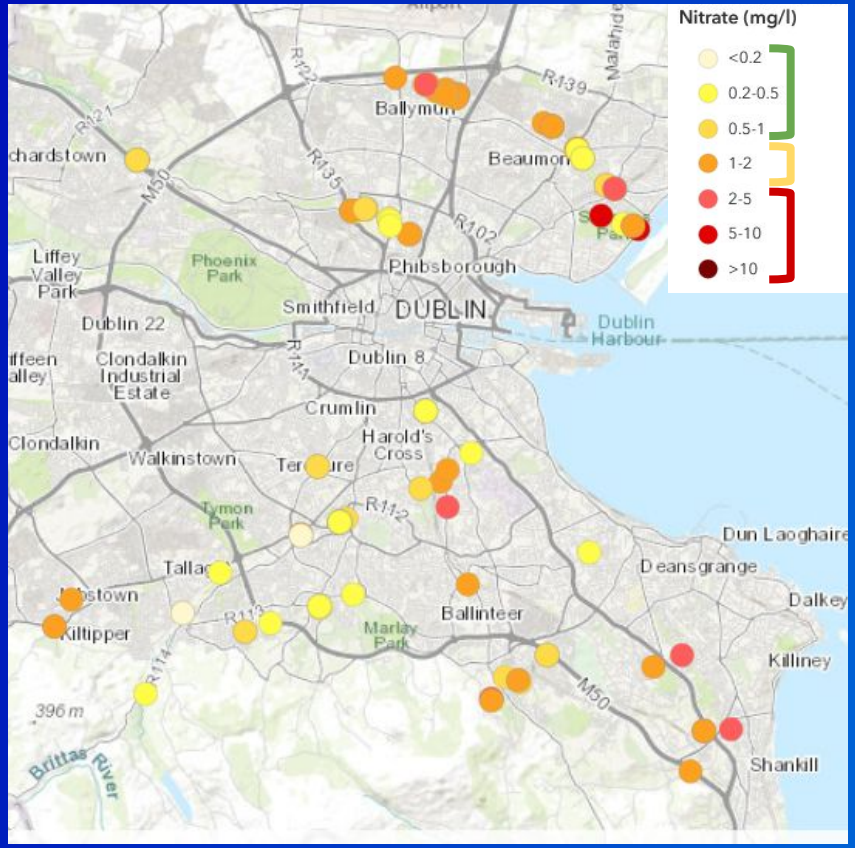
~65 volunteers have been trained (July-March)

~45 volunteers are currently collecting data

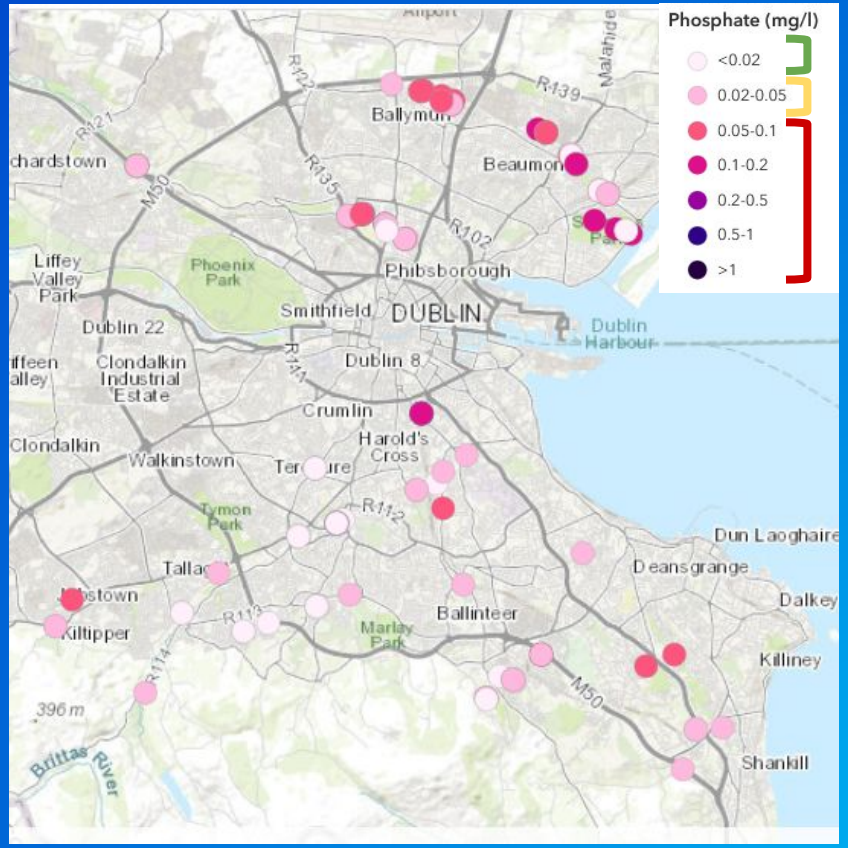
~180 surveys have been submitted to date

Choice of sites: "co-created" together with volunteers

Nitrates



Phosphates



Macroinvertebrates

→ Citizen scientists are detecting the 6 **CSSI taxa**

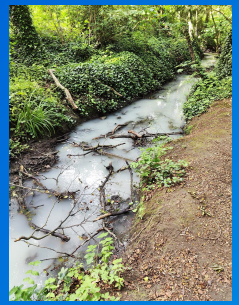
… and also
“non-CSSI” groups

building knowledge through experience

Pollution Events

→ **Dodder River**:
sewage pipe overflowing
(Nov 2023)


→ **Santry River**:
oil spill (Jan 2024)
+ milky suspension (Feb 2024)
[**+ Pers. Comms.**: kerosene spill
& milky water in 2022]


→ **Kill-of-the-Grange Stream**:
macroinvertebrate die-off, possibly
due to rat poison (Feb 2024)



Next steps…

- Completing **data collection** and **analysis**
- Exploring **spatial and temporal patterns** of and **correlations** between **measured variables (nutrients, macroinvertebrates, visual observations)**
- Exploring potential **sources of pollution**
- How these data compare with **local authorities data** (e.g. EPA) and **previous projects** (e.g. WaterBlitz events)?
- Evaluating the **CSSI** (pros and cons, practical considerations)
- Evaluating our **training methods** and **citizens' engagement**

How can all of this help our rivers?

- Detecting **existing issues and pollution events** (“early warning system” for authorities/scientists)
- People feel **empowered** (they can actively contribute to making a change)
- Increasing **public knowledge** of natural resources and **awareness** of existing issues
- Gradually **changing the collective mindset** of society

Ultimately, people can become **river stewards**, continuing monitoring initiatives, educating others, advocating with authorities and decision-makers

Thank you for listening!

Any questions?