



## 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.

# AUGUST 2022

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## A. KEY POINTS FROM WRT CSI MONITORING IN AUGUST 2022

1. The Friends of Par Beach (FoPB) undertook CSI testing at Par Beach slipway and Treesmill.
2. River levels were low but there had been rainfall in the days preceding our surveys.
3. Water temperatures exceeded the critical figure 18° Celsius at 5 of the 9 sites included in the Excel graphs.
4. Once again, Phosphate levels from Luxulyan allotments downstream to the sea were High or Too High.
5. High bacteria levels continue to be a concern but the source(s) is unknown.
6. Evidence was found for the presence of otters and fish.

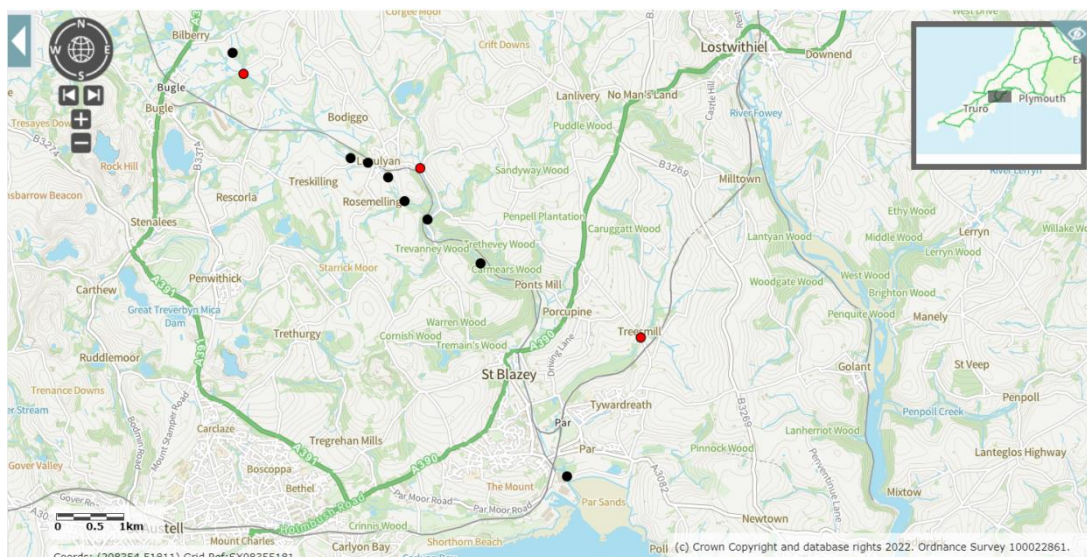
## B. OUR GROUP

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 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 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. AUGUST 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>



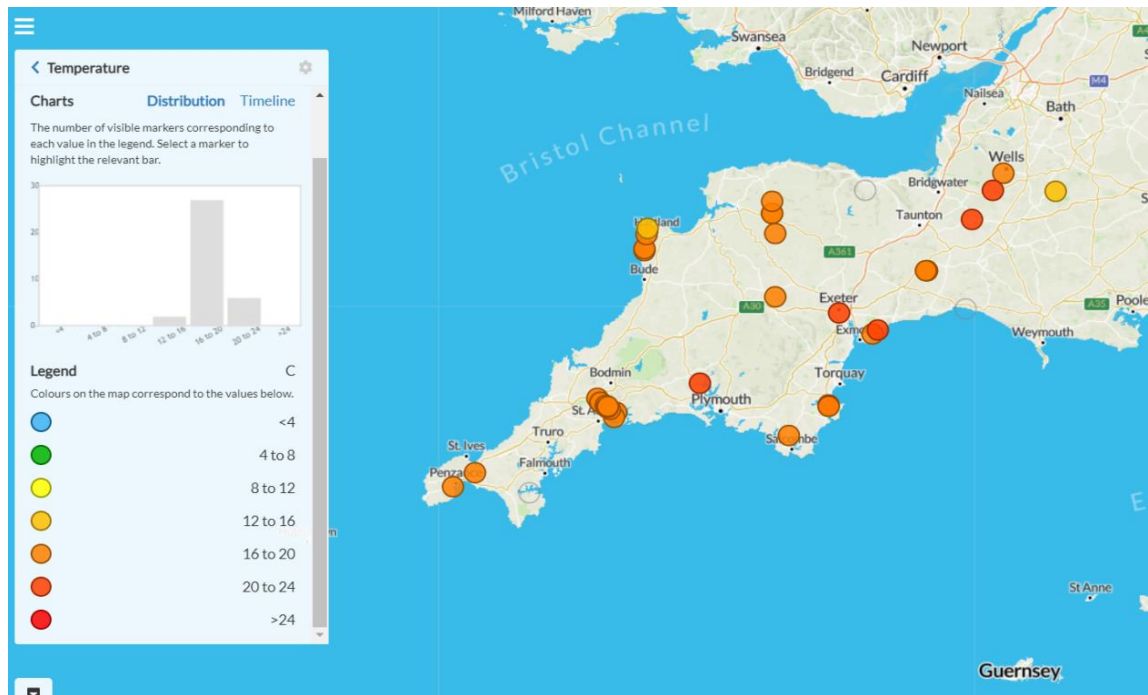
LOCATION	DATE	TYPE OF CHECK	MONITORED BY
<b>Criggan Moors, Par River, SX 01882 61133</b>	19/08/2022	CSI sample & Cartographer record but not included on Excel graphs. Water sample for bacteria testing.	Roger Smith
<b>South of Minorca Lane, Par River, SX 02657 59788</b>	19/08/2022	CSI sampling. Cartographer record.	Roger Smith
<b>Carbis Stream SX 02834 59401</b>	19/08/2022	CSI sampling. Cartographer record.	Roger Smith
<b>Downstream St Austell North STW SX 0446 5811</b>	21/08/2022	Visual check.	Joan Farmer, Veronica Jones, Roger Smith.
<b>Luxulyan allotments, Par River, SX 04732 58045</b>	21/08/2022	CSI sampling. Cartographer record.	Joan Farmer, Veronica Jones, Roger Smith.
<b>Luxulyan SWW pumping station, Par River, SX 05033 57849</b>	19/08/2022	Visual check.	Roger Smith
<b>Cam Bridges, Par River, SX 05292 57454</b>	21/08/2022	CSI sampling. Cartographer record.	Joan Farmer, Roger Smith.
<b>Gatty's Bridge, Bokiddick Stream SX 05531 57953</b>	21/08/2022	CSI sampling. Cartographer record.	Joan Farmer, Roger Smith.
<b>Treffry Viaduct, Par River, SX 05650 57179</b>	21/08/2022	CSI sampling. Cartographer record.	Joan Farmer, Roger Smith.
<b>Lady Rashleigh Mine, Par River, SX 06451 56509</b>	21/08/2022	CSI sampling, E.coli, Total Coliform. Cartographer record.	Joan Farmer, Veronica Jones, Roger Smith.
<b>Treesmill, Tywardreath Stream, SX 08873 55385</b>	20/08/2022	CSI sampling. Cartographer record.	Simon Tagney
<b>Par Beach slipway, SX 0776 53261</b>	20/08/2022	CSI sampling. Cartographer record.	Brian Harrisson

#### D. TEMPERATURE

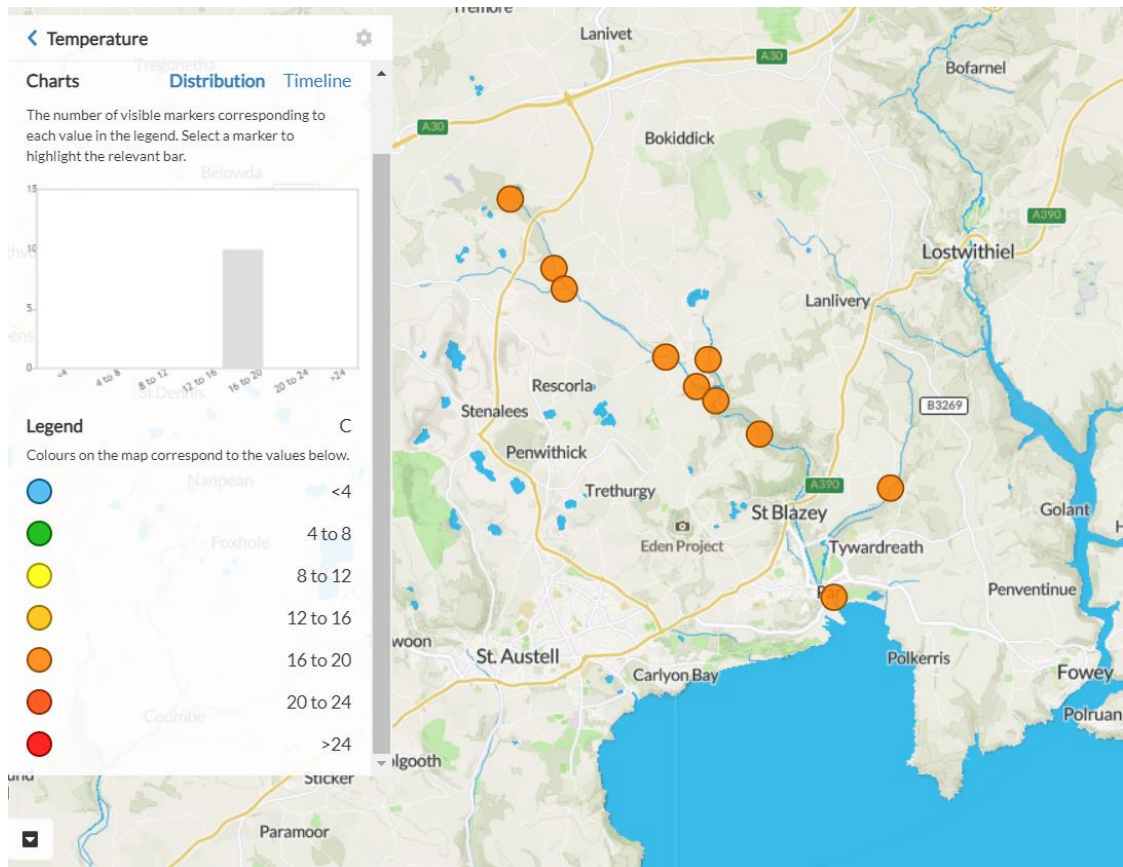
1. This is the WRT's explanation of why this is monitored:

*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.



WRT results across the region

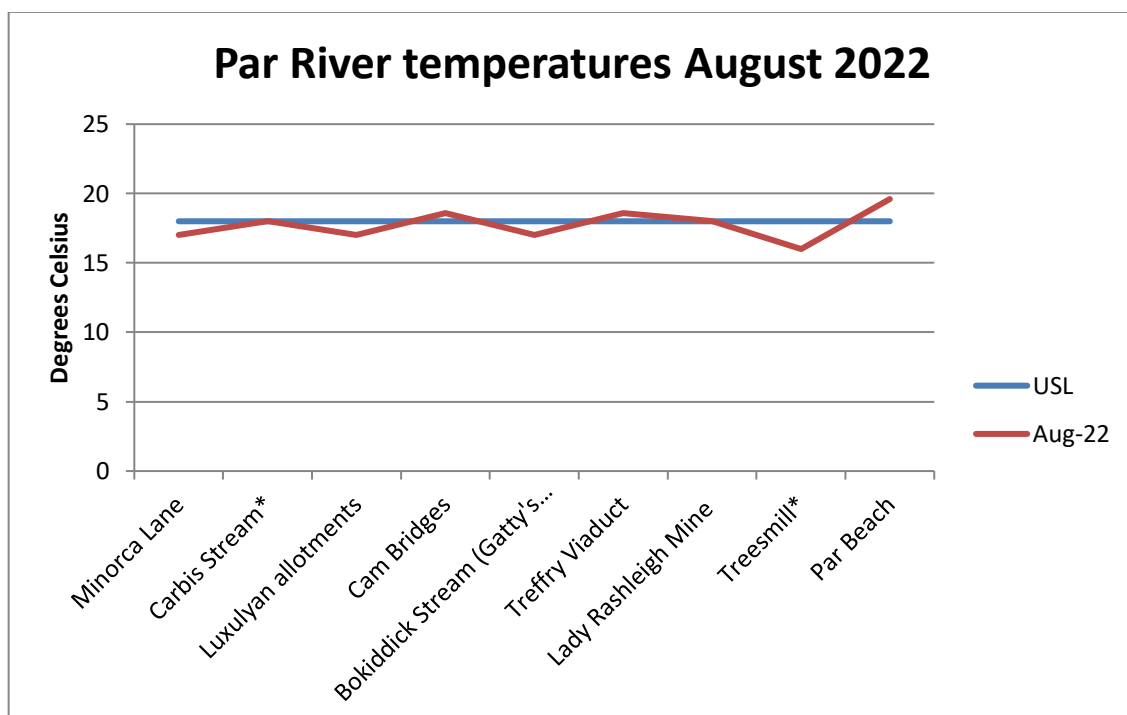


### 3. Results August 2022

PAR RIVER/TRIBUTARY	LOCATION	Temperature °Celsius
Par	South of Minorca Lane, Par River, SX 02657 59788	17
Tributary	Carbis Stream SX 02834 59401	18
Par	Luxulyan allotments, Par River, SX 04732 58045	17
Par	Cam Bridges, Par River, SX 05292 57454	18.6
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	17
Par	Treffry Viaduct, Par River, SX 05650 57179	18.6
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	18
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385	16
Par	Par Beach slipway, SX 0776 53261	19.6

Criggan Moors, Par River, SX 01882 61133: 16° Celsius not included on graph

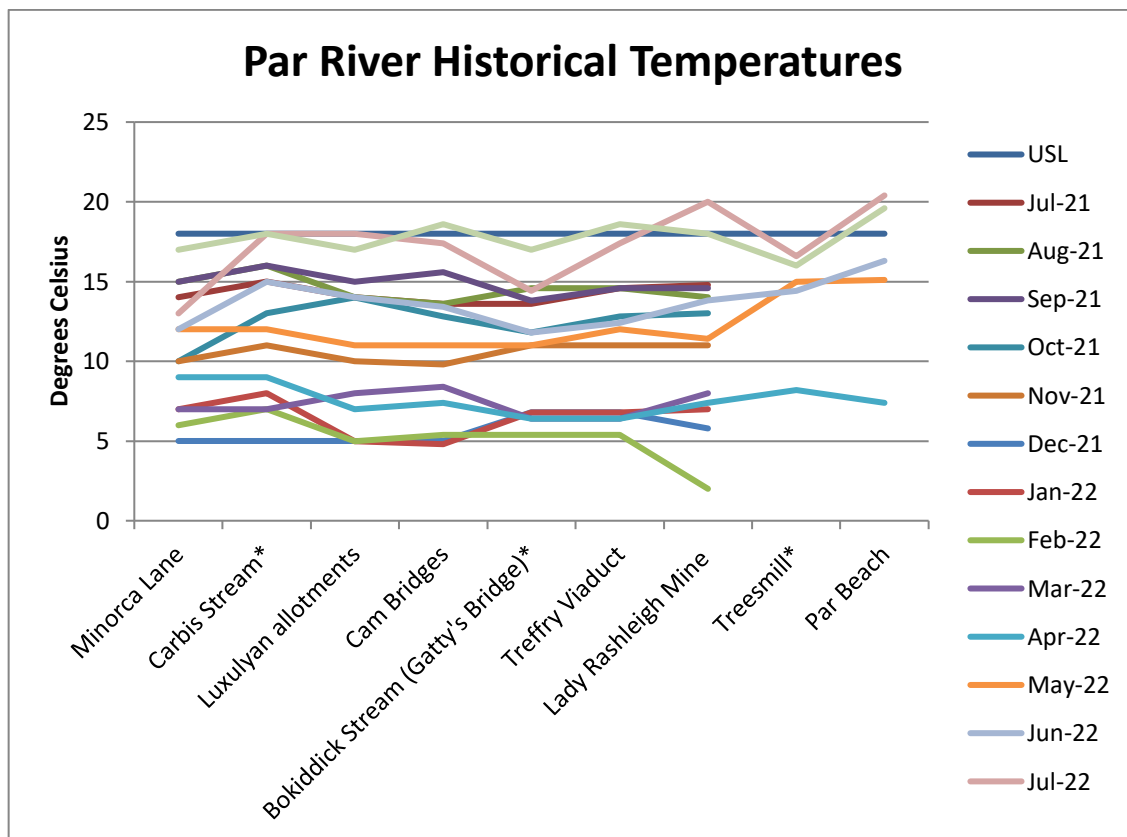
### 4. Graph August 2022



\*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:



Our database is tiny so should not be used to generalise but it is interesting that our surveys have only recorded river temperatures above 18° in July and August 2022.

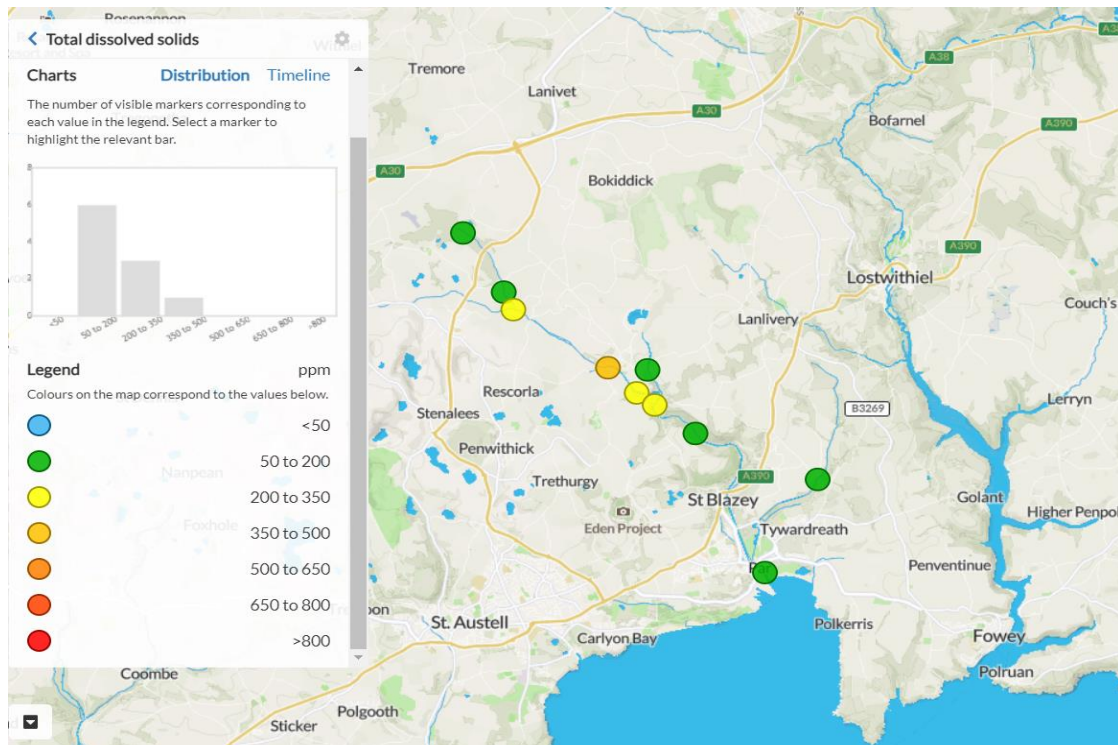
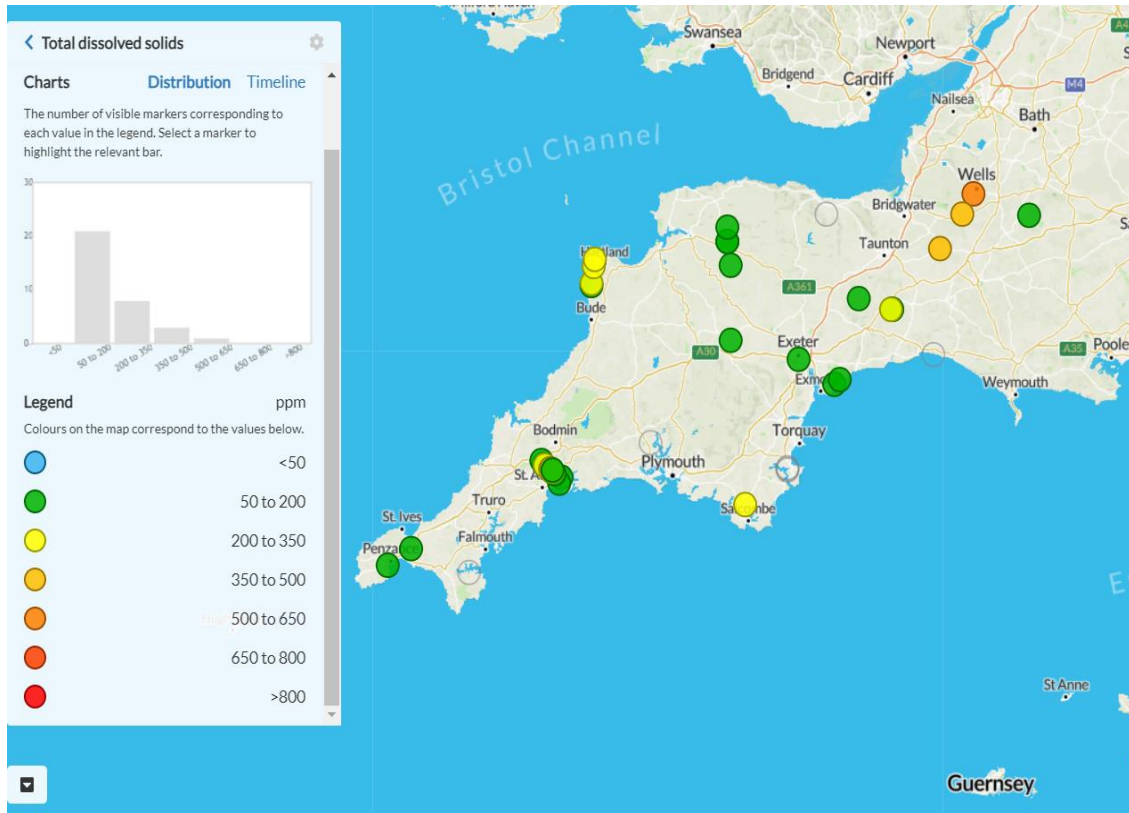
## E. TOTAL DISSOLVED SOLIDS

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.*



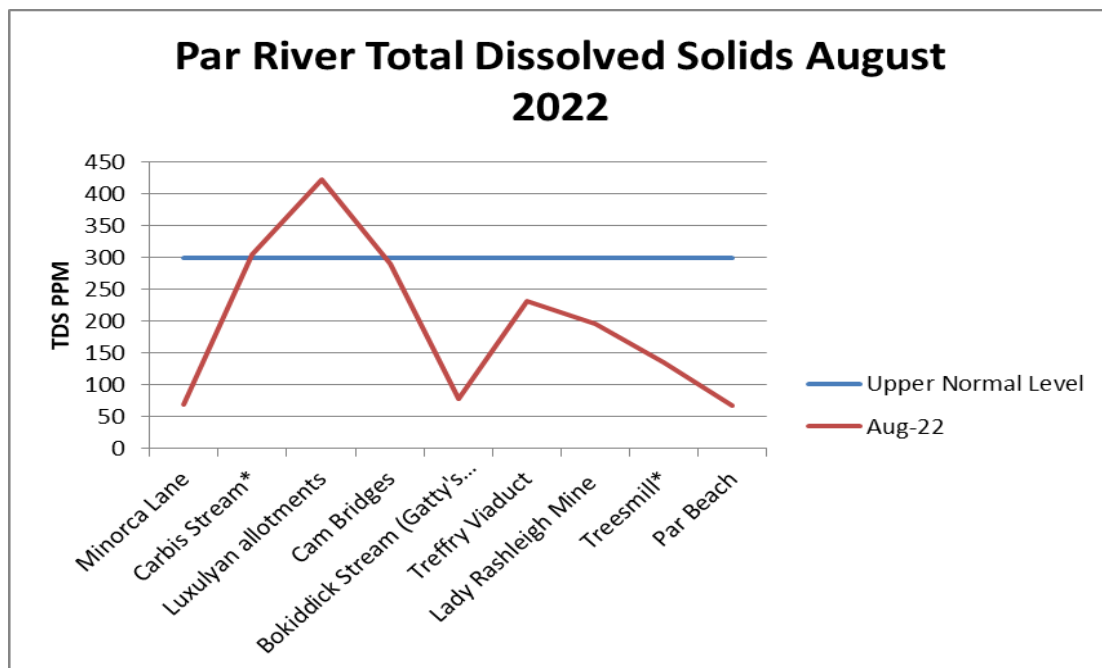
2. **Geographical comparison.** Source: Cartographer. (The reading >800 was at Fowey, not one of our readings.)



### 3. Results August 2022

PAR RIVER/TRIBUTARY	LOCATION	Total Dissolved Solids ppm
Par	South of Minorca Lane, Par River, SX 02657 59788	69
Tributary	Carbis Stream SX 02834 59401	304
Par	Luxulyan allotments, Par River, SX 04732 58045	423
Par	Cam Bridges, Par River, SX 05292 57454	291
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	79
Par	Treffry Viaduct, Par River, SX 05650 57179	232
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	196
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385	135
Par	Par Beach slipway, SX 0776 53261	67.3

Criggan Moors, Par River, SX 01882 61133: 90 ppm. Not included on graph.

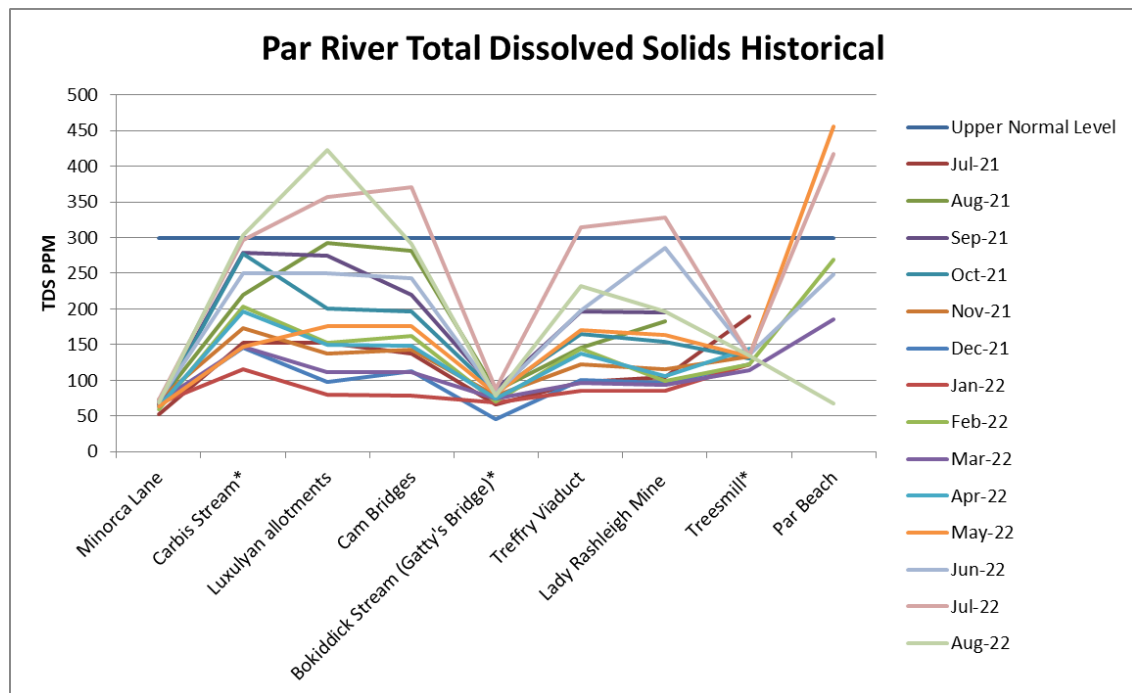


#### Upper Normal Level

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.'



### 3. Historical data on total dissolved solids:

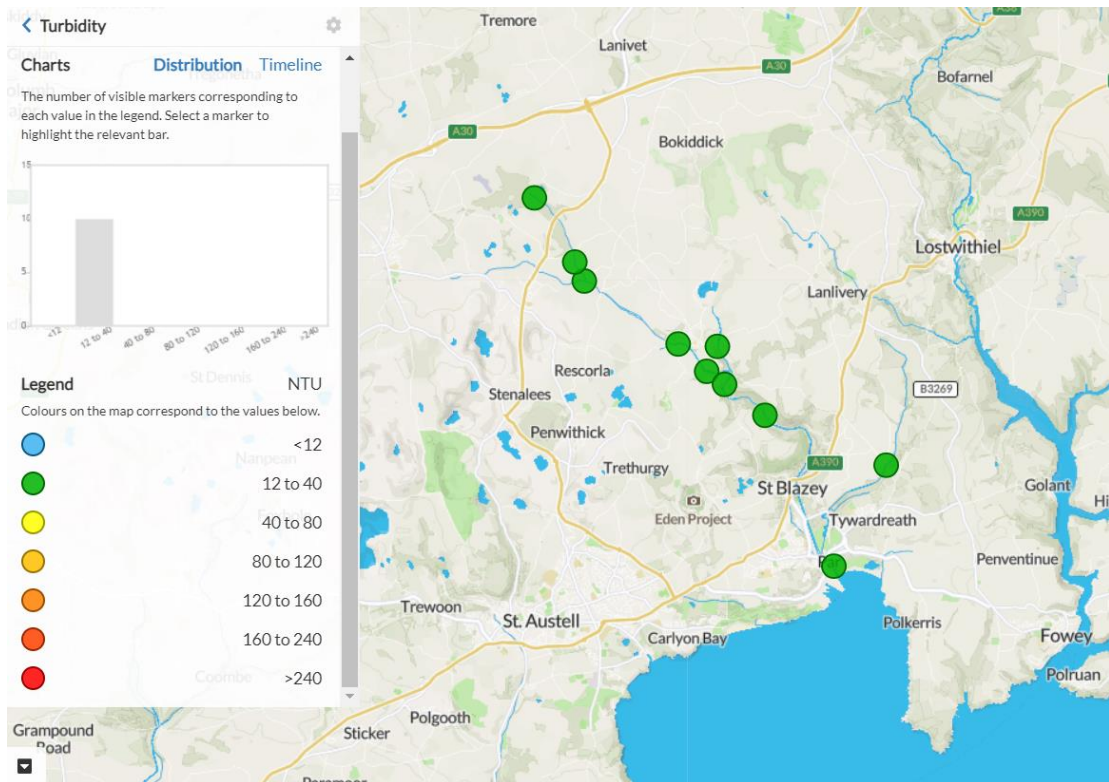
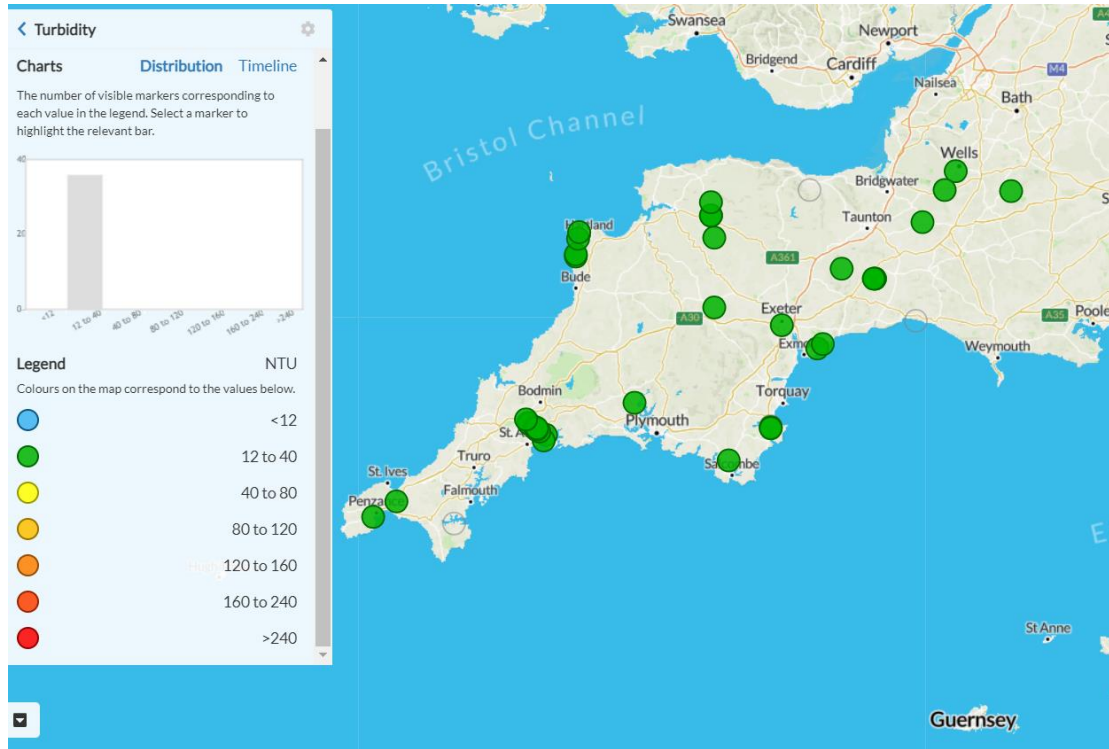


## F. TURBIDITY

### 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.*

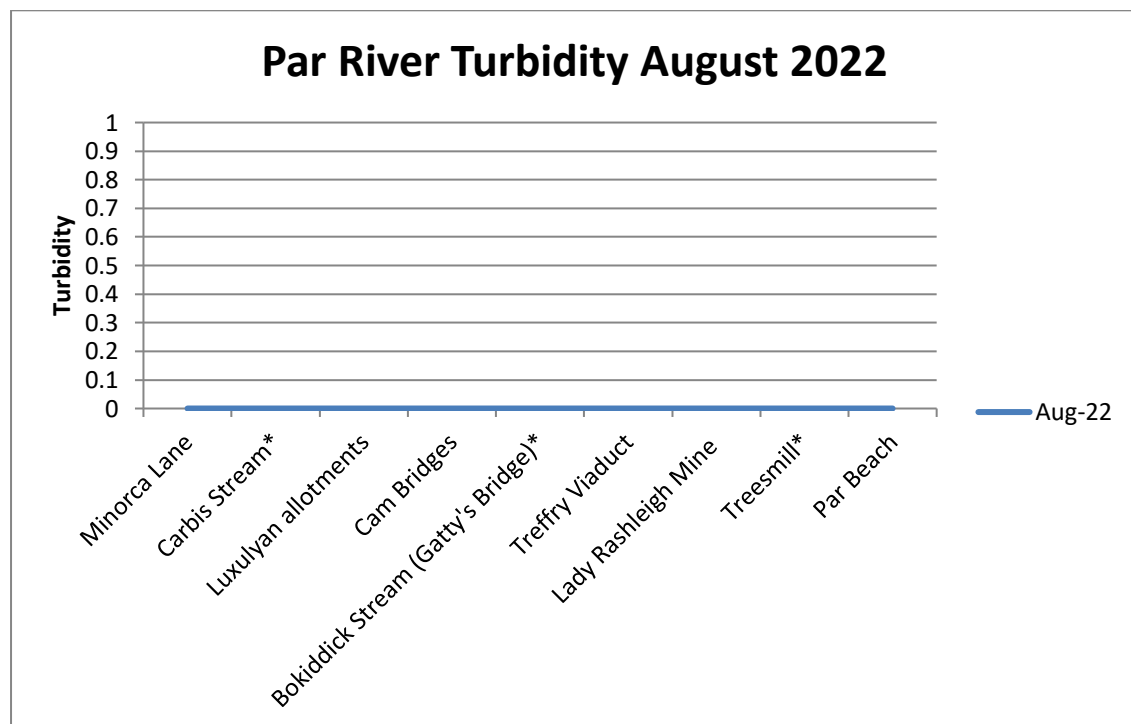
2. **Geographical comparison.** Where scores are shown as 0, it means that the reading using the Secchi tube was <12. Source: Cartographer.



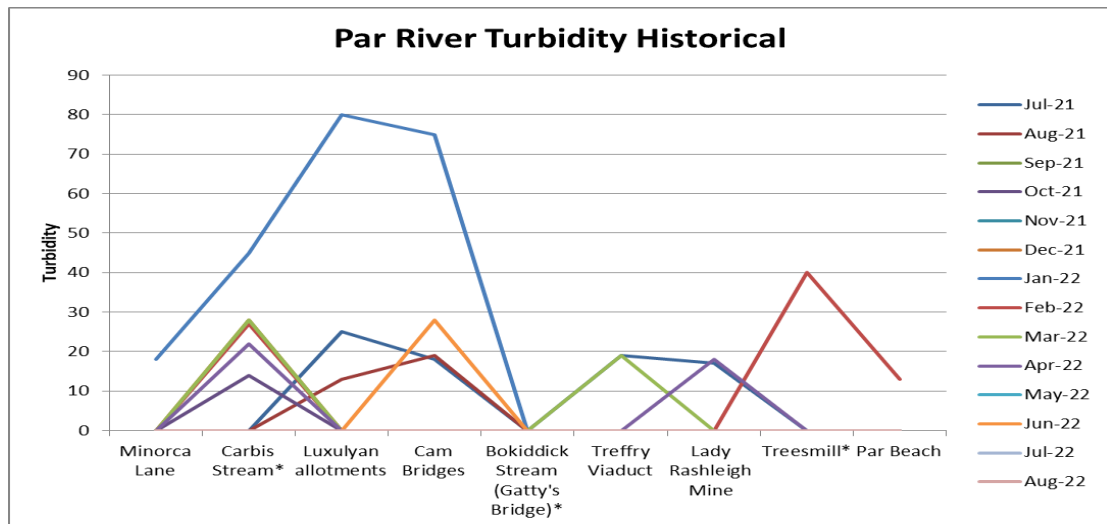
**3 Results August 2022**

PAR RIVER/TRIBUTARY	LOCATION	Turbidity
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

Criggan Moors, Par River, SX 01882 61133: 0 Turbidity. Not included on graph.



#### 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:*

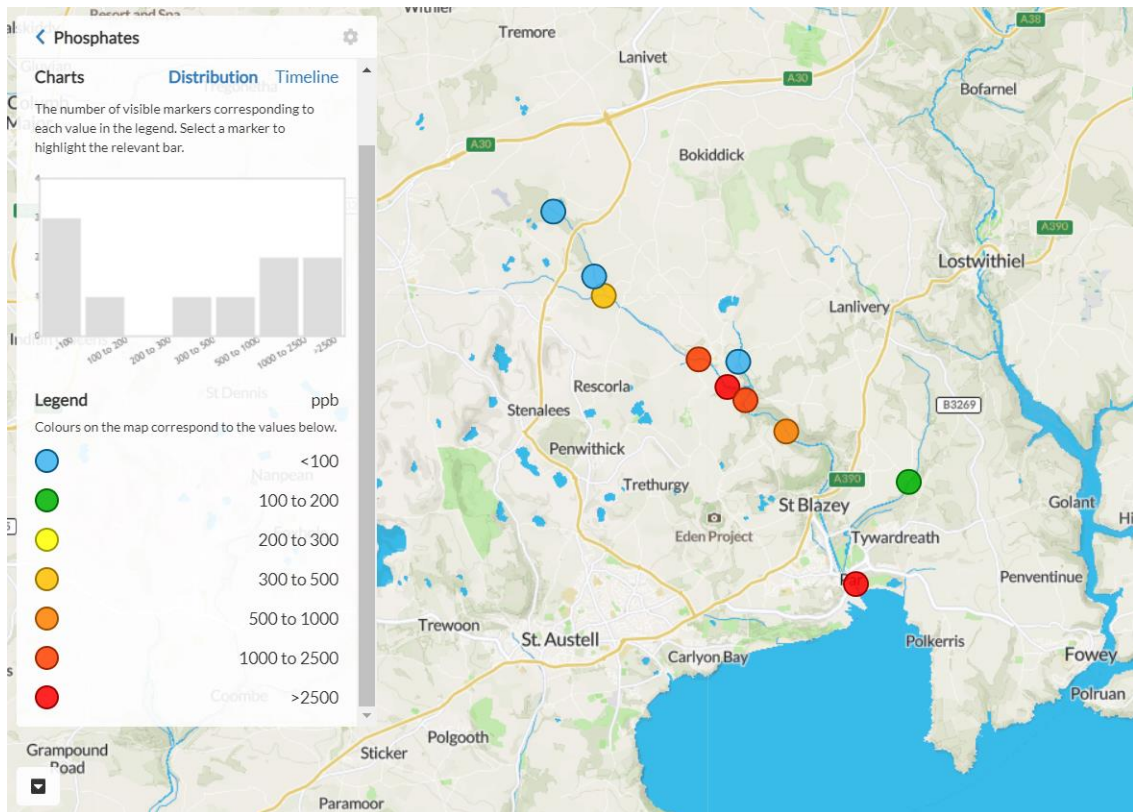
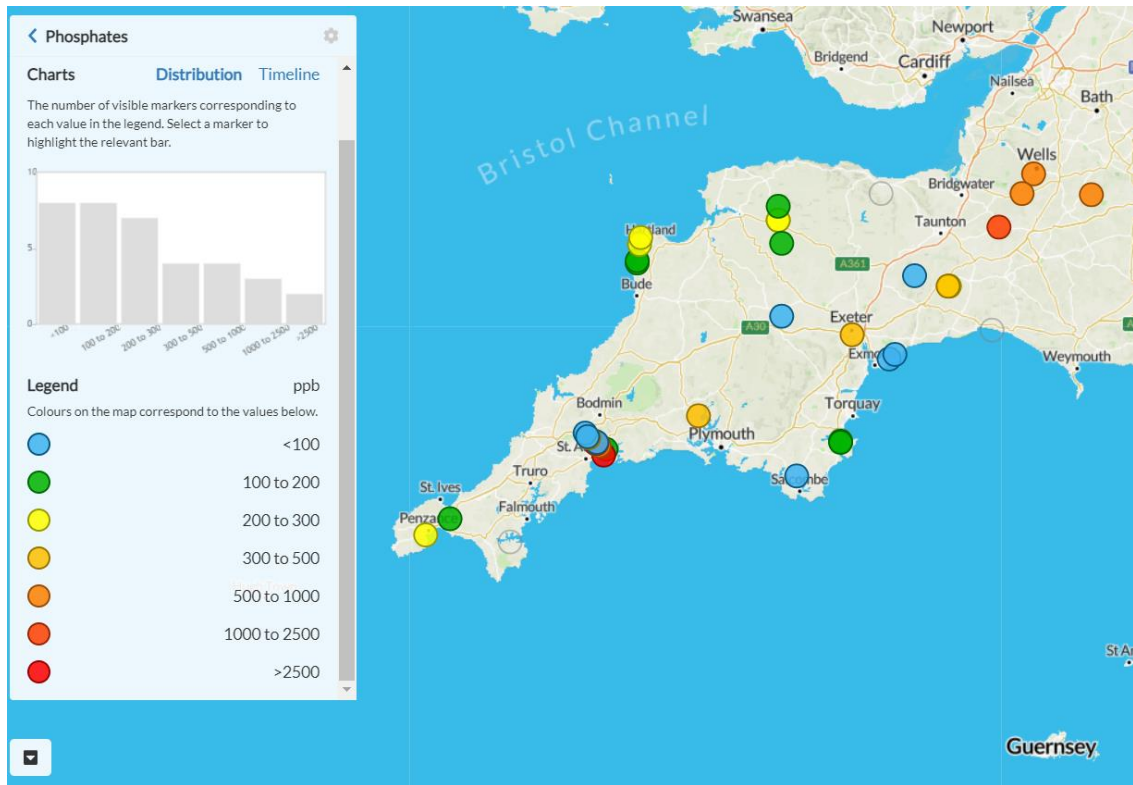
*0 – 100 OK*

*200 – 300 HIGH*

*500 – 2500 – TOO HIGH*

Phosphate levels were relatively low for the second month running. Levels at all sites monitored were OK according to the WRT guidance. Maximum scores of 2500 PPB have been recorded at some sites but these precede the date range in the historical graphs. They have been recorded on Cartographer.

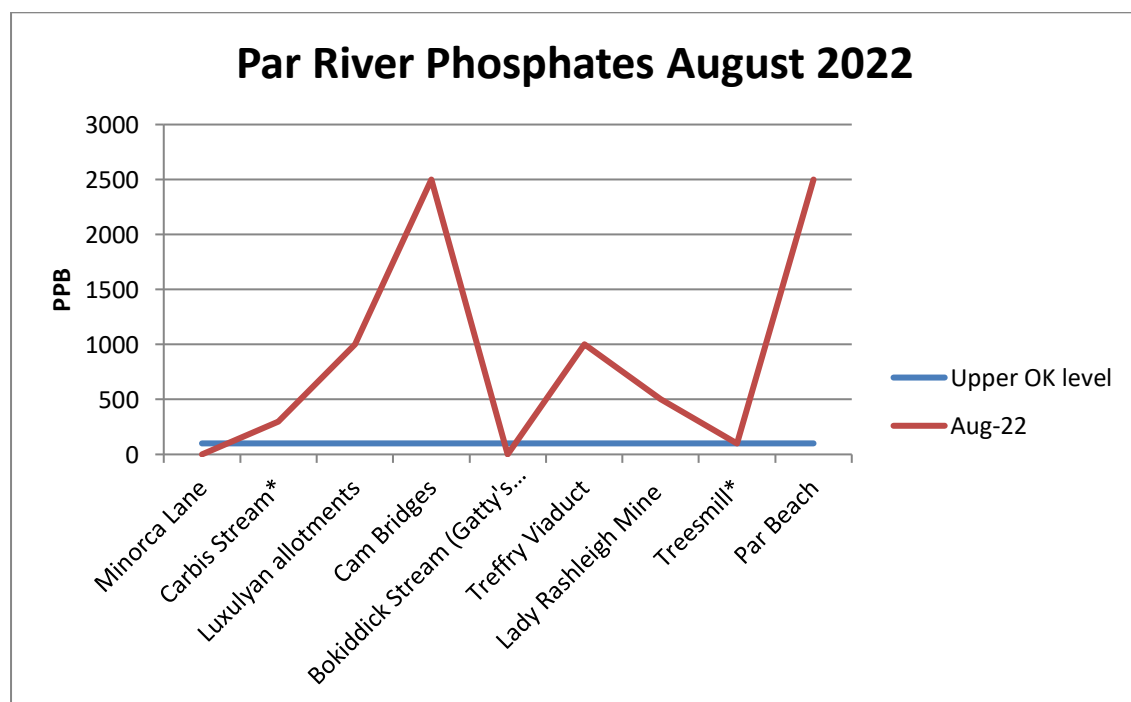
2. Geographical comparison. Source: Cartographer





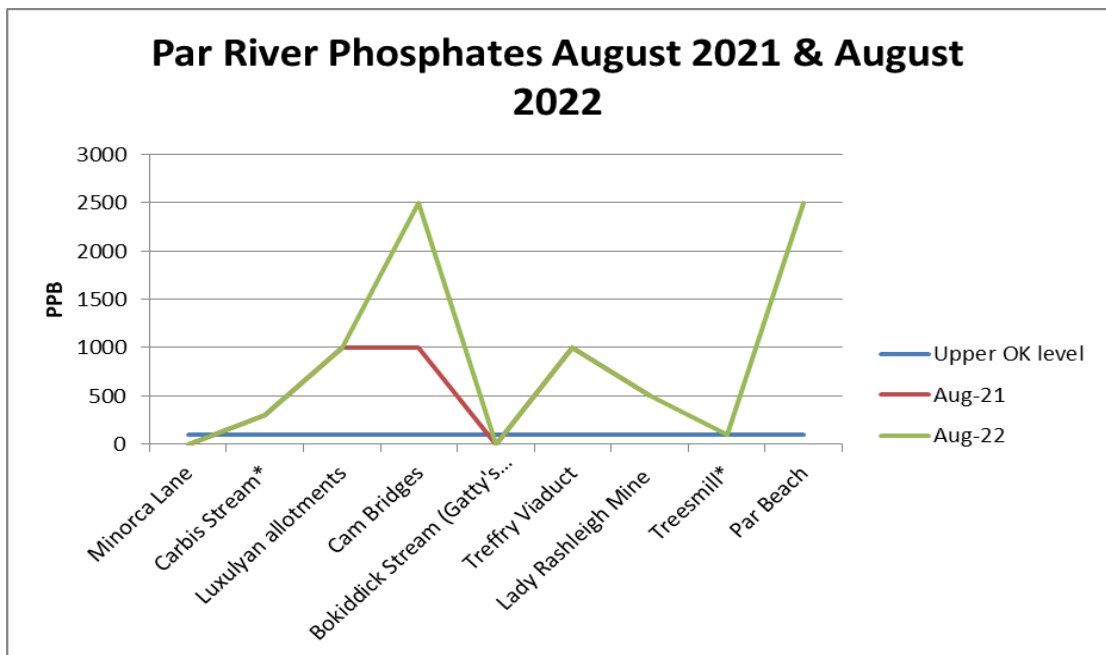
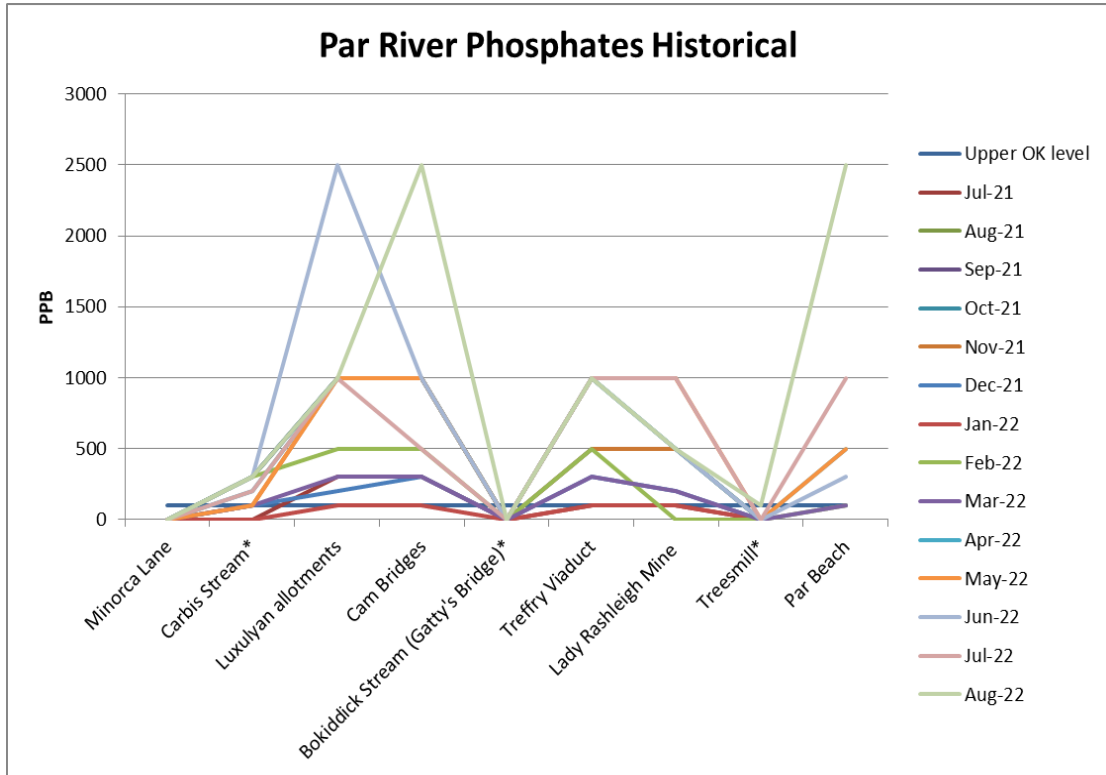
PAR RIVER/TRIBUTARY	LOCATION	Phosphates ppb
Par	South of Minorca Lane, Par River, SX 02657 59788	0
Tributary	Carbis Stream SX 02834 59401	300
Par	Luxulyan allotments, Par River, SX 04732 58045	1000
Par	Cam Bridges, Par River, SX 05292 57454	2500
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	0
Par	Treffry Viaduct, Par River, SX 05650 57179	1000
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	500
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385	100
Par	Par Beach slipway, SX 0776 53261	2500

Criggan Moors, Par River, SX 01882 61133: 0 ppb. Not included on graph.



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

5. Historical data on phosphates:



This comparison of August 2021 and 2022 only shows a difference in the reading at one location: Cam Bridges. No readings were taken at Treesmill or Par Beach in August 2021.

## H. NITRATES

1. The WRT kit has these ranges for nitrates:

Nitrate (ppm NO<sub>3</sub>)

0

10

30

60

120

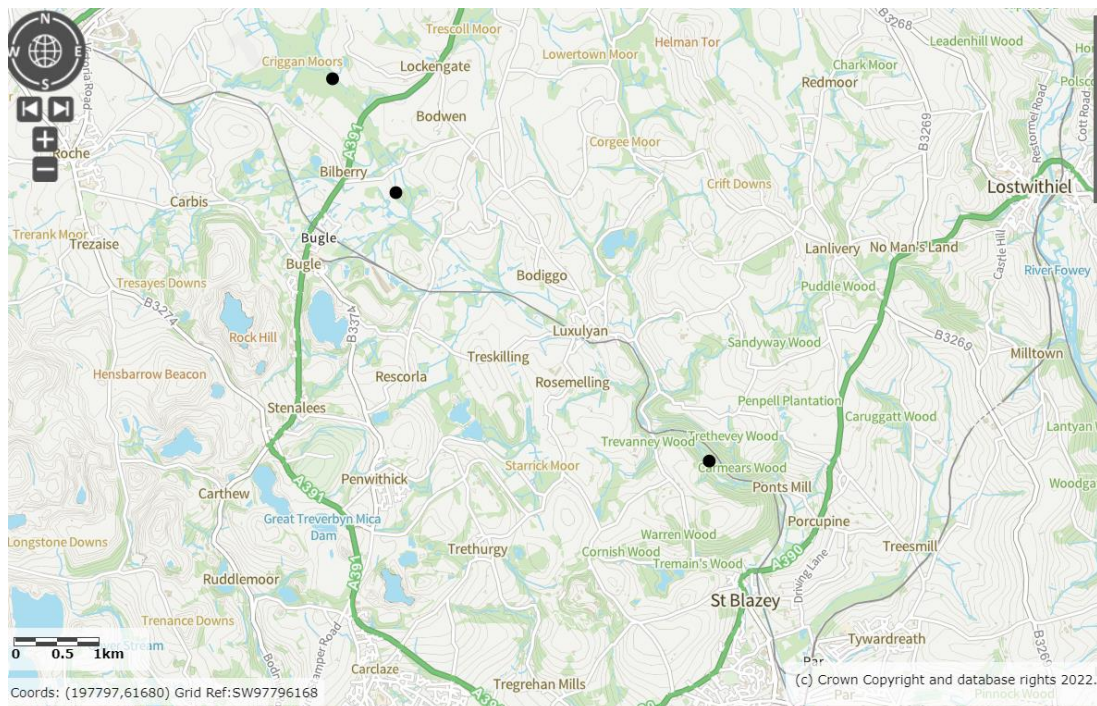
200

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 the Par River:

Comparing 3 sites, 2 upstream of the St Austell North Sewage Treatment Works (STW) and 1 downstream

SITE	Criggan Moor Upper Par SX01882 61133	Minorca Lane Upper Par SX02657 59788	Lady Rashleigh Mine. Lower Par SX06451 56509
Date of sample	19/08/2022	19/08/2022	21/08/2022
E coli result	483 mpn/100ml	483mpn/100ml	483mpn/100ml
Coliform result	>1000 " "	>1000 " "	>1000 " "

All 3 sites were the same according to the Aquagenx compartment bag test for Surface and Recreational Water. If anything, the samples seemed slightly darker and smelt stronger in the upstream samples and took more pills to neutralize the sample, but these observations are not part of the test.

The USA Health risk Category for Recreational water deems all 3 sites Very High Risk/ Unsafe for e coli and Very Unsafe for Total Coliforms. Although the river is not deemed a recreational bathing area, Lady Rashleigh mine is used recreationally by families visiting the Luxulyan Valley, and the water flows into the sea at Par Sands.



#### 4. Historical results for Par River near Lady Rashleigh Mine. Report and data from Joan Farmer.

This is our main monitoring point.

##### Par River near Lady Rashleigh Mine SX 06451 56509

Results are shown in MPN/100ml (Most Probable Number)

>1000 is the highest reading on the 32 row chart. 483 is the second highest number.

Sample Date	Rain? Notes	Result Date	Results E coli	Health Risk	Results Coliforms	Health Risk
21/02/22	Rain prev. 24hrs.	23/02/22	483 <sup>1</sup>	Very High Unsafe	>1000	V Unsafe
		24/02/22	>1000 See text message attached <b>483</b>	Very Unsafe  Very High Risk /Unsafe	>1000	V Unsafe
21/03/22	dry	24/03/22	136	High risk Prob. Unsafe	>1000 <sup>2</sup>	V.Unsafe
16/04/22	Dry and sunny following rain	18/04/22 Temp over 30 C	326	Very High Risk/Unsafe	>1000 Def. blue In comp 4 and 5	V. unsafe
09/05/22	Dry	11/05/22	136	High Risk. Probably Unsafe	>1000 Def. blue	V.unsafe
27/06/22	Rain in previous 24 hrs	29/06/22	483	Very High Risk /Unsafe	>1000 Def. blue	V Unsafe
18/07/22	Dry	20/07/22	47	Low Risk /Possibly Safe*** <sup>3</sup>	483	V.High Risk Prob. unsafe
Sample Date	Rain? Notes	Result Date	Results e coli	Health Risk (Rec Waters)	Results Coliforms	Health Risks (Rec Waters)
21/08/2022	Light rain	23/08/2022	483	Very High Risk/Unsafe	>1000	V. High risk Prob Unsafe

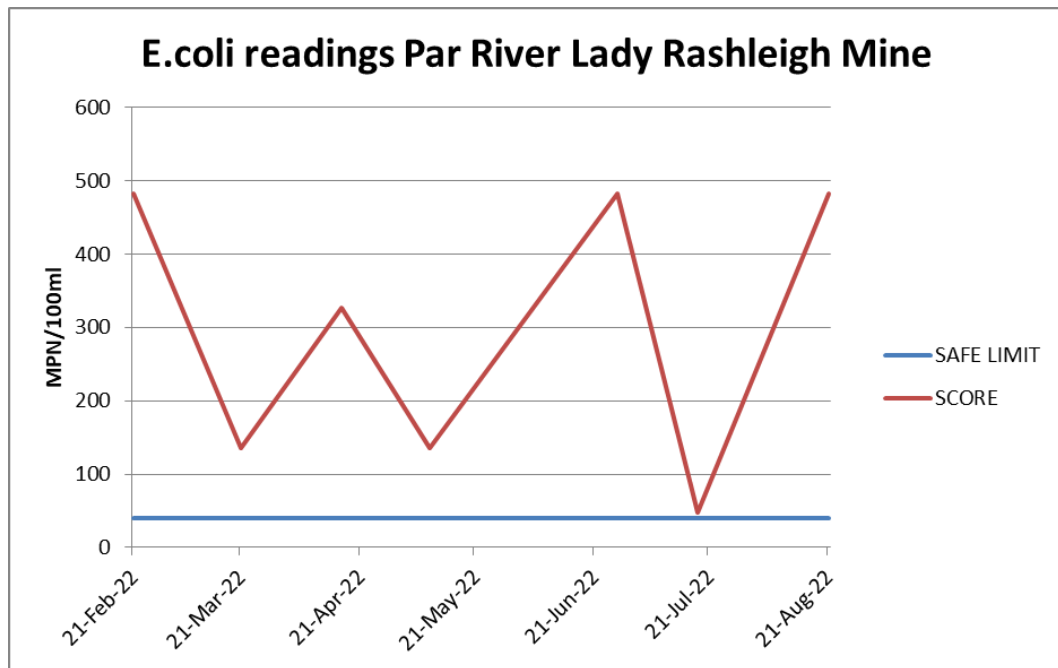
\*I now believe this reading should be 483 and the traces of blue in compartment 5 had leaked out of one of the other compartments as the clip was not positioned exactly along the maximum fill line.

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

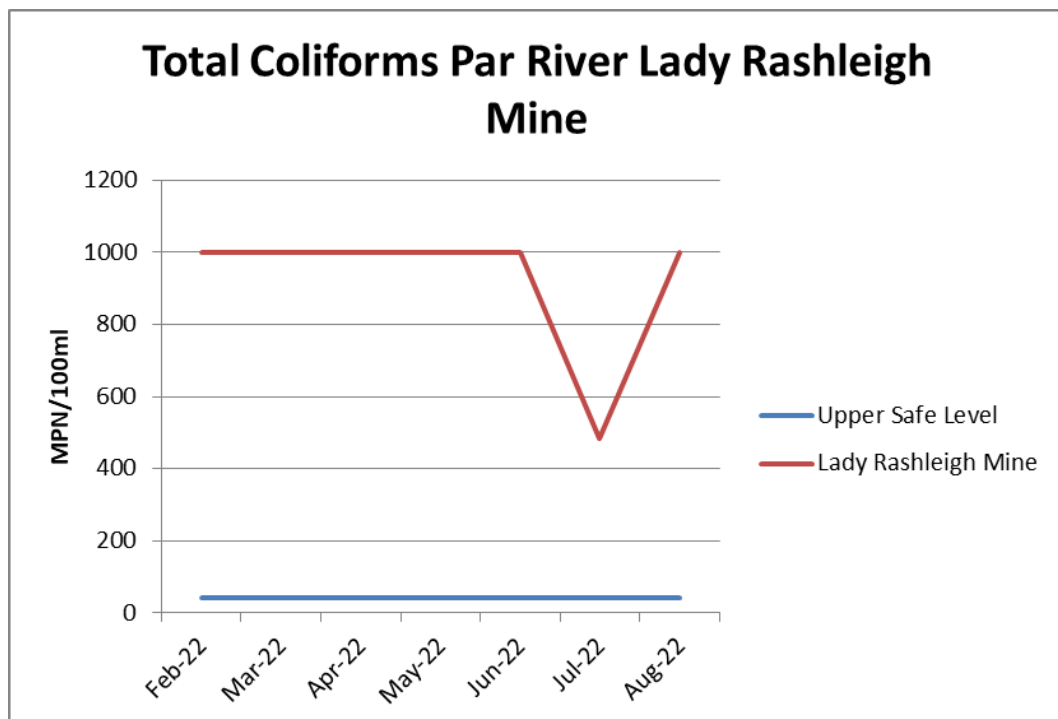
<sup>2</sup> Compartments 4 and 5 had only very pale blue fluorescence in UV light, but definitely glowed with no trace of yellow. Aquagenx company confirmed that fluorescence under UV light indicates positive for total coliforms.

5. Graphs

E.coli readings Lady Rashleigh Mine SX 06451 56509

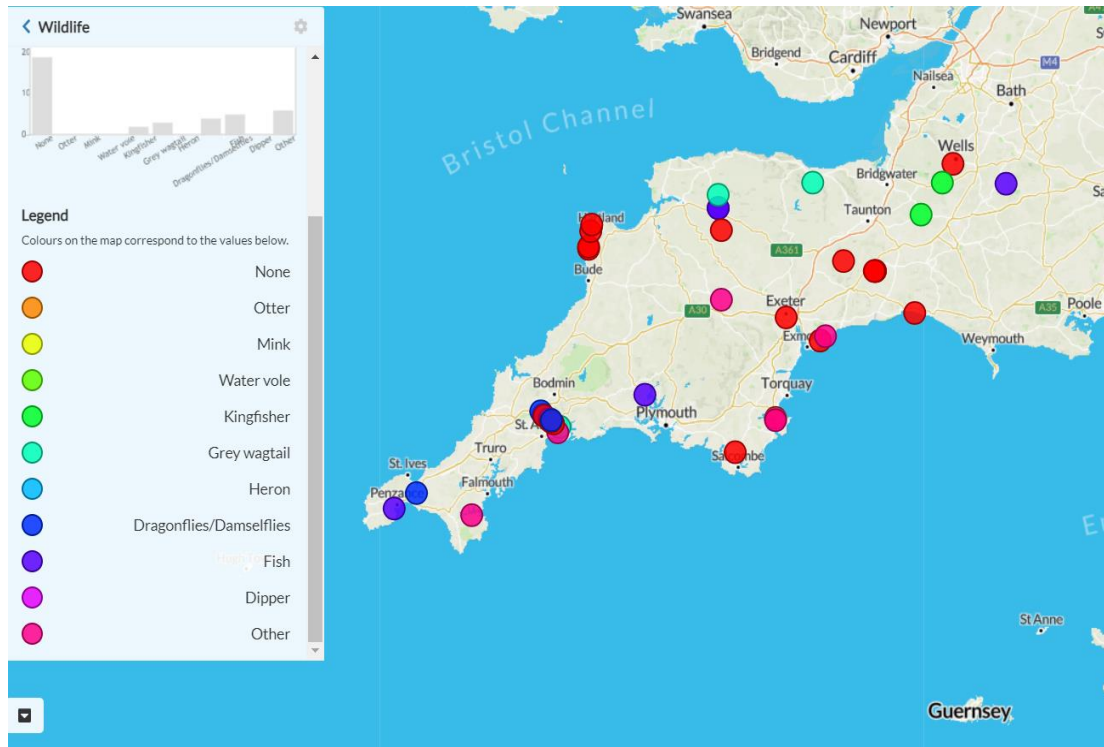


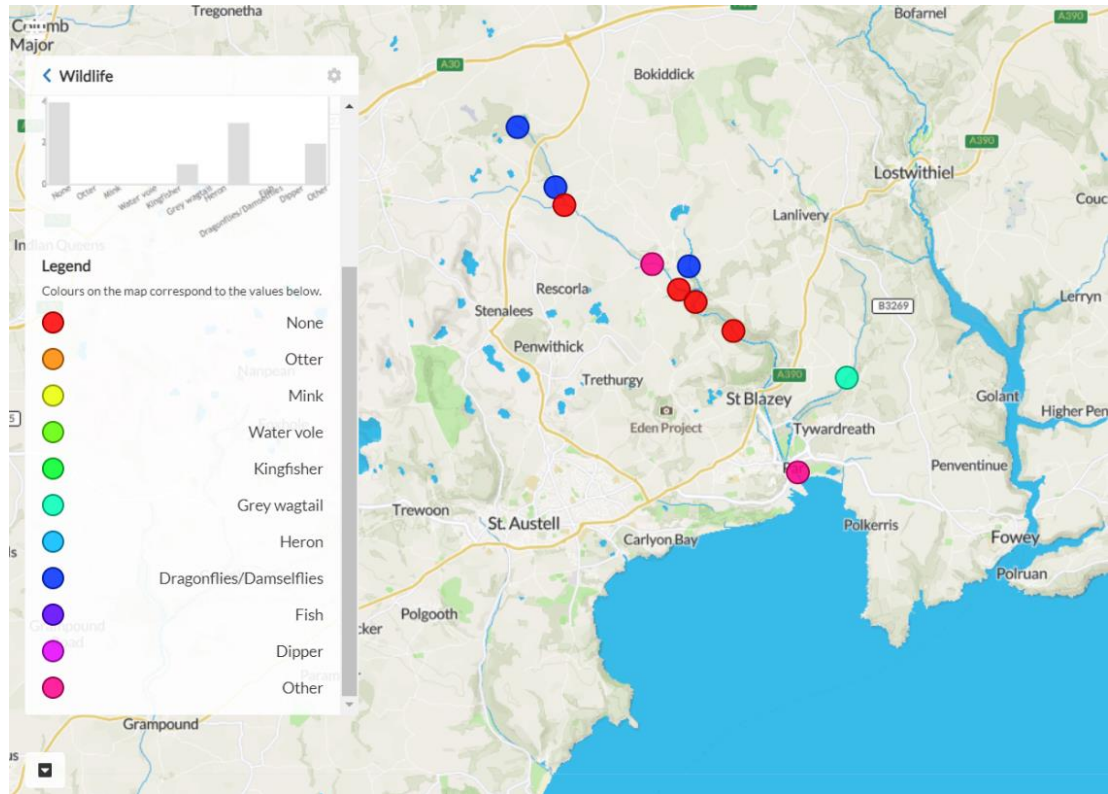
Total Coliforms Lady Rashleigh Mine SX 06451 56509



### J. WILDLIFE (FOR OTTER REPORT SEE SECTION 3)

#### (a) Maps





Source: Cartographer.

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

(b) Wildlife sightings, other than evidence for otters, included: fish in the river near Lavrean and St Austell North STW; dragonflies and damselflies (Gatty's, Criggan, and Minorca Lane); cased caddis on stones at Gatty's; a robin (Treesmill); seagulls, ducks and swans (Par Beach slipway); a kingfisher on the Polmear Stream at the eastern end of Par Beach (not a monitored site).



Damselfly, Criggan Moor

## K. OTTER SURVEY

## 1. SURVEY CONDITIONS

Date & time	19/8/2022, 21/8/2022
Surveyors	Roger Smith, Joan Farmer, Veronica Jones
Areas surveyed	Par River from STW to Cam Bridges; Par River from Treffry Viaduct to Lady Rashleigh Mine; Upper Par (Criggan Moors and Minorca Lane)
Weather	Recent light rain
River level	Very low
River flow	Steady
Water quality	Too High phosphate levels from Luxulyan allotments downstream, with maximum readings of 2500 PPB at Cam Bridges and Par Beach. E.coli readings at Criggan Moor, Minorca Lane and Lady Rashleigh Mine were <i>Very High Risk/Unsafe</i> . Total coliform scores at the same locations were <i>Very Unsafe</i> .
Other wildlife	Fish seen in the river near Lavrean on 19 <sup>th</sup> August 2022.

## 2. EVIDENCE FOR OTTERS ✓

EVIDENCE	SEEN/ ORKS*	LOCATION	NOTES
Spraint - fresh			
Spraint – recent	✓ *	SX 04747 58056 Luxulyan allotments boulder in river	
	✓ *	SX 06471 56497 Downstream from bridge at Lady Rashleigh Mine	
Spraint - old	✓ *	SX 04747 58056 Luxulyan allotments boulder in river	
	✓ *	SX 06456 56498 Lady Rashleigh Mine – boulder in river	
Anal jelly			
Sign heap			
Staining			
Tracks			
Path			
Slide			
Holt			
Hover			
Couch			
Live sighting			
Corpse			

\*Report sent to ORKS: <https://ercis.org.uk/>



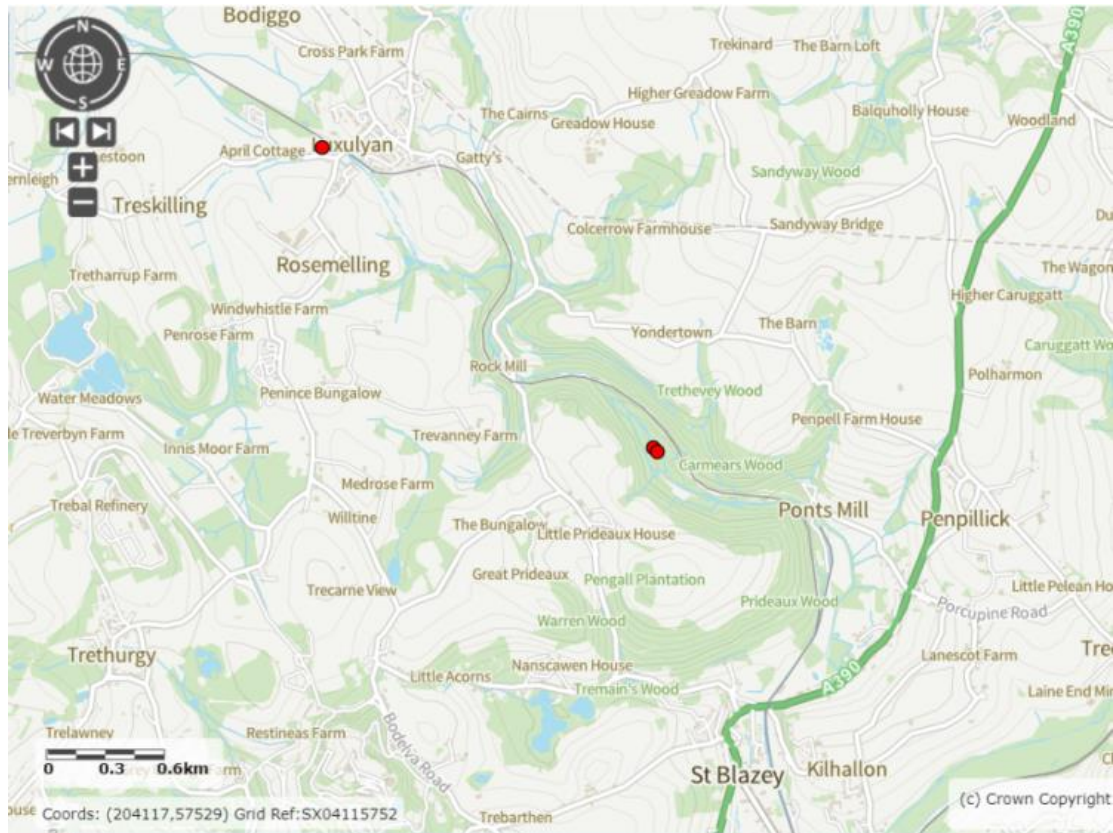
### 3. MAP

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.



### 4. PHOTOGRAPHS

Spraint on boulder near Luxulyan allotments (SX 04747 58056):



## 5. COMMENTS

Unfortunately, only a limited survey was made this time although it was enough to establish the presence of otters at two places.

A member of the public thought he'd seen an otter upstream from Lavrean Bridge in the afternoon of 19<sup>th</sup> August but this can't be verified. Given the presence of fish in that stretch, it seems possible.

## 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 because of low river levels. Surveying in these conditions could cause harm to riverfly populations.

## M. DISCUSSION

### 1. Clarifications and updates

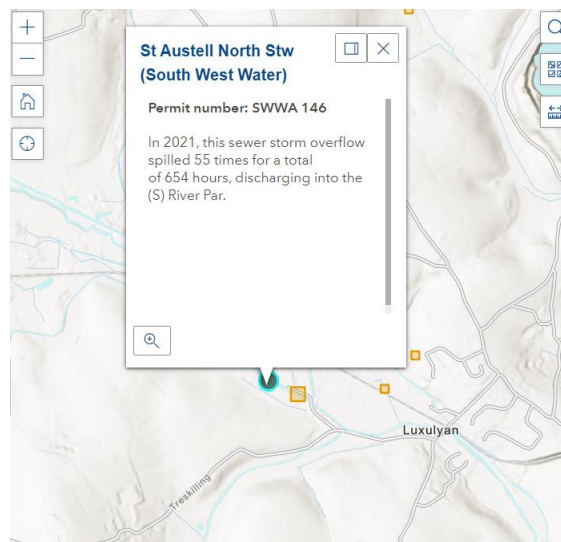
The July report listed some matters that puzzled our group and we are grateful to Lydia Ashworth (Evidence and Engagement Officer, WRT) and Matt Healey (Rivers Team Project Manager, WRT) for the following advice:

Area of doubt	WRT explanation
1. What does the absence of 3 species of riverfly (Mayfly, Blue-winged olive and Flat-bodied upwings) signify?	<p>Quite simply that the water quality and habitat just isn't good enough to sustain these species. It may also be as they are not present that even if the water quality were good enough they may have to be re-introduced as they are not present in the first instance.</p> <p>Extra info here:  <a href="https://www.wildtrout.org/assets/files/news/Restoring%20Fly%20Populations.pdf">https://www.wildtrout.org/assets/files/news/Restoring%20Fly%20Populations.pdf</a></p> <p>MH</p>
2. Presumably higher water temperatures are a result of global warming but what is the effect on biodiversity in the Par River?	<p>Salmonids can really struggle in temperatures over 18 degrees centigrade. As with all of our wildlife it has evolved to function within a relatively stable temperature threshold including winter and summer fluctuations. That coincided with no rain and low flows then aquatic species will be really struggling at the moment. There is not much that can be done about that but to restore wetland areas to improve as low release back into the watercourse but that may not help much given the lack of rain we have had this year. Tree cover is also important to help keep rivers cool, mostly over the deeper pools. Tunnelling (long areas of shading) can be detrimental for in river species that need more light, such as over riffles and that is why we tend to focus our tree works over riffle areas. More light equals more productivity (plants and invertebrates) and more fish food.</p> <p>MH</p>
3. Was there any attempt to re-stock fish after the 2 catastrophic pollution incidents in 2013?	<p>We have just undertaken fish surveys but as yet I don't have the results. The EA are also due to undertake some too. Numbers will not be as they were as after the fish kills it will take a long time to recover. That is part of the aim of the Par Improvement Project, to improve habitat, fish passage and refuge so numbers can increase. Fish restocking isn't really undertaken as a general rule. Salmon and trout have a genetic code that that ties them to the river they spawned in, therefore you can't just add in fish from a different area or from a hatchery. It's a long and complex discussion but basically it's frowned upon. We are taking the long and slow route to recovery. With regards to fish health, if they are skinny and slow then there's a problem. Trout can change their colouration based on their surroundings so that's not an indicator of poor health but purely a camouflage technique.</p> <p>MH</p>

Area of doubt	WRT explanation
<p>4. Imerys has a permit to discharge into the Carbis Stream from its plant at Rocks near Bugle. It has not been possible to find the details of this permit. Any advice on how to do so would be appreciated because it might lead to efforts to review its terms.</p>	<p>During the recent dry weather the Carbis Stream has not been white with china clay but it is likely that the pollution will resume once we get more rain. This is a very old discharge which is being looked into by the EA. And quite correct that once the rains come and Imerys needs to manage its water flows, it will turn white again. Ironically the river could do with some more flow in it right now to improve the conditions for in river species i.e. more flow and cooler water but they are not currently pumping. Imerys have undertaken a consultation regarding strategic water management and impacts in Mid Cornwall and are investigating longer term management options. WRT, the EA, Natural England and others were asked to contribute to the consultation.</p> <p>MH</p>
<p>5. While we are able to interpret our phosphate readings (as being OK, High or Too High), we aren't able to make such easy judgements about temperature, total dissolved solids, or bacteria.</p>	<p>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. You can now see all the scorecards here:  <a href="https://wrt.maps.arcgis.com/apps/instant/attachmentviewer/index.html?appid=50d99c50c373473fa7af43c0eccb3fec">https://wrt.maps.arcgis.com/apps/instant/attachmentviewer/index.html?appid=50d99c50c373473fa7af43c0eccb3fec</a> .</p> <p>Bacteria is still something we need to look further into. We really need to be testing more rivers with varying influences with those kits. You guys are at the forefront of this so will have little to compare to. However, projects are popping up for inland bathing waters and we are seeing more groups buying their own bacteria kits so we will soon see a more comprehensive picture.</p> <p>LA</p>
<p>6. What is/are the source(s) of the high levels of E.coli and Total coliforms that our bacteria surveys have recorded (at various times) between Minorca Lane and Lady Rashleigh Mine?</p>	<p>Are there any private septic tanks in the area? We tend to look at big picture sewage works and farming but quite often people fail to maintain small septic tanks which can be a real issue for phosphates and bacteria!</p>

## 2. Positive observations.

- (a) Simon Tagney and Brian Harrison of The Friends of Par Beach have started river monitoring at Treemill and Par beach. Cooperation between the two groups will be invaluable.
- (b) The new Water and Carbon Reduction Working Party attached to the Luxulyan Valley Partnership may be able to highlight the need for improvements to water quality and biodiversity.
- (c) There was no visible evidence of pollution. Even in the Carbis Stream, which often is polluted with china clay, the water looked clear. Generally speaking, the river, which was very low, had an aesthetic appeal.
- (d) Fish were seen near St Austell North STW at Luxulyan and upstream from Lavrean Bridge.
- (e) Although only a limited otter survey was carried out, spraint was found between Luxulyan allotments and Lady Rashleigh Mine. A member of the public claimed to have seen an otter upstream from Lavrean Bridge. There were other wildlife sightings too.
- (f) Recreational use of the river was noted, with people bathing near the Treffry Viaduct (and at Lady Rashleigh Mine in the week preceding the survey). Dogs regularly enter the river at various places within Luxulyan Valley. It is good that people wish to make such use of the river and feel confident enough to do so.





(g) The St Austell North STW sewer storm overflow (Permit number: SWWA 146) was not discharging when we checked on 21<sup>st</sup> August 2022. (See: <https://theriverstrust.org/key-issues/sewage-in-rivers> ).



St Austell North sewer storm overflow, 21<sup>st</sup> August 2021

### 3. Points of concern.

(a) Water temperatures were high, reflecting the heatwave and drought, which are widely thought to have been caused by climate change. At 5 of the 9 CSI sites shown in the preceding tables and graphs, the temperature was 18° Celsius or higher (it was 16° on the river at Criggan Moor). This is a critical temperature for the health of fish since they struggle to cope in anything warmer. It should be noted that readings were taken at different times of the day which might affect readings.

(b) Guidance received from WRT suggests a score exceeding 300 parts per million for Total Dissolved Solids is likely to be excessive for this catchment. This was the case on the Carbis Stream (not visibly polluted with china clay this time, although it often is) and on the main river at Luxulyan Allotments. It was 291 ppm at Cam Bridges. The latter two sites are downstream from St Austell North STW but that may be coincidence rather than a consequence of any discharge. It is possible that lower water levels mean that any solids I suspension are more concentrated.

(b) Phosphate levels in the main river from Luxulyan allotments downstream to the sea were Too High or High, as well as being High on the Carbis Stream. At Cam Bridges and Par Beach slipway the maximum reading of 2500 parts per billion were noted.

(c) Bacteria levels are unhealthy according the Aquagenx test, which is based on US standards for recreational and surface waters. Samples were taken from 2 sites upstream of St Austell North STW (Criggan Moor and Minorca Lane) as well as the usual site at Lady Rashleigh Mine. This was to test the possibility that the STW was the cause of higher bacteria levels, a theory that our group has become doubtful about. This doubt was confirmed because at all three sites the readings were identical: Very High Risk/Unsafe for E.coli and Very Unsafe for Total Coliform according to the United States Environmental Protection Agency Recreational Water Health Risk Category Based on Minimum Probable Number and Upper 95% Confidence Level.

(e) Last month this observation was made: *One of the problems of the Par River is that its course has been heavily modified, i.e. straightened, to the detriment of its biodiversity and also accelerating the speed of flow, particularly after heavy rainfall. Possibly some of this alteration took place a long time ago but near St Austell North STW and Bridges it is noticeable that the bed and banks have been encased in a heavy duty mesh. In places this has broken, possibly as a result of bank erosion, causing a build-up of vegetation and other material (and a hazard for anyone wading in the river).*

This photograph shows the damaged mesh.





#### 4. Areas of doubt

(a) While it was pleasing that the St Austell North STW sewer storm overflow was inactive at the time of monitoring, it should be noted that the treated effluent was, as usual, discharging into the river.



This is permitted and it is not being suggested that the terms of the permit are being breached. The only evidence of this outfall is a slight smell and a trail of bubbles. Additionally, there are fish immediately downstream. However, it would be useful to know the chemical composition of this discharge and whether or not there is reason to change the details of the permit.

(b) People and animals enter the river, particularly in the Luxulyan Valley section, and, to the group's knowledge, experience no ill effects. Yet we know that phosphate levels are High or Too High according to WRT guidance and that bacteria levels would not be acceptable in the USA. It is hard to reconcile these observations.

**Par River Monitoring Group, 7<sup>th</sup>  
September 2022**