WESTCOUNTRY RIVERS TRUST CITIZEN SCIENCE

MONITORING OF THE PAR RIVER AND ITS TRIBUTARIES

The monitoring group operates under the citizen science scheme run by the Westcountry Rivers Trust. The Friends of Luxulyan Valley, The Friends of Par Beach, and the G7 Legacy Project for Nature Recovery have helped. Comments and opinions in this report are those of the authors and not necessarily shared by these organisations.

JUNE 2023

Motorbike in Par River near Minorca Lane. It was reported to the police and Cornwall Council. Cornwall Council has taken this up and will remove and crush the bike.

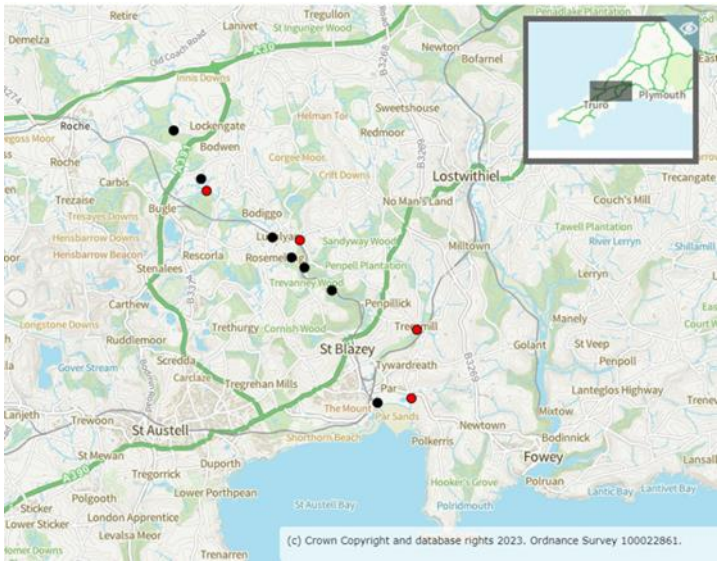
A. OUR JUNE 2023 FINDINGS AT A GLANCE (SEE SECTIONS C TO J FOR FULL PICTURE)

We sampled at 11 locations.

CRITERIA	UPPER PAR (UPSTREAM OF CONFLUENCE WITH BOKIDDICK STREAM NEAR BLACK HILL CAR PARK) 4 SAMPLE LOCATIONS	LOWER PAR (FROM CONFLUENCE WITH BOKIDDICK STREAM TO SEA) 3 SAMPLE LOCATIONS	TRIBUTARIES OF UPPER PAR (CARBIS STREAM, BOKIDDICK STREAM) 2 SAMPLE LOCATIONS	TRIBUTARIES OF LOWER PAR (TREESMILL/TYWARDREATH MARSH STREAM & POLMEAR STREAM) 3 SAMPLE LOCATIONS
TEMPERATURE (SHOULD NOT EXCEED 18˚ CELSIUS)	Average 15.55˚ Celsius	Average 17.36˚ Celsius	Average 17.4˚ Celsius	Average 16.9˚ Celsius
TOTAL DISSOLVED SOLIDS (SHOULD NOT EXCEED 300 PPM)	150.5 PPM	158.66 PPM	184 PPM	147.5 PPM
TURBIDITY (SHOULD BE <12 ON SECCHI TUBE. FOR AVERAGING ANY READING <12 IS COUNTED AS 11)	0	0	0	0
PHOSPHATES (SHOULD NOT EXCEED 100 PPB)	500 PPB	1,333.33 PPB (Max. 2500 at LRM. EA informed)	333.33 PPB	50 PPB
RIVERFLY TRIGGER LEVEL (SHOULD BE ≥ 6)	N/A	9	N/A	N/A
E.COLI (SHOULD NOT EXCEED 84 MPN/100ML BUT RESULTS NEED EXPERT CONFIRMATION)	N/A	LRM = >1000 MPN/100ML (VERY UNSAFE – USA RECREATIONAL BATHING WATER STANDARDS)	Gatty's = 136 MPN/100ML (HIGH RISK/PROB. UNSAFE– USA RECREATIONAL BATHING WATER STANDARDS)	N/A
TOTAL COLIFORMS (SHOULD NOT EXCEED 84 MPN/100ML BUT RESULTS NEED EXPERT CONFIRMATION)	N/A	LRM =>1000 MPN/100ML (VERY UNSAFE - USA RECREATIONAL BATHING WATER STANDARDS)	Gatty's = >1000 MPN/100ML (VERY UNSAFE - USA RECREATIONAL BATHING WATER STANDARDS)	N/A
WILDLIFE EVIDENCE	Dragonflies, fish, otter spraint.	Dippers, fish, otter spraint, 5 types of riverfly larvae (out of 8 sought).	None	Fish, magpies, thrush, robin.
VISIBLE EVIDENCE OF POLLUTION	Foam, motorbike	NONE	DEBRIS, SOME CHINA CLAY.	NONE

B. JUNE 2023 MONITORING POINTS

This month monitoring occurred at the 11 regular locations. Monitoring points along the main Par River are shown in black. Those in red are on tributaries.



Source: https://magic.defra.gov.uk/MagicMap.aspx

LOCATION	DATE	TYPE OF CHECK	MONITORED BY
Criggan Moors, Par River, SX 01882 61133	23/6/2023	CSI sample & Cartographer record.	Roger Smith
South of Minorca Lane, Par River, SX02668 59747	23/6/2023	CSI sampling. Cartographer record.	Roger Smith
Carbis Stream SX 02834 59401	23/6/2023	CSI sampling. Cartographer record.	Roger Smith
Luxulyan allotments, Par River, SX 04732 58045	23/6/2023	CSI sampling. Cartographer record.	Roger Smith
Cam Bridges, Par River, SX 05292 57454	23/6/2023	CSI sampling. Cartographer record.	Roger Smith
Gatty's Bridge, Bokiddick Stream SX 05531 57953	23/6/2023	CSI sampling. Cartographer record.	Joan Farmer
Treffry Viaduct, Par River, SX 05650 57179	23/6/2023	CSI sampling. Cartographer record.	Joan Farmer, Roger Smith
Lady Rashleigh Mine, Par River, SX 06451 56509	23/6/2023	CSI sampling. Cartographer record. Riverfly. Bacteria sample.	Dave Burrell, Joan Farmer, Veronica Jones, Roger Smith
Treesmill, Tywardreath Stream, SX 08873 55385	18/6/2023	CSI sampling. Cartographer record.	Maggie Tagney
Par Beach slipway, SX 0776 53261	22/6/2023	CSI sampling. Cartographer record.	Brian Harrisson
Polmear Stream, Ship Inn SX 08749 53417	22/6/2023	CSI sampling. Cartographer record.	Simon Tagney

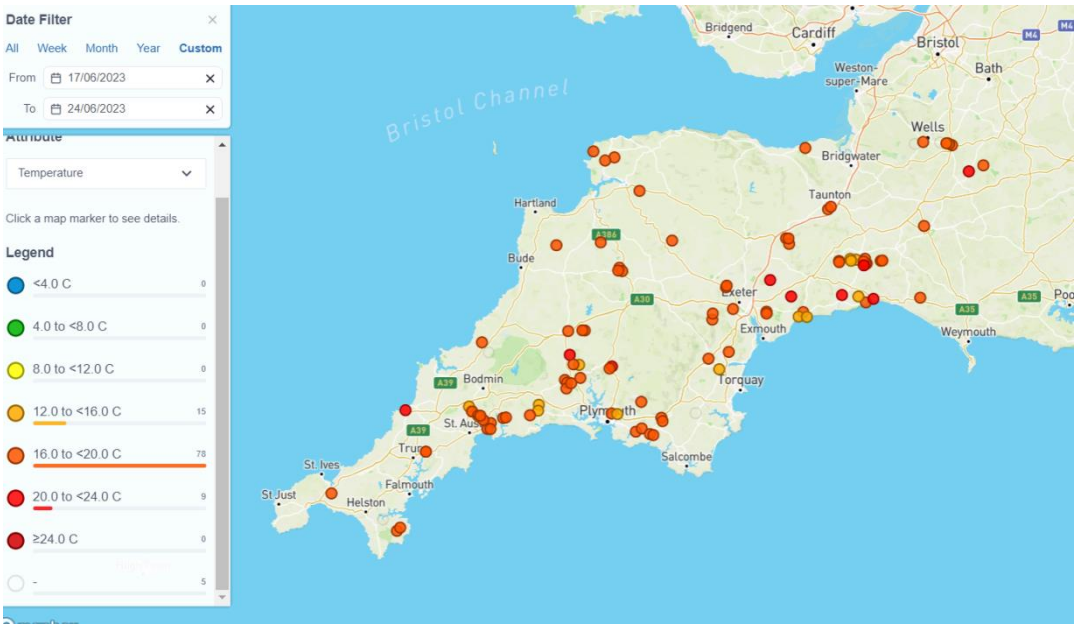
C. TEMPERATURE

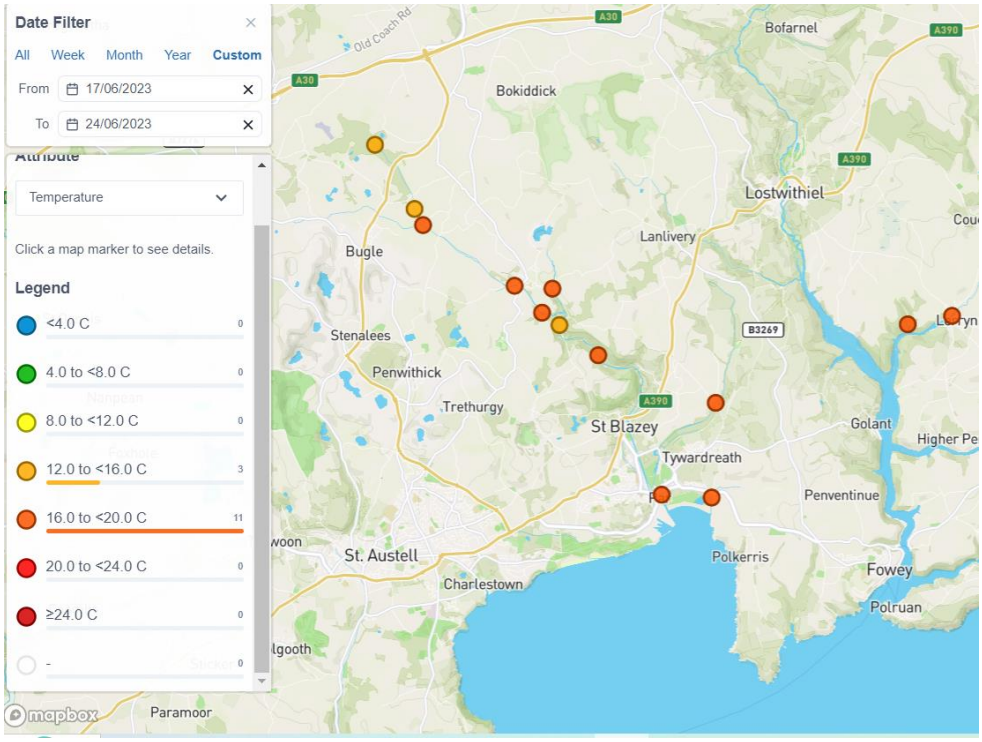
1. This is the WRT's explanation of why this is monitored:

Temperature is a vital parameter within the river ecosystem. It controls many of the aquatic species life cycles. Temperature fluctuates with the seasons; however, you do get variation within

that, particularly in small rivers and streams. Another important reason to measure temperature is to track the impact of our warming climate on our waterbodies.

2. **Geographical comparison.** Source: Cartographer.





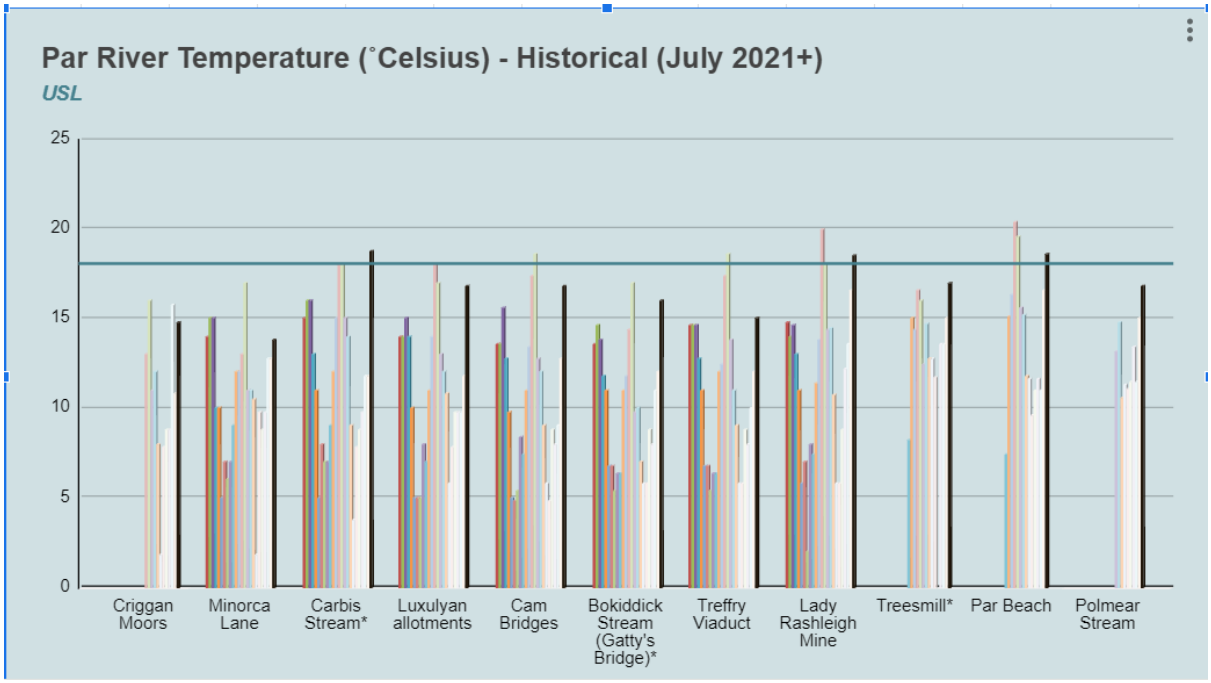
3. Results June 2023

PAR RIVER/TRIBUTARY	LOCATION	Temperature ˚Celsius
Par	Criggan Moors, SX 01882 61133	**14.8**
Par	South of Minorca Lane, Par River, SX 02657 59788	**13.8**
Tributary	Carbis Stream SX 02834 59401	**18.8**
Par	Luxulyan allotments, Par River, SX 04732 58045	**16.8**
Par	Cam Bridges, Par River, SX 05292 57454	**16.8**
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	**16**
Par	Treffry Viaduct, Par River, SX 05650 57179	**15**
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	**18.5**
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385*	**17**
Par	Par Beach slipway, SX 0776 53261	**18.6**
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	16.8

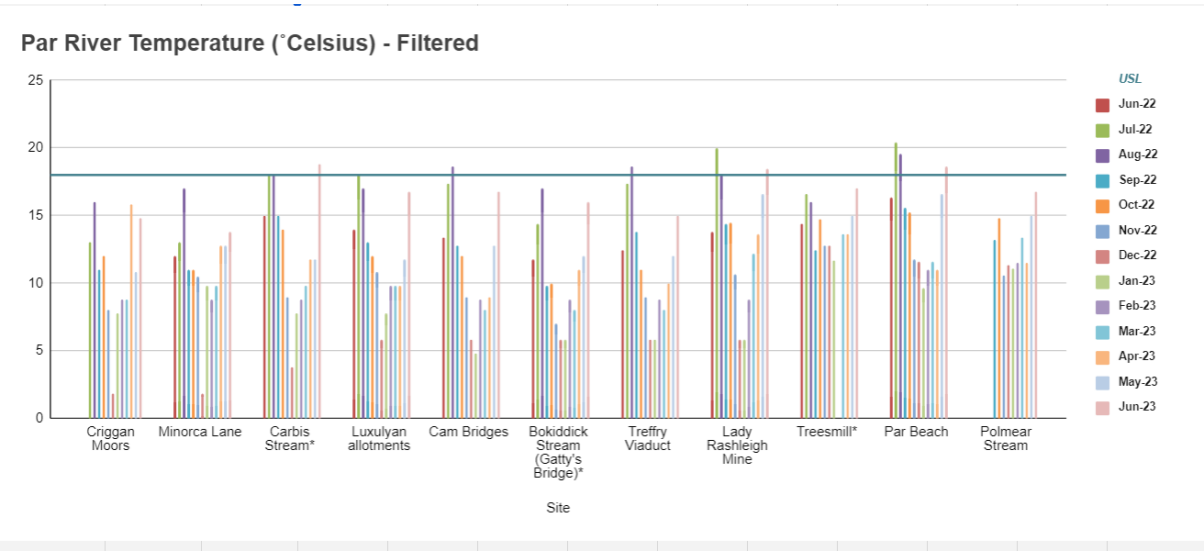
Results in red are above the temperature at which fish and other organisms can function healthily.

4. Graphs

(a) Historical



(b) The last year

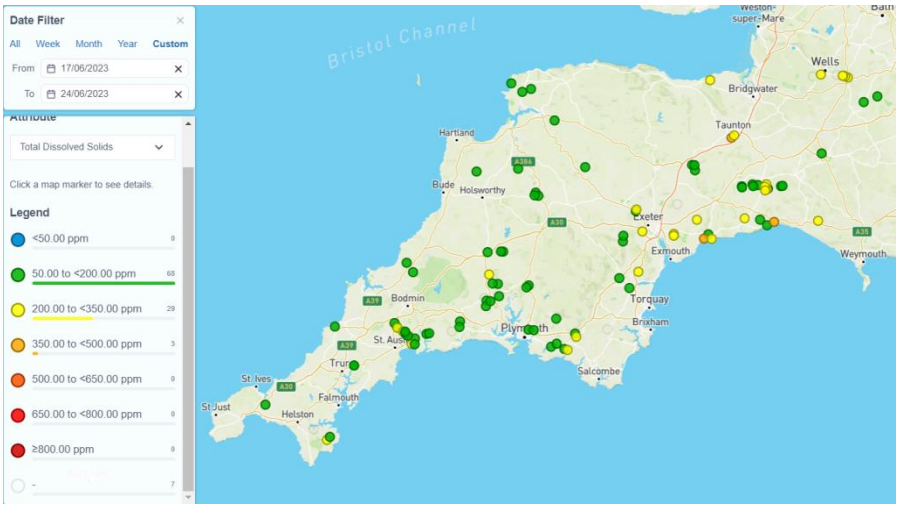


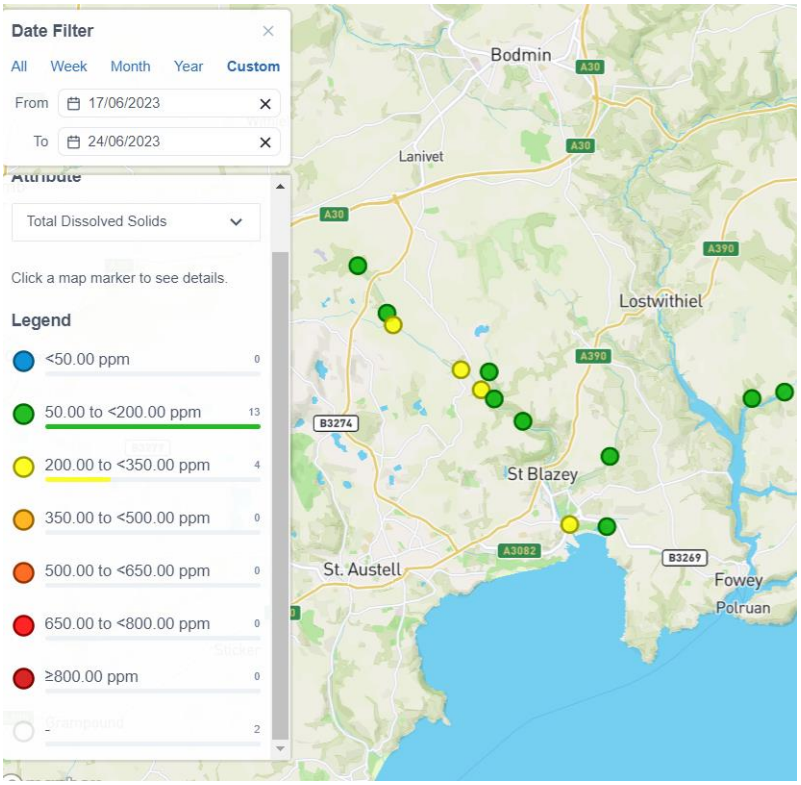
D. TOTAL DISSOLVED SOLIDS

1. We measure these in ppm (parts per million). This is the WRT's explanation:

Total Dissolved Solids (TDS) is directly related to the conductivity of the water. The more minerals, salts and metals that are dissolved in the water the more conductive it gets. Low levels of dissolved solids in waters such as those on Dartmoor near to the source of the river are a result of very low levels of input from the surrounding landscape. As the river runs down to the sea it collects material from many different inputs, some natural and some man-made such as farms, sewage plants, factories and residential areas. This typically increases the amount of solids dissolved in the water leading to a higher reading. Harmful pollution from things like sewage, slurry and factory discharge will usually elevate your TDS reading. However, some pollutants such as oil can lower conductivity; therefore it should be used as a general indicator of water quality not a specific measure of toxicity. Geology will influence the normal level of conductivity in a watercourse (e.g. Areas dominated by granite generally give a lower conductivity than those with limestone). Regular monitoring will allow the detection of changes in conductivity which can indicate pollution.

2. Geographical comparison. Source: Cartographer.





3. Results June 2023

PAR RIVER/TRIBUTARY	LOCATION	Total Dissolved Solids PPM
Par	Criggan Moors, SX 01882 61133	84
Par	South of Minorca Lane, Par River, SX 02657 59788	77
Tributary	Carbis Stream SX 02834 59401	282
Par	Luxulyan allotments, Par River, SX 04732 58045	214
Par	Cam Bridges, Par River, SX 05292 57454	227
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	86

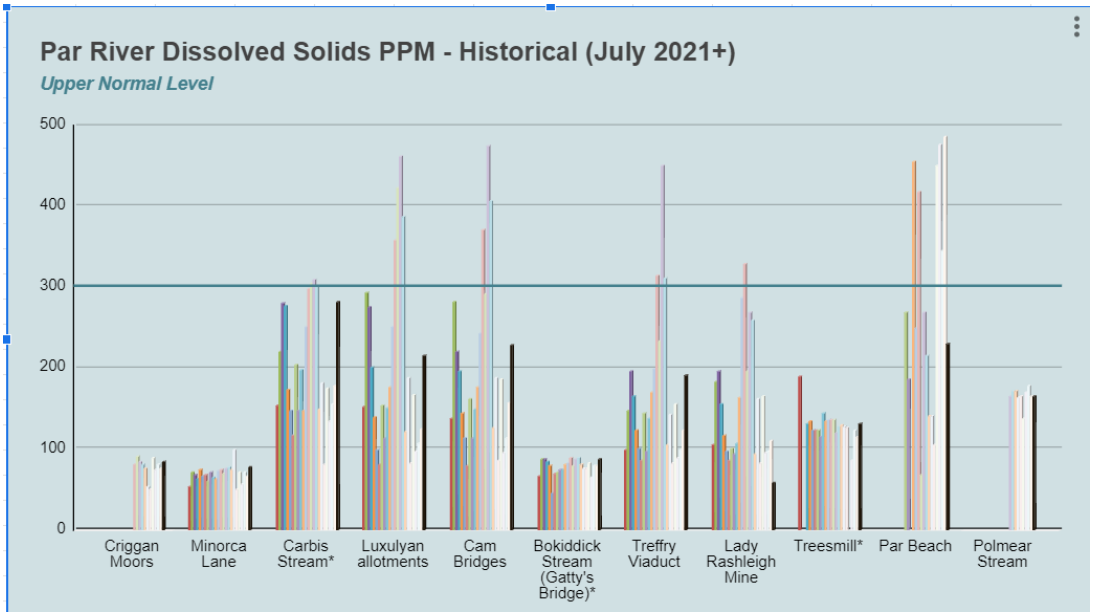
Par	Treffry Viaduct, Par River, SX 05650 57179	190
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	57
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385*	130
Par	Par Beach slipway, SX 0776 53261	229
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	165

Upper Normal Level

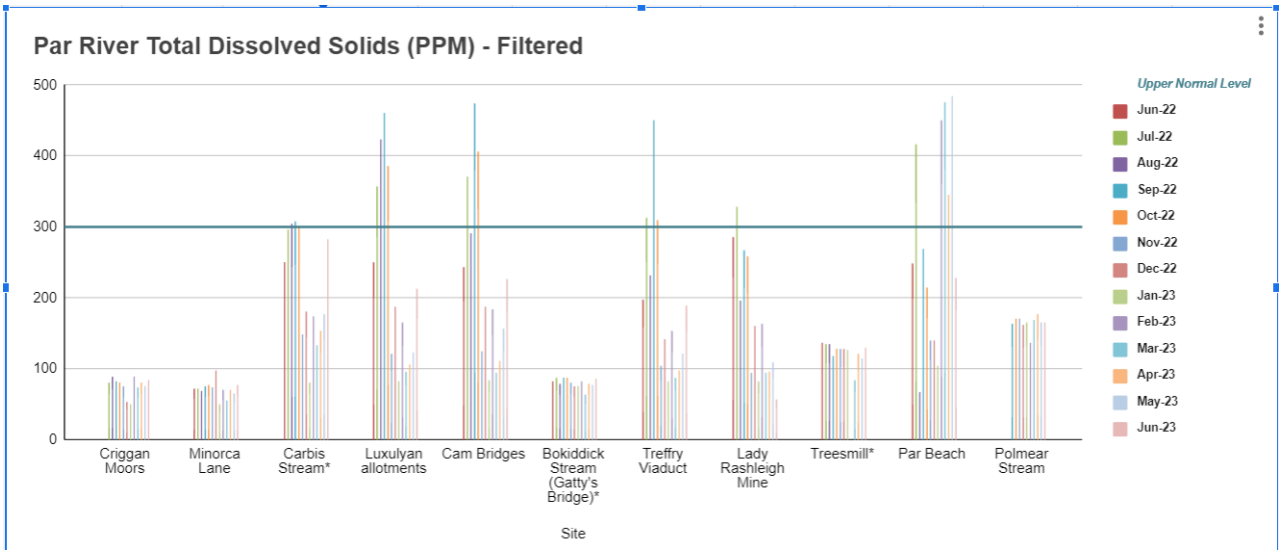
The WRT advice is: 'TDS levels vary between catchments due to natural geology etc. We generally say that after 6 months of sampling you should have an idea of what is 'normal' for your river. Looking at the scorecards for the Lower Par for 2020 and 2021 I would say that anything above 300 ppm is too high.'

4. Graphs

(a) Historical



(b) The last year

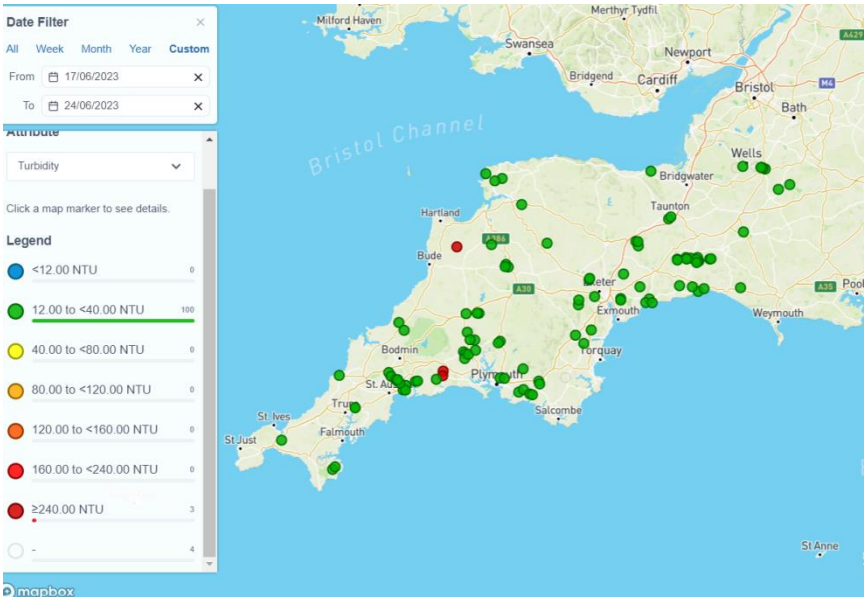


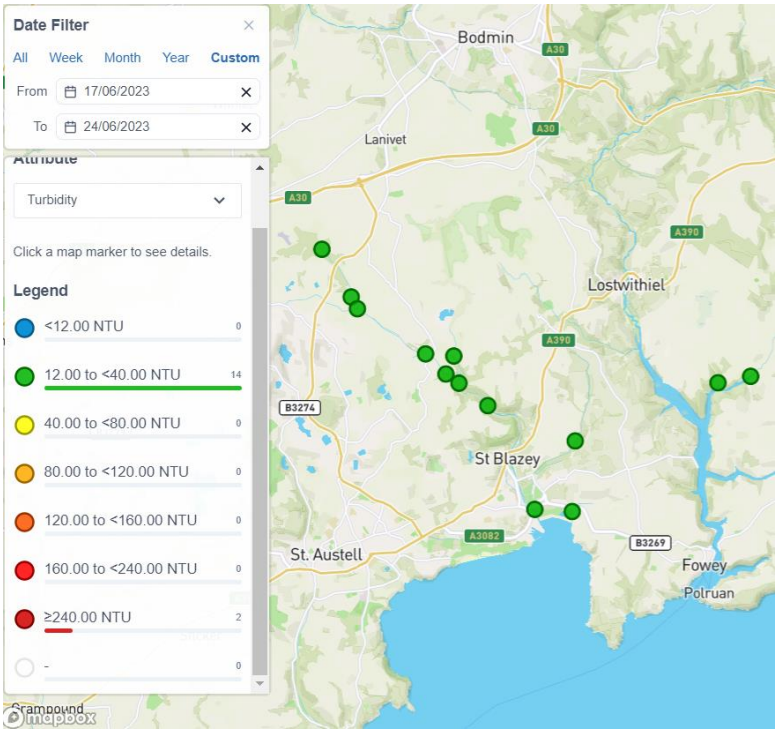
E. TURBIDITY

1. This is the WRT explanation of this measure:

Turbidity tube is a measure of the optical clarity of the water. The more suspended particles in the water the lower the clarity and the higher the turbidity. You will often find your waterbody gets more turbid after heavy rainfall due to soil running off the fields and sediment being mixed into the water column. This loss of topsoil is both a problem for farmer and river. It can often contain chemicals from the fertiliser and pesticides used on the land. An increase in sediment level on the substrate of the river can cause smothering of habitat by removing light and oxygen. Aquatic wildlife such as the less mobile invertebrates and fish eggs struggle to survive in low oxygen conditions and without light, plants are unable to grow. It is a good idea to sample your river after different weather conditions to understand how it responds to rainfall or drought.

2. **Geographical comparison.** Where scores are shown as 0, it means that the reading using the Secchi tube was <12. Source: Cartographer. The dots for the Par River should be blue, not green.



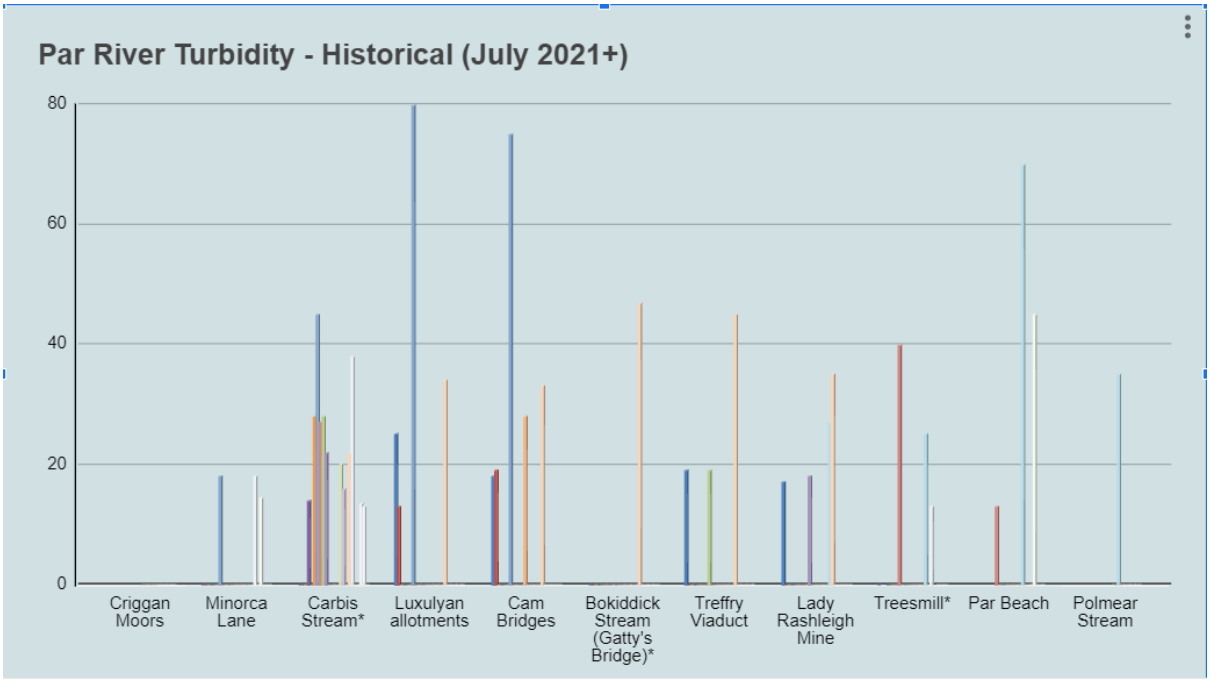


3. Results June 2023

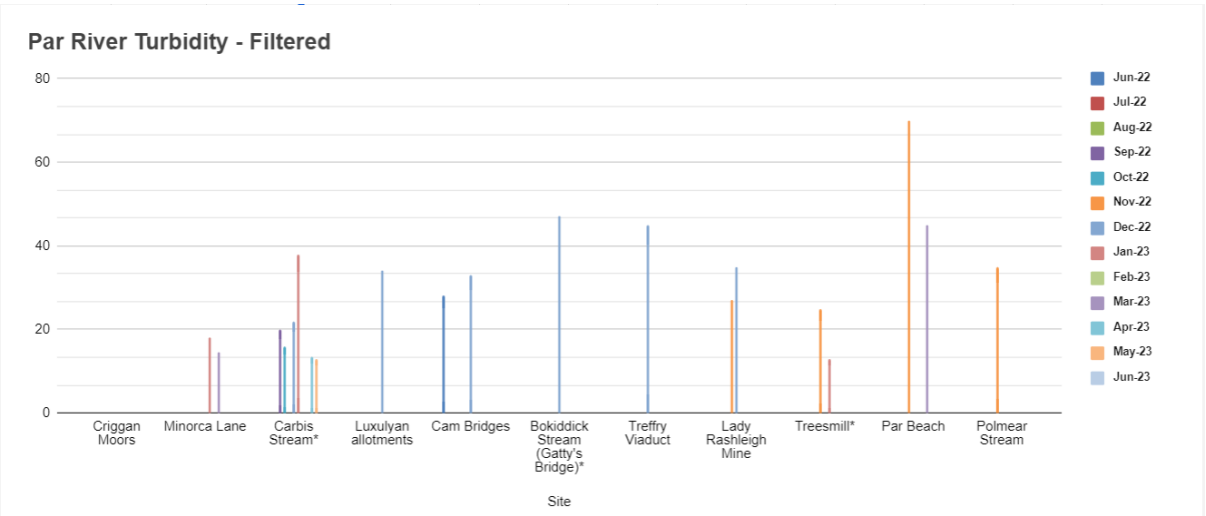
PAR RIVER/TRIBUTARY	LOCATION	Turbidity
Par	Criggan Moors, SX 01882 61133	0
Par	South of Minorca Lane, Par River, SX 02657 59788	0
Tributary	Carbis Stream SX 02834 59401	0
Par	Luxulyan allotments, Par River, SX 04732 58045	0
Par	Cam Bridges, Par River, SX 05292 57454	0
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	0
Par	Treffry Viaduct, Par River, SX 05650 57179	0
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	0
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385*	0
Par	Par Beach slipway, SX 0776 53261	0
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	0

4. Graphs

(a) Historical



(b) The last year



F. PHOSPHATES

1. This is the WRT's explanation of this measure.

Phosphate occurs naturally within the river ecosystem, but in very low levels under 0.05 mg/l. Therefore, higher levels may indicate anthropogenic input. Phosphate is found in animal and human waste, cleaning chemicals, industrial runoff and fertiliser so this can be a good indicator of pollution. Having raised levels of phosphate can lead to increases in plant growth within the watercourse. This leads to a depletion of oxygen due to the plant's aerobic respiration during the night. Without oxygen aquatic species cannot survive and the river ecosystem collapses. (It is important to note that phosphate is taken up by plants. You may get a low reading but high plant growth, indicating eutrophication.)

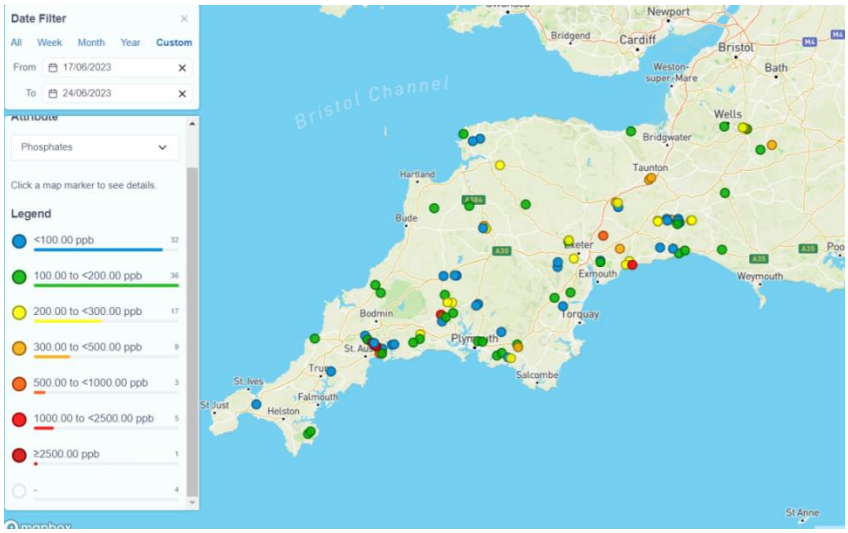
Ranges on phosphate diagnostic colour chart:

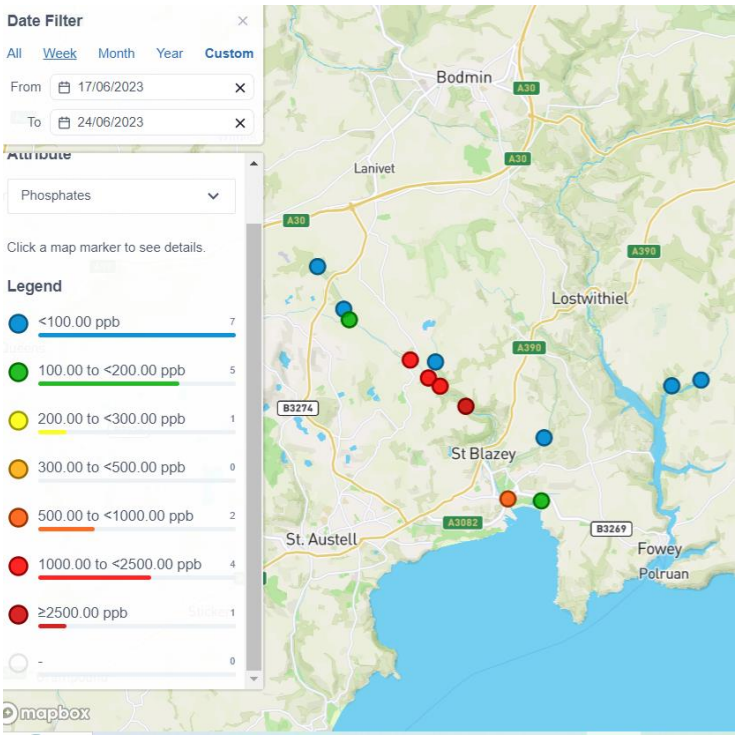
0 – 100 OK

200 – 300 HIGH

500 – 2500 – TOO HIGH

2. **Geographical comparison.** Source: Cartographer





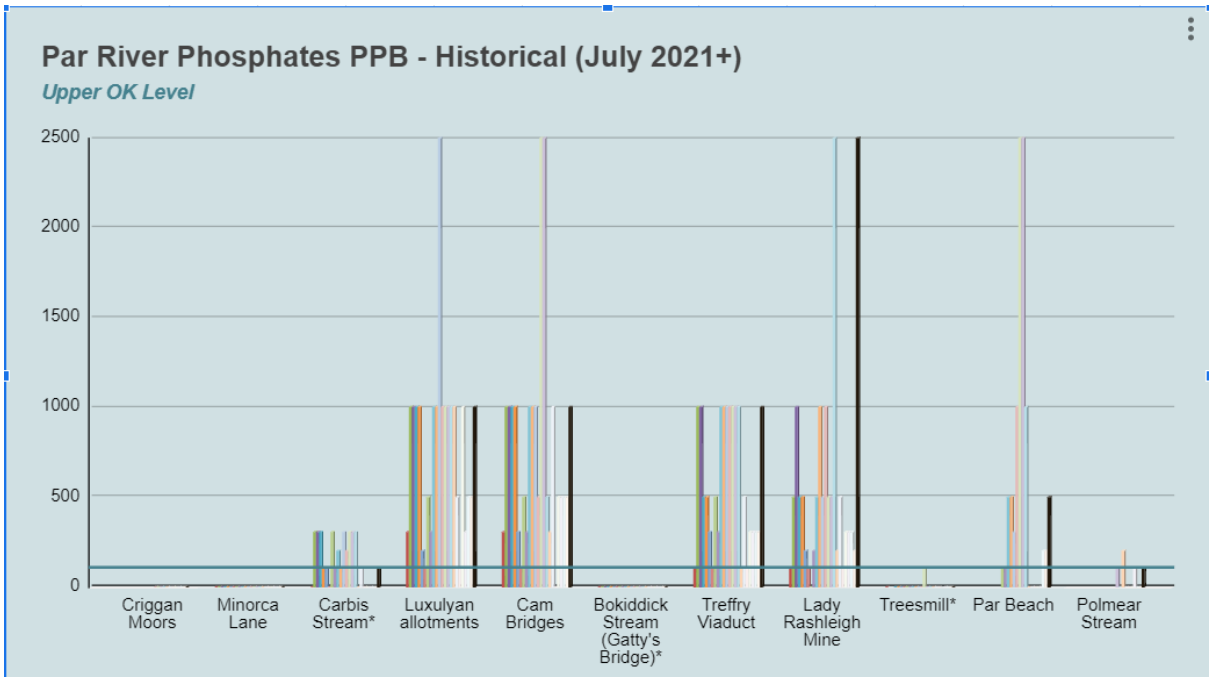
3. Results June 2023

PAR RIVER/TRIBUTARY	LOCATION	Phosphates PPB
Par	Criggan Moors, SX 01882 61133	**0**
Par	South of Minorca Lane, Par River, SX 02657 59788	**0**
Tributary	Carbis Stream SX 02834 59401	**100**
Par	Luxulyan allotments, Par River, SX 04732 58045	**1000**
Par	Cam Bridges, Par River, SX 05292 57454	**1000**
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	**0**
Par	Treffry Viaduct, Par River, SX 05650 57179	**1000**
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	**2500***
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385*	**0**
Par	Par Beach slipway, SX 0776 53261	**500**
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	**100**

***The Environment Agency was contacted on 23rd June 2023 because of the maximum phosphate score recorded at Lady Rashleigh Mine.

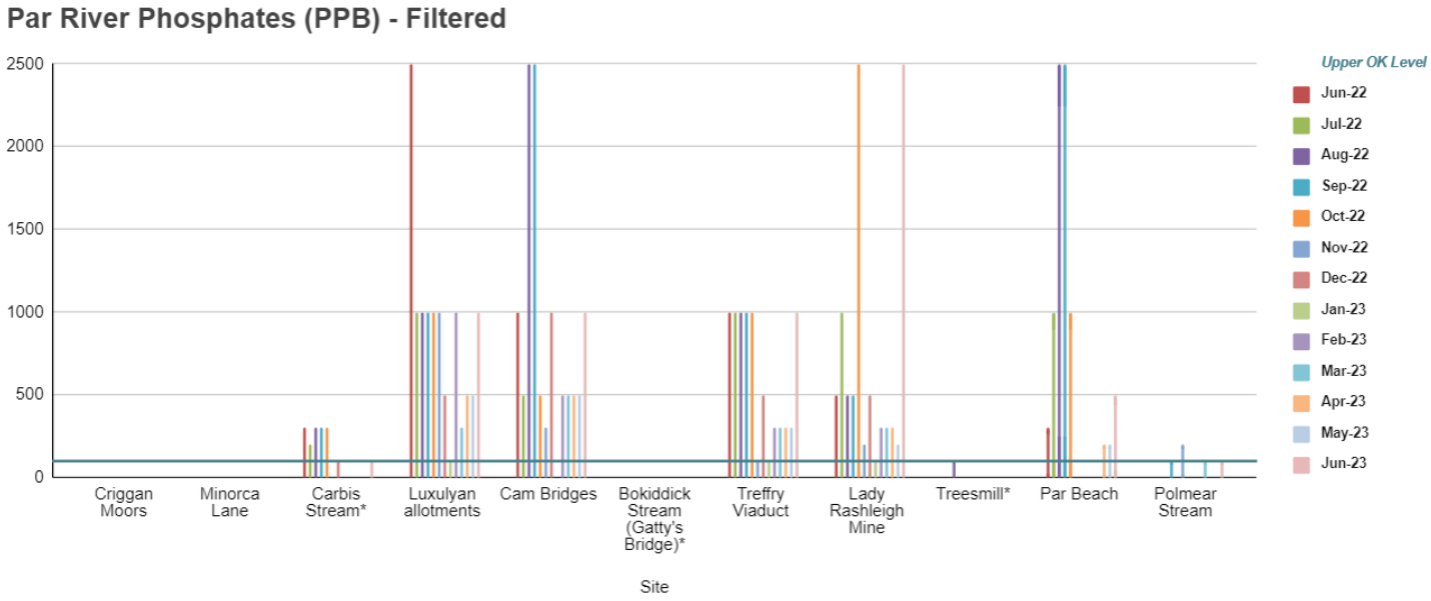
4. Graphs

(a) Historical



*indicates a tributary of the Par River. USL is 100 Parts Per Billion which, according to WRT, is the Upper Safe Level.

(b) The last year



G. BACTERIA (E.COLI (EC) & TOTAL COLIFORM (TC)

1. A sample was taken from the Par River at Lady Rashleigh Mine (SX 06451 56509). Joan Farmer incubated the samples.

2. Key information:

(a) What is the difference between total coliform and E. coli?

Total coliform is a large collection of different kinds of bacteria. Faecal coliform are types of total coliform that exist in faeces. E. coli is a subgroup of faecal coliform.
https://doh.wa.gov/sites/default/files/legacy/Documents/Pubs//331-181.pdf

(b) Why is E. coli in river water a concern?

The presence of E. coli **indicates faecal contamination of the drinking water** and as a result, there is an increased risk that enteric pathogens may be present. https://www.canada.ca/en/health-canada/programs/consultation-e-coli-drinking-water/document.html

Particular thanks are due to Joan Farmer for allowing the use of her home for the unpleasant process of incubating the samples and also for contacting the manufacturers of the kit in North Carolina, USA, for guidance on the results. Thanks too to Ross Tonkin for sharing his professional expertise.

(c) Interpreting the river group results:

Aquagenx CBT EC+TC MPN Kit gives a guide to help interpret the results of the incubated samples. This is an attempt at a simple guide linked to the **United States Environmental Protection Agency Recreational Water Health Risk Category Based on Most Probable Number (MPN) and Upper 95% Confidence Level.** However, this simplification should be used with caution until it has been checked by someone with relevant expertise.

MPN/100mL	Health Risk Category
0	**Low Risk/Safe**
10 - 40	**Low Risk/Probably Safe**
47 – 84	**Low Risk/Possibly Safe**
91 - 96	**Intermediate Risk/Possibly Safe**
136 - 171	**High Risk/Probably Unsafe**
326 - 483	**Very High Risk/Unsafe**
>1000	**Very Unsafe**

3. Monthly results including June 2023

MONTH & TEST	Criggan Moor (Upper Par) SX01882 61133 Sample & Result Dates, Score & Health Risk	Minorca Lane (Upper Par) SX02657 59788 Sample & Result Dates, Score & Health Risk	Lady Rashleigh Mine (Lower Par) SX06451 56509 Sample & Result Dates, Score & Health Risk	NOTES ON WEATHER, TEST ETC
FEBRUARY 2022				
E.coli	n/a	n/a	21/02/2022 (23/02/2022; 24/02/2022) **483**[1] **Very High/ Unsafe** **483**[2] **Very High Risk /Unsafe**	Rain prev. 24 hrs
Total Coliform	n/a	n/a	21/02/2022 (23/02/2022; 24/02/2022) **>1000** **Very Unsafe** **>1000** **Very Unsafe**	Rain prev. 24 hrs
MARCH 2022				
E.coli	n/a	n/a	21/03/2022; 24/02/2022 **136** **High Risk. Probably unsafe.**	Dry
Total Coliform	n/a	n/a	21/03/2022; 24/02/2022 **>1000**[3] **Very Unsafe**	Dry
APRIL 2022	**Criggan**	**Minorca Lane**	**Lady Rashleigh**	
E.coli	n/a	n/a	16/04/2022; 18/04/2022 **326** **Very High Risk /Unsafe**	Dry and sunny following rain. Temp over 30˚ C.
Total Coliform	n/a	n/a	16/04/2022; 18/04/2022 **>1000** **Very Unsafe**	Dry and sunny following rain. Temp over 30˚ C. Definitely blue in

				compartments 4 & 5.
MAY 2022				
E.coli	n/a	n/a	9/05/2022; 11/05/2022 **136** **High Risk. Prob. Unsafe**	Dry
Total Coliform	n/a	n/a	9/05/2022; 11/05/2022 **>1000** **Very Unsafe**	Dry Def. blue
JUNE 2022				
E.coli	n/a	n/a	27/06/2022; 29/06/2022 **483** **Very High Risk/ Unsafe**	Rain in prev. 24 hours
Total Coliform	n/a	n/a	27/06/2022; 29/06/2022 **>1000** **Very Unsafe**	Rain in prev. 24 hours Def. blue
JULY 2022				
E.coli	n/a	n/a	18/07/2022; 20/07/2022 **47** **Low Risk/Possibly Safe**[4]	Dry
Total Coliform 18/07/2022; 20/07/2022	n/a	n/a	18/07/2022; 20/07/2022 **483** **Very High Risk/ Unsafe**	Dry
AUGUST 2022	**Criggan**	**Minorca Lane**	**Lady Rashleigh**	
E.coli	19/08/2022 **483** **Very High Risk/ Unsafe**	19/08/2022 **483** **Very High Risk/ Unsafe**	21/08/2022; 23/08/2022 **483** **Very High Risk/ Unsafe**	
Total Coliform	19/08/2022 **>1000** **Very Unsafe**	19/08/2022 **>1000** **Very Unsafe**	21/08/2022; 23/08/2022 **>1000** **Very Unsafe**	Light rain
SEPTEMBER 2022	**Criggan**	**Minorca Lane**	**Lady Rashleigh**	
E.coli	16/09/2022 **483** **Very High Risk/ Unsafe**	16/09/2022 **136** **High Risk/Probably Unsafe**	17/09/2022; 19/09/2022 **483** **Very High Risk/ Unsafe**	No rain
Total Coliform	16/09/2022 **>1000** **Very Unsafe**	16/09/2022 >1000 Very Unsafe	17/09/2022; 19/09/2022 **>1000** **Very Unsafe**	No rain
OCTOBER 2022	**Criggan**	**Minorca Lane**	**Lady Rashleigh**	
E.coli	17/10/2022 **483**	17/10/2022 **47**	15/10/2022 **483**	Dry. Light rain in previous 24

	Very High Risk/ Unsafe	**Low Risk/Possibly Safe**	**Very High Risk/ Unsafe**	hours. River low.
Total Coliform	17/10/2022 **>1000** **Very Unsafe**	17/10/2022 **>1000** **Very Unsafe**	15/10/2022 **>1000** **Very Unsafe**	Dry. Light rain in previous 24 hours. River low.
NOVEMBER 2022	**Criggan**	**Minorca Lane**	**Lady Rashleigh**	
E.coli	No sample	16/11/2022 **483** **Very High Risk/ Unsafe**	16/11/2022 **483** **Very High Risk/ Unsafe**	Heavy rain
Total Coliform	No sample	16/11/2022 **>1000** **Very Unsafe**	16/11/2022 **>1000** **Very Unsafe**	Heavy rain
DECEMBER 2022	**Criggan**	**Minorca Lane**	**Lady Rashleigh**	
E.coli	No sample	No sample	18/11/2022 **483** **Very High Risk/ Unsafe**	Heavy rain
Total Coliform	No sample	No sample	18/11/2022 **>1000** **Very Unsafe**	Heavy rain
JANUARY 2023	**Criggan**	**Minorca Lane**	**Lady Rashleigh**	
E.coli	No sample	No sample	No sample	
Total Coliform	No sample	No sample	No sample	
FEBRUARY 2023	**Criggan**	**Minorca Lane**	**Lady Rashleigh**	
E.coli	No sample	No sample	**136** **High Risk. Prob. Unsafe**	Light rain in previous 24 hours. River level average or slightly lower.
Total Coliform	No sample	No sample	**136** **High Risk. Prob. Unsafe**	Light rain in previous 24 hours. River level average or slightly lower.
MARCH 2023	**Criggan**	**Minorca Lane**	**Lady Rashleigh**	
E.coli	No sample	No sample	22/3/2022 **>1000** **Very Unsafe**	Light rain in previous 24 hours.
Total Coliform	No sample	No sample	22/3/2022 **>1000** **Very Unsafe**	Light rain in previous 24 hours.
APRIL 2023	**Criggan**	**Minorca Lane**	**Lady Rashleigh**	
E.coli			18/4/2023 **483** **Very High Risk/ Unsafe**	No rain in previous 24 hours. River level average
Total Coliform			18/4/2023 **>1000** **Very Unsafe**	No rain in previous 24 hours. River level average

MAY 2023				
E.coli			**12/5/2023 136 High Risk. Prob. Unsafe**	Light rain in previous 24 hours.
Total Coliform			**12/5/2023 >1000 Very Unsafe**	Light rain in previous 24 hours.
JUNE 2023				
E.coli			**>1000 Very Unsafe**	No rain in previous 24 hours.
Total Coliform			**>1000 Very Unsafe**	No rain in previous 24 hours.

1. Readings taken twice on the 1st sample as it took 12 hours to reach the minimum temperature of 25 degrees.

2. Originally >1000 but I now believe this reading should be 483 and the traces of blue in compartment 5 had leaked out of one of the other compartments as the clip was not positioned exactly along the maximum fill line.

3. Compartments 4 and 5 had only very pale blue fluorescence in UV light, but definitely glowed with no trace of yellow. Aquagenx company confirmed that fluorescence under UV light indicates positive for total coliforms.

4. Due to hot weather, limited additional heat was added. The temperature for most of the time was between 25 and 30 so should have been left for 40-48 hours. Insufficient time given (36 hrs) so results may be wrong.

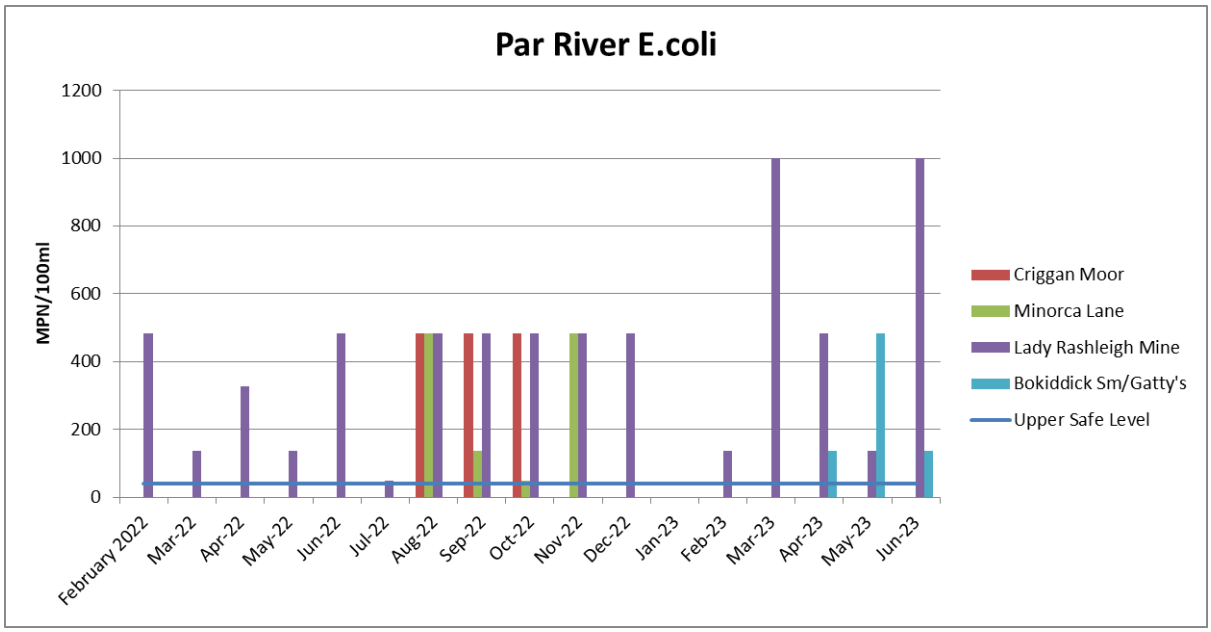
Additional samples have been taken from the Bokiddick Stream at Gatty's (SX 05531 57953):

APRIL 2023				
E.coli			18/4/2023 **136mpn/100ml, so High Risk/Probably Unsafe**	No rain in previous 24 hours. River level average
Total Coliform			18/4/2023 **>1000 Very Unsafe**	No rain in previous 24 hours. River level average
MAY 2023				
E.coli			**12/5/2023 483 Very High Risk/ Unsafe**	No rain in previous 24 hours. River level average
Total Coliform			**12/5/2023483 >1000 Very Unsafe**	No rain in previous 24 hours. River level average
JUNE 2023				
E.coli			**136 High Risk. Prob. Unsafe**	No rain in previous 24 hours. River

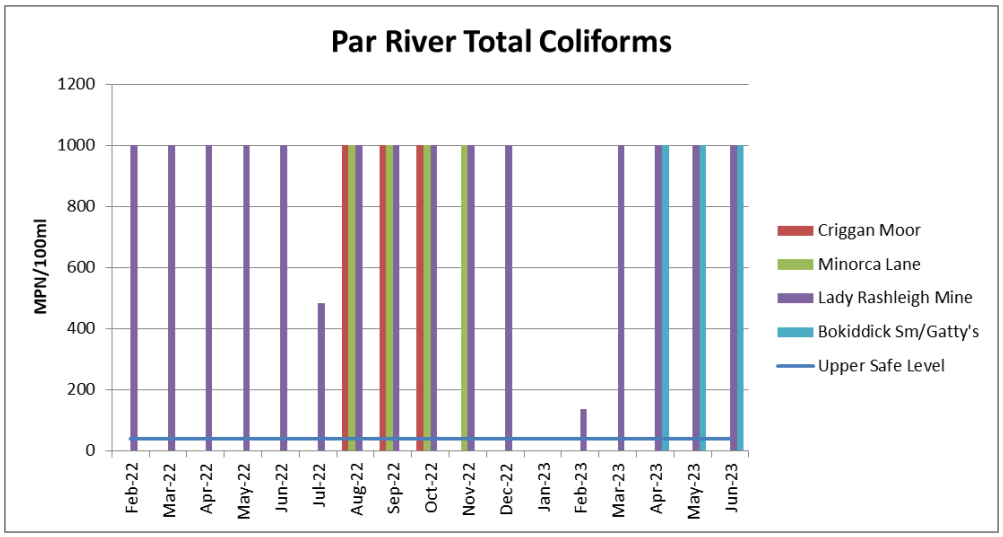
				level low.
Total Coliform			**>1000** **Very Unsafe**	No rain in previous 24 hours. River level low.

4. Graphs

(a) E.coli

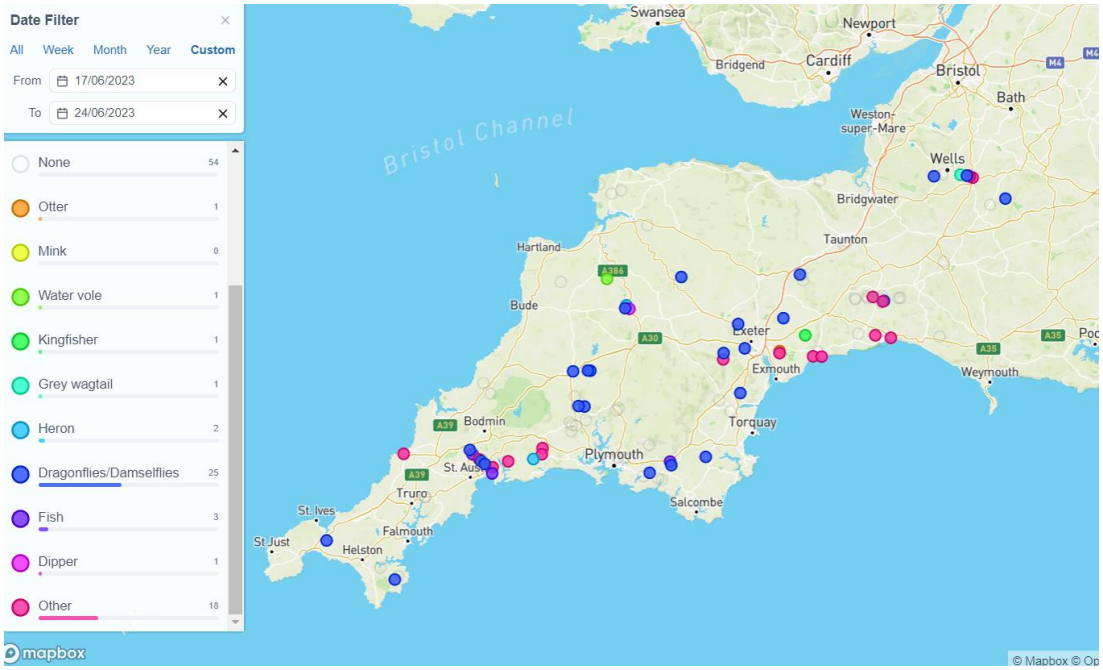


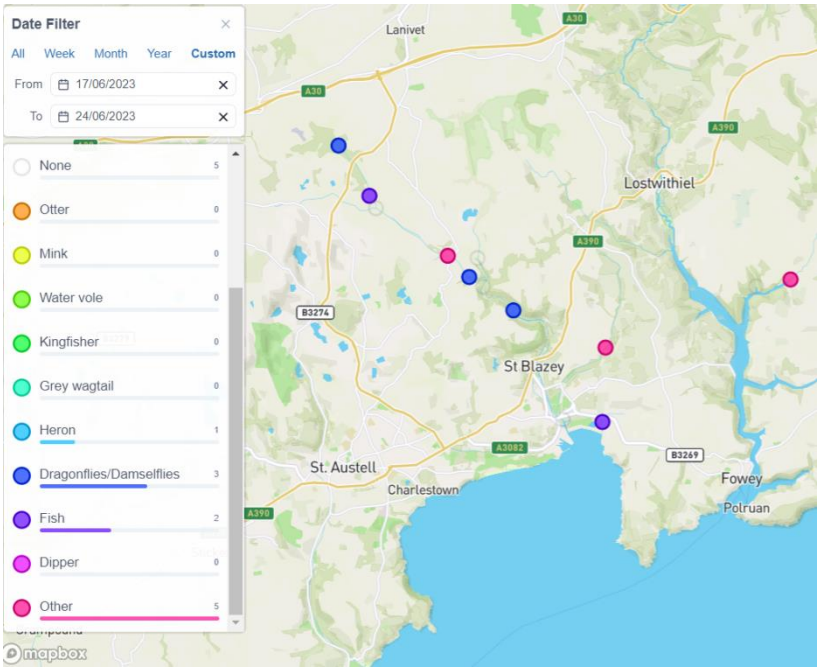
(b) Total Coliforms



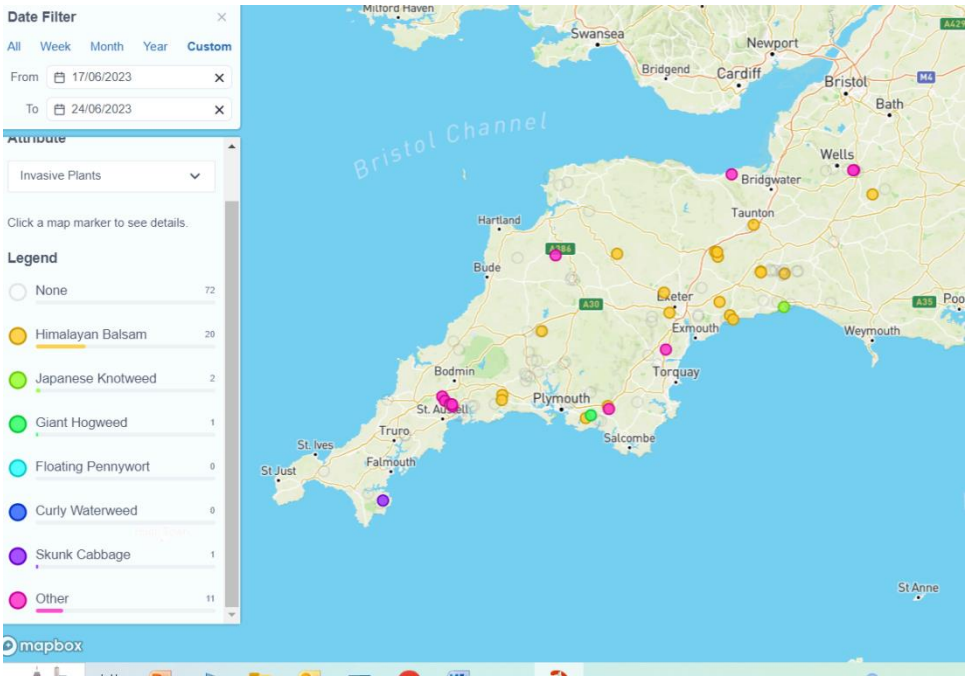
H. WILDLIFE (FOR OTTER REPORT SEE SECTION I) & INVASIVE PLANTS

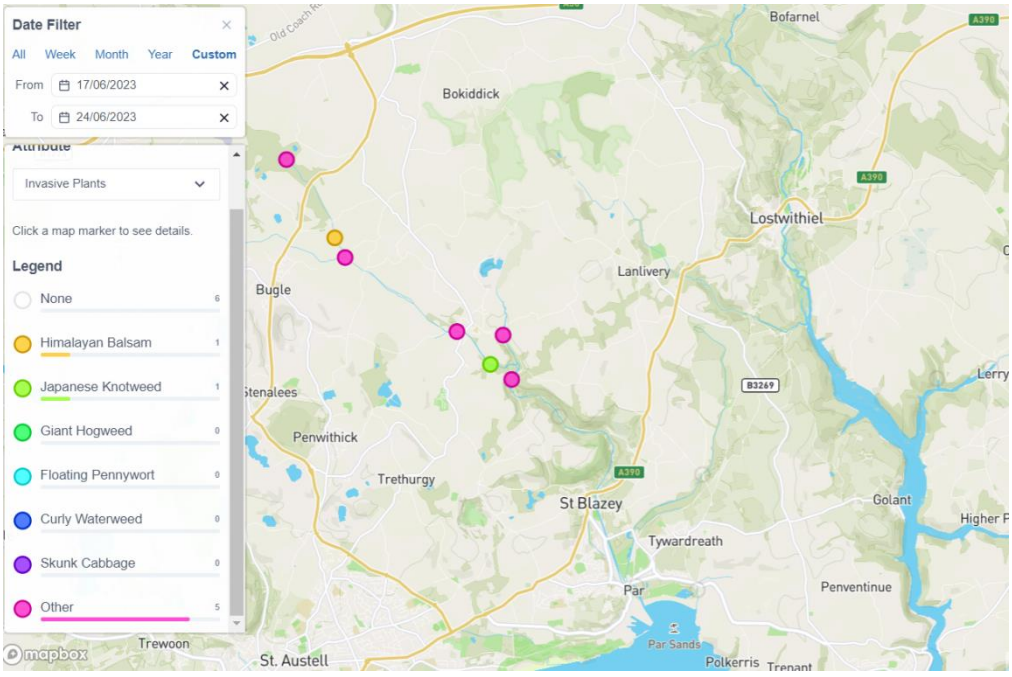
(a) Wildlife maps





(b) Invasive plants maps





N.B. ‘Other’ on the Par River tends to be Hemlock Water Dropwort.

(c) Wildlife & Invasive Plants sightings at the monitoring points included:

PAR RIVER/TRIBUTARY	LOCATION	WILDLIFE NOTED	INVASIVE PLANTS NOTED
Par	Criggan Moors, SX 01882 61133	Dragonfly	Hemlock Water Dropwort
Par	South of Minorca Lane, Par River, SX 02657 59788	Fish	Hemlock Water Dropwort, Himalayan Balsam
Tributary	Carbis Stream SX 02834 59401	None.	Hemlock Water Dropwort
Par	Luxulyan allotments, Par River, SX 04732 58045	Otter spraint	Hemlock Water Dropwort
Par	Cam Bridges, Par River, SX 05292 57454	Dragonflies	Hemlock Water Dropwort, Japanese Knotweed
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	None	Hemlock Water Dropwort
Par	Treffry Viaduct, Par River, SX 05650 57179	None	Hemlock Water Dropwort
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	Dipper, butterfly, dragonflies, fish. Riverfly nymphs: Cased Caddisfly, Caseless Caddisflies, Olives, Stoneflies, and Freshwater Shrimps.	
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385*	Magpies, thrush, robin	
Par	Par Beach slipway, SX 0776 53261	None	
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	Fish	Hemlock Water Dropwort (probably)

I. OTTER SURVEY MAY 2023

1. SURVEY CONDITIONS

Date & time	23/6/2023
Surveyors	Roger Smith, Dave Burrell, Joan Farmer, Veronica Jones
Areas surveyed	Upper Par (Criggan Moors and Minorca Lane); Par River from STW to Cam Bridges; Par River from Treffry Viaduct to Lady Rashleigh Mine.
Weather	No rain previously
River level	Low
River flow	Steady
Water quality	Phosphate readings 1000 PPB at the highest (Luxulyan allotments), 1000 at Cam Bridges, 1000 at Treffry Viaduct and 2500 at Lady Rashleigh Mine and 500 at Par Beach slipway. All readings zero upstream from the allotments. High bacteria levels at LRM and Gatty's.
Other wildlife	Dippers, fish and riverfly nymphs at Lady Rashleigh Mine. Fish at Minorca Lane. Dragonflies at Criggan, Cam Bridges and Lady Rashleigh Mine.

2. EVIDENCE FOR OTTERS ✓

EVIDENCE	SEEN/ ORKS*	LOCATION	NOTES
Spraint - fresh			
Spraint – recent			
Spraint - old	✓* ✓*	Luxulyan allotments – boulder in river. SX 04747 58056 Lady Rashleigh Mine – boulder in river. SX 06456 56498	
Anal jelly			
Sign heap			
Staining			
Tracks			
Path			
Slide			
Holt			
Hover			
Couch			
Live sighting			
Corpse			

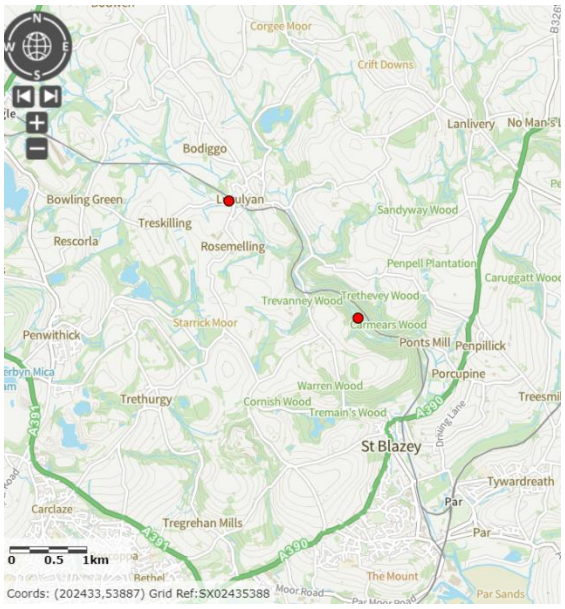
***Report sent to ORKS:** https://erccis.org.uk/

3. MAP

Red dots – definite evidence. Recorded on ORKS.

Black dots – possible evidence. Not recorded on ORKS.

Green dots – definite evidence but may have been recorded in the previous month, e.g. old spraint.



Source: https://magic.defra.gov.uk/MagicMap.aspx

4. PHOTOGRAPHS

(a)

Old spraint with bird dropping (dipper?) on top at Luxulyan allotments

(b)

Looking upstream at Luxulyan allotments. Old spraint on 2 boulders.

(c)

Very old spraint at Lady Rashleigh Mine

(d)

Unidentified dropping at Lady Rashleigh Mine

5. COMMENTS

A very limited survey was done this month.

J. ARMI RIVERFLY SURVEY

Three of the group (Joan Farmer, Veronica Jones and Roger Smith) have undertaken the training to carry out Riverfly Surveys under the Anglers' Riverfly Monitoring Initiative (https://www.riverflies.org/rp-riverfly-monitoring-initiative). In short, sampling for 8 riverfly groups is carried out using standardised methods with scores calculated for their abundance. Information is

passed to ARMI and the ORKS database. If the score does not reach a trigger level (in our case trigger level was raised from 5 to 6 in May 2022), the Environment Agency must be informed immediately since it is highly likely to indicate that the water is polluted. Our group received approval to sample at two sites: Luxulyan allotments (SX 04743 58054) and Lady Rashleigh Mine (SX 06453 56500). We have decided, for the time being, to concentrate on the latter.

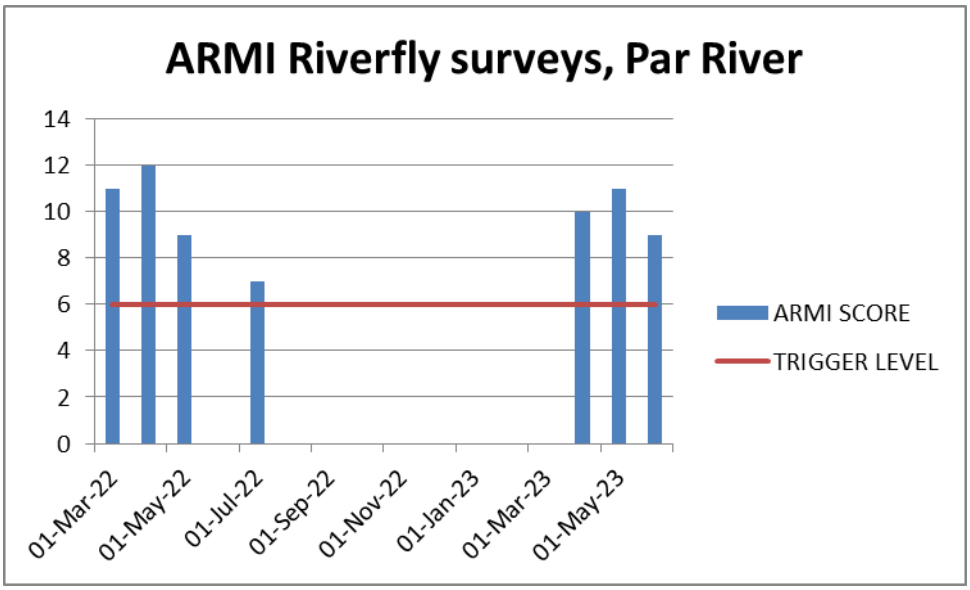
It is impossible to count every invertebrate so this counting method is used:

Abundance	Score	Estimated Number
1-9	1	Quick count
10-99	2	Nearest 10
100-999	3	Nearest 100
>1000	4	Nearest 1000

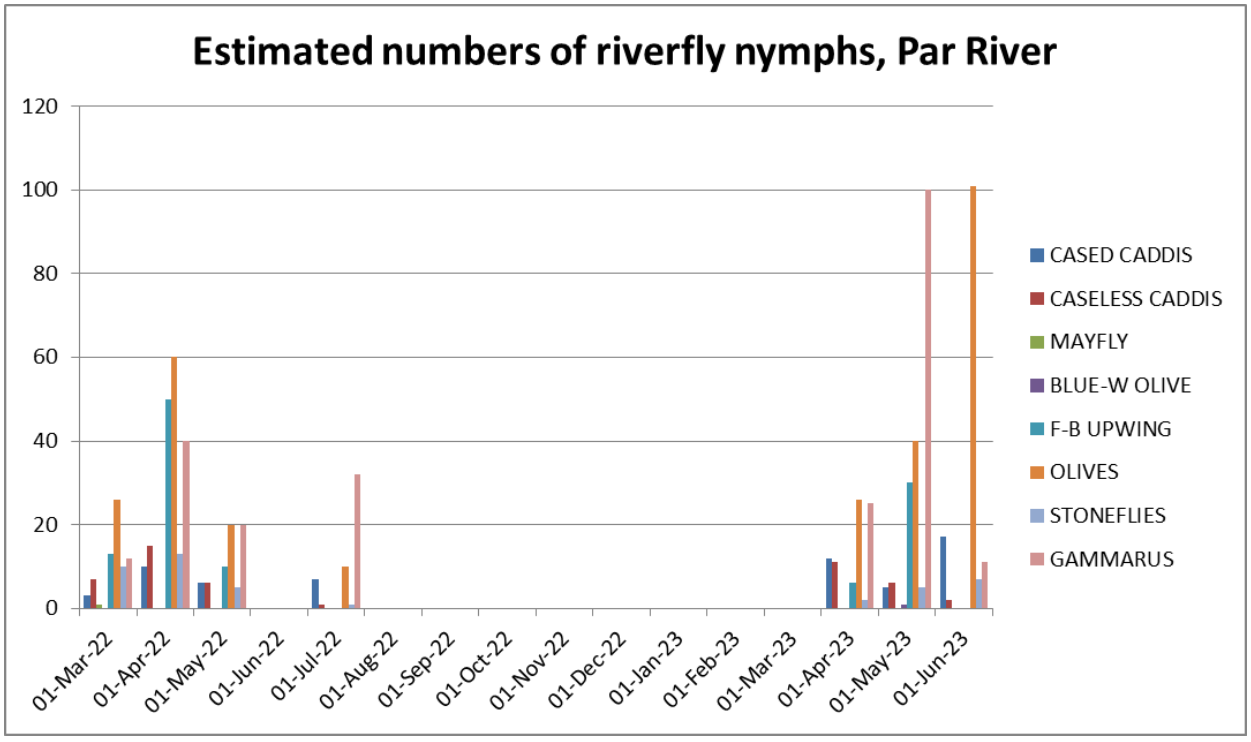
Results of survey at Lady Rashleigh Mine (SX 06451 56509) carried out by Dave Burrell, Joan Farmer, Veronica Jones and Roger Smith on 23rd June 2023

	SPECIES	NUMBER	CATEGORY
Trichoptera			
1	Cased Caddisfly	17	2
2	Caseless Caddisfly	2	1
Ephemeroptera 3 tails			
3	Mayfly (Ephemeridae)	0	0
4	Blue-winged olive (Ephemerellidae)	0	0
5	Flat-bodied up-wings (Heptageniidae)	0	0
6	Olives (Baetidae)	100+	3
Plecoptera 2 tails			
7	Stoneflies	7	1
Gammaridae			
8	Freshwater Shrimp	11	2
			9

CATEGORY TOTAL	**9**
TRIGGER LEVEL	**6**



Please note in the next graph, that where there are many of these nymphs in the sample only a very rough estimate of actual numbers is given. For example, the June figure shows 101 Olives, giving a category score of 2, but there were probably far more.



K. DISCUSSION

1. Positive observations

(a) The ARMI riverfly trigger level was exceeded at Lady Rashleigh Mine on the Lower Par.

(b) There were some other encouraging wildlife sightings, including fish, otter spraint, dragonflies and dippers.

(c) Although phosphate contamination was very bad this month (see below), the good news is that it is now officially recognised as a problem that needs to be overcome. Defra has identified the Lower Par in this report: Urban waste water treatment: identification of sensitive areas notice 2023 schedule - GOV.UK (www.gov.uk). As the population equivalent of the area has exceeded 10,000, it means that a suitable level of treatment is required. Although there are no firm plans yet, something will be done in the 2025-2030 cycle, which is great news.

(c) China clay pollution on the Carbis Stream was not on the scale seen at other times.

2. Points of concern

(a) Taken at face value, the bacteria tests are worrying. The main testing site at Lady Rashleigh Mine in the popular Luxulyan Valley had very high levels of Total Coliforms, and a very high score for E.coli, with both levels being considered 'Very Unsafe' according to the guidelines for our test. The scores for E.coli and Total Coliforms on the Bokiddick Stream at Gatty's ('Very High Risk/Unsafe' and Very Unsafe' respectively, according to the US Aquagenx test) are concerning since on other measures this waterbody has seemed to be relatively clean and healthy.

(b) Phosphate levels were worryingly high, which may be because low river levels increased the concentration of phosphates. The maximum score of 2,500 ppb at Lady Rashleigh Mine prompted a call to the Environment Agency hotline. (Strictly speaking, this was not the right thing to do because there was no visible pollution, so in future any readings unaccompanied by signs of an incident will be passed to the EA by other means. That said, the EA officials responded swiftly and helpfully.)

The EA monitors regularly for phosphate and their analysis shows that the SWW St Austell North Sewage Treatment Works at Luxulyan is the main source of phosphate (and ammonia) because there are no other known sources between their sample points 81610190 (SX0430858221) and 81610186 (SX0452058073).

(d) According to the EA monitoring, ammonia levels are very high. The source is likely to be the St Austell North STW.

(e) Finding a motorbike in the river near Minorca Lane was certainly unusual but the stretch of the river between the road bridge and the junction of paths near Higher Menadue would benefit from having various metal items removed. Some of these objects have been in the river for years. Likewise, the footbridge crossing the Carbis Stream still hasn't been replaced, although last year I was told that Cornwall Council had it on its to-do list. Consequently, people wishing to cross the stream are throwing planks and other objects into it in order to cross (see photograph below). This is unsatisfactory for the ecology of the river as well as for walkers.

Objects in the Carbis Stream at SX 02834 59401

3. Areas of doubt

(a) We cannot be sure about the validity of our bacteria results, or the suitability of the Aquagenx test for rivers, until expert guidance is received. Therefore, it would be wrong to be alarmist at this stage.

(b) As citizen scientists, we do not have the expertise to understand the precise impact on the river's health being caused by high levels of phosphate, ammonia and bacteria. According to the EA, the Ecological status of the river is Moderate and it fails on Chemical standards.

(c) Once again, the riverfly sample exceeded the trigger level but not to the extent recorded in May. This month there were no Blue-winged Olives or Flat-bodied Upwings (we don't seem to get Mayflies anyway), the numbers of Gammarus were down, yet there was an abundance of Olives. This may be a natural variation in numbers.

L. OUR GROUP AND SUPPORTERS

Monitoring is part of the Citizen Science programme run by the West Country Rivers Trust (WCRT) and is carried out monthly by volunteers, including Dave Burrell; Joan Farmer; Veronica Jones; Sue Perry; Roger Smith; Simon Tagney; Maggie Tagney; and Brian Harrisson. They have received training from Lydia Ashworth, Junior Evidence and Engagement Officer of the West Country Rivers Trust (https://wrt.org.uk/project/become-a-citizen-scientist/). Results are logged on the Cartographer website. The support and advice given by Ross Tonkin, Chloe Lake, David Edwards, Claire and Gary Phillips, Jenny Heskett, Nick Taylor, Jeremy Roberts, Mat Bateman, Colin Pringle, Matt Healey, Simon Browning, Lydia Deacon, Layla Ousley, Jack Middleton, Nicola

Rogers and Callum Lewis is greatly appreciated. The interest and encouragement offered by Environment Agency officers, especially Lisa Best, Lisa Goodall and Peter Scobie, have been invaluable.

Report compiled by Dave Burrell, Joan Farmer and Roger Smith, July 2023