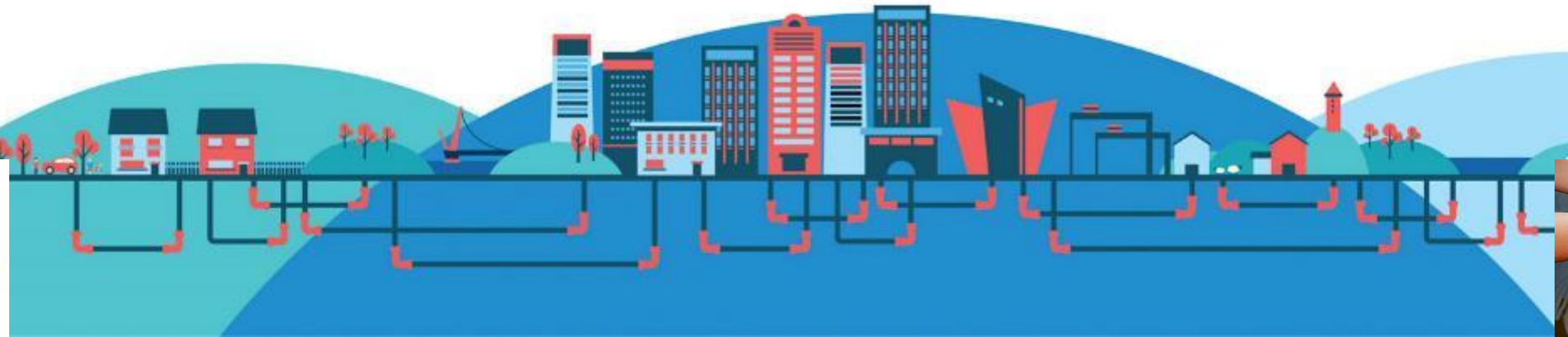
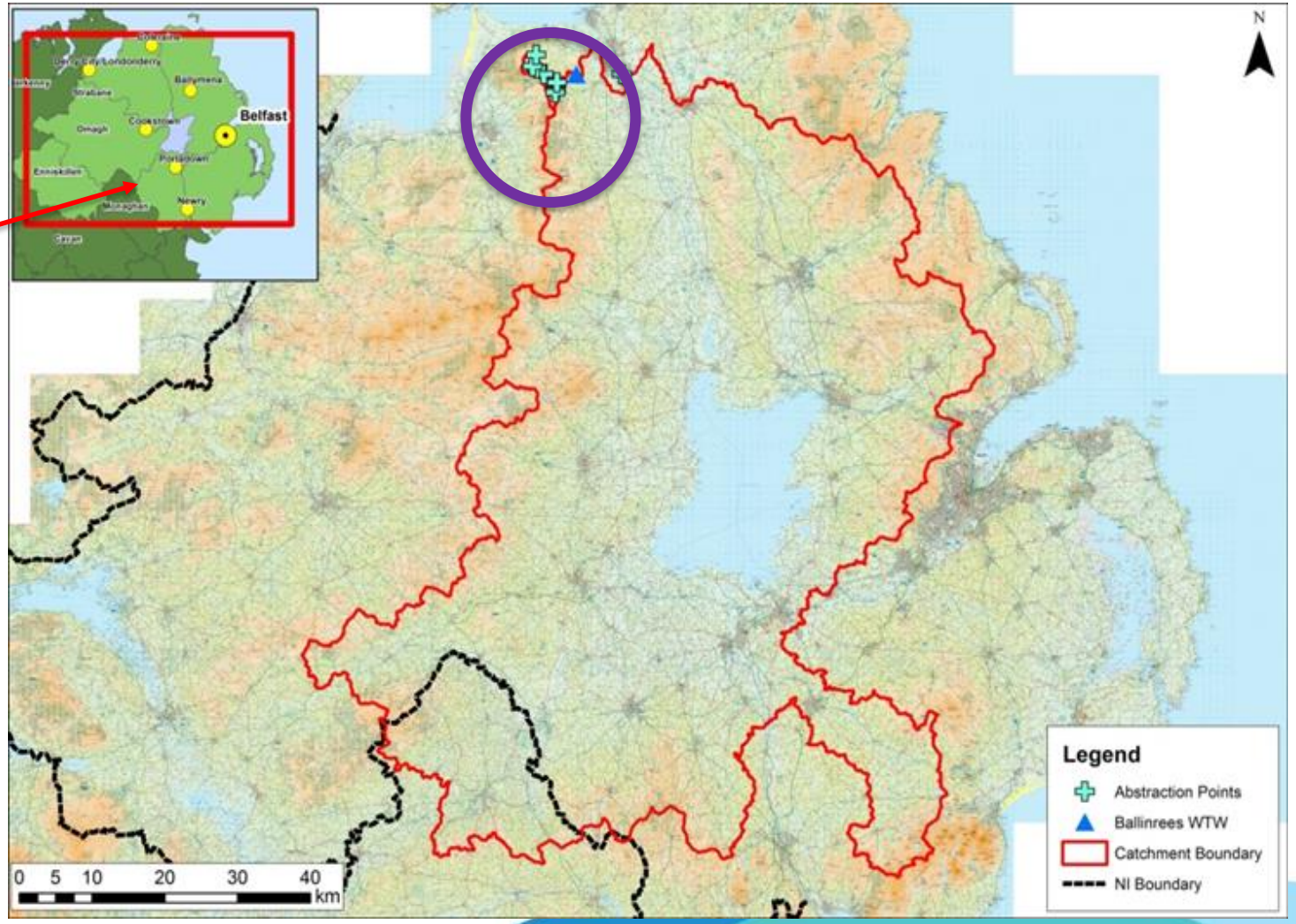
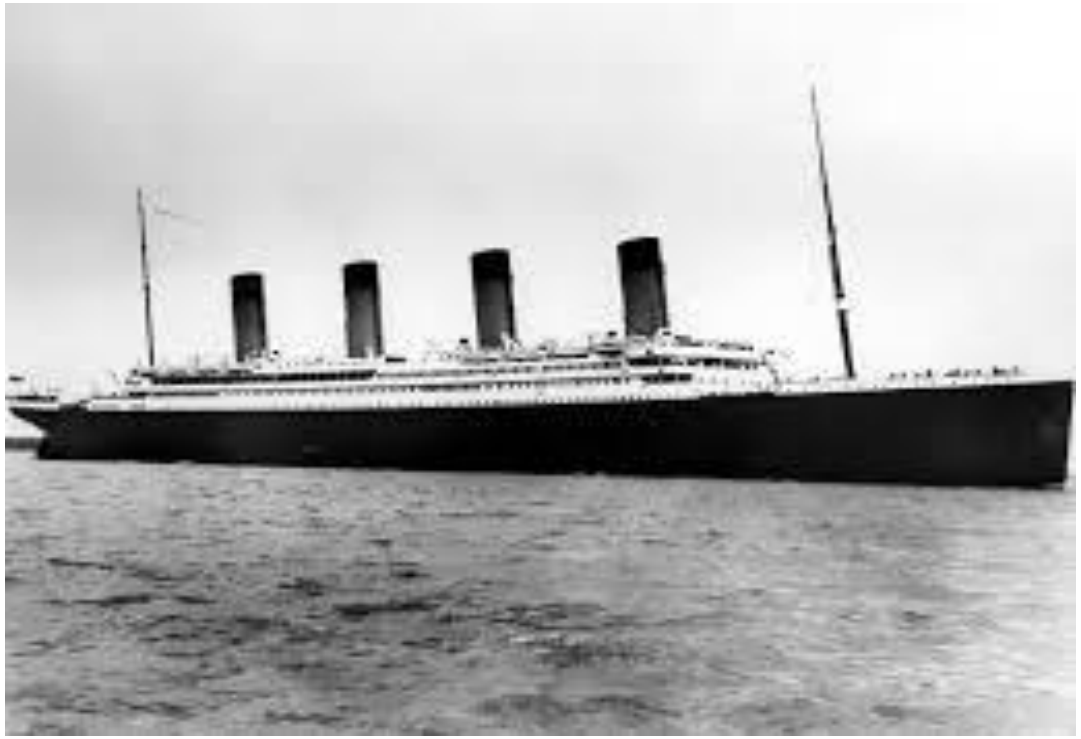
# How Northern Ireland Water is using Chemcatcher® to target raw water improvements
# - Ballinrees Catchment



# Where is Northern Ireland?



# What is Northern Ireland famous for?

# Northern Ireland Water

Assets include:

- 16765 miles of In Operation Water Mains
- 1,401 In Operation Waste Water Pumping Stations
- 1,077 In Operation Waste Water Treatment Works
- 23 In Operation Major Water Treatment Works

Drinking Water supply:

- 559 million litres per day

# Sustainable Catchment Management Program (SCaMP) Team

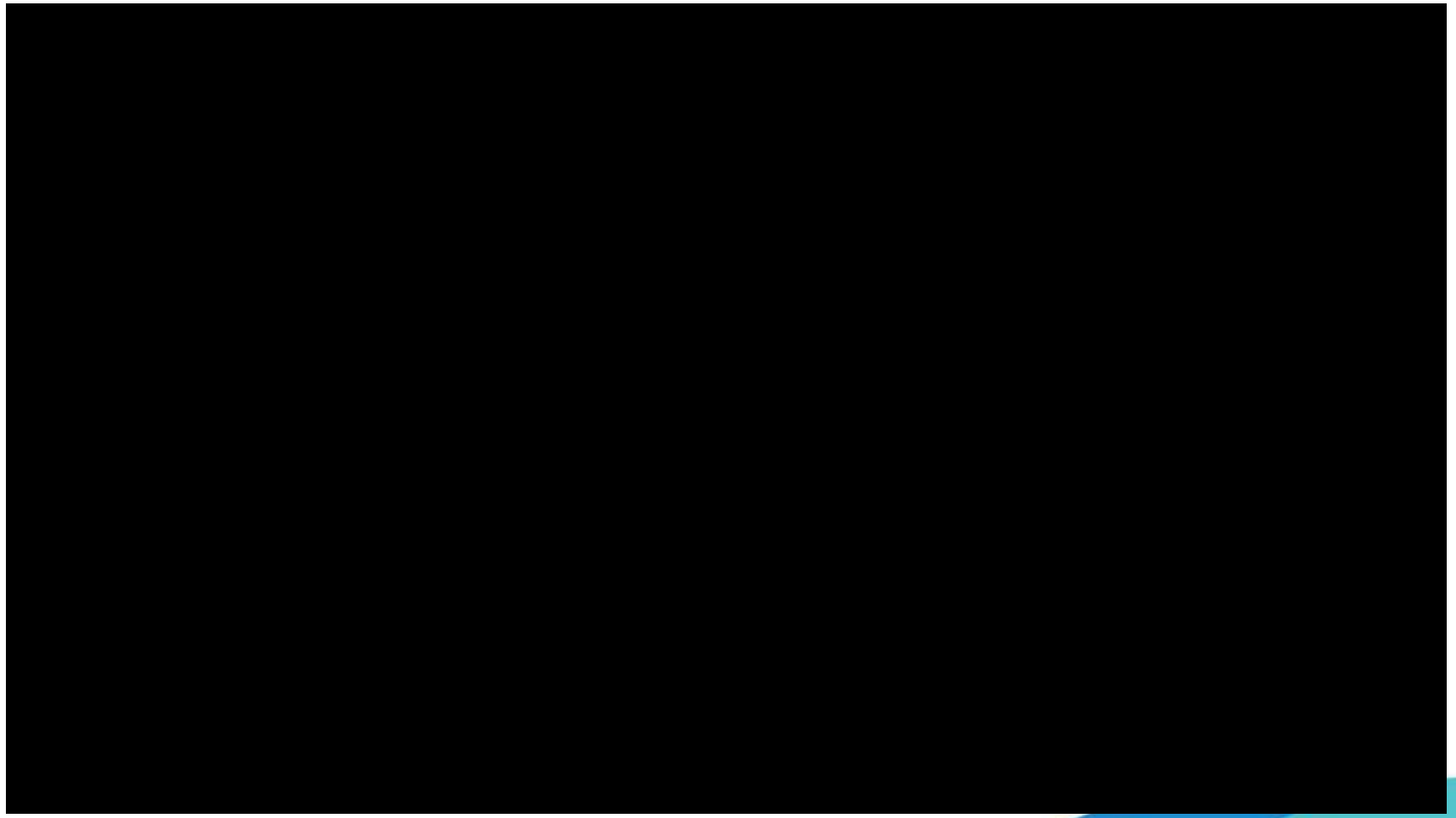
**Rebecca Allen**

- Working NI Water for 16 years in various roles.
- Catchment Liaison Officer since April 2019, implementing catchment management projects

**Dominic McCann**

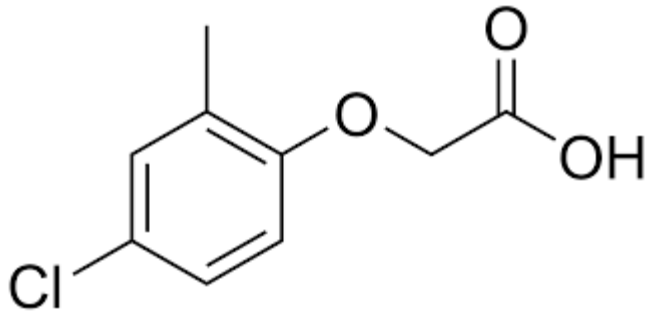
- Working as Farm Liaison Officer since 2014
- Key in forging a strong relationship with the agricultural community in Northern Ireland and promoting water protection

# Introduction to the work of SCAMP NI Water



# Why did NI Water use Chemcatchers?

- To investigate **source** of grassland **MCPA**




- Issues with exceedances of MCPA in drinking water

- Difficulties in removing MCPA - Granular activated carbon filters at treatment stage remove the chemical but are compromised with VOCs and humic acids so require capital investment for regeneration or replacement, especially after a significant MCPA ‘event’

# NI Water – issues with MCPA

- Water Inspectorate issued 3 enforcement notices to NI Water in 2017 – issues with MCPA since 2016

| Date of Significant Event | Area and Estimate of Population/ Properties Potentially Affected | Nature and Cause of Significant Event | Associated Council Area(s) |
|---|---|---|---|
| 17/04/17 - 10/08/17 | Ballinrees WTW (168,204 population) | Contraventions of the individual pesticide standard for MCPA occurred in the works final water due to insufficient treatment. A Consideration of Provisional Enforcement Order (CPEO) has been issued by the Inspectorate. | Causeway Coast & Glens Borough; and Derry City & Strabane District |
| 06/06/17 - 07/09/17 | Derg WTW (38,989 population) | Contraventions of the individual pesticide standard for MCPA occurred in the works final water due to insufficient treatment to effectively remove levels of MCPA in the raw water supply to the treatment works. MCPA use in the catchment area, to control weeds and rushes, caused elevated levels of MCPA in the raw water supply. A Consideration of Provisional Enforcement Order (CPEO) has been issued by the Inspectorate. | Derry City & Strabane District; and Fermanagh & Omagh District |

# What is MCPA?

- Specifically designed to kill weeds without harming crops and is a common active ingredient, widely available in both agricultural and domestic herbicide products.


- Used widely in Northern Ireland to control the growth of weeds like the Common Soft Rush

# MCPA Pollution

- MCPA does not bind to soil particles and is prone to leaching, directly into watercourses or via land drains.

- Field half-life of 14 days to one month depending on the type of crop being treated and the amount of MCPA being used.

# MCPA Limits/1

- In the European Union (EU), most individual pesticides including MCPA have a legal limit in drinking water of **0.1 micrograms/litre.**

- If more than one pesticide is found in drinking water, the total (sum) of all pesticides together, has a legal limit of **0.5 micrograms/litre.**

# MCPA Limits/2

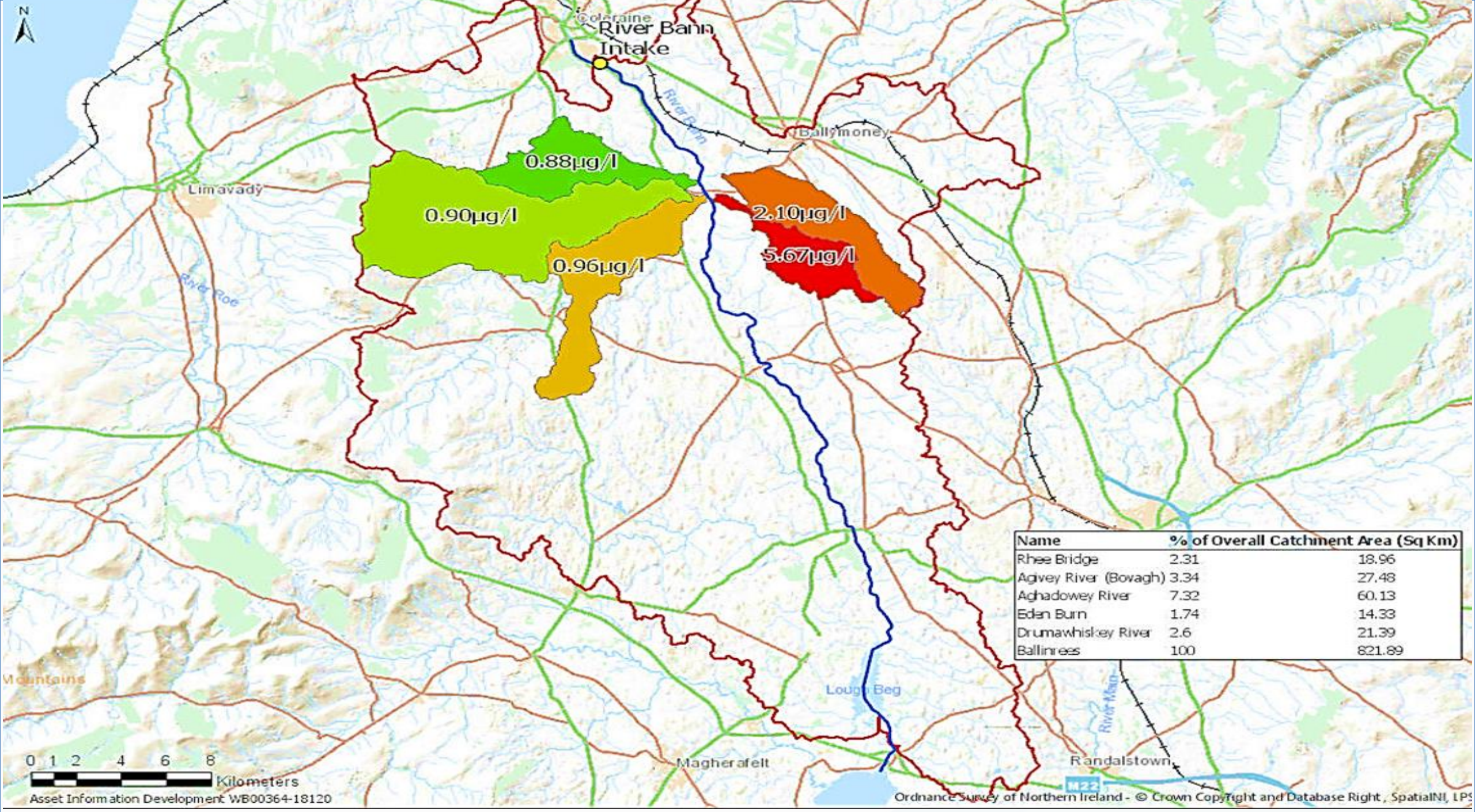
A single drop of pesticide in a water body such as a typical stream (1m wide, 0.30m deep), for example, can be enough to breach the legal limit for pesticides in drinking water of 0.1 micrograms /litre along 30 kilometres of its length.' (Pesticide Registration & Control Division, Dept. of Agriculture, Ireland)

# MCPA Health Effects

- The quickest way for MCPA to enter the system is through the nose. The herbicide is readily absorbed in the lungs and skin and can cause chronic damage.
- MCPA is not known to elicit any acute effects unless consciously ingested.
- MCPA exposure has a transgenerational effect. Mothers exposed to the substance have a higher chance of delivering a low birth weight baby.

# Training prior to deployments – Feb 2018

# On deployment – July 2018

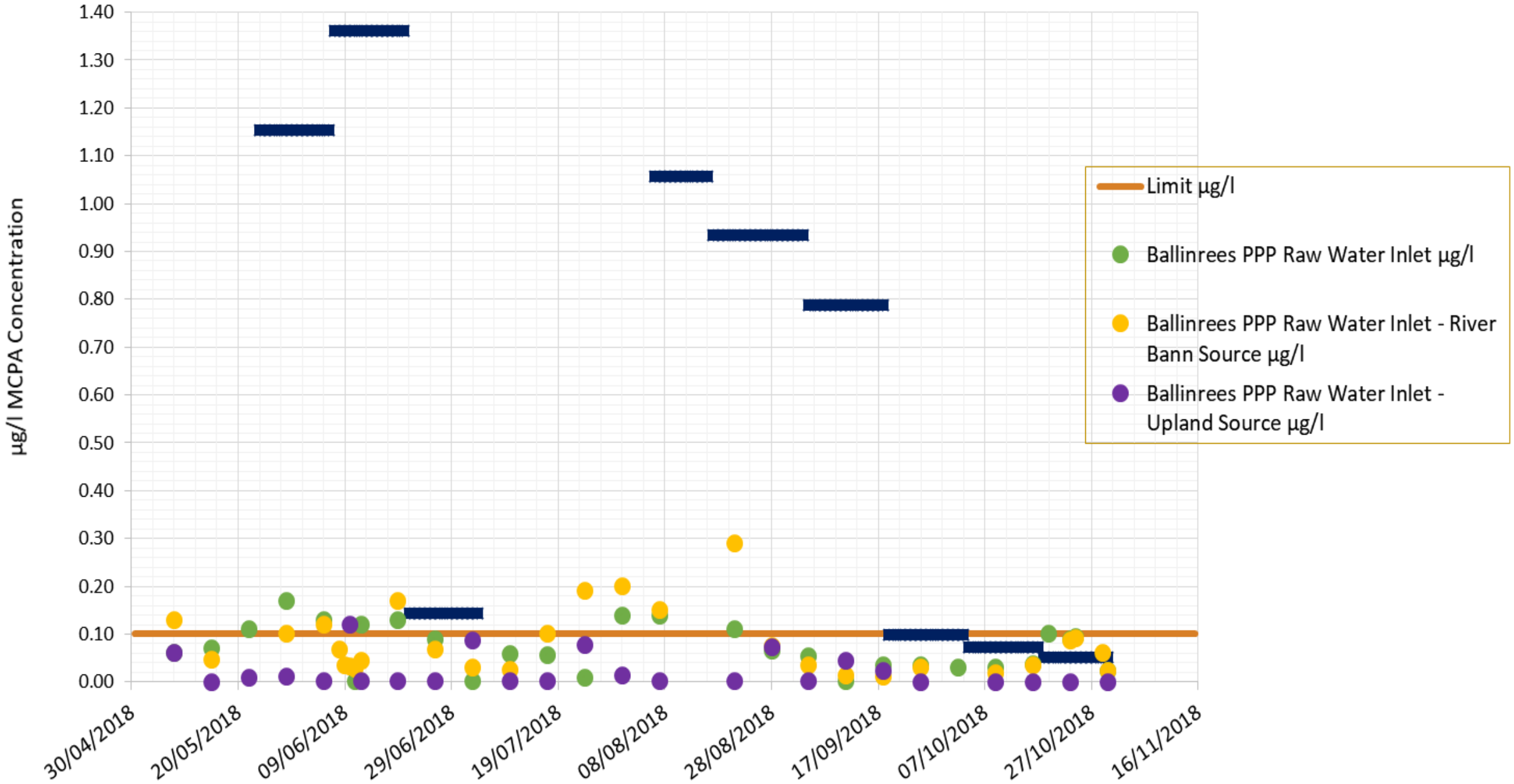


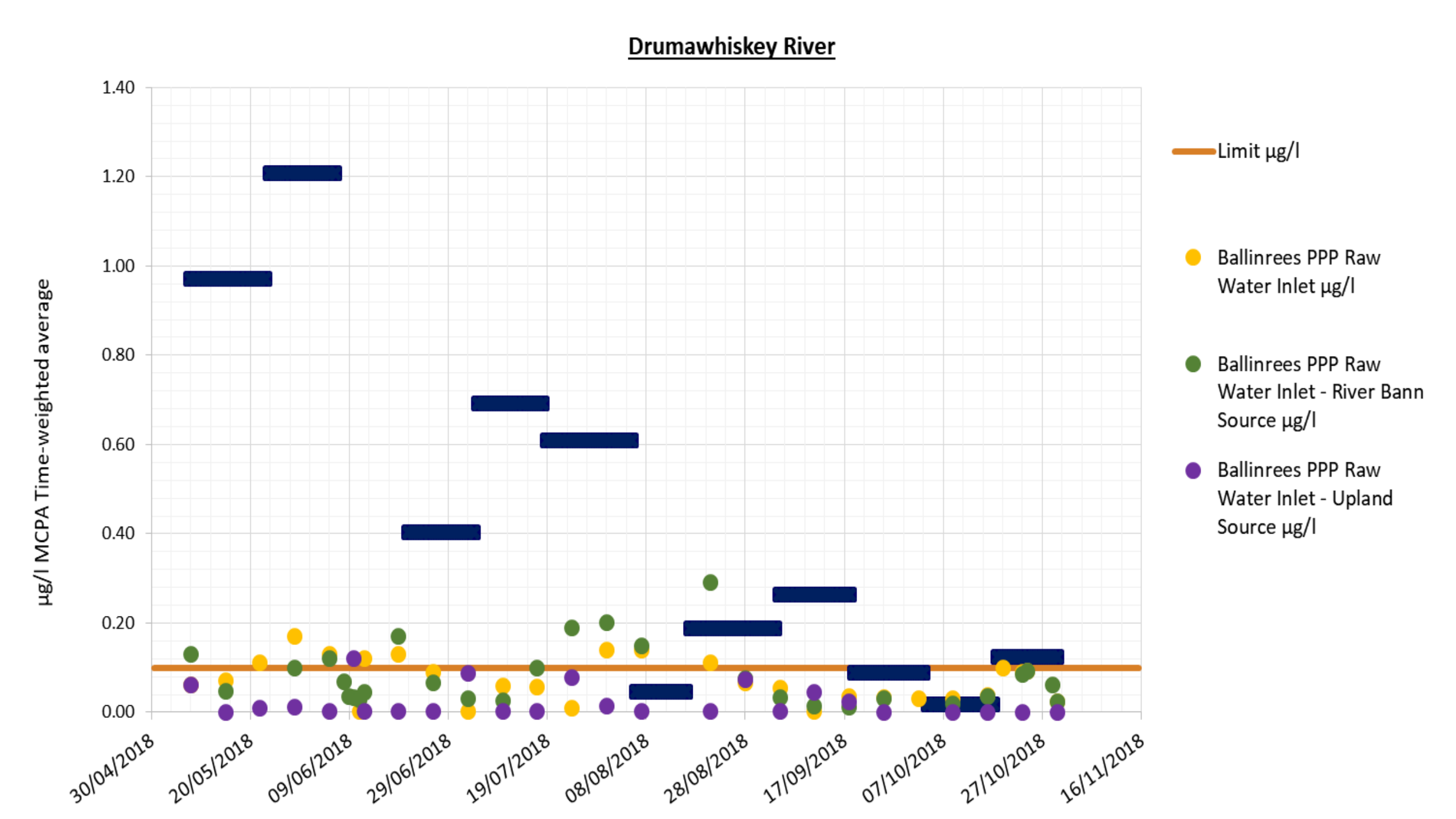

| Name | % of Overall Catchment | Area (Sq Km) |
|---|---|---|
| Rhee Bridge | 2.31 | 18.96 |
| Agivey River (Bovagh) | 3.34 | 27.48 |
| Aghadowey River | 7.32 | 60.13 |
| Eden Burn | 1.74 | 14.33 |
| Drumawhiskey River | 2.6 | 21.39 |
| Ballinrees | 100 | 821.89 |

# Calibration Data

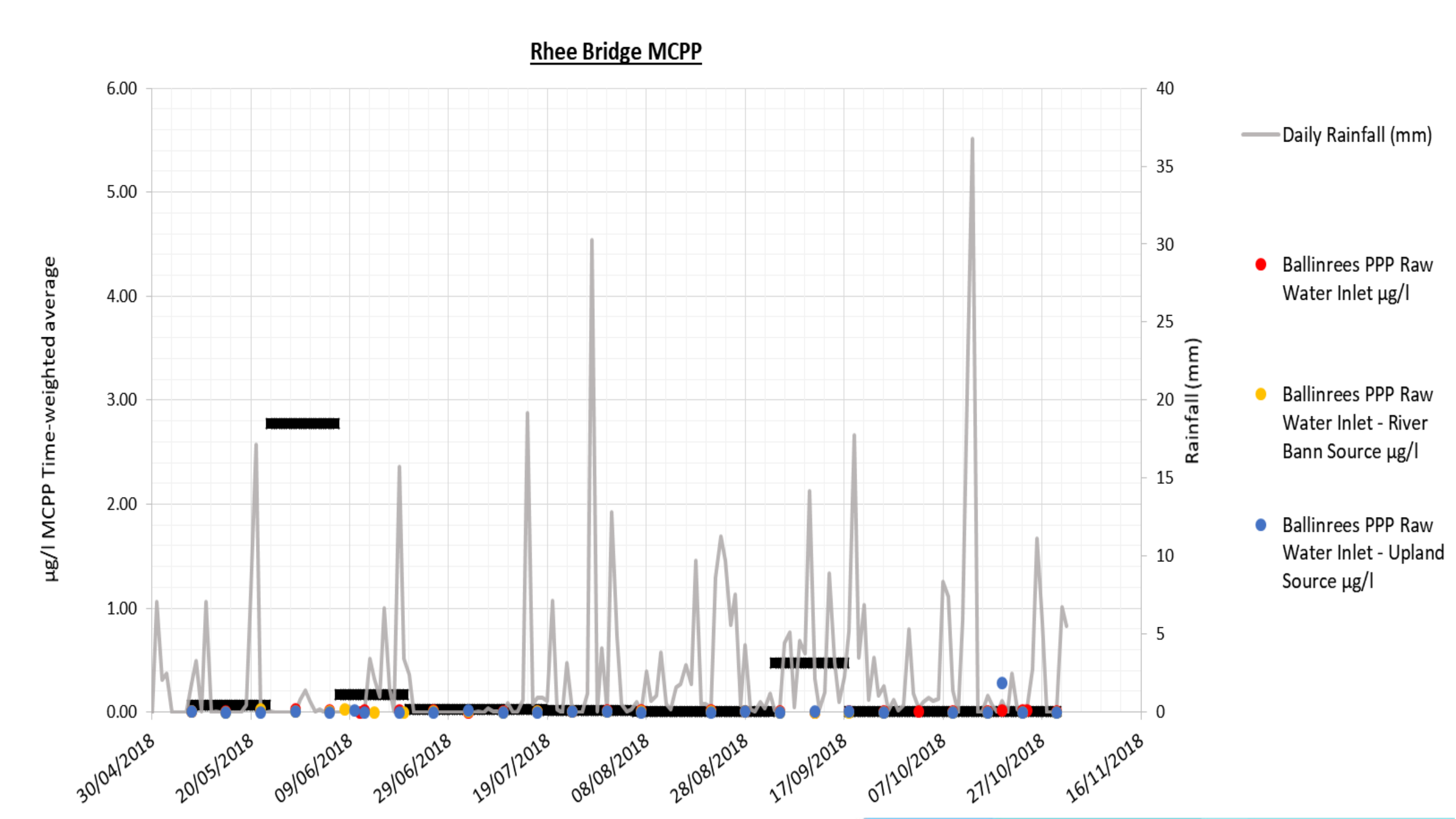
| | | Receiving phase | Diffusion membrane | $R_S$ (L day$^{-1}$) | Calibration conditions | | |
|---|---|---|---|---|---|---|---|
| | | | | | Field *vs.* lab | Temp. (°C) | Velocity (m s$^{-1}$) |
| **Metals** | Zn | Empore™ chelating disk | CA | 0.118 | Lab. | 18 | 0.4 and 0.7 |
| | Hg | Iminodiacetic chelating disk | PES | 2.088 | Lab. | | |
| **Organotin compounds** | TBT | C18 Empore™ disk | CA | 2.544 | Lab. | | |
| | DBT | | | 3.384 | Lab. | | |
| | MBT | | | 0.264 | Lab. | | |
| | TPhT | | | 1.416 | Lab. | | |
| | 2,4-D | Empore™ SDB-RPS disk | PES | 0.02 | Field | 5 - 20 | 0.05 – 0.8 |
| | 2,6-dichlorbenzamide | Empore™ SDB-RPS disk | PES | 0.06 | Field | 5 - 20 | 0.05 – 0.8 |
| | 4-acetamidoantipyrin | Empore™ SDB-RPS disk | PES | 0.06 | Field | 5 - 20 | 0.05 – 0.8 |

# Eden Burn


µg/l MCPA Concentration
1.40
1.30
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
30/04/2018
20/05/2018
09/06/2018
29/06/2018
19/07/2018
08/08/2018
28/08/2018
17/09/2018
07/10/2018
27/10/2018
16/11/2018
Limit µg/l
Ballinrees PPP Raw Water Inlet µg/l
Ballinrees PPP Raw Water Inlet - River Bann Source µg/l
Ballinrees PPP Raw Water Inlet - Upland Source µg/l


Drumawhiskey River
µg/l MCPA Time-weighted average
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
30/04/2018
20/05/2018
09/06/2018
29/06/2018
19/07/2018
08/08/2018
28/08/2018
17/09/2018
07/10/2018
27/10/2018
16/11/2018
Limit µg/l
Ballinrees PPP Raw Water Inlet µg/l
Ballinrees PPP Raw Water Inlet - River Bann Source µg/l
Ballinrees PPP Raw Water Inlet - Upland Source µg/l

# Crash near Rhee Bridge – May 2018


Rhee Bridge MCPP
µg/l MCPP Time-weighted average
Rainfall (mm)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
40
35
30
25
20
15
10
5
0
30/04/2018
20/05/2018
09/06/2018
29/06/2018
19/07/2018
08/08/2018
28/08/2018
17/09/2018
07/10/2018
27/10/2018
16/11/2018
Daily Rainfall (mm)
Ballinrees PPP Raw Water Inlet µg/l
Ballinrees PPP Raw Water Inlet - River Bann Source µg/l
Ballinrees PPP Raw Water Inlet - Upland Source µg/l

# Cost of Chemcatchers versus Spot Sampling

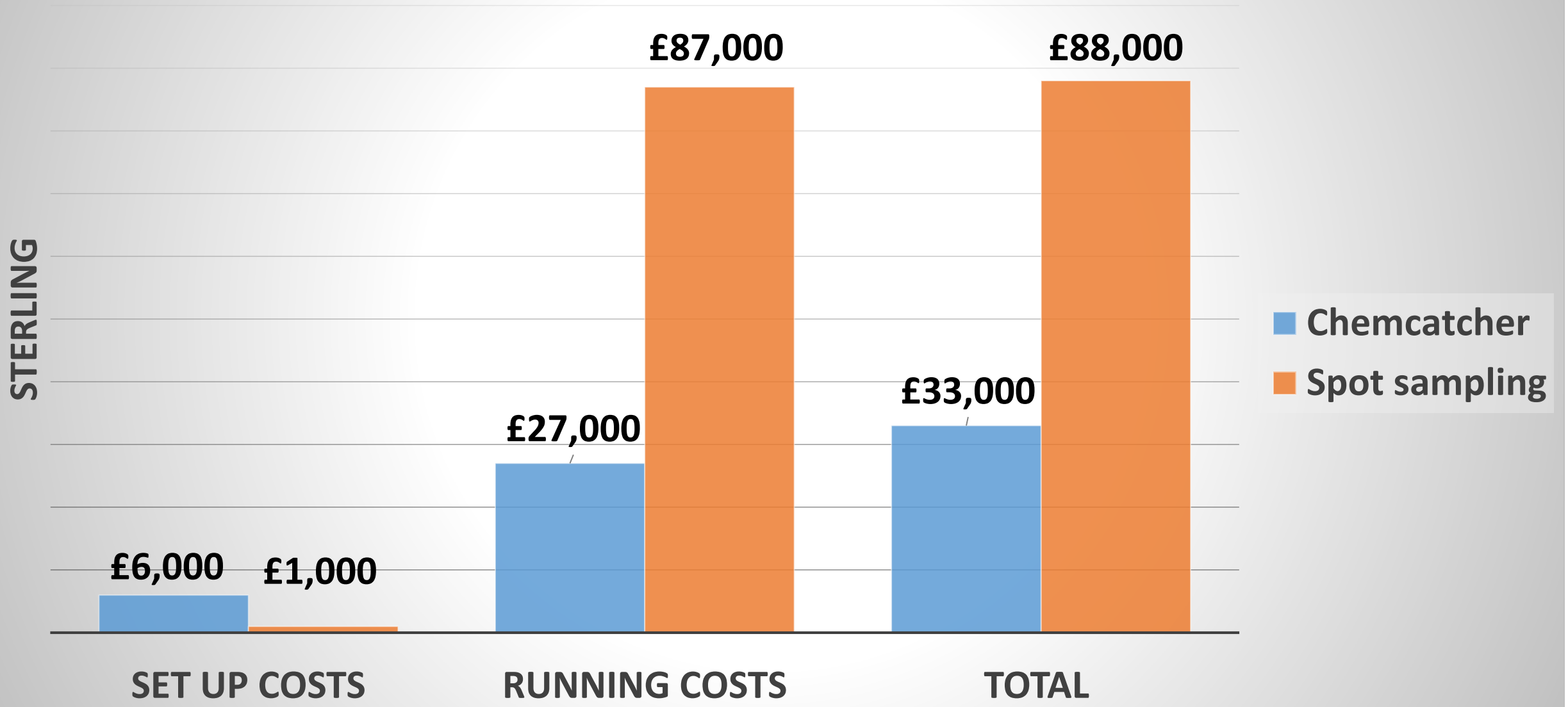
Estimate of costs over a 22 week sampling period

Based on 6 sampling sites in 1 catchment area

Spot sampling – 154 samples (7 samples per week x 22 weeks)

Chemcatcher – Deployed at 6 sites for 14 days

# Cost of Chemcatcher versus Spot Sampling



# Working with the community

# Conclusions

- NI Water und and
  associated ac nto the Lower
  Bann
- Identificatio g work area
  to **<5% of tot**
- Weed wiping farming
  communities
- NI Water found Chemcatchers easy to use and effective so they are using them in another campaign this year until November 2019

Thank you