

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.

JULY 2023



Par River at Treffry Viaduct Photo: Joan Farmer

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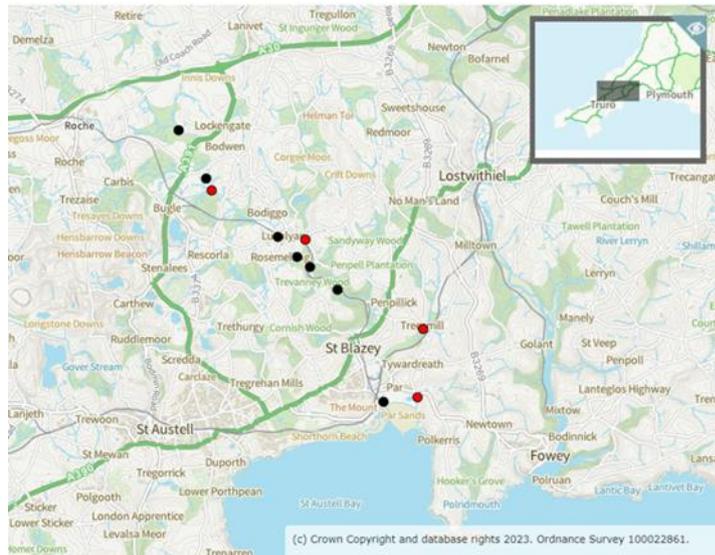
A. OUR JULY 2023 FINDINGS AT A GLANCE (SEE SECTIONS C TO J FOR FULL PICTURE)

We sampled at 11 locations. The **red** highlighting shows points of concern.

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/TYWAR DREATH MARSH STREAM & POLMEAR STREAM) 3 SAMPLE LOCATIONS
TEMPERATURE (SHOULD NOT EXCEED 18° CELSIUS)	Average 14.55° Celsius	Average 16.1° Celsius	Average 14.9° Celsius	Average 16.4° Celsius
TOTAL DISSOLVED SOLIDS (SHOULD NOT EXCEED 300 PPM)	116.25 PPM	171.66 PPM	0 PPM	133 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)	325 PPB	433.33 PPB	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 = 483 MPN/100ML (Very High Risk/ Unsafe - USA RECREATIONAL BATHING WATER STANDARDS)	N/A	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)	N/A	N/A
WILDLIFE EVIDENCE	Otter spraint.	Fish, 5 types of riverfly larvae (out of 8 sought), butterflies (Silver-Washed Fritillary, Red Admiral, Holly Blue), Dipper, Dunlin.	None	Fish.
VISIBLE EVIDENCE OF POLLUTION	Foam, motorbike	Traffic cone, fishing line	DEBRIS	NONE

B. JULY 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>

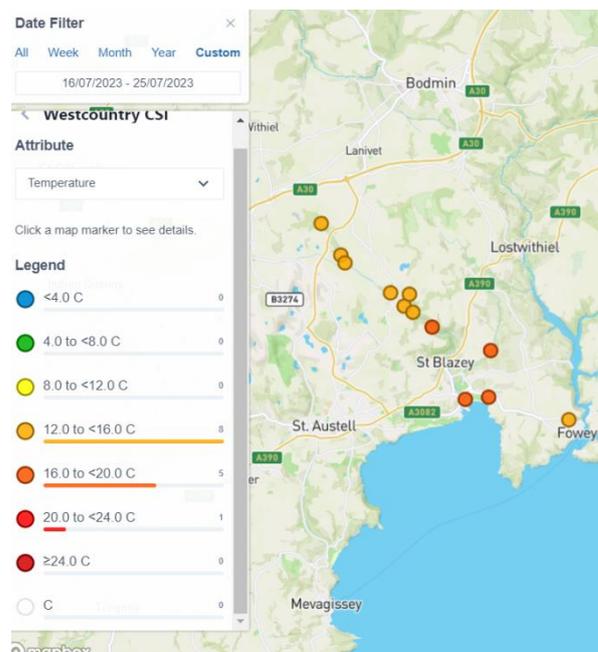
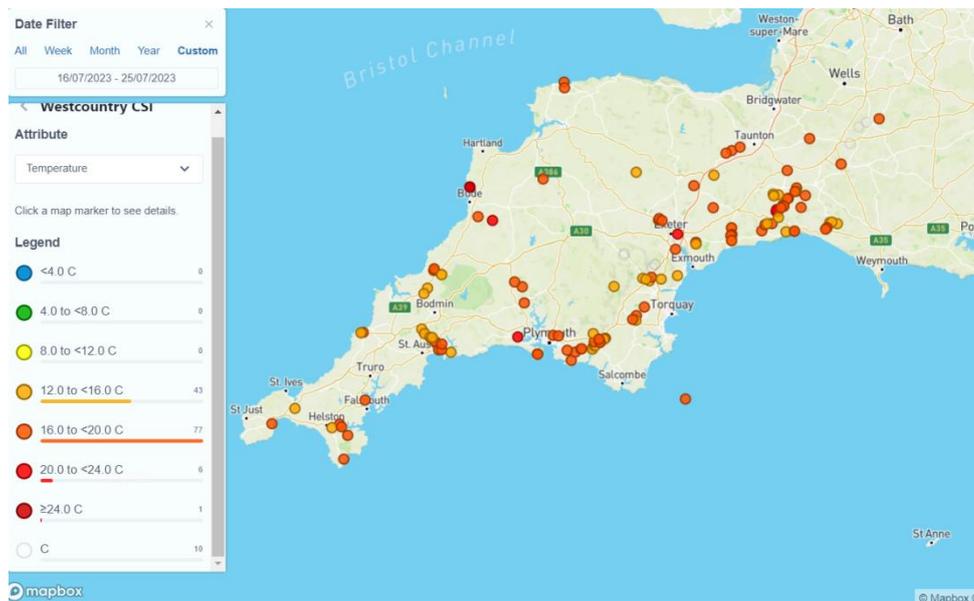
LOCATION	DATE	TYPE OF CHECK	MONITORED BY
Criggan Moors, Par River, SX 01882 61133	17/7/2023	CSI sample & Cartographer record.	Roger Smith
South of Minorca Lane, Par River, SX02668 59747	17/7/2023	CSI sampling. Cartographer record.	Roger Smith
Carbis Stream SX 02834 59401	17/7/2023	CSI sampling. Cartographer record.	Roger Smith
Luxulyan allotments, Par River, SX 04732 58045	17/7/2023	CSI sampling. Cartographer record.	Roger Smith
Cam Bridges, Par River, SX 05292 57454	17/7/2023	CSI sampling. Cartographer record.	Roger Smith
Gatty's Bridge, Bokiddick Stream SX 05531 57953	17/7/2023	CSI sampling. Cartographer record.	Joan Farmer
Treffry Viaduct, Par River, SX 05650 57179	17/7/2023	CSI sampling. Cartographer record.	Joan Farmer, Roger Smith
Lady Rashleigh Mine, Par River, SX 06451 56509	17/7/2023	CSI sampling. Cartographer record. Riverfly. Bacteria sample.	Dave Burrell, Joan Farmer, Roger Smith
Treesmill, Tywardreath Stream, SX 08873 55385	24/7/2023	CSI sampling. Cartographer record.	Maggie Tagney
Par Beach slipway, SX 0776 53261	21/7/2023	CSI sampling. Cartographer record.	Brian Harrison
Polmear Stream, Ship Inn SX 08749 53417	21/7/2023	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.



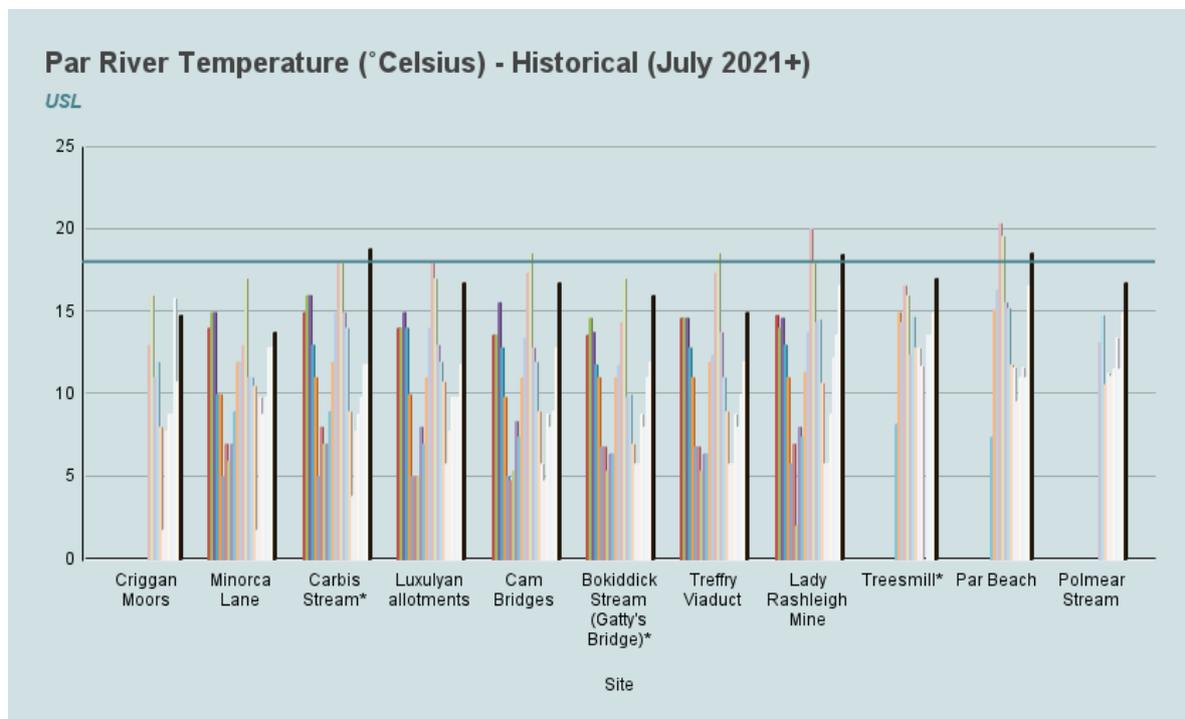
3. Results July 2023

PAR RIVER/TRIBUTARY	LOCATION	Temperature °Celsius
Par	Criggan Moors, SX 01882 61133	14
Par	South of Minorca Lane, Par River, SX 02657 59788	14.8
Tributary	Carbis Stream SX 02834 59401	15.8
Par	Luxulyan allotments, Par River, SX 04732 58045	14.8
Par	Cam Bridges, Par River, SX 05292 57454	14.8
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	14
Par	Treffry Viaduct, Par River, SX 05650 57179	14
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	16.8
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385	16.5
Par	Par Beach slipway, SX 0776 53261	17.5
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	16.3

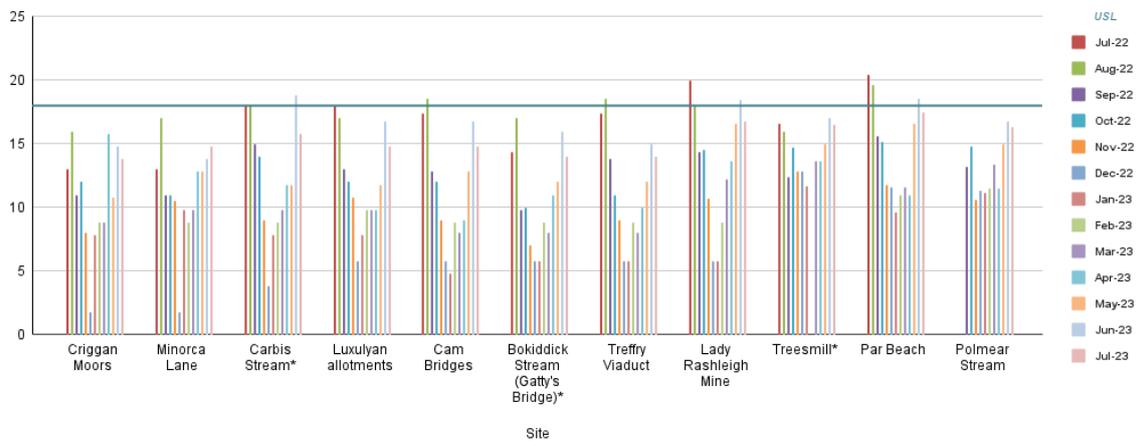
Results above the temperature at which fish and other organisms can function healthily will be shown in red. At present, 18 °Celsius is being used as the upper safe limit for fish and other creatures, although 20° Celsius has recently been suggested by WRT instead.

4. Graphs

(a) Historical



*Indicates a tributary.

(b) The last year**Par River Temperature (°Celsius) - Filtered**

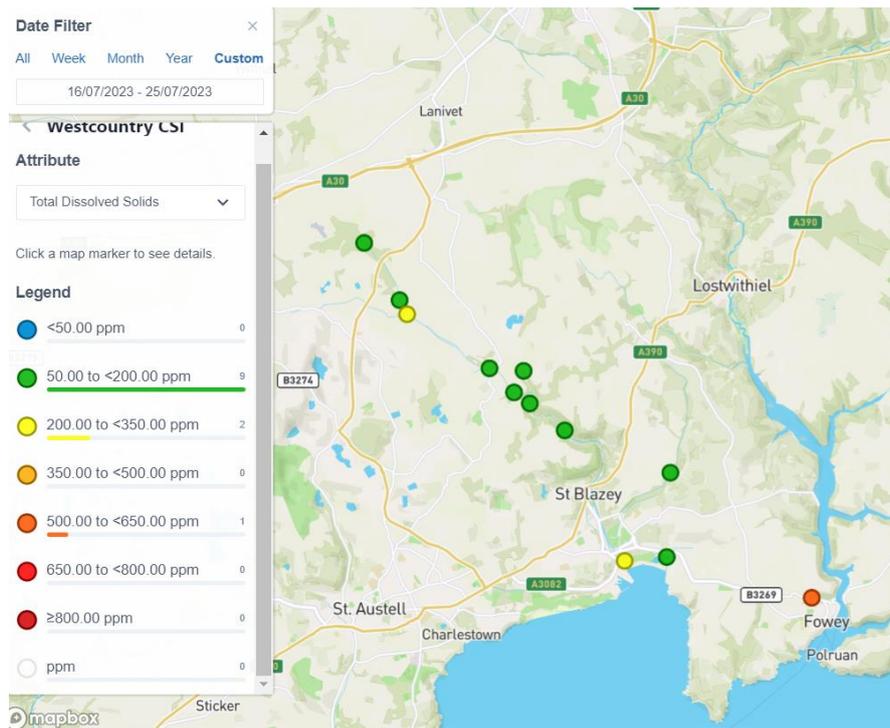
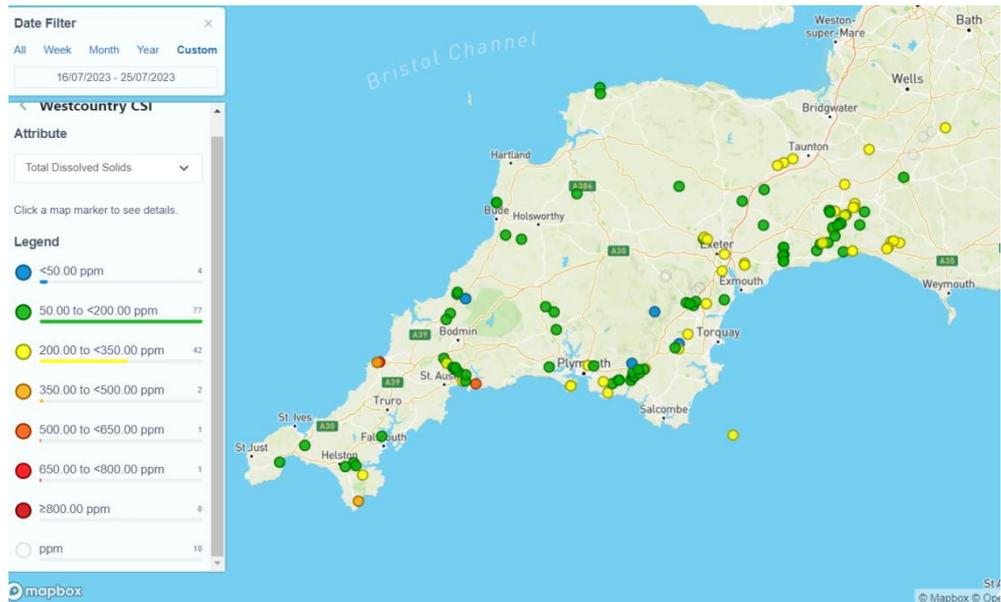
*Indicates a tributary.

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.

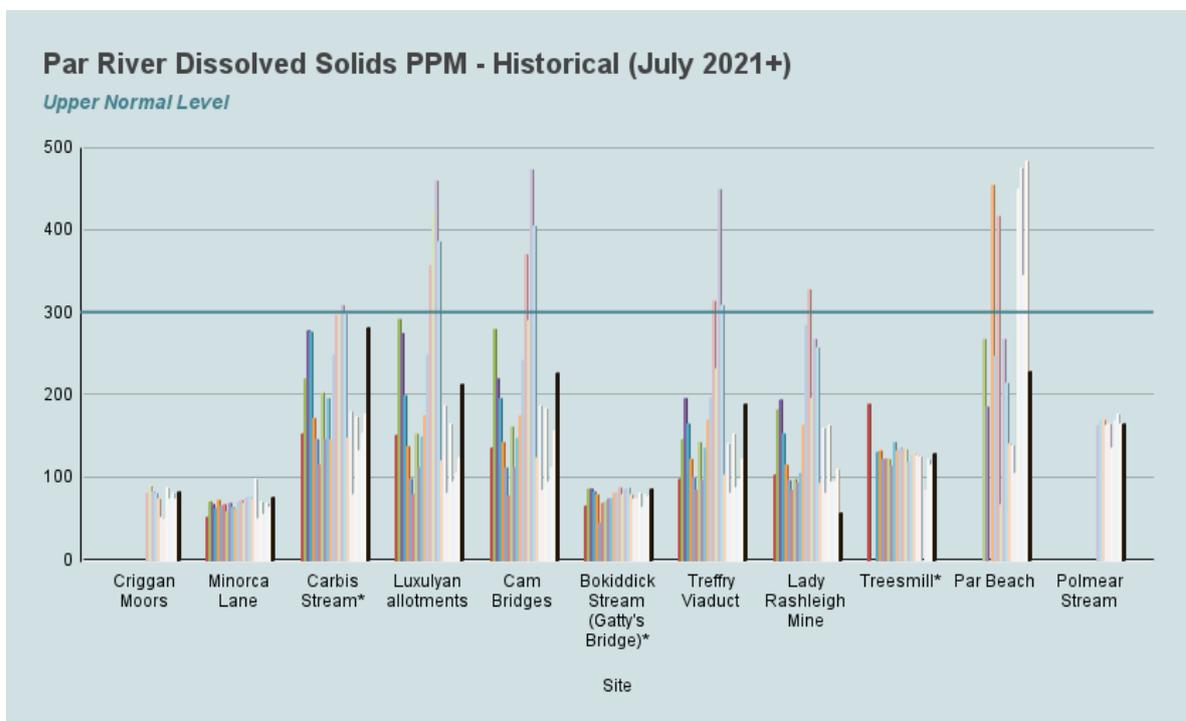


3. Results July 2023

PAR RIVER/TRIBUTARY	LOCATION	Total Dissolved Solids PPM
Par	Criggan Moors, SX 01882 61133	80
Par	South of Minorca Lane, Par River, SX 02657 59788	68
Tributary	Carbis Stream SX 02834 59401	220
Par	Luxulyan allotments, Par River, SX 04732 58045	160
Par	Cam Bridges, Par River, SX 05292 57454	157
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	82
Par	Treffry Viaduct, Par River, SX 05650 57179	139
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	148
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385	118
Par	Par Beach slipway, SX 0776 53261	228
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	148

Upper Normal Level

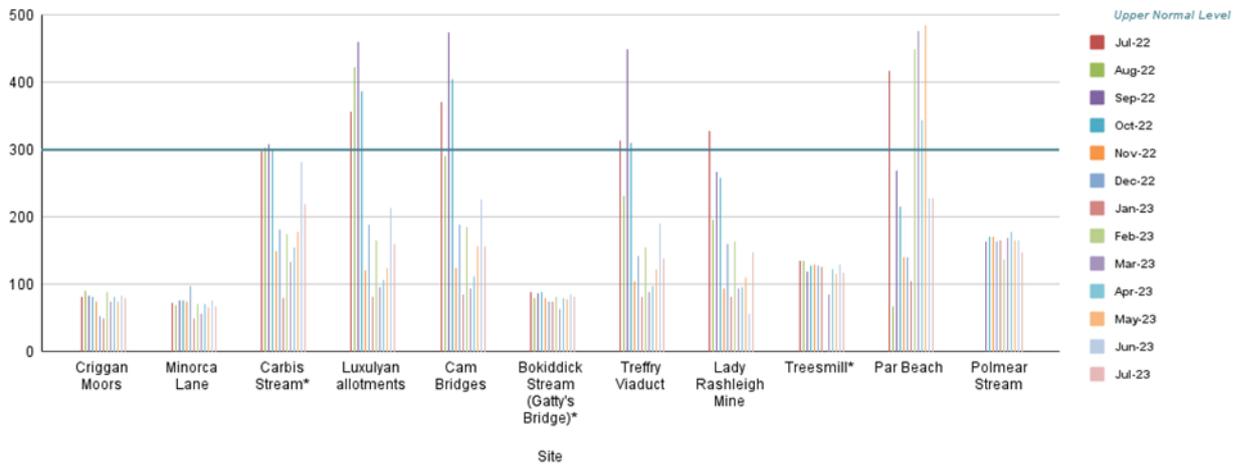
The WRT advice is: 'TDS levels vary between catchments due to natural geology etc. We generally say that after 6 months of sampling you should have an idea of what is 'normal' for your river. Looking at the scorecards for the Lower Par for 2020 and 2021 I would say that anything above 300

4. Graphs**(a) Historical**

*Indicates a tributary.

(b) The last year

Par River Total Dissolved Solids (PPM) - Filtered



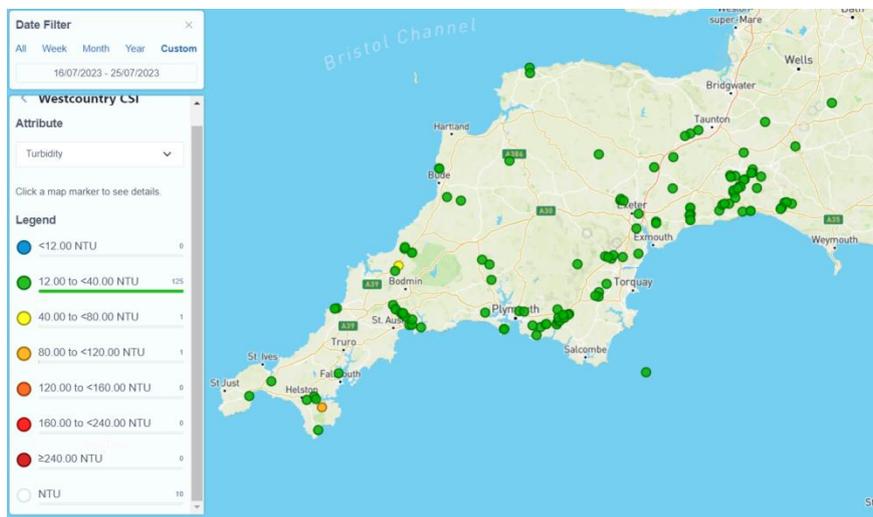
*Indicates a tributary.

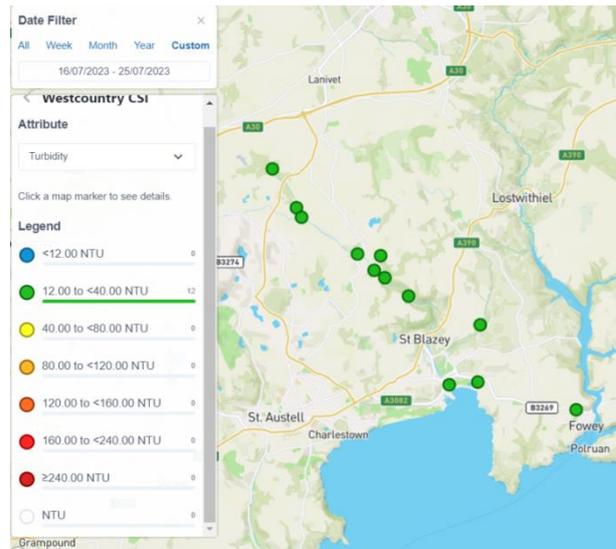
E. TURBIDITY

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.





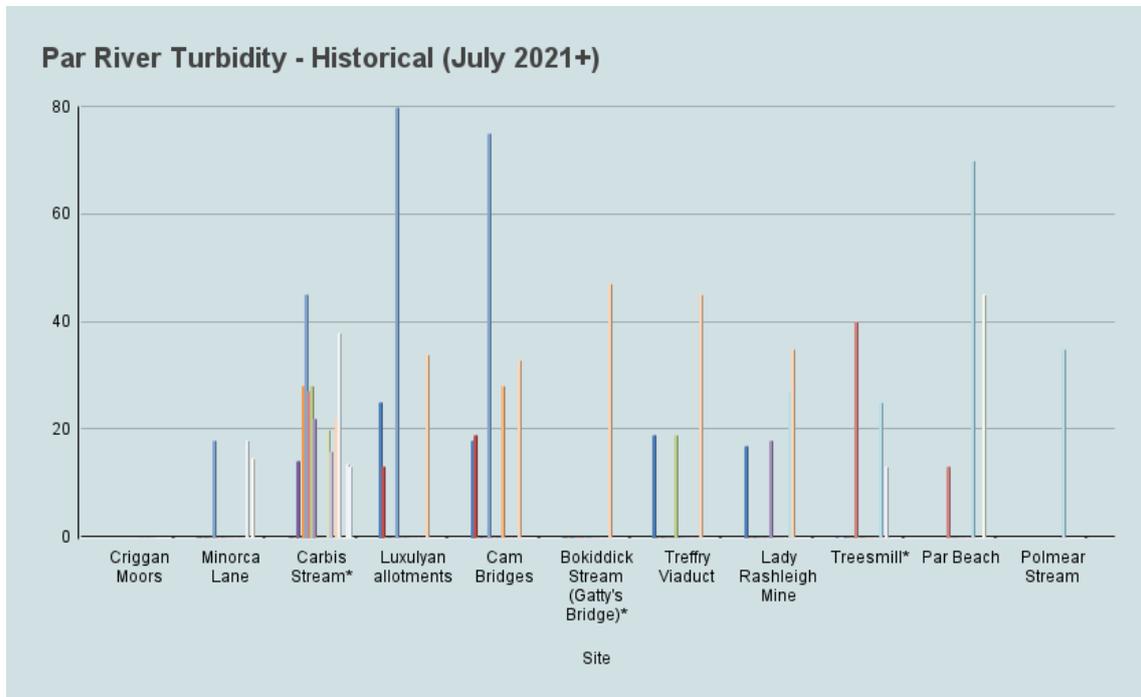
The dots should be blue (<12) but Cartographer shows them as green for some reason.

3. Results July 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

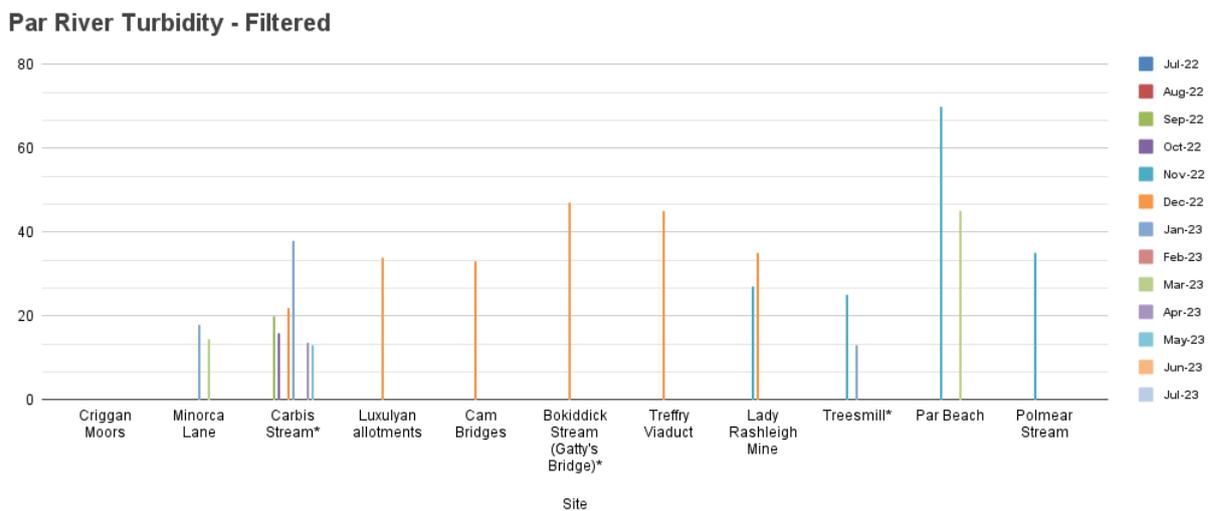
4. Graphs

(a) Historical



*Indicates a tributary.

(b) The last year



*Indicates a tributary.

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.)

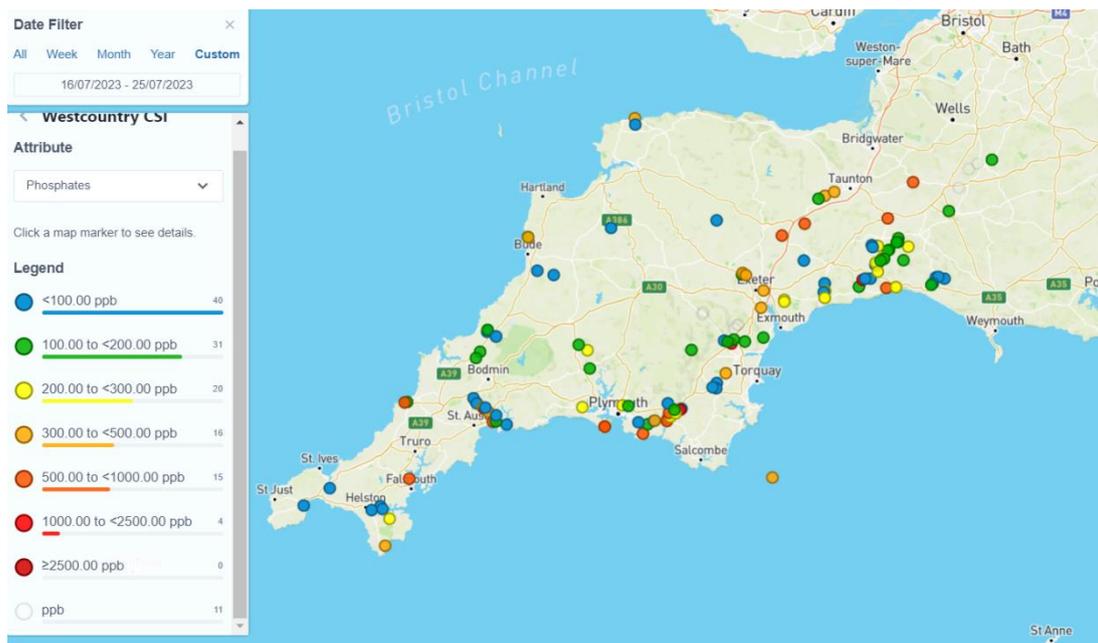
Ranges on phosphate diagnostic colour chart:

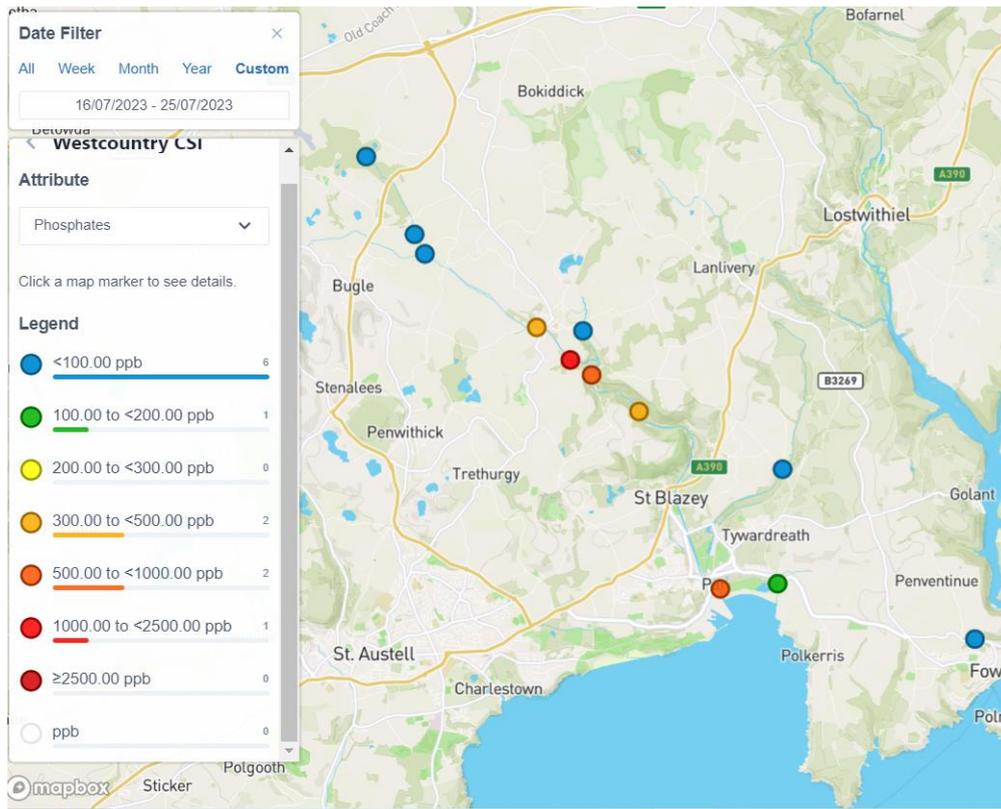
0 – 100 OK

200 – 300 HIGH

500 – 2500 – TOO HIGH

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





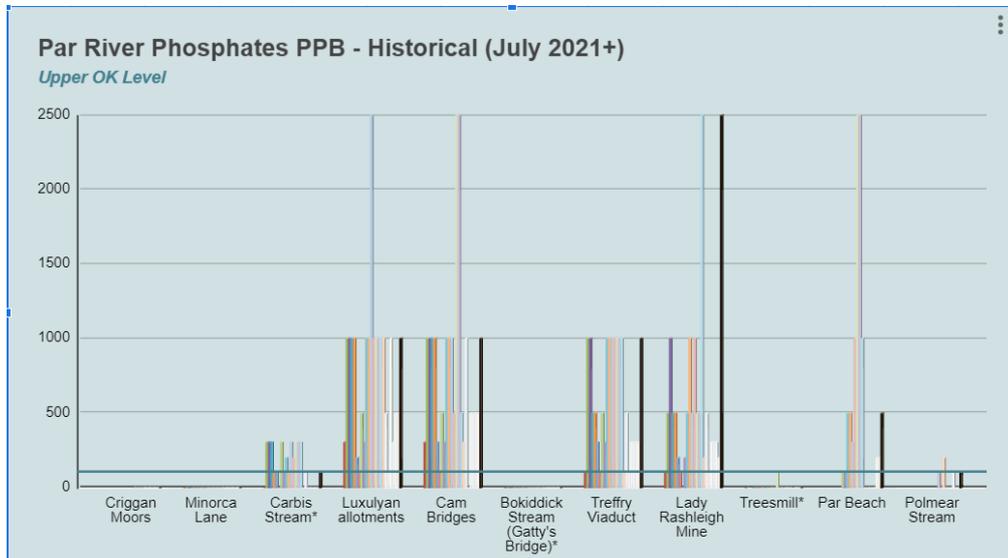
3. Results July 2023

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	0
Par	Luxulyan allotments, Par River, SX 04732 58045	300
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	500
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	300
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

Results in red show phosphate levels that are Too High (WRT advice).

4. Graphs

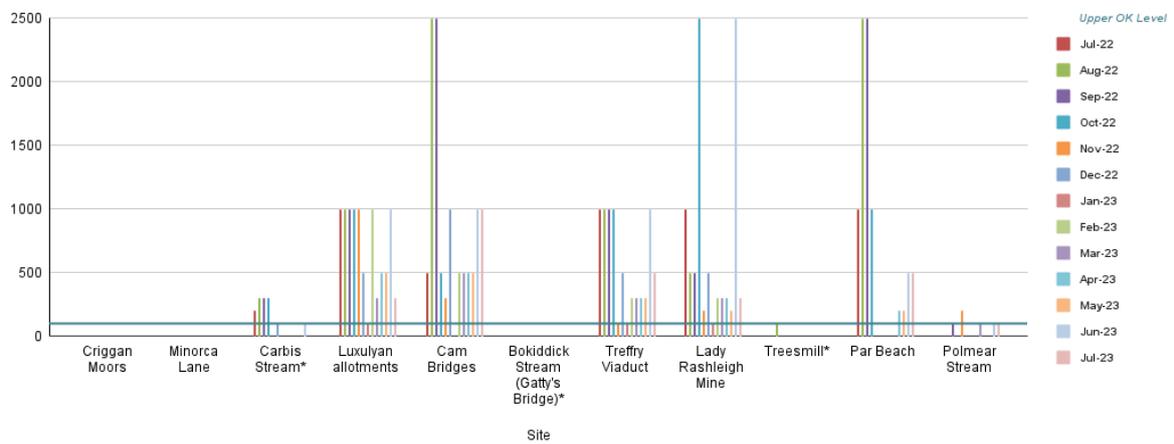
(a) Historical



*Indicates a tributary.

(b) The last year

Par River Phosphates (PPB) - Filtered



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 July 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				
E.coli	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 Safe⁴	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

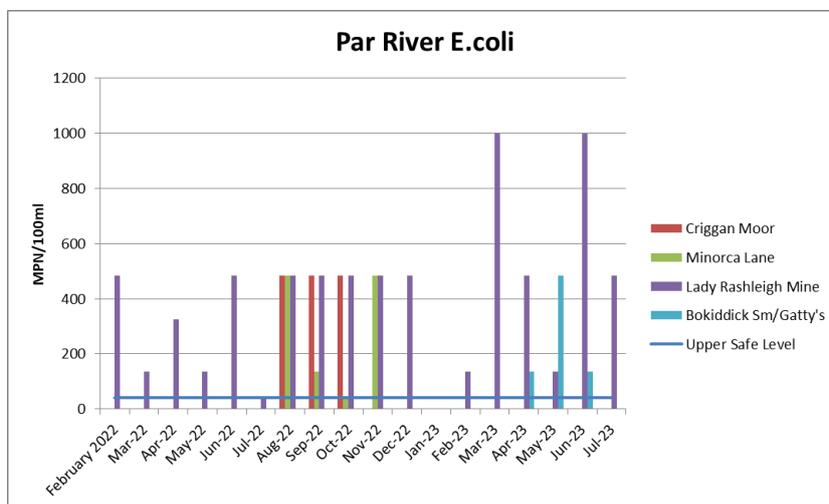
	Very High Risk/ Unsafe	Low Risk/Possibly Safe	Very High Risk/ Unsafe	hours. River low.
Total Coliform	17/10/2022 >1000 Very Unsafe	17/10/2022 >1000 Very Unsafe	15/10/2022 >1000 Very Unsafe	Dry. Light rain in previous 24 hours. River low.
NOVEMBER 2022	Criggan	Minorca Lane	Lady Rashleigh	
E.coli	No sample	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.
JULY 2023				
E.coli			483 Very High Risk/ Unsafe	Rain in previous 24 hours. River level below average.
Total Coliform			>1000 Very Unsafe	Rain in previous 24 hours. River level below average.

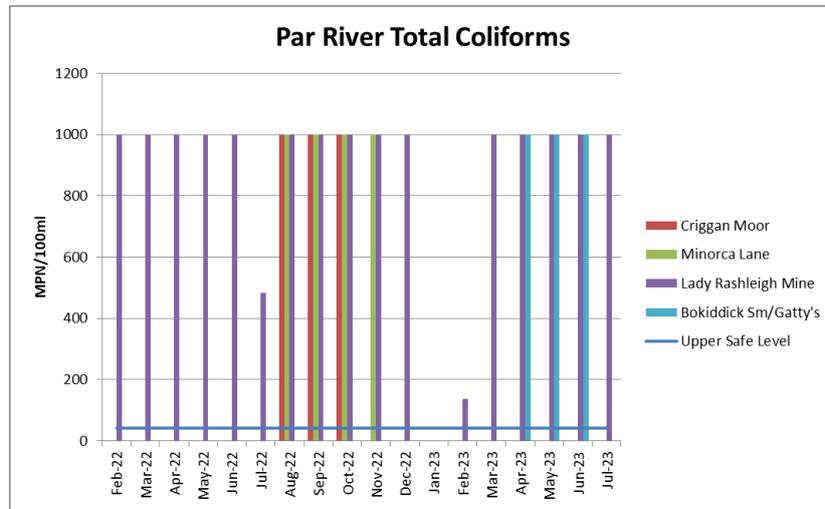
1. Readings taken twice on the 1st sample as it took 12 hours to reach the minimum temperature of 25 degrees.
2. Originally >1000 but I now believe this reading should be 483 and the traces of blue in compartment 5 had leaked out of one of the other compartments as the clip was not positioned exactly 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.

4. Graphs

(a) E.coli



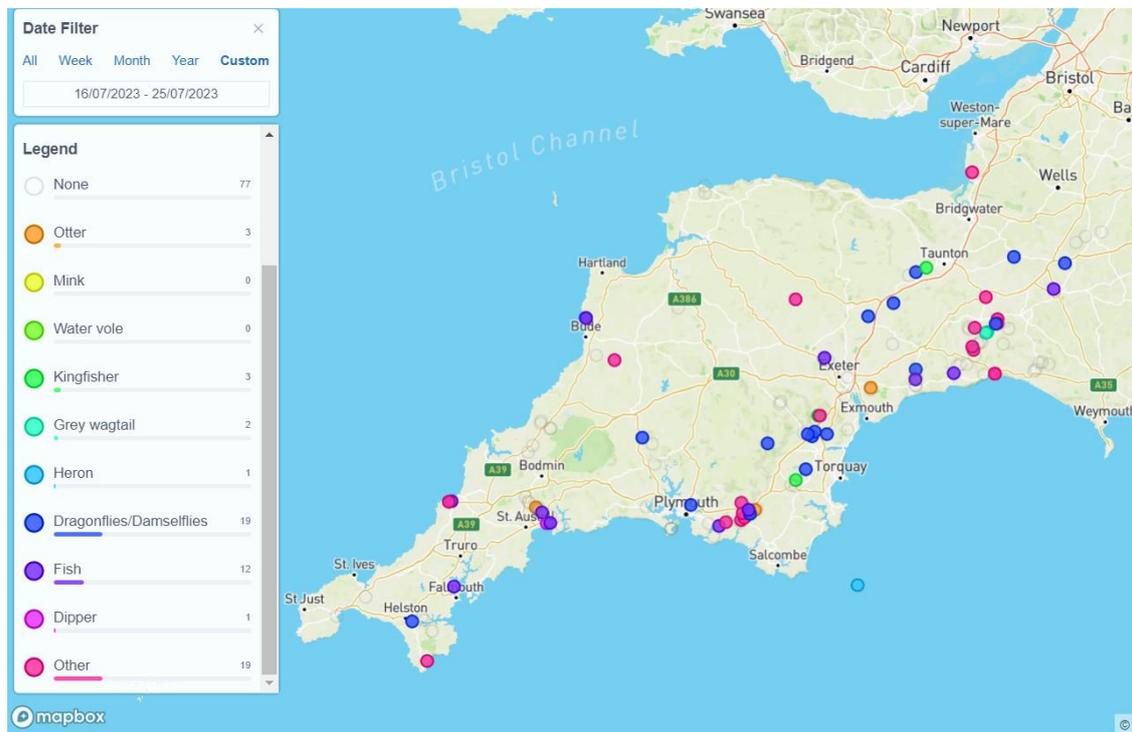
(b) Total Coliforms

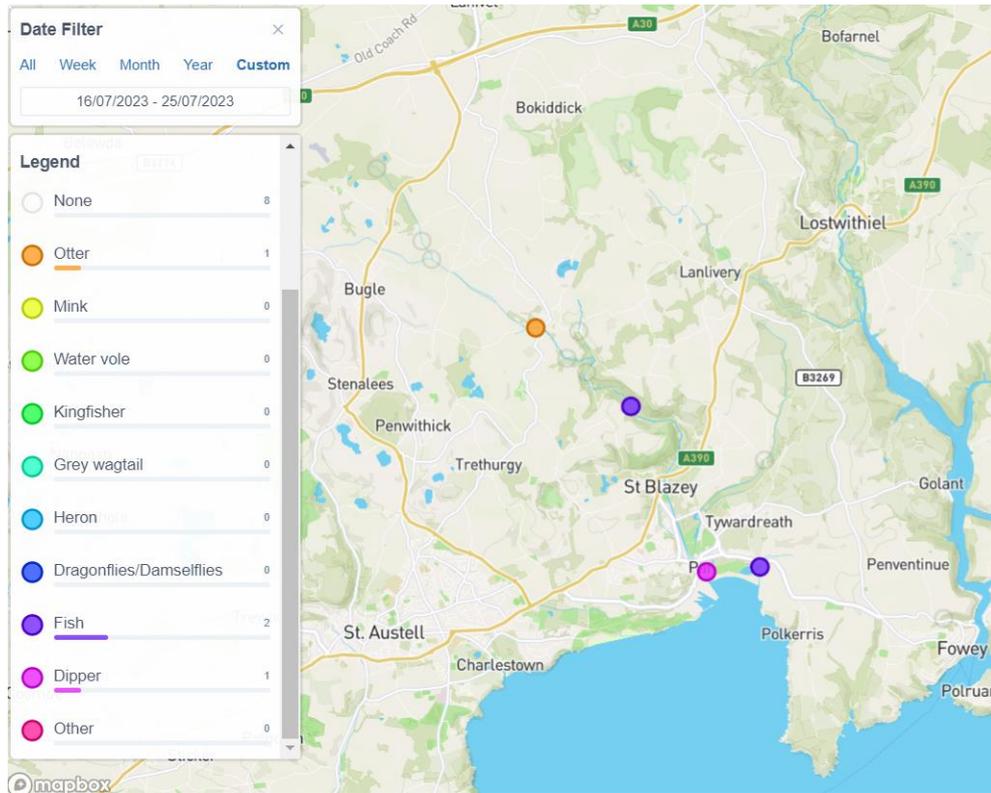


This is the last time we will monitor bacteria using the Aquagenx test as we have run out of the necessary materials.

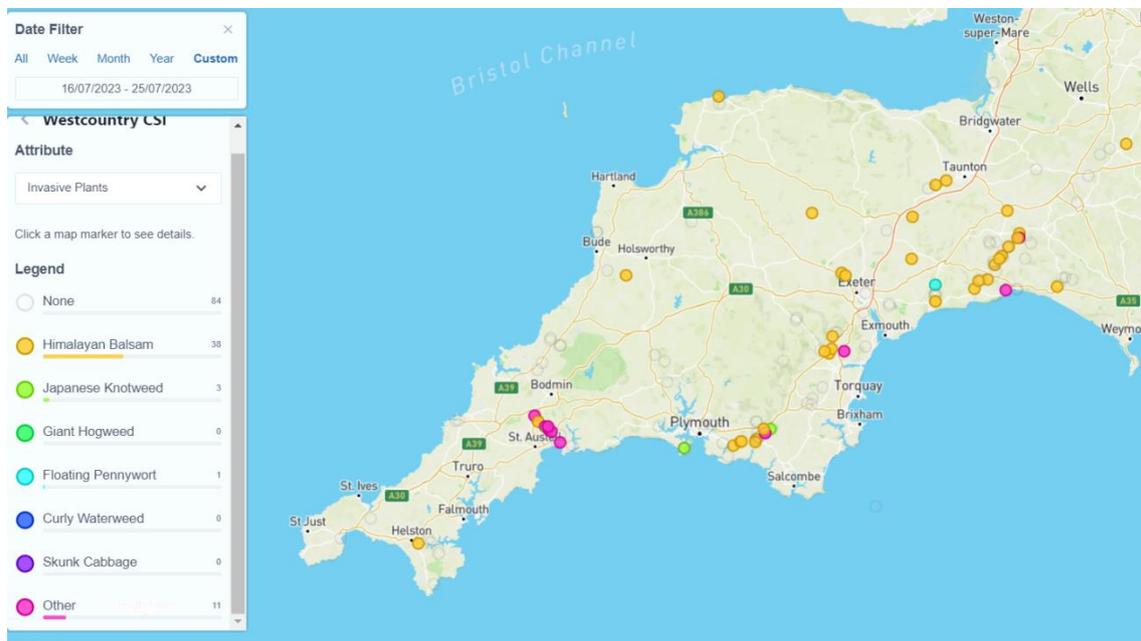
H. WILDLIFE (FOR OTTER REPORT SEE SECTION I) & INVASIVE PLANTS

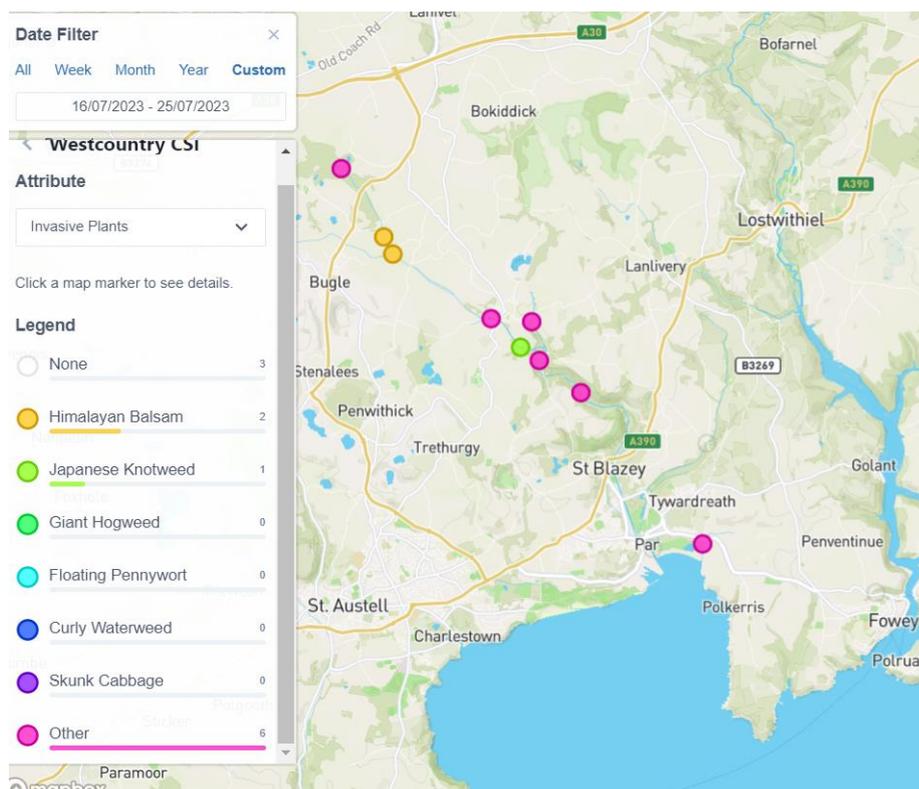
(a) Wildlife maps





(b) Invasive plants maps





Hemlock Water Dropwort makes up all our entries under 'Other'. Although highly poisonous, it is an indigenous plant.

(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	None	Hemlock Water Dropwort
Par	South of Minorca Lane, Par River, SX 02657 59788	None	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	None	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	Butterflies (Silver-washed Fritillary, Holly Blues, Red Admirals), fish. Riverfly nymphs: Cased Caddisfly, Caseless Caddisflies, Olives, Flat-bodied Upwings, and Freshwater Shrimps. Also leeches* and a worm.	
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385	None	

Par	Par Beach slipway, SX 0776 53261	Dipper, dunlin	
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	Fish	Hemlock Water Dropwort (probably)

*Thanks to Nick Taylor for identifying the leeches. He said: 'We seem to be finding two types; one is dark brown, with paler brown edges (like the one you have found), the other has a sort of 'netted' pattern on it'.

I. OTTER SURVEY JULY 2023

1. SURVEY CONDITIONS

Date & time	17/7/2023
Surveyors	Roger Smith, Dave Burrell, Joan Farmer,
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	Heavy rain in previous 24 hours
River level	Low
River flow	Steady
Water quality	Phosphate readings 300 PPB at the highest (Luxulyan allotments), 1000 at Cam Bridges, 500 at Treffry Viaduct and 300 at Lady Rashleigh Mine and 500 at Par Beach slipway. All readings zero upstream from the allotments. High bacteria levels at LRM.
Other wildlife	Butterflies, fish and riverfly nymphs at Lady Rashleigh Mine. Dipper and dunlin at Par Beach.

2. EVIDENCE FOR OTTERS ✓

EVIDENCE	SEEN/ ORKS*	LOCATION	NOTES
Spraint - fresh			
Spraint – recent			
Spraint - old	✓*	Luxulyan allotments – boulder in river. SX 04747 58056	Other droppings (rat?) nearby
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 near Luxulyan allotments

(b)



Other droppings (perhaps rat) near Luxulyan allotments

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.

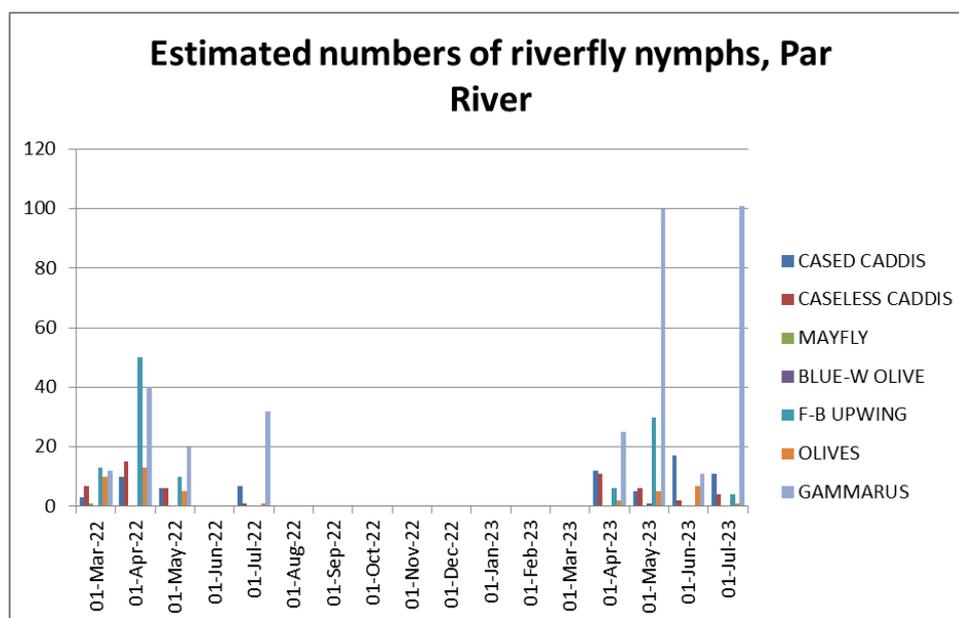
It is impossible to count every invertebrate so this counting method is used:

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

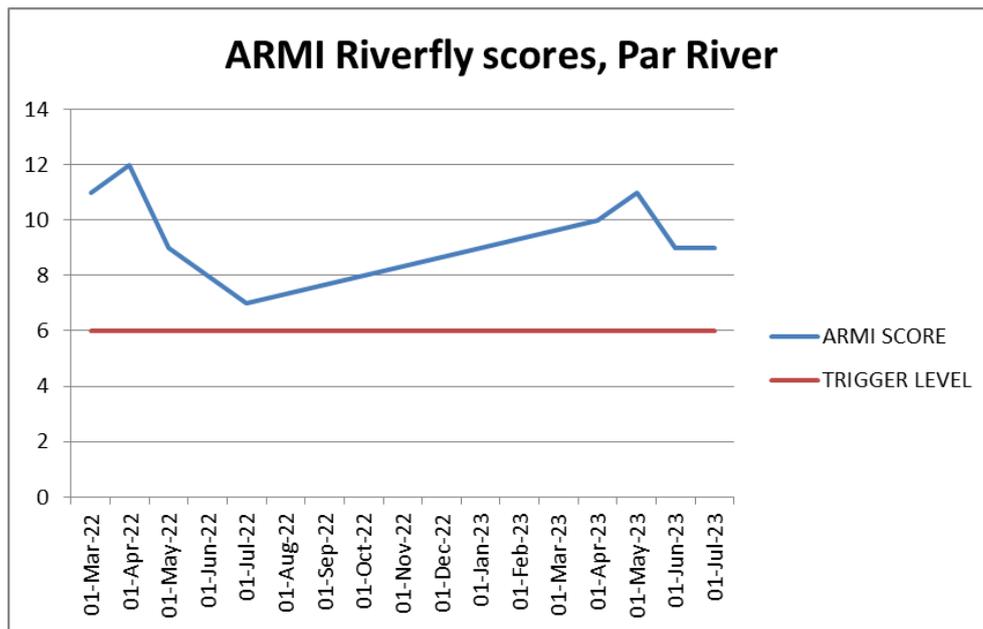
Results of survey at Lady Rashleigh Mine (SX 06451 56509) carried out by Dave Burrell, Joan Farmer, and Roger Smith on 17th July 2023

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

CATEGORY TOTAL	9
TRIGGER LEVEL	6



These are estimated numbers, especially when there are large numbers of a particular type. For example, there were more than 100 Gammarus but this has been recorded for the purposes of the graph as 101.



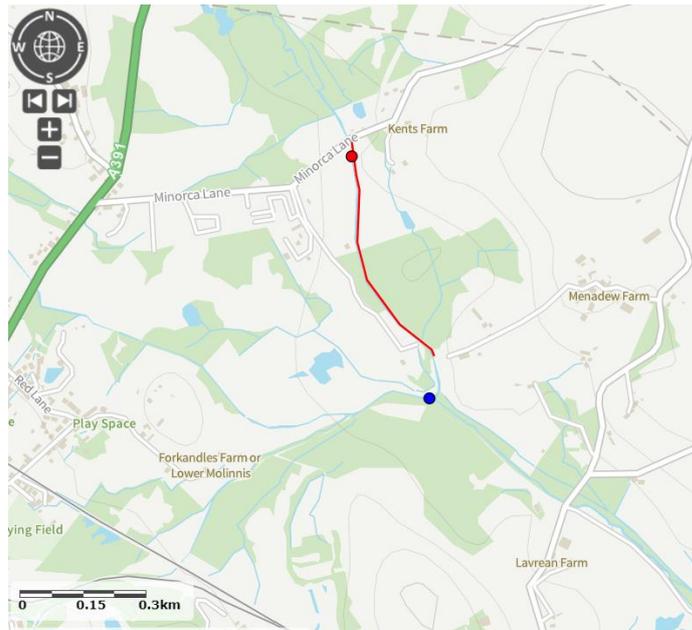
K. DISCUSSION

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, dippers, dunlin and butterflies.
- (c) Phosphate levels, though too high, did not match the very high levels of the previous month.
- (c) China clay pollution on the Carbis Stream was not evident.

2. Points of concern

- (a) Taken at face value, the bacteria tests are worrying.
- (b) Phosphate levels are too high.
- (c) The motorbike remains in the river near Minorca Lane. Cornwall Council officers have visited but it seems that the bike has been stolen, so the police and insurance company are involved, which will slow things down. It will be impossible to get access from the narrow, adjacent footpath to remove it; however the owner of the field on the other bank is willing to allow access. Although the process of extricating the bike is frustratingly slow, I am very impressed with Cornwall Council for keeping me updated.
- (d) At various places along the Upper Par there are objects in the river bed that should not be there and which may pose a threat to riparian life. The motorbike near Minorca Lane is one, but on the stretch between Minorca Lane and the junction of paths near Higher Menadue there are various items, such as corrugated sheets, canisters and so on that should not be there.



Harmful objects in River Par and Carbis Stream south of Minorca Lane

Key to map above:

Red line: stretch of river with various objects.

Red dot: motorbike.

Blue dot: site of missing bridge. Here, numerous objects have been placed in the stream to allow people to cross – see next photo. This has been reported before 2023 to Cornwall Council Countryside Access team and a reply was received to say there were plans to replace the bridge but nothing has happened yet.



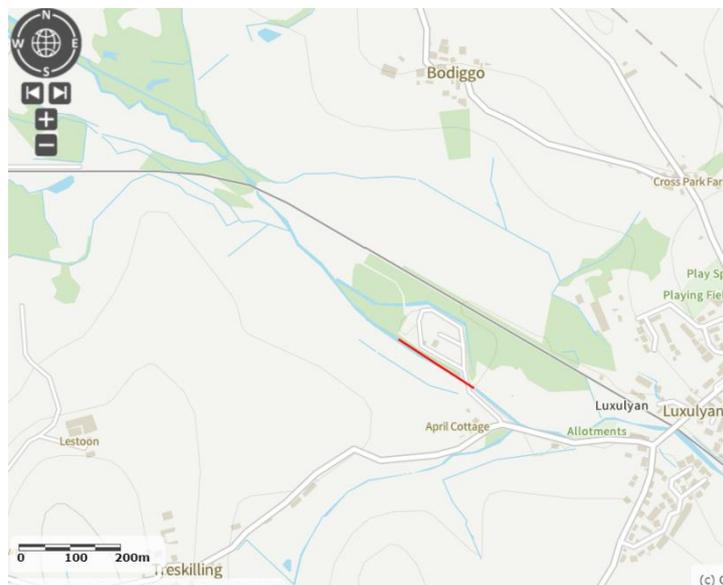
Missing bridge over the Carbis Stream on Treverbyn public footpath 424/34/1 at SX 02831 59403

Another serious problem is the mesh lining the banks and bed of the Par River near the St Austell North STW. It seems likely this was installed as part of a river-straightening process, perhaps when the STW was built. In places this has become detached and not only poses a problem for wildlife but also for anyone in the river (see photo below):



Mesh in river near St Austell North STW at Luxulyan – August 2022.

The approximate location of the mesh is shown by the red line:



3. Areas of doubt

(a) We have now completed our bacteria testing trial as requested by WRT. Huge thanks are due to Joan Farmer for undertaking this time-consuming and very unpleasant task. But we are not sure about the validity of our bacteria results, or the suitability of the Aquagenx test for rivers, until expert guidance is received. An evaluation by WRT of this pilot, if possible, would be very

helpful. Continuing to monitor bacteria, preferably with a different, less unpleasant method, and one that was compatible with Environment Agency methods and measures, is important.

(b) As citizen scientists, we do not have the expertise to understand the impact of negative findings, such as phosphates and bacteria, are having on the biodiversity of our rivers. Likewise, the impact of the climate deterioration that we are experiencing is hard to assess but although these are areas of doubt, we can be certain of the urgent need to carry on monitoring the river.

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 Harrison. 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