WESTCOUNTRY RIVERS TRUST CITIZEN SCIENCE

MONITORING OF THE PAR RIVER AND ITS TRIBUTARIES

The monitoring group has been helped by the Westcountry Rivers Trust, The Friends of Luxulyan Valley, The Friends of Par Beach, and the G7 Legacy Project for Nature Recovery. Comments and opinions in this report are not necessarily shared by these organisations.

OCTOBER 2022

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A. KEY POINTS FROM WRT CSI MONITORING IN OCTOBER 2022

1. River levels remained low.
2. Following very high phosphate readings last month we intended to contact the Environment Agency hotline if we had more readings of 2500 ppb. Our reading for Lady Rashleigh Mine was definitely in excess of 1000 ppb, and probably 2500 ppb, but since there was some uncertainty we did not contact the EA this time.
3. Bacteria scores remain a source of puzzlement and concern.
4. Evidence was found for the presence of otters and fish.

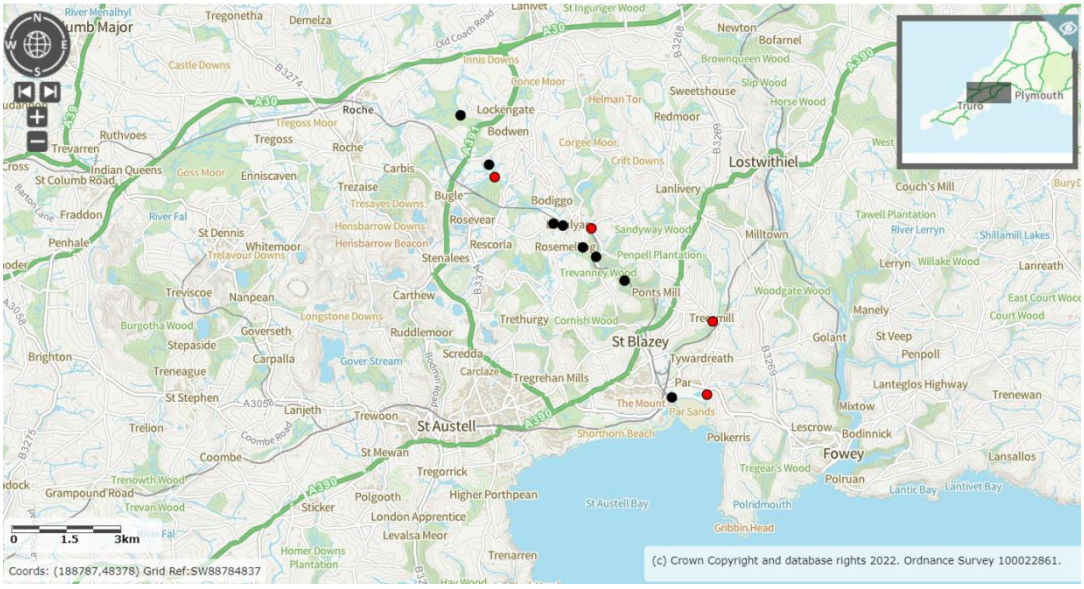
B. OUR GROUP

Monitoring is part of the Citizen Science programme run by the West Country Rivers Trust (WCRT) and is carried out monthly by volunteers from the Friends of Luxulyan Valley. The FoLV team comprises: Dave Burrell; Joan Farmer; Veronica Jones; Sue Perry; Roger Smith; the FoPB team includes 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 and Lydia Deacon is greatly appreciated. The interest and encouragement offered by Environment Agency officers, especially Lisa Best and Lisa Goodall, have been invaluable.

C. OCTOBER 2022 MONITORING POINTS

This month monitoring occurred at 12 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



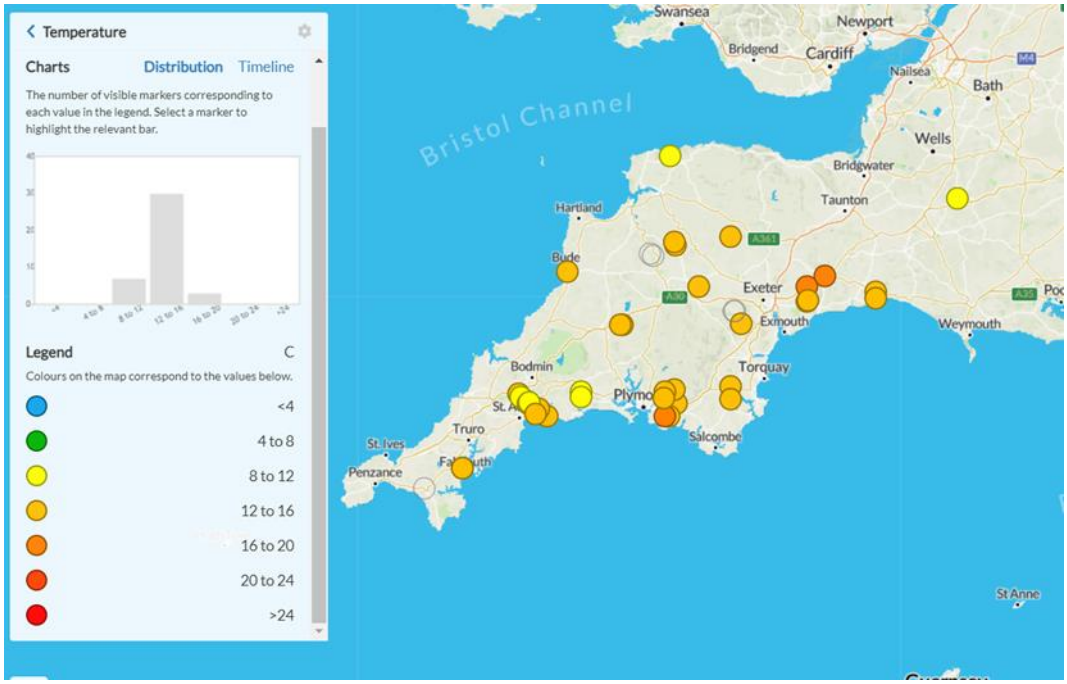
LOCATION	DATE	TYPE OF CHECK	MONITORED BY
Criggan Moors, Par River, SX 01882 61133	17/10/2022	CSI sample & Cartographer record. Water sample for bacteria testing.	Roger Smith
South of Minorca Lane, Par River, SX 02657 59788	17/10/2022	CSI sampling. Cartographer record. Water sample for bacteria testing.	Roger Smith
Carbis Stream SX 02834 59401	17/10/2022	CSI sampling. Cartographer record.	Roger Smith
Downstream St Austell North STW SX 0446 5811	15/10/2022	Visual check.	Dave Burrell, Joan Farmer, Veronica Jones, Roger Smith.
Luxulyan allotments, Par River, SX 04732 58045	15/10/2022	CSI sampling. Cartographer record.	Dave Burrell, Joan Farmer, Veronica Jones, Roger Smith.
Cam Bridges, Par River, SX 05292 57454	15/10/2022	CSI sampling. Cartographer record.	Dave Burrell, Joan Farmer, Veronica Jones, Roger Smith.
Gatty's Bridge, Bokiddick Stream SX 05531 57953	15/10/2022	CSI sampling. Cartographer record.	Dave Burrell, Joan Farmer, Roger Smith.
Treffry Viaduct, Par River, SX 05650 57179	15/10/2022	CSI sampling. Cartographer record.	Dave Burrell, Joan Farmer, Veronica Jones, Roger Smith.
Lady Rashleigh Mine, Par River, SX 06451 56509	15/10/2022	CSI sampling. Cartographer record. Water sample for bacteria testing.	Dave Burrell, Joan Farmer, Veronica Jones, Roger Smith.
Treesmill, Tywardreath Stream, SX 08873 55385	17/10/2022	CSI sampling. Cartographer record.	Maggie Tagney
Par Beach slipway, SX 0776 53261	17/10/2022	CSI sampling. Cartographer record.	Brian Harrisson
Polmear Stream, Ship Inn SX 08749 53417	17/10/2022	CSI sampling. Cartographer record.	Simon Tagney

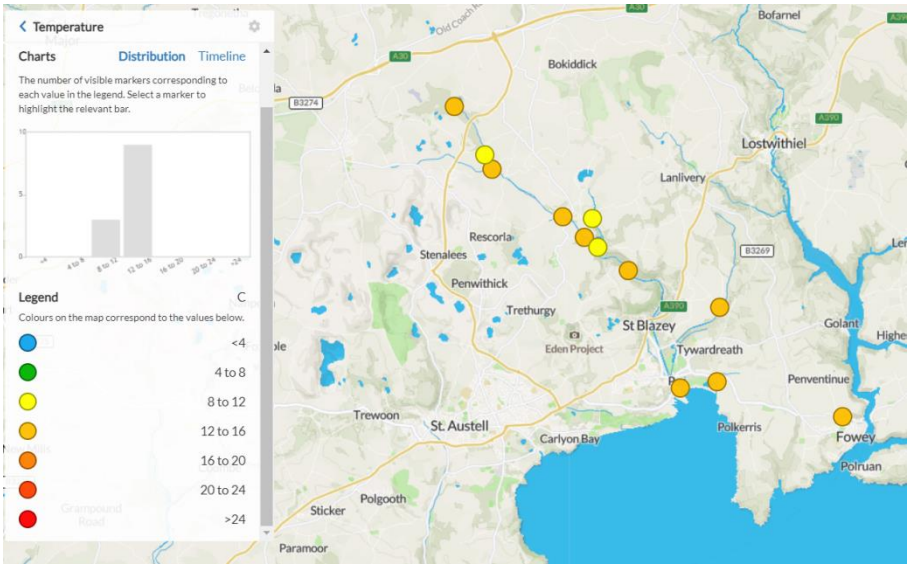
D. TEMPERATURE

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.





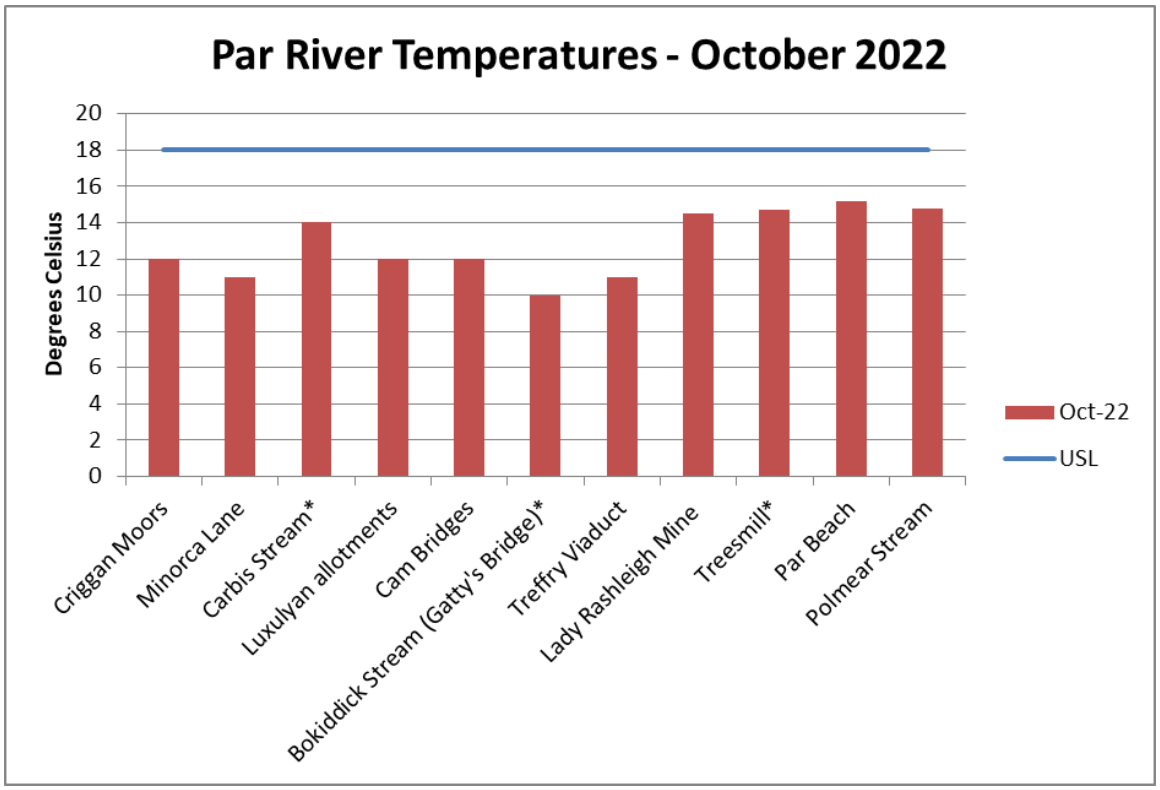
3. **Results** October 2022

PAR RIVER/TRIBUTARY	LOCATION	Temperature ˚Celsius
Par	Criggan Moors, SX 01882 61133	12
Par	South of Minorca Lane, Par River, SX 02657 59788	11
Tributary	Carbis Stream SX 02834 59401	14
Par	Luxulyan allotments, Par River, SX 04732 58045	12
Par	Cam Bridges, Par River, SX 05292 57454	12
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	10
Par	Treffry Viaduct, Par River, SX 05650 57179	11
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	14.5
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385	14.7
Par	Par Beach slipway, SX 0776 53261	15.2
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	14.8

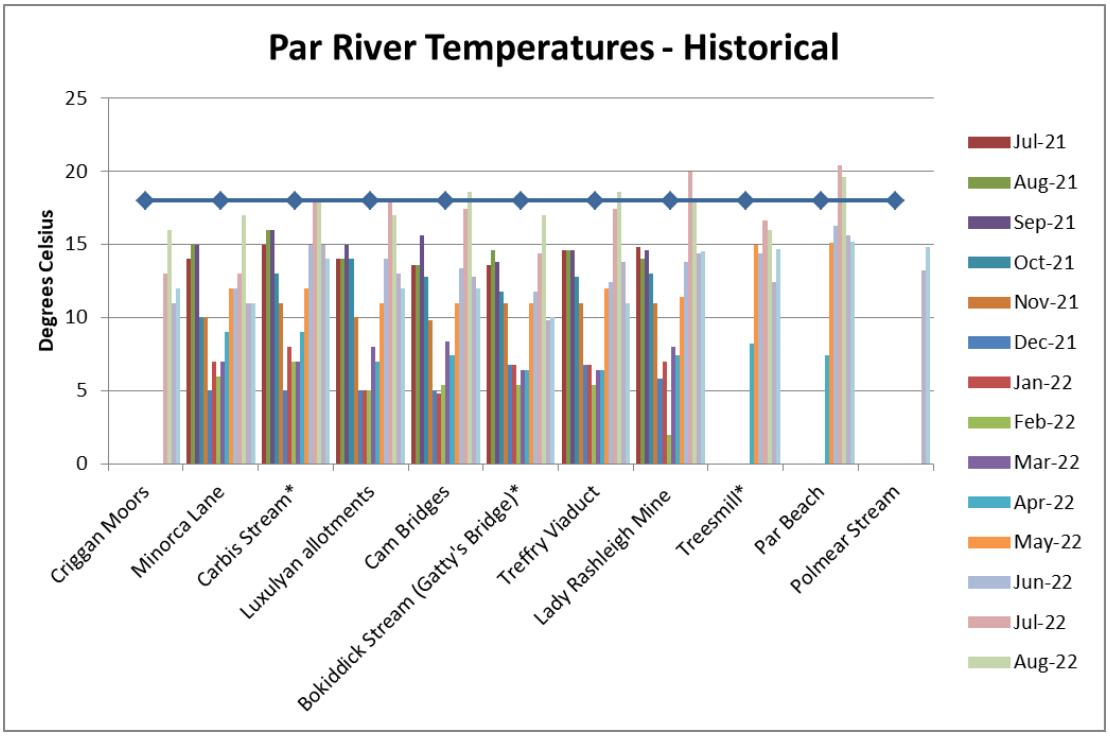
4. Graph October 2022

*indicates a tributary of the Par River.

USL – Upper Safe Limit Our assumption is that 18˚ Celsius is the upper safe limit for fish. This simplification is a useful rule of thumb.



5. **Historical data** on temperature:

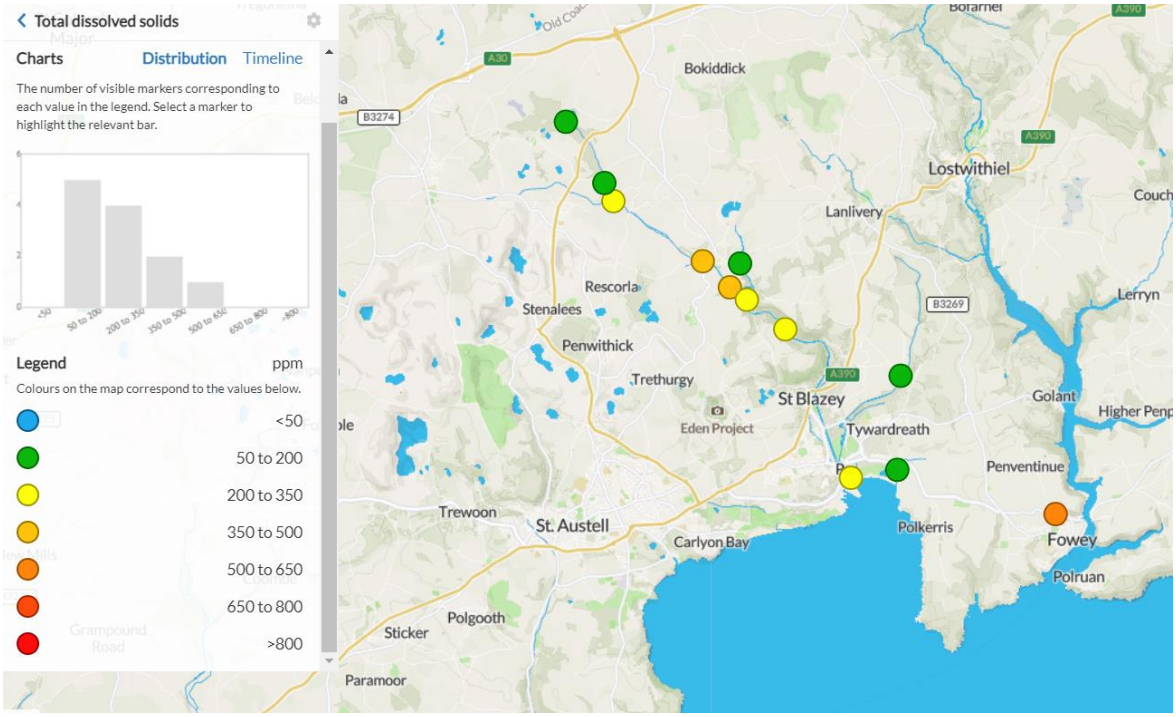


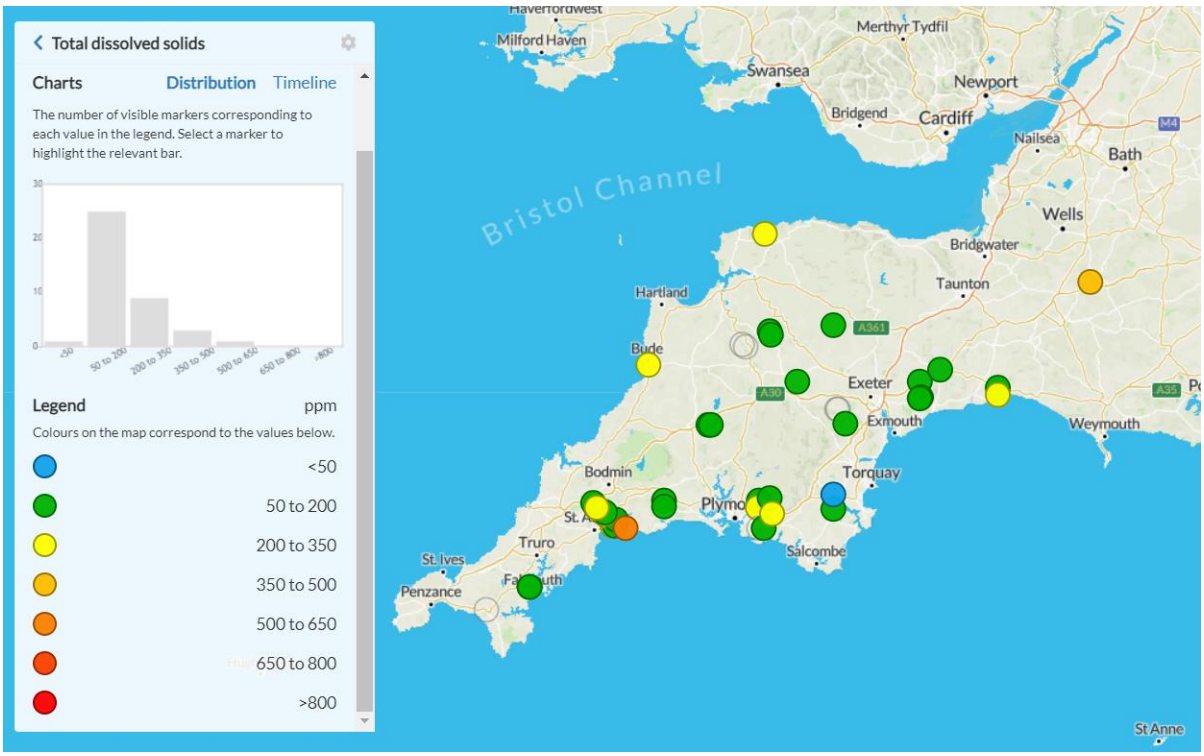
E. TOTAL DISSOLVED SOLIDS

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.

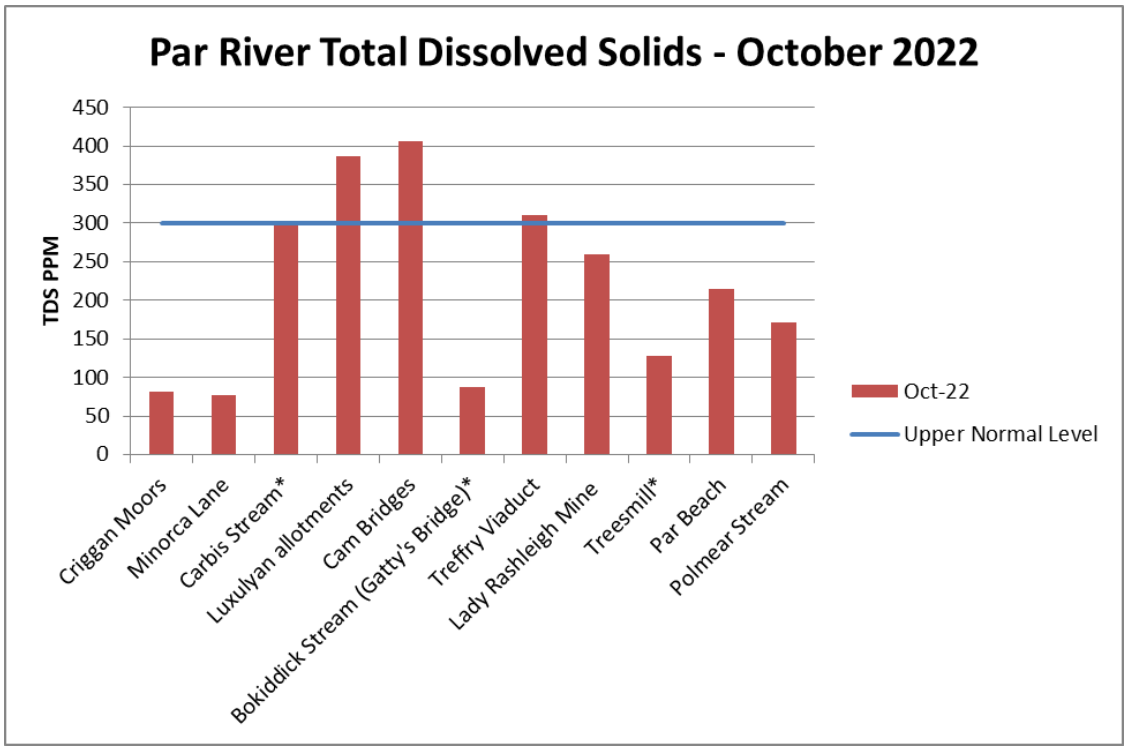
2. Geographical **comparison.** Source: Cartographer.





3. **Results** October 2022

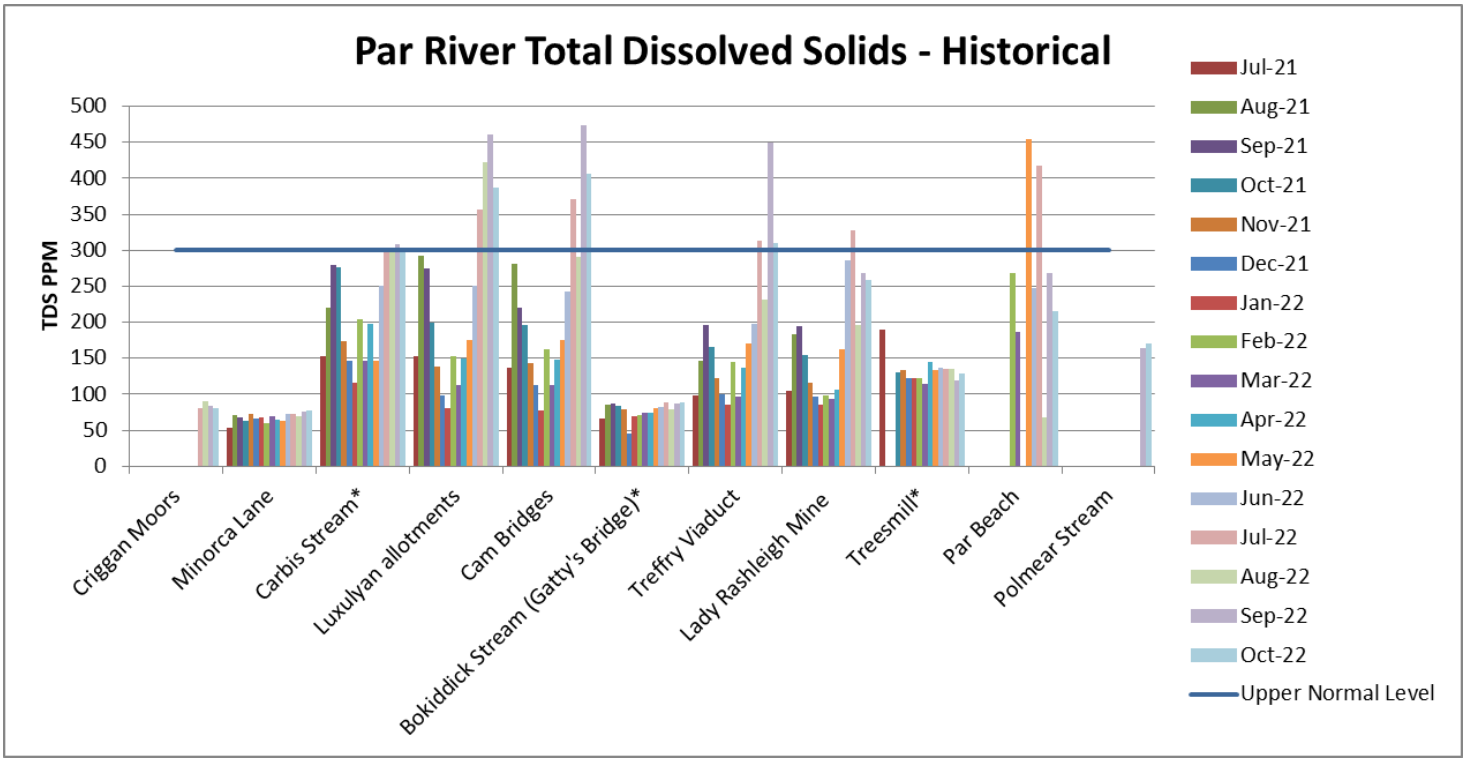
PAR RIVER/TRIBUTARY	LOCATION	Total Dissolved Solids PPM
Par	Criggan Moors, SX 01882 61133	81
Par	South of Minorca Lane, Par River, SX 02657 59788	77
Tributary	Carbis Stream SX 02834 59401	300
Par	Luxulyan allotments, Par River, SX 04732 58045	387
Par	Cam Bridges, Par River, SX 05292 57454	406
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	88
Par	Treffry Viaduct, Par River, SX 05650 57179	310
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	259
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385	128
Par	Par Beach slipway, SX 0776 53261	215
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	171



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. **Historical data** on total dissolved solids:



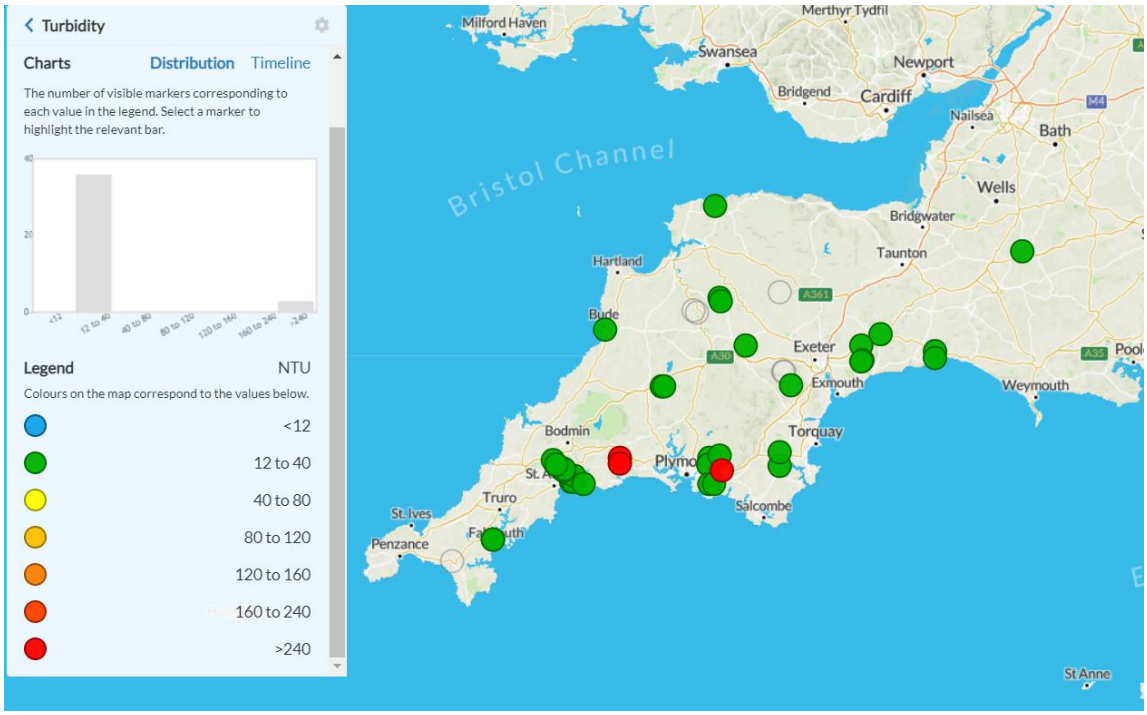
N.B. The sites most frequently exceeding the informally designated Upper Normal Level are downstream from St Austell North STW but correlation does not establish causation. Readings on the Carbis Stream often exceed those elsewhere but only triggered the Upper Normal Level this year. Low water levels might be an explanation of some of these readings if dilution increases the concentration of Total Dissolved Solids.

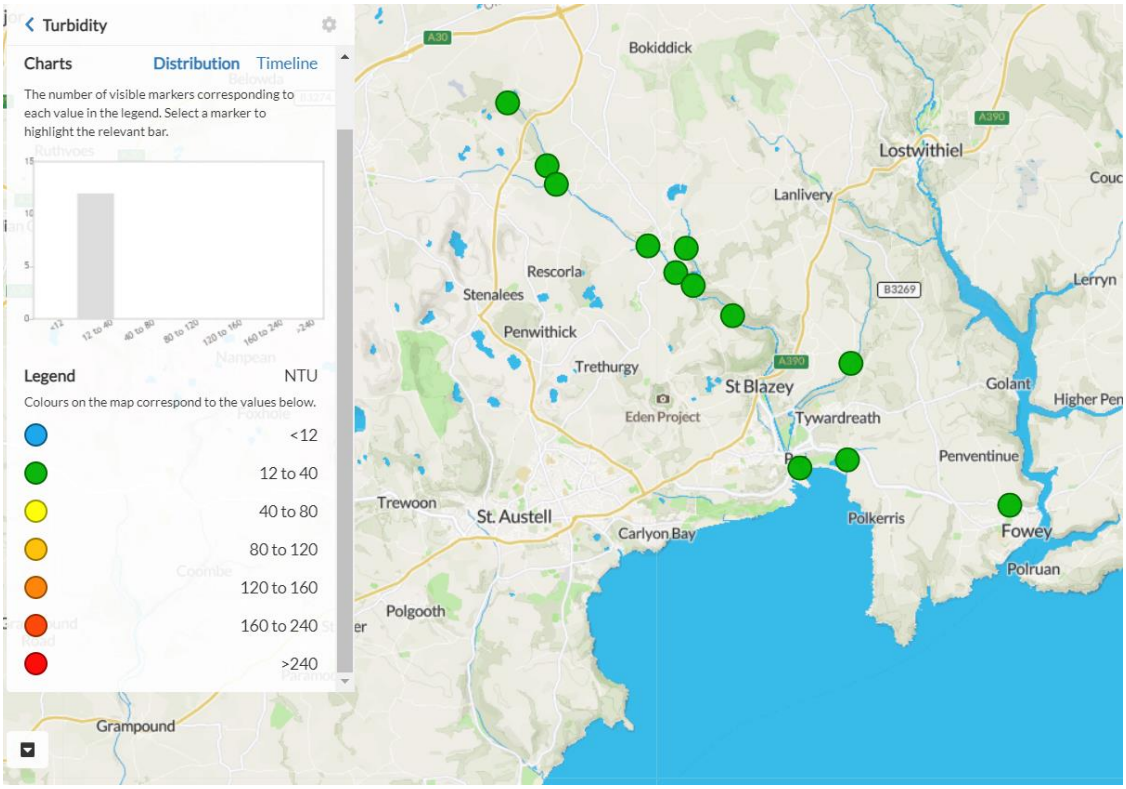
F. TURBIDITY

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.

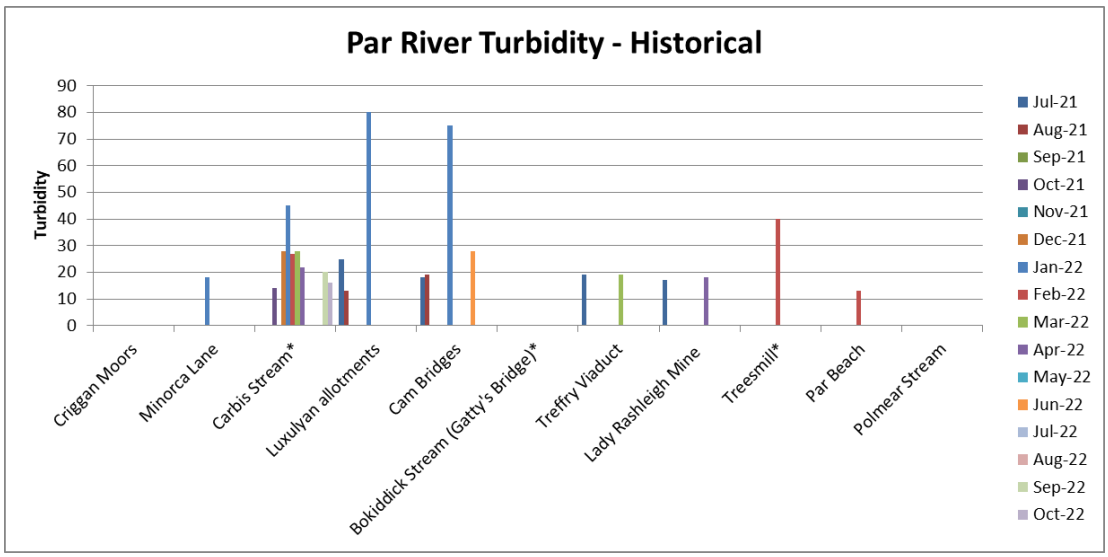




3. Results October 2022

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	16
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. Historical **data on turbidity:**



G. 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.)

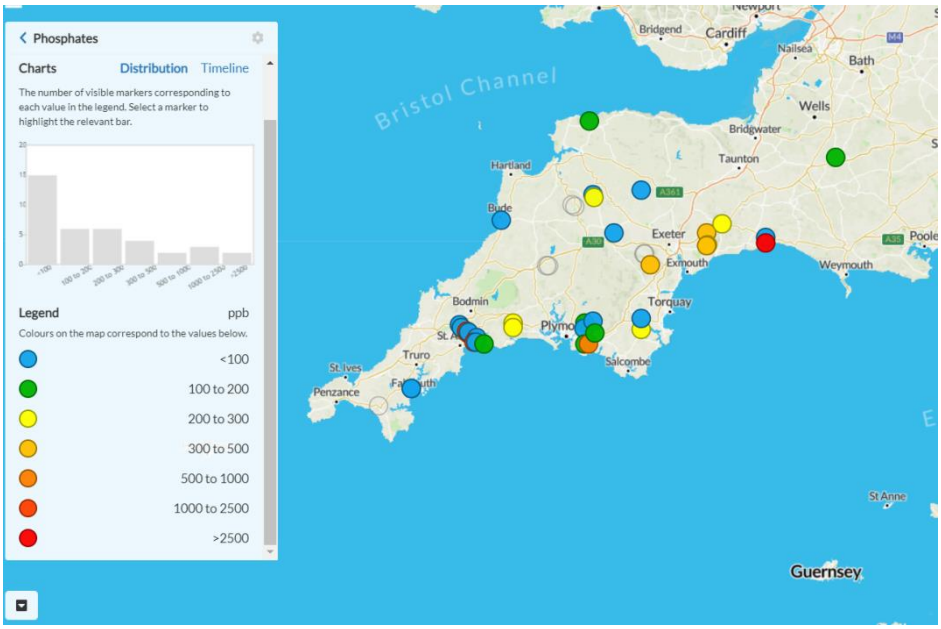
Ranges on phosphate diagnostic colour chart:

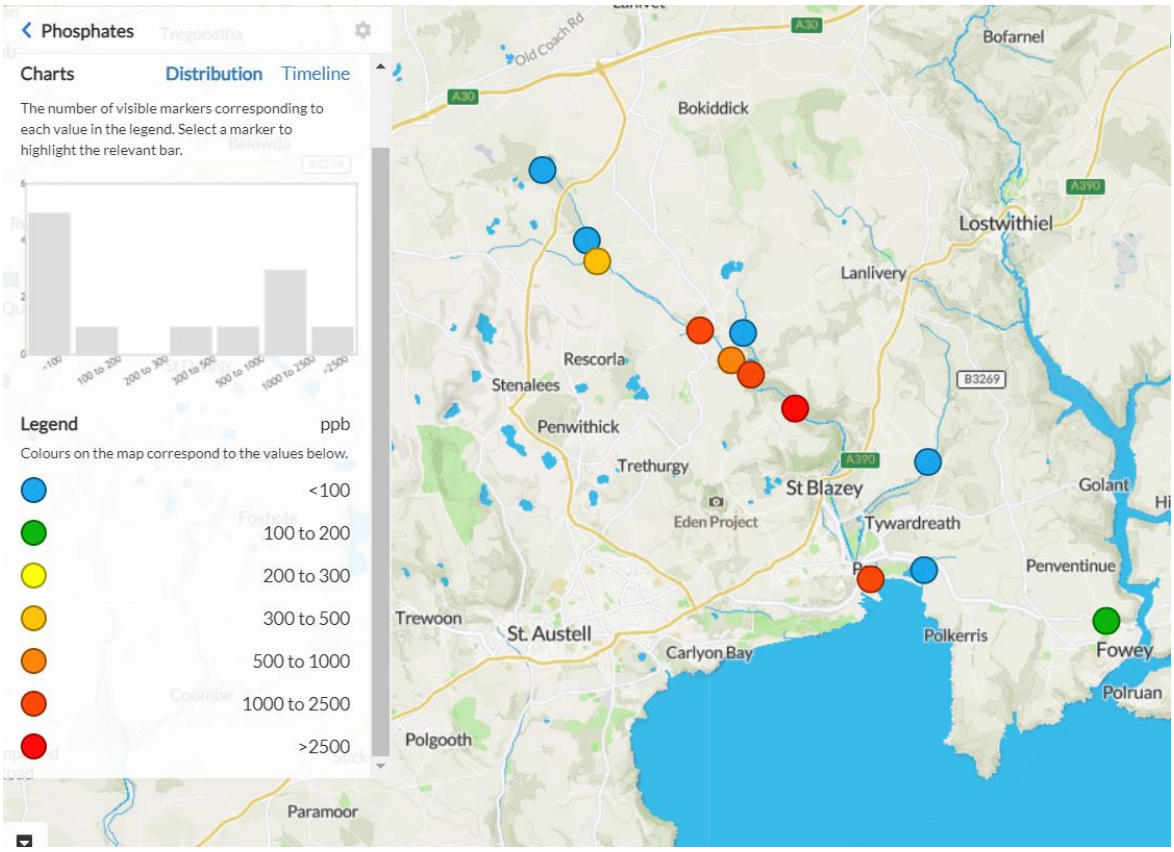
0 – 100 OK

200 – 300 HIGH

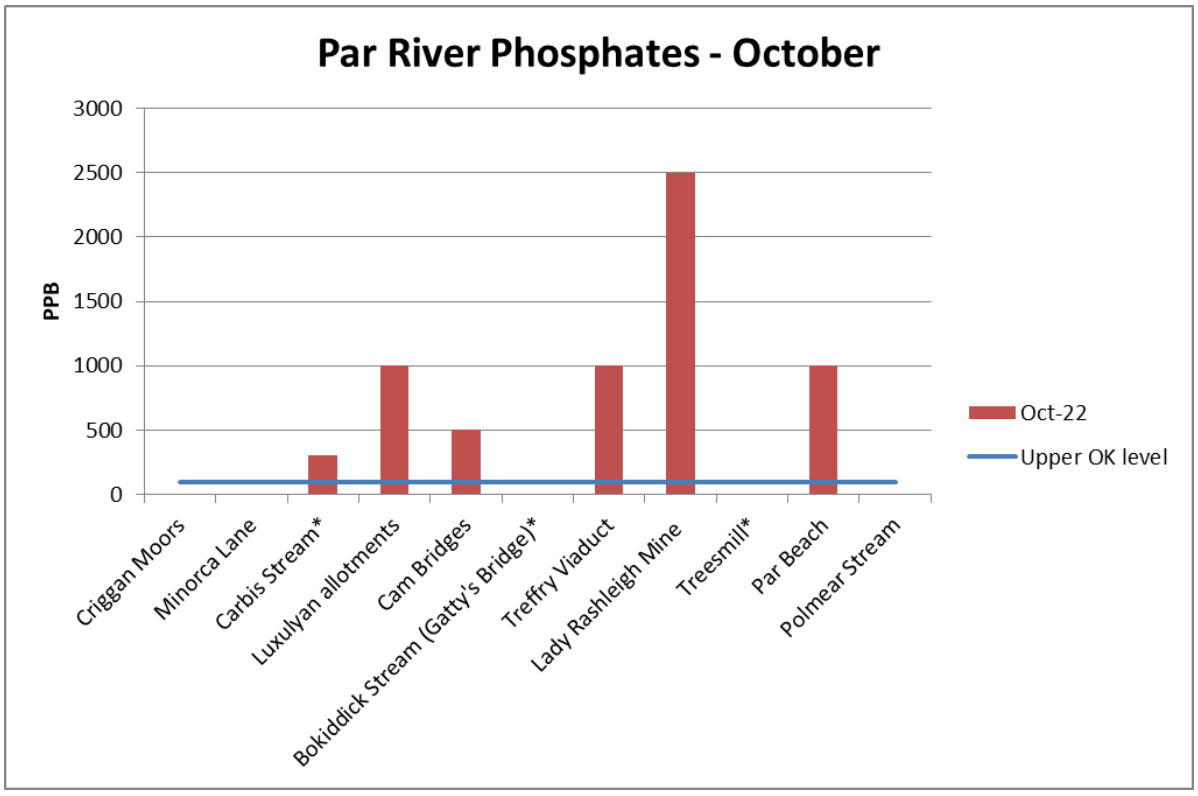
500 – 2500 – TOO HIGH

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



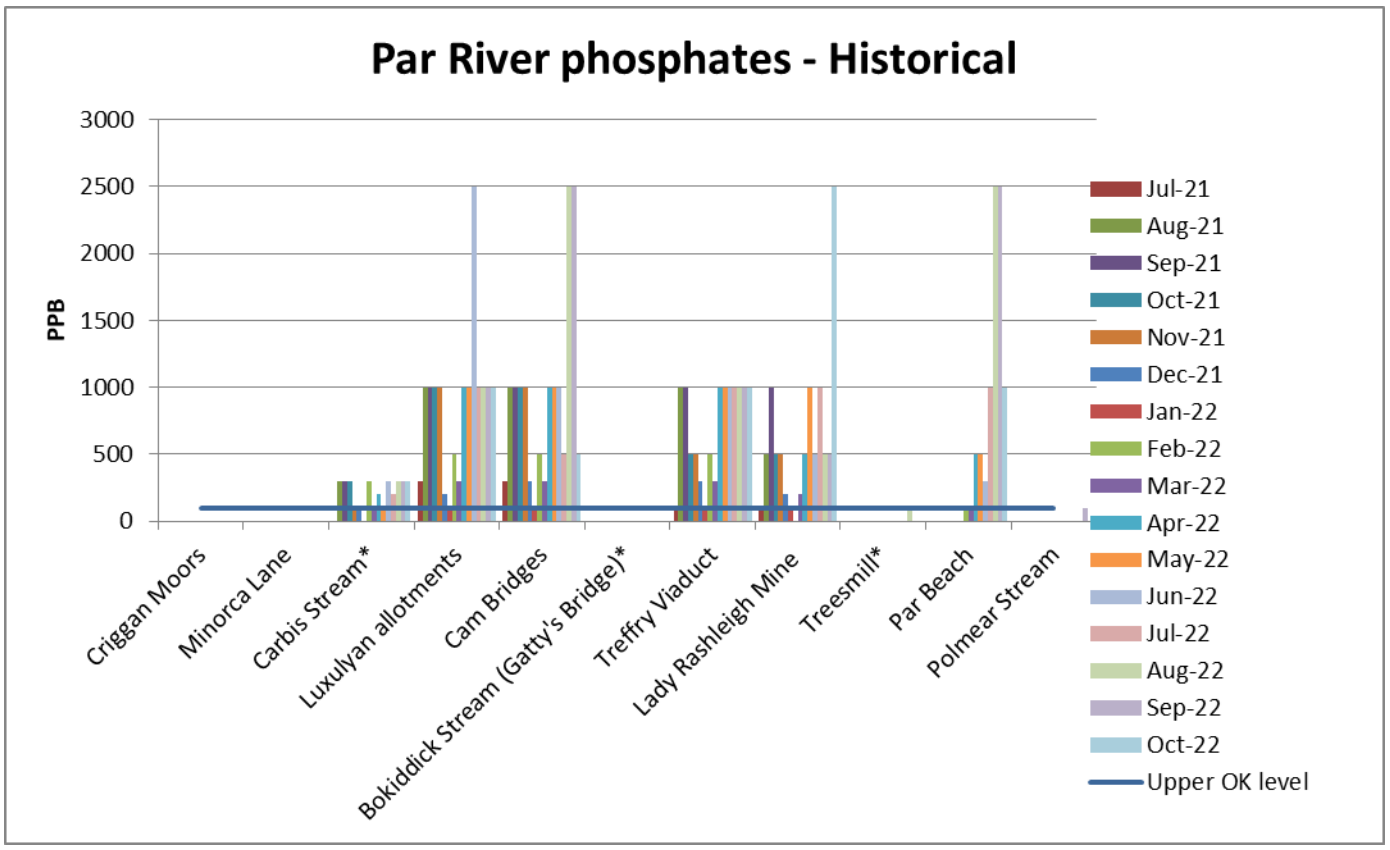


PAR RIVER/TRIBUTARY	LOCATION	Phosphates PPB
Par	Criggan Moors, SX 01882 61133	0
Par	South of Minorca Lane, Par River, SX 02657 59788	0
Tributary	Carbis Stream SX 02834 59401	300
Par	Luxulyan allotments, Par River, SX 04732 58045	1000
Par	Cam Bridges, Par River, SX 05292 57454	500
Tributary	Gatty's Bridge, 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	1000
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	0



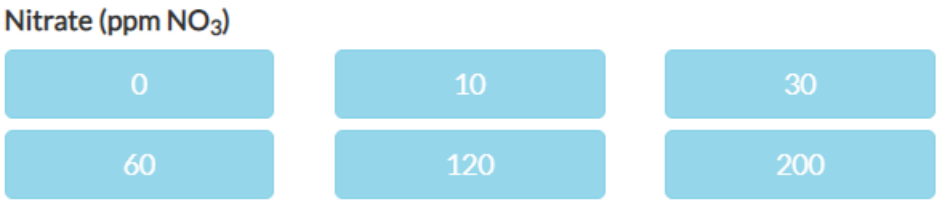
*indicates a tributary of the Par River. USL is 100 Parts Per Billion which, according to WRT, is the Upper Safe Level.

6. **Historical data on phosphates:**



H. NITRATES

1. The WRT kit has these ranges for nitrates:

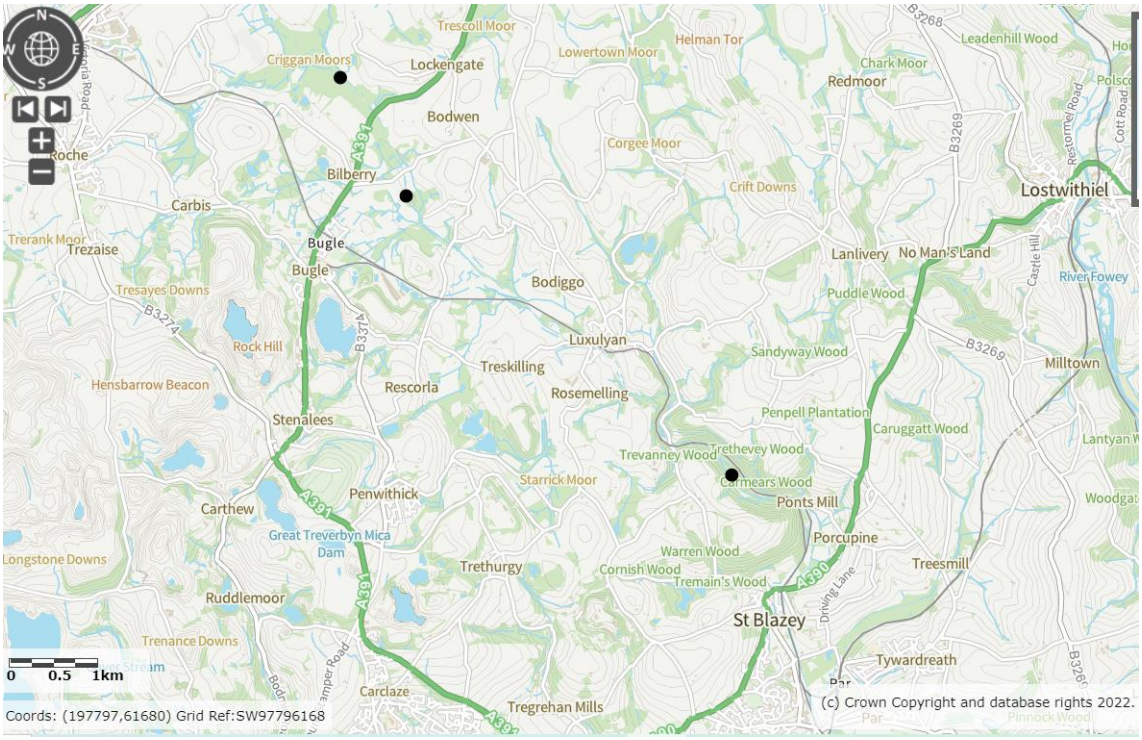


2. We have concerns about the sensitivity of the testing strips so did not carry out any tests this month.

I. BACTERIA (E.COLI (EC) AND TOTAL COLIFORM (TC))

1. Samples were taken at these locations:

- Criggan Moor (SX 01882 61133)
- South of Minorca Lane (SX 02657 59788)
- Lady Rashleigh Mine (SX 06451 56509)



2. Key information:

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

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.

Interpreting the 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 Minimum Probable Number 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. Bacteria results. Report and data from Joan Farmer:

Bacteria in Par River: October results.

Place	Date	Compartment number blue	E coli	Total coliforms
Criggan Moor	17/10/22	1-4	483	>1000
Minorca Lane	17/10/22	2+3	47	>1000
Gatty's (trib)	15/10/22	1-4	483	>1000
Lady Rashleigh Mine	15/10/22	1-4	483	>1000
Treesmill (trib)	17/10/22	1-3	326	>1000
Par Slipway	17/10/22	1-4	483	>.1000

According to the US standards for recreational water,

47 mpn/100ml is Low risk/Possibly safe

326 and 483 mpn/100ml are Very High Risk/Unsafe

>1000 mpn/100ml for total coliforms meant every compartment glowed under UV light: Very Unsafe.

Additional results:

Place	Date	Compartment Number Blue	E coli	Total Coliforms
Polmear Stream	17/10/22	1-4	483	>1000
Tap water	19/10/22	3	15	84

15mpn/ 100ml is Low Risk/Probably Safe for recreational water. However, the result should be 0 for tap water. As it was the first test of the day, there should be no cross contamination so either the equipment was not adequately sterilised, (test tube and syringe for1:10 solution) or my 90ml of previously boiled tap water for dilution was compromised, **or** there was indeed e coli and other coliforms in the tap water. In the tap water sample under UV light all compartments except no 2 glowed. It remained a sandy colour, which is not very clear from the photo. In ambient light compartment 3 was quite a dark blue and I used 3 chlorine tablets to neutralize it and turn it a sludgy brown, so it was not a mere trace of bacteria.

Tap water test **Photo: Joan Farmer**

Tap water sample under UV light Photo: Joan Farmer

I sterilize washing with Dettol surface cleaner spray on equipment and sterilise surfaces with the bacterial wipes provided. I wore gloves when preparing the samples.

I intend to buy some bleach to sterilise all equipment and repeat the tap water test. The tablet present in the 1st bag (where you dilute the sample and add sugars), should remove traces of chlorine from the sample.

4. Monthly results from 3 main monitoring sites:

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)	Rain prev. 24 hrs

			483[1] Very High/ Unsafe **483[2] Very High Risk /Unsafe**	
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**	16/09/2022	17/09/2022; 19/09/2022	No rain

	Very High Risk/ Unsafe	**136 High Risk/Probably Unsafe**	**483 Very High Risk/ Unsafe**	
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 Very High Risk/ Unsafe**	17/10/2022 **47 Low Risk/Possibly Safe**	15/10/2022 **483 Very High Risk/ Unsafe**	Dry. Light rain in previous 24 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.

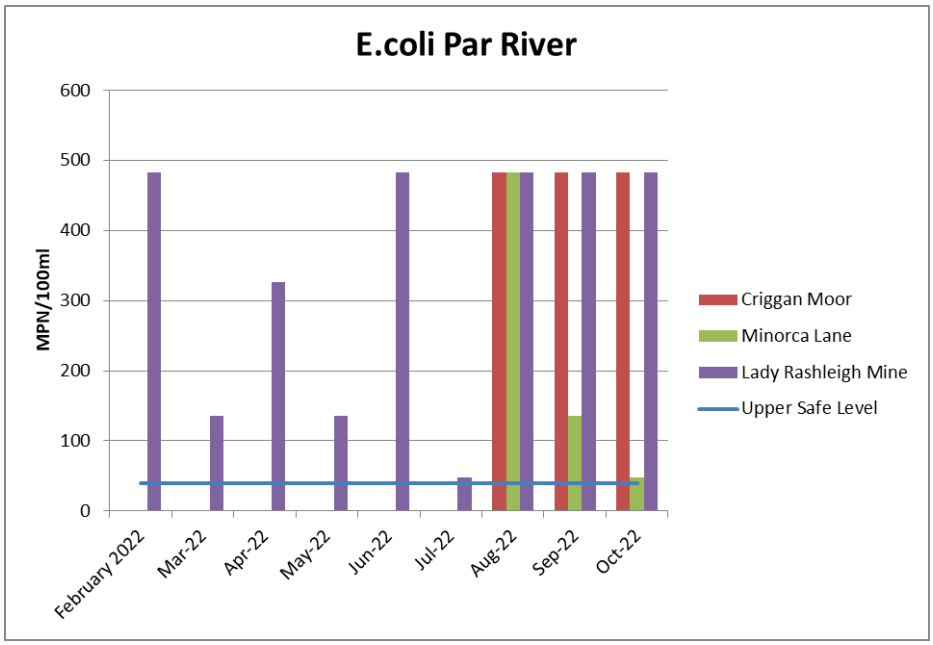
1. Readings taken twice on the 1st sample as it took 12 hours to reach the minimum temperature of 25 degrees.

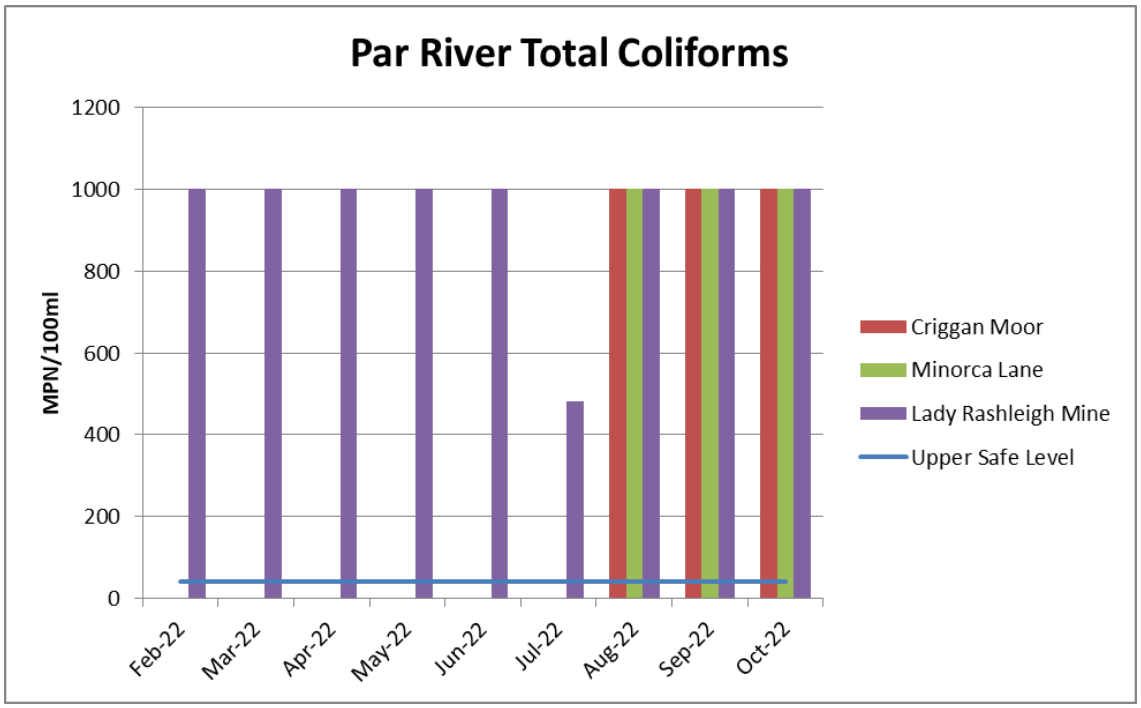
2. Originally >1000 but I now believe this reading should be 483 and the traces of blue in compartment 5 had leaked out of one of the other compartments as the clip was not positioned exactly along the maximum fill line.

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.

5. Graphs

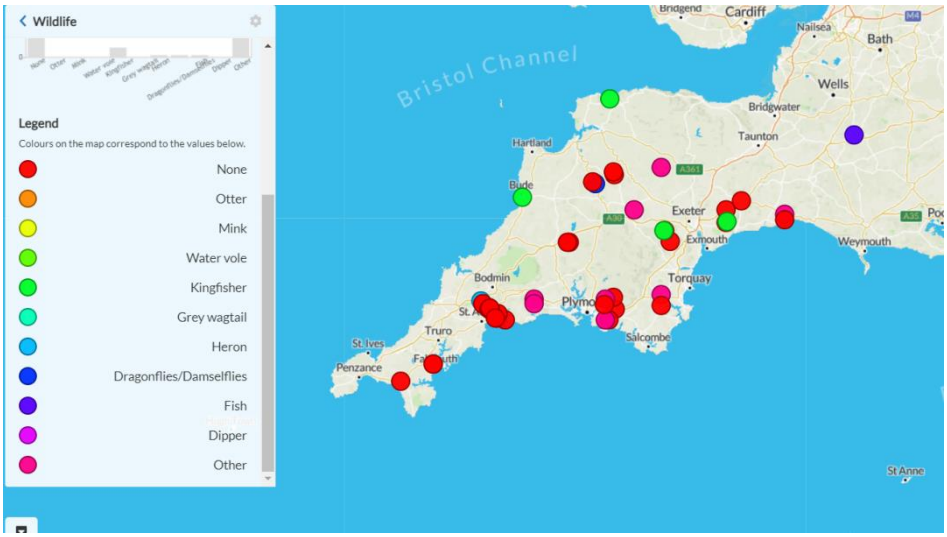




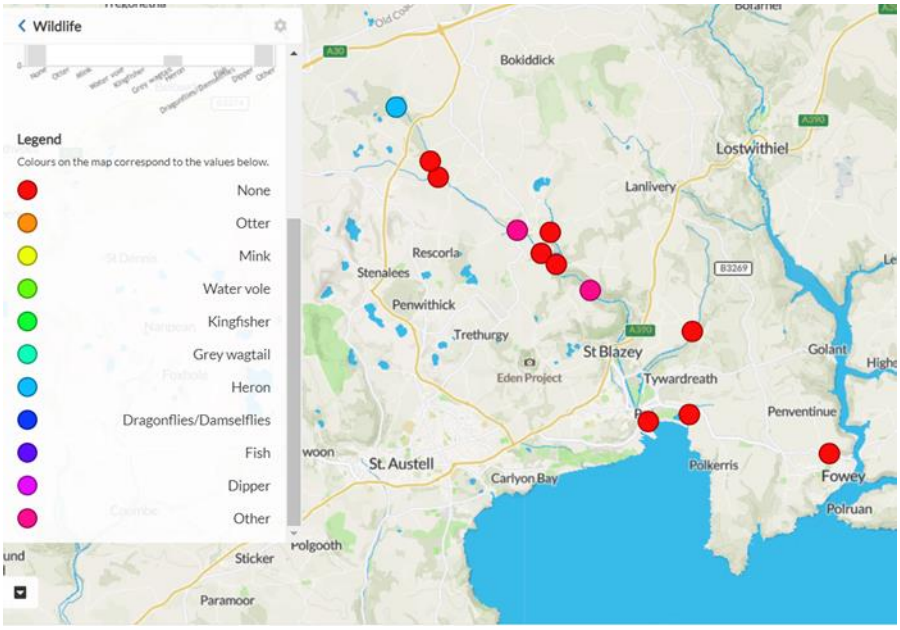
Note: readings in excess of 1000 MPN/100 ml are represented as 1001 on the graph.

J. WILDLIFE (FOR OTTER REPORT SEE SECTION K)

(a) Maps



Source: Cartographer.



Source: Cartographer

Otter spraint is included, as usual, under 'Other'.

(**b) Wildlife sightings, other than evidence for otters, included:**

A heron and a Great Tit were seen on Criggan Moors.

K. OTTER SURVEY

FRIENDS OF LUXULYAN VALLEY OTTER SURVEYS

OCTOBER 2022

A. SURVEY CONDITIONS

Date & time	15/10/2022, 17/10/2022
Surveyors	Roger Smith, Joan Farmer, Veronica Jones, Dave Burrell
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; Lady Rashleigh Mine to Middleway
Weather	Mostly dry
River level	Low
River flow	Steady
Water quality	Too High phosphate levels from Luxulyan allotments downstream, with a possible maximum reading of 2500 PPB at Lady Rashleigh (certainly in excess of 1000 ppb). E.coli readings at Criggan Moor and Lady Rashleigh Mine were *Very High Risk/Unsafe,* but *Low Risk/Possibly Safe at* Minorca Lane. Total coliform scores at the same locations were *Very Unsafe*.
Other wildlife	Heron on Criggan Moors on 17th October 2022.

B. EVIDENCE FOR OTTERS ✓

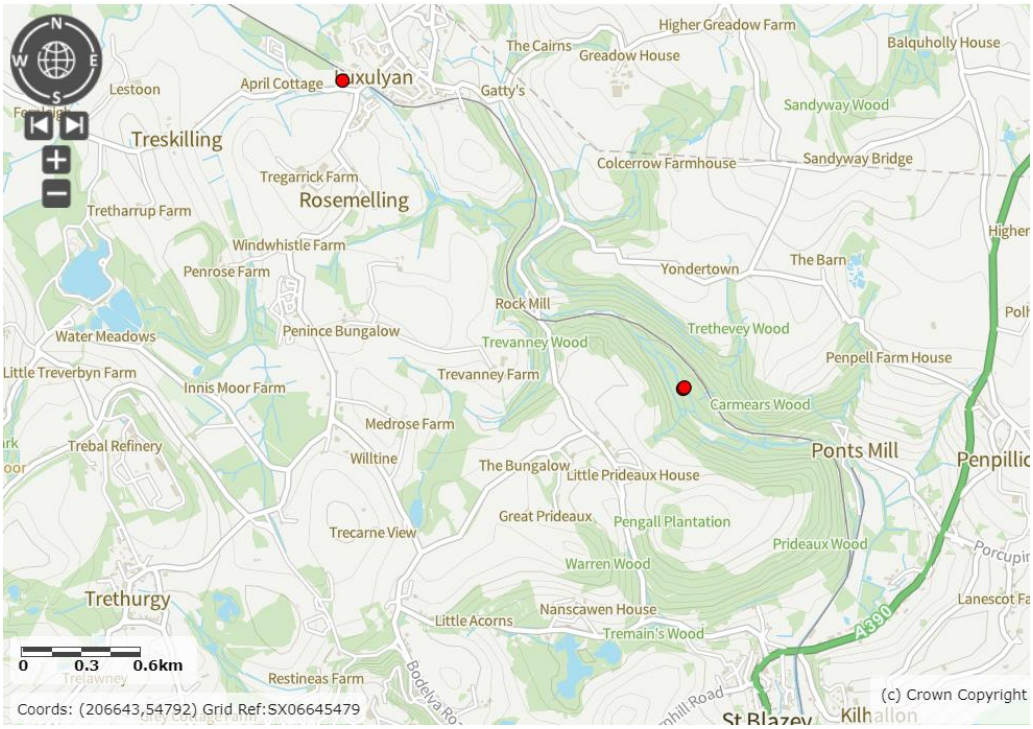
EVIDENCE	SEEN/ ORKS*	LOCATION	NOTES
Spraint - fresh			
Spraint – recent	✓*	SX 06471 56497 Boulders downstream Lady Rashleigh Mine, west bank **and** mid-stream	First sighting on mid-stream boulder
Spraint - old	✓*	SX 04747 58056 Luxulyan allotments boulder in river	
Anal jelly			
Sign heap			
Staining			
Tracks			
Path			
Slide			
Holt			
Hover			
Couch			
Live sighting			
Corpse			

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

C. MAP

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

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.



D. **PHOTOGRAPHS**

1. Old spraint on boulder near Luxulyan allotments (SX 04747 58056):

3. Recent spraint on boulders in river downstream from Lady Rashleigh Mine (SX 06471 56497):

(a) Near west bank:

(b) Mid-stream (second photo clearly shows fish bones):

E. COMMENTS

No checks were made downstream from Middleway. Some of the usual sprainting spots yielded no evidence but boulders downstream from Lady Rashleigh Mine and near Luxulyan allotments did. Once again, nothing was found under the canal bridge at Ponts Mill, possibly because of human disturbance. This used to be a place where spraints were found regularly. This wasn't a thorough survey but it is sufficient to demonstrate the presence of otters and, indirectly, fish, but the quantity (and health) of either is unknown.

L. 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

Riverfly monitoring has been suspended until Spring 2023 to avoid disturbing fish spawning.

M. DISCUSSION

1. Positive observations.

(a) Otters and fish are still present.

(b) Turbidity is generally low.

(c) A very successful meeting was hosted recently in St Blazey by the G7 Legacy Fund for Nature and Westcountry Rivers Trust to consider future approaches to the monitoring of rivers and nature generally.

(d) The support from the Environment Agency, especially Lisa Goodall (Cornwall Catchment Coordinator /Environment Programme Team, EA) has been invaluable. We hope to arrange a joint visit to certain locations in November so EA staff can evaluate the accuracy of our readings, especially for bacteria.

2. Points of concern.

(a) As the report above shows, Joan Farmer continues to monitor samples from 3 sites to determine bacteria levels (E.coli and Total Coliforms): Criggan Moors and Minorca Lane (Upper Par River), and Lady Rashleigh Mine (Lower Par). E.coli at Criggan Moors and Lady Rashleigh Mine were **Very High Risk/ Unsafe;** at Minorca Lane, surprisingly, the level was **Low Risk/Possibly Safe**. Total Coliform levels were **Very Unsafe** at all three sites. All judgements are based on United States Environmental Protection Agency Recreational Water Health Risk Categories. Additional tests were conducted at Par Beach slipway (Lower Par), on the Bokiddick Stream at Gatty's Bridge, and on the Treesmill and Polmear Streams where the readings also caused concern. But so did the readings for tap water, which has raised doubts about our findings (see **Areas of Doubt** below).

(b) Phosphate levels, again, were *Too High* (WRT classification) at sites from Luxulyan allotments downstream to the sea and *High* on the Carbis Stream. The reading at Lady Rashleigh Mine was 2500 parts per billion, the maximum possible. Following advice received after our last report we had decided to report any such readings to the Environment Agency

and nearly did so this time. After discussion it was decided not to do so because although all present considered the test to show phosphates in excess of 1000 ppb, there had been some debate before a figure of 2500 ppb was agreed.

(c) The Carbis Stream was tinged white, probably with china clay and at the confluence with the Par the contrast in water colour was evident once again, although not as stark as it is for most months of the year. As the photo shows, a grating, branches and planks have been placed in the water as a makeshift bridge, which also acts as a barrier for fish. The good news is that the bridge (vandalised years ago) will soon be replaced by Cormac.

3. Areas of doubt

(a) It has always been recognised by the group that the tests we carry out are unsophisticated and as such will be more susceptible to error than those conducted by qualified professionals. However, the bacteria-testing has given us particular concern given the alarmingly high readings we have obtained. This is what led Joan to take samples from a wider range of sites this time and also from domestic tap water in Luxulyan. The readings from testing the latter of 15 MPN/100 ml for E.coli and 84 MPN/100 ml, which seem improbable, have led us to question our methodology and the accuracy of the tests. Hopefully, advice from the EA will clarify the situation.

(b) We have never understood why, at popular places like the river beach at Lady Rashleigh Mine, people and animals seem to use the water without ill effect despite the high phosphate and bacteria readings. In the last month I have heard from one local resident that the family dog was unwell with a stomach upset after bathing there and that they will not allow the dog into the river again. This is one incident, unproven and anecdotal, but worth noting here.

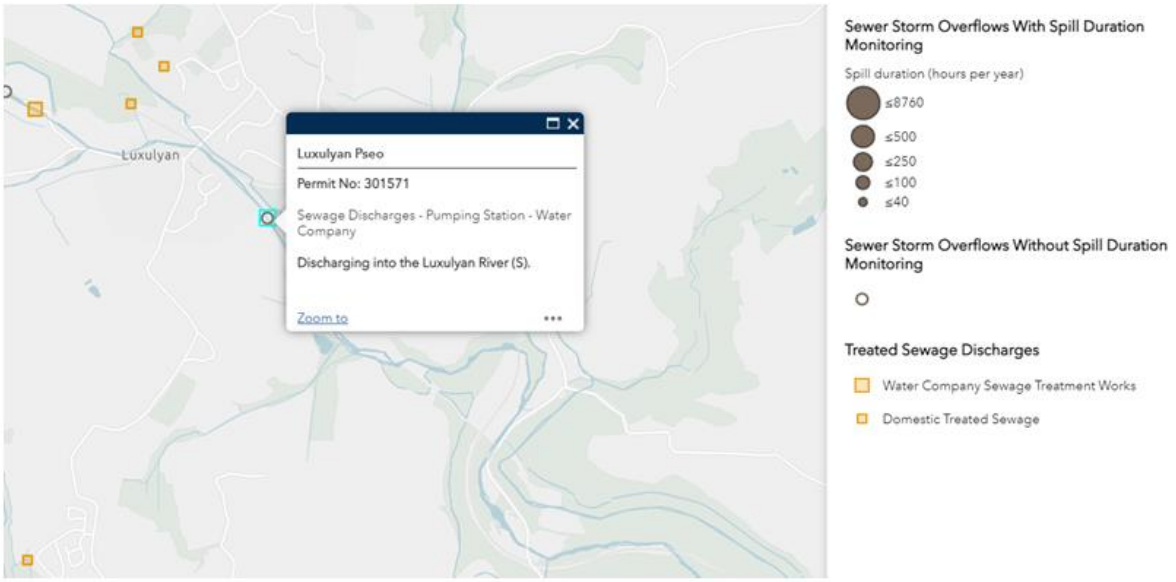
(c) Some houses at the new garden village at Carclaze are now occupied. It is believed that sewage from this large new settlement will be treated at St Austell North STW at Luxulyan. Does this plant have sufficient capacity to treat it?

(d) South West Water has recently informed a local landowner of their intention to repair the dilapidated pipe and headwall of their sewage pumping station at SX 0504 5783. Our group was

concerned that this might have been a source of pollution and reported it to the Environment Agency in May 2021. Investigation showed it had not been a source of recent sewage pollution but SWW did say that the pipe and structure would be repaired, as this message received in July 2021 from SWW shows:

> *SWW do have a pump station at Luxulyan and under the terms of the Environment Agency (EA) permit SWW can discharge in an emergency, as described in the permit (see appendix) SWW were contacted by the EA on 19th May, the NGR the EA provided wasn't near one of our assets, however Luxulyan SPS was checked via telemetry and was operating as normal. We also sent an operator to physically check the pumping station on the same day, he also reported that the pumping station was working as normal and hadn't spilled and the water course the discharge drains to was walked and confirmed free of any discharge. This site does not have an Event Duration Monitor (EDM) installed but, as explained above, the levels and working status of the station is monitored electronically. If pump levels get high this would trigger an alarm and the site would be visited to see if/why the pumps may not be working. EDM monitoring is mostly installed on permitted storm water discharges. The discharge point is recorded in our records as being at SX 0504 5783. Thank you for the photos of the pipe and headwall, these have now been passed for repair. We have no record of advising that the asset is not SWW's.*

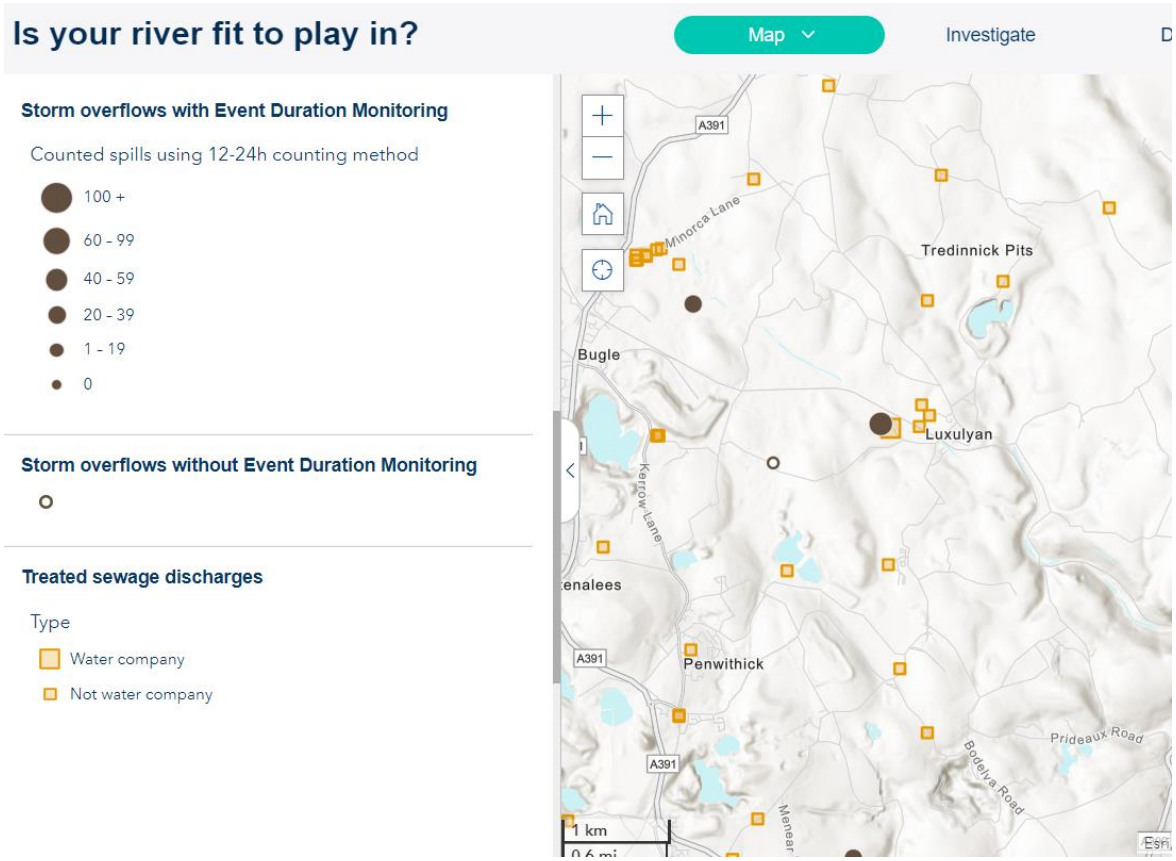
The pumping station was shown on The Rivers Trust's sewage map in 2021:



It seems that SWW do not intend to replace the pipe, which raises the question of what will happen should the operation of the pumping station be interrupted, for example by a power cut: where would the sewage go? Also strange is the fact that the pumping station is not shown at all on the current Rivers Trust map:

Source: https://theriverstrust.org/sewage-map

Does this pumping station still operate?



Par River Monitoring Group, 2nd November 2022