

# 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.

## AUGUST 2023



The Polmeare Stream at the eastern end of Par Beach (SX 08749 53417). Photo: Simon Tagney

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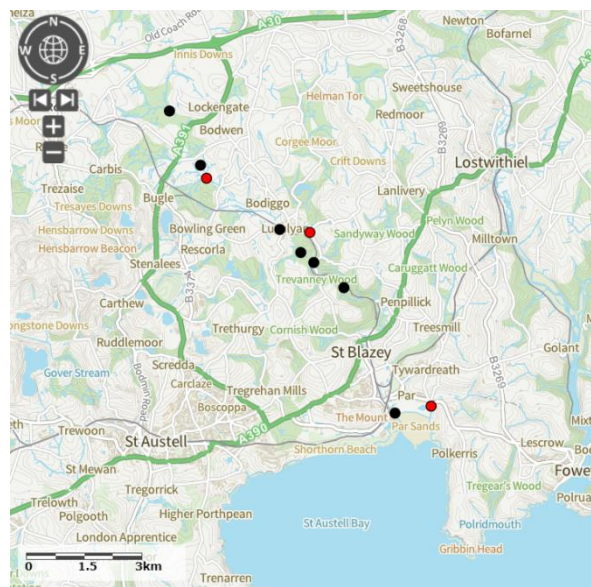
## A. OUR AUGUST 2023 FINDINGS AT A GLANCE (SEE SECTIONS C TO J FOR FULL PICTURE)

We sampled at 10 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	TRIBUTARY OF LOWER PAR (POLMEAR STREAM) 1 SAMPLE LOCATION
TEMPERATURE (SHOULD NOT EXCEED 18° CELSIUS)	Average 15.55° Celsius	Average 17.1° Celsius	Average 15.3° Celsius	Average 16.5° Celsius
TOTAL DISSOLVED SOLIDS (SHOULD NOT EXCEED 300 PPM)	121.75 PPM	148.5 PPM (2 locations only)	170.5 PPM	169 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)	<b>200 PPB</b>	<b>600 PPB</b>	<b>333.33 PPB</b>	100 PPB
RIVERFLY TRIGGER LEVEL (SHOULD BE ≥ 6)	N/A	10 (1 location)	N/A	N/A
WILDLIFE EVIDENCE	Deer, pond-skaters, dragonfly.	7 types of riverfly larvae (out of 8 sought), dragonflies.	None	None
VISIBLE EVIDENCE OF POLLUTION	Foam	Traffic cone	DEBRIS	NONE

## B. AUGUST 2023 MONITORING POINTS

This month monitoring occurred at 10 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	15/8/2023	CSI sample & Cartographer record.	Roger Smith
South of Minorca Lane, Par River, SX02668 59747	15/8/2023	CSI sampling. Cartographer record.	Roger Smith
Carbis Stream SX 02834 59401	15/8/2023	CSI sampling. Cartographer record.	Roger Smith
Luxulyan allotments, Par River, SX 04732 58045	15/8/2023	CSI sampling. Cartographer record.	Roger Smith
Cam Bridges, Par River, SX 05292 57454	15/8/2023	CSI sampling. Cartographer record.	Roger Smith
Gatty's Bridge, Bokiddick Stream SX 05531 57953	15/8/2023	CSI sampling. Cartographer record.	Joan Farmer
Treffry Viaduct, Par River, SX 05650 57179	15/8/2023	CSI sampling. Cartographer record.	Joan Farmer, Roger Smith
Lady Rashleigh Mine, Par River, SX 06451 56509	15/8/2023	CSI sampling. Cartographer record. Riverfly.	Joan Farmer, Veronica Jones, Roger Smith
Par Beach slipway, SX 0776 53261	25/8/2023	CSI sampling. Cartographer record.	Brian Harrison
Polmear Stream, Ship Inn SX 08749 53417	25/8/2023	CSI sampling. Cartographer record.	Simon Tagney

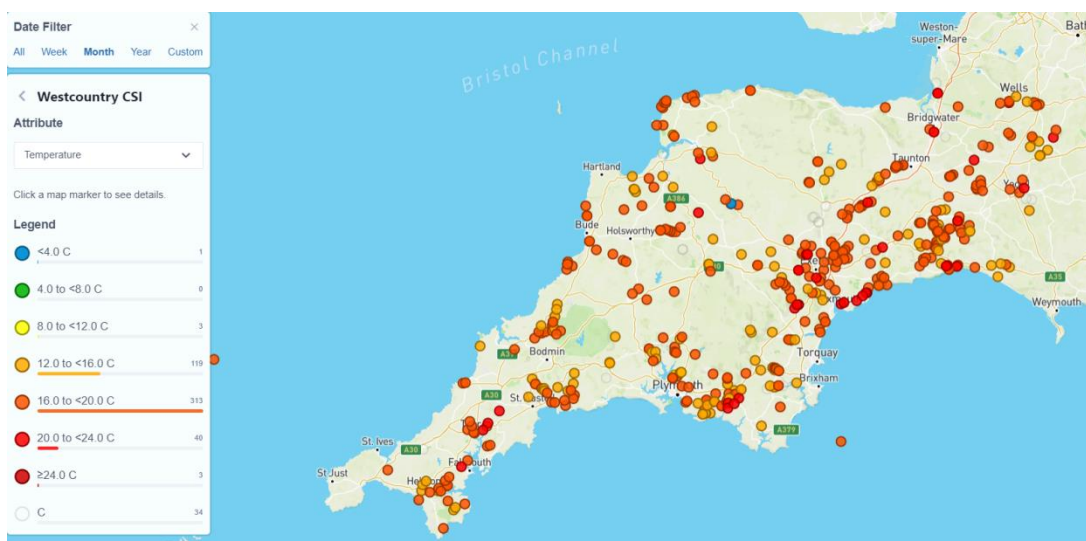
## C. TEMPERATURE

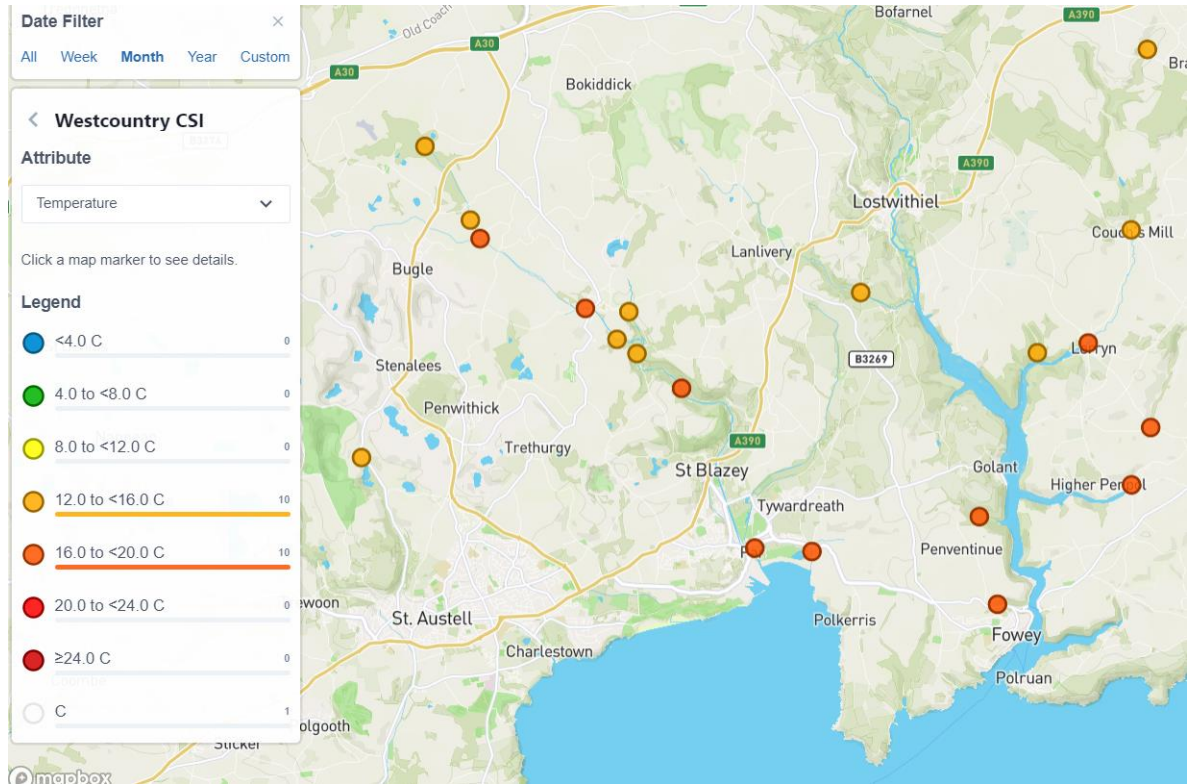
1. This is the WRT's explanation of why this is monitored:

*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.

**N.B.** The new website doesn't seem to allow a selection of dates so it is assumed these results relate to the previous month, in which case some September results may be included from other catchments.





### 3. Results August 2023

PAR RIVER/TRIBUTARY	LOCATION	Temperature °Celsius
Par	Criggan Moors, SX 01882 61133	14.8 [16.5]
Par	South of Minorca Lane, Par River, SX 02657 59788	14.8 [16.7]
Tributary	Carbis Stream SX 02834 59401	16.8 [18.3]
Par	Luxulyan allotments, Par River, SX 04732 58045	16.8 [18.1]
Par	Cam Bridges, Par River, SX 05292 57454	15.8 [17.6]
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	13.8
Par	Treffry Viaduct, Par River, SX 05650 57179	14.8
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	<b>19.5</b>
Par	Par Beach slipway, SX 0776 53261	17
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	16.5

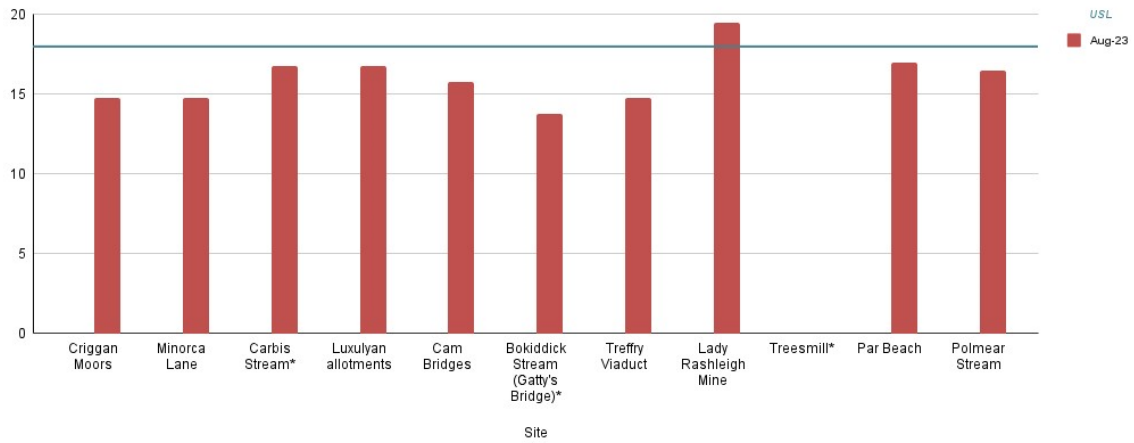
Results above the temperature at which fish and other organisms can function healthily will be shown in red. At present, 18 °Celsius is being used as the upper safe limit for fish and other creatures, although 20° Celsius has recently been suggested by WRT instead.

Figures in square brackets show readings with the new thermometer/TDS device. There is a worrying discrepancy with the readings on the older devices.

4. Graphs

(a) This month

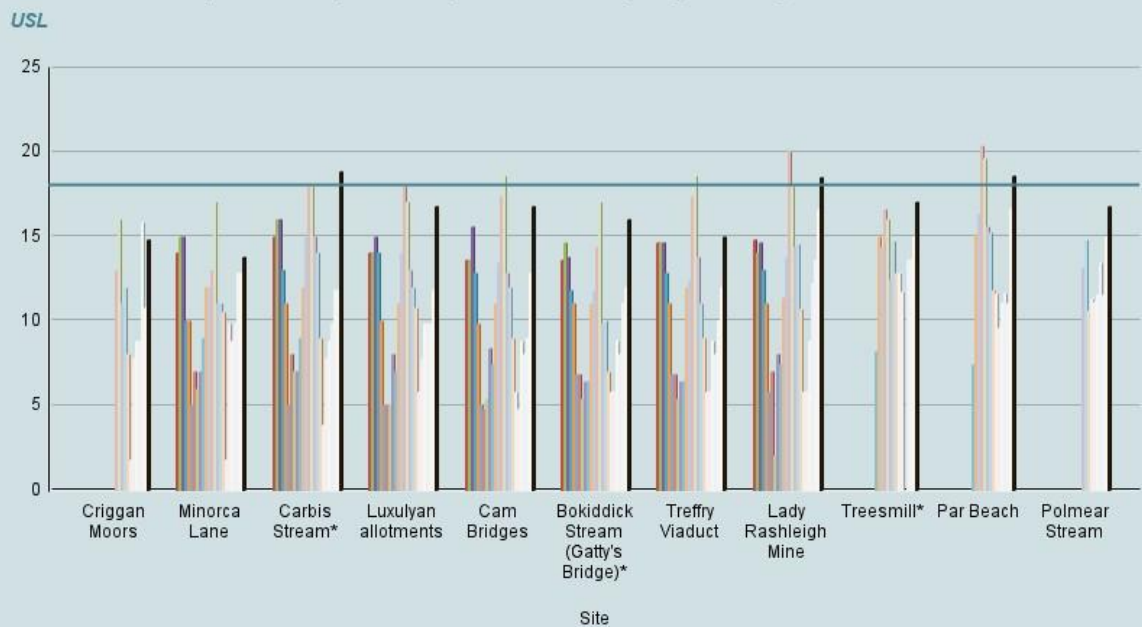
Par River Temperature (°Celsius) - Filtered



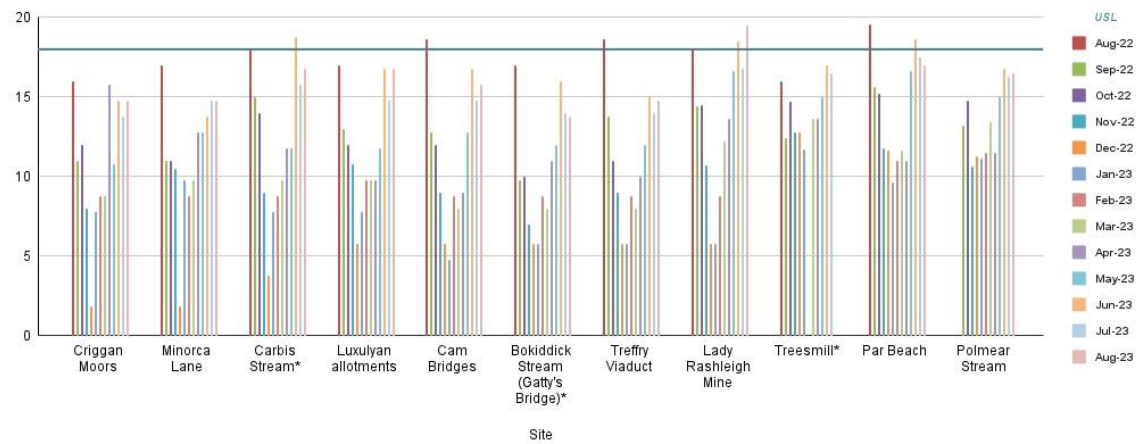
\*Indicates a tributary.

(b) Historical

Par River Temperature (°Celsius) - Historical (July 2021+)



\*Indicates a tributary.

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

\*Indicates a tributary.

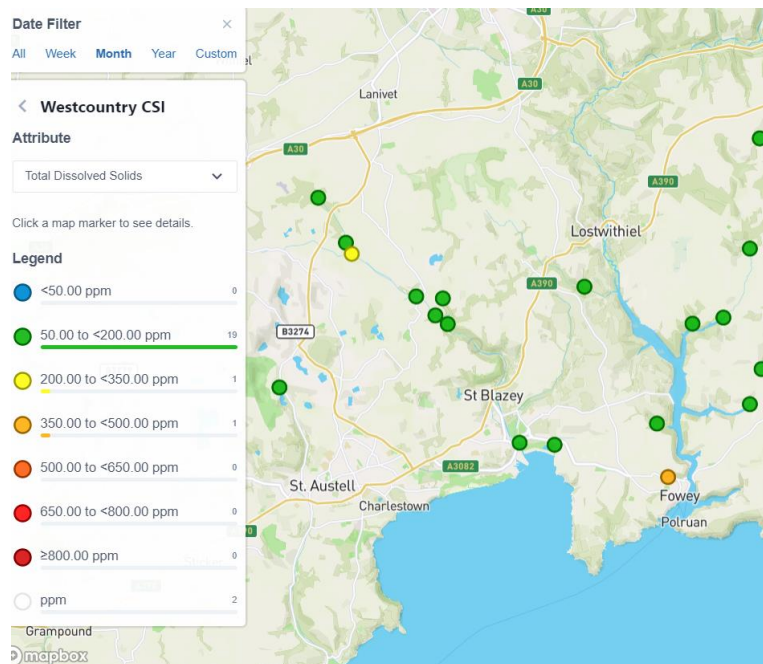
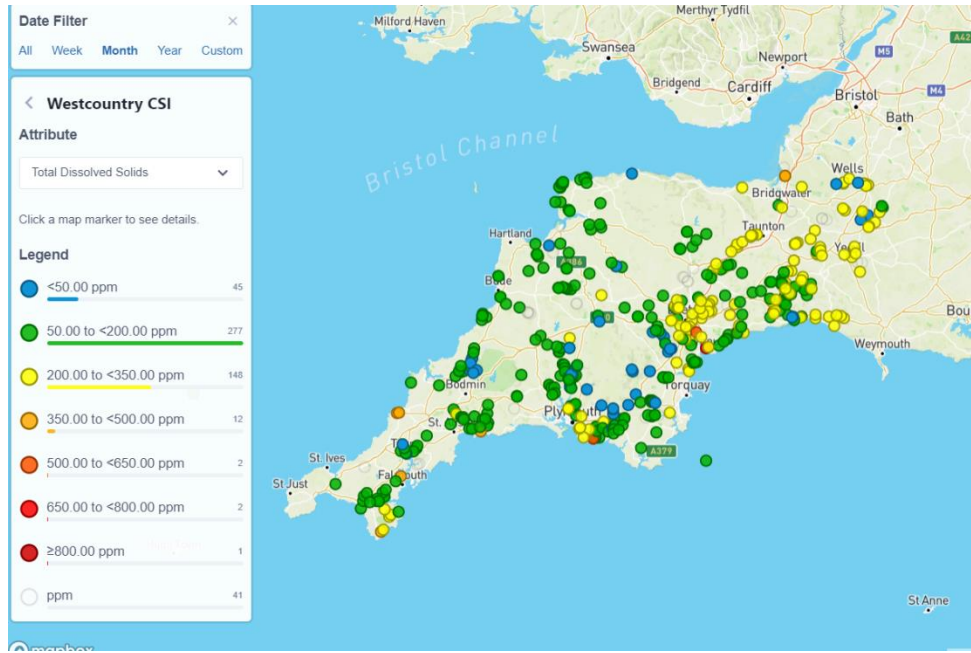
**D. TOTAL DISSOLVED SOLIDS**

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.

**N.B.** The new website doesn't seem to allow a selection of dates so it is assumed these results relate to the previous month, in which case some September results may be included from other catchments.



## 3. Results August 2023

PAR RIVER/TRIBUTARY	LOCATION	Total Dissolved Solids PPM
Par	Criggan Moors, SX 01882 61133	85 [69]
Par	South of Minorca Lane, Par River, SX 02657 59788	71 [56]
Tributary	Carbis Stream SX 02834 59401	250 [183]
Par	Luxulyan allotments, Par River, SX 04732 58045	162 [113]
Par	Cam Bridges, Par River, SX 05292 57454	169 [124]
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	91
Par	Treffry Viaduct, Par River, SX 05650 57179	168
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	-
Par	Par Beach slipway, SX 0776 53261	129
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	169

**Upper Normal Level**

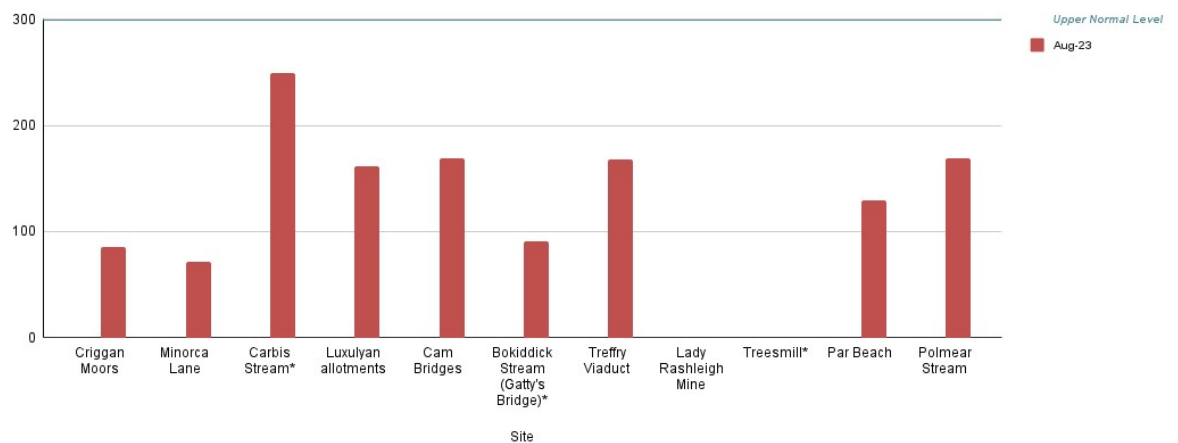
The WRT advice for this river is that it should not exceed 300 ppb.

Figures in square brackets show readings with the new thermometer/TDS device. There is a worrying discrepancy with the readings on the older devices.

## 4. Graphs

## (a) This month

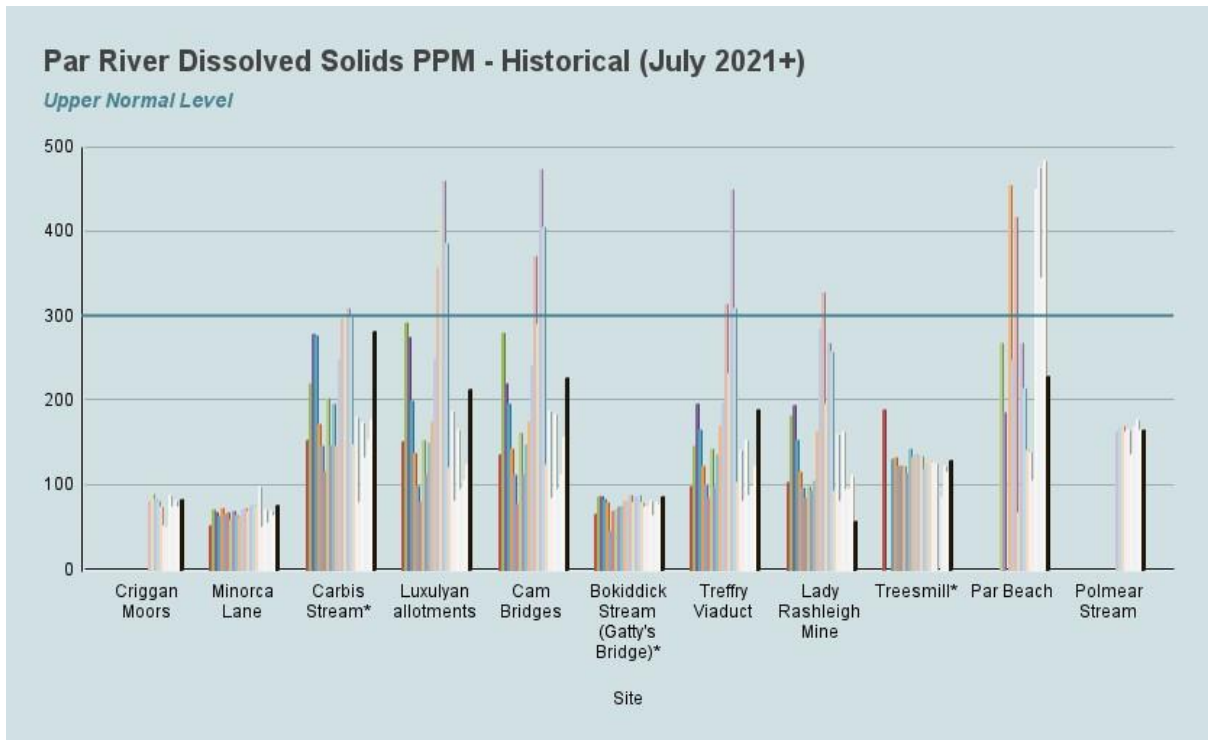
Par River Total Dissolved Solids (PPM) - Filtered



\*Indicates a tributary.

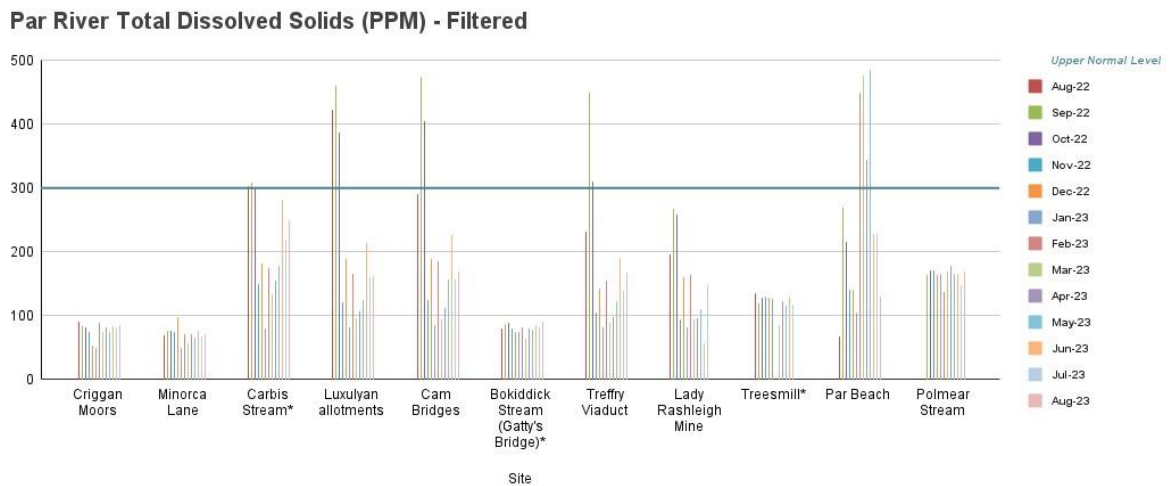


**(b) Historical**



\*Indicates a tributary.

**(c) The last year**



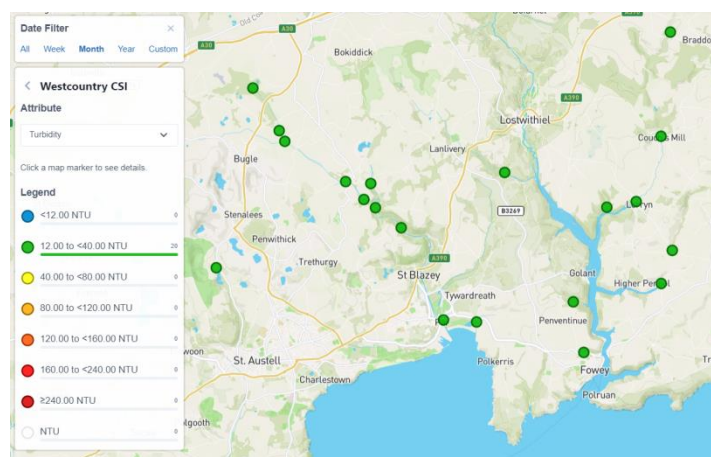
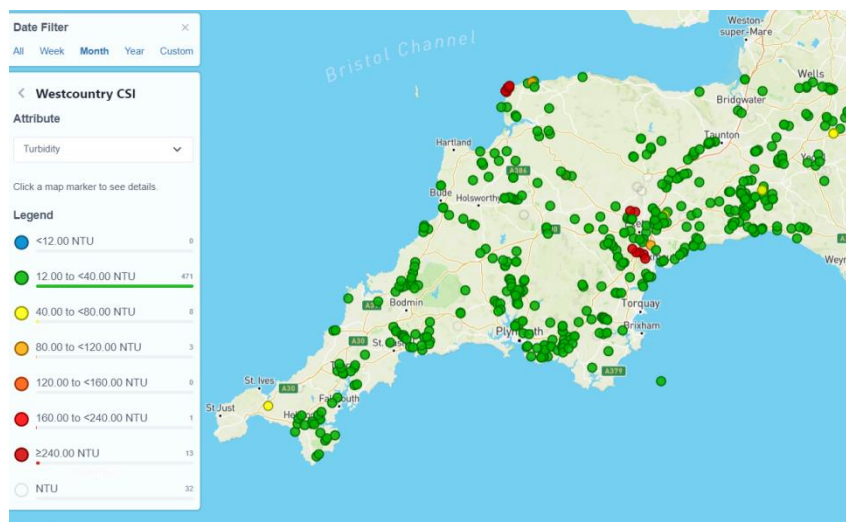
\*Indicates a tributary.

## 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.

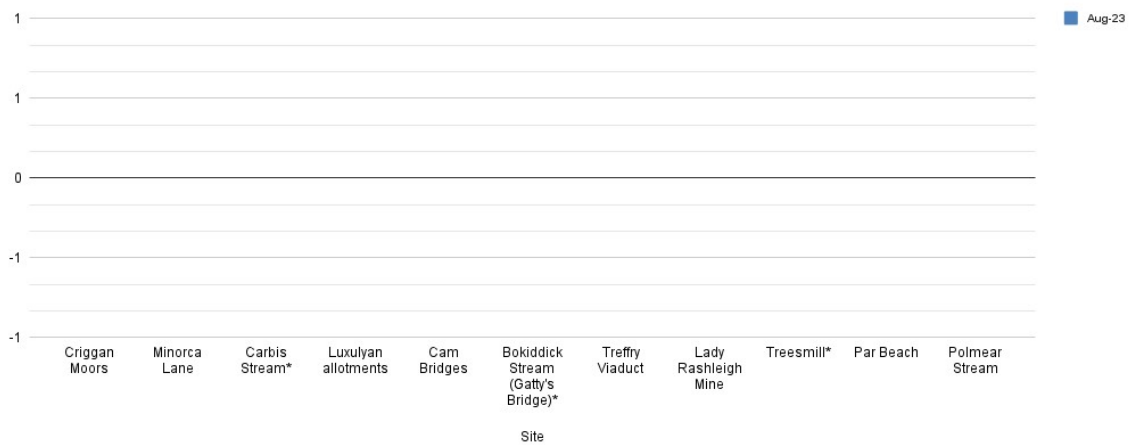
**3. Results August 2023**

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
Par	Par Beach slipway, SX 0776 53261	0
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	0

**4. Graphs**

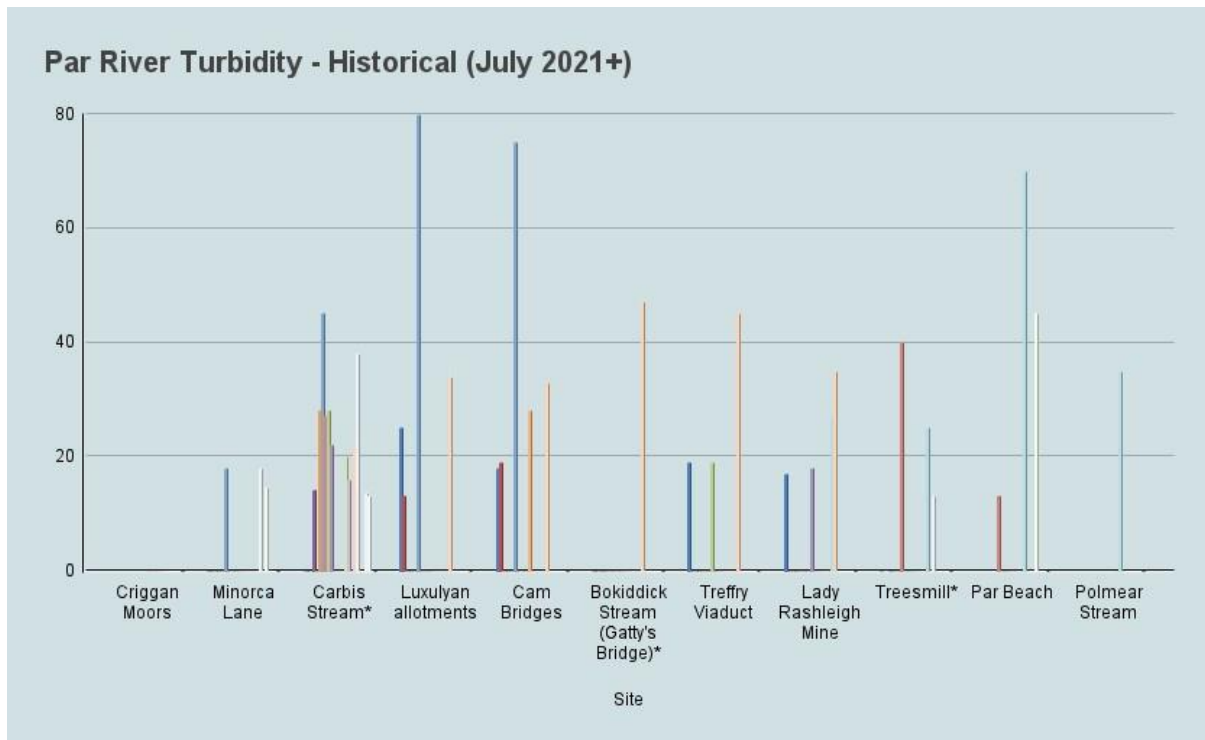
**(a) This month**

**Par River Turbidity - Filtered**



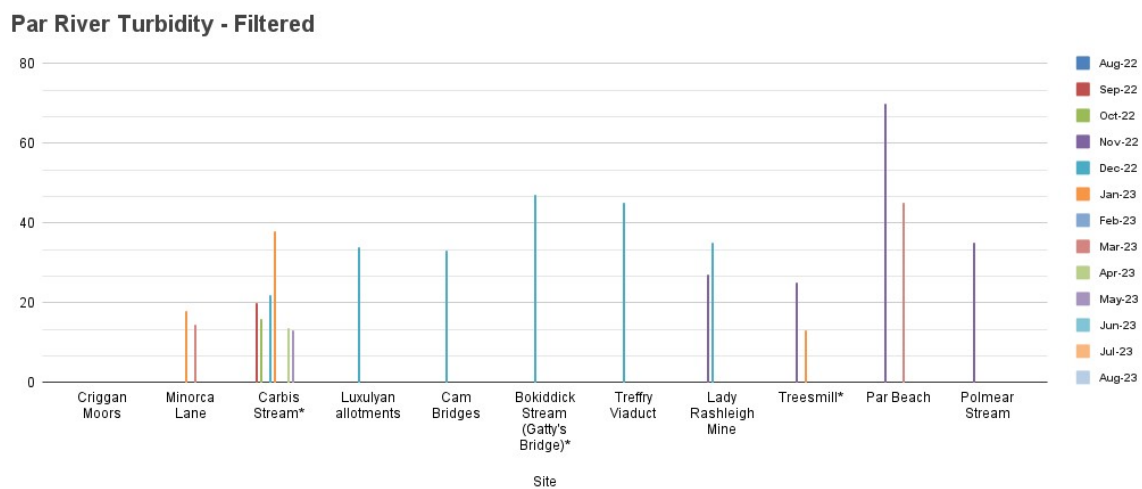
\*Indicates a tributary.

(b) Historical



\*Indicates a tributary.

(c) 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.)

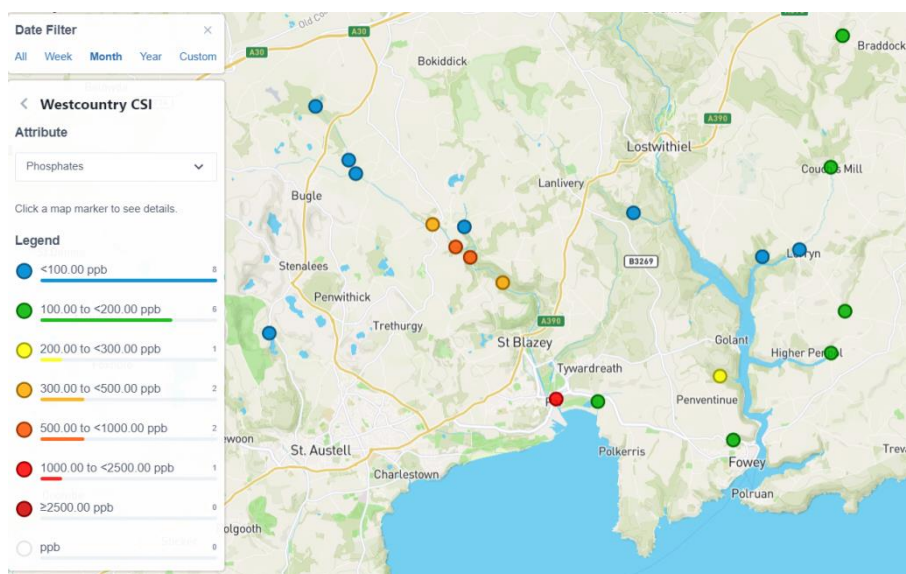
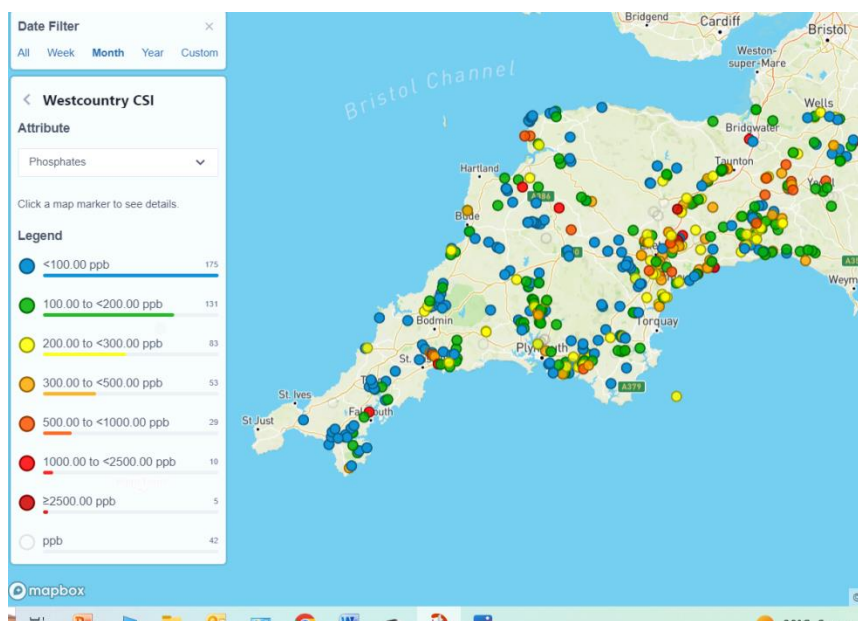
Ranges on phosphate diagnostic colour chart:

0 – 100 OK

200 – 300 HIGH

500 – 2500 – TOO HIGH

## 2. Geographical comparison. Source: Cartographer



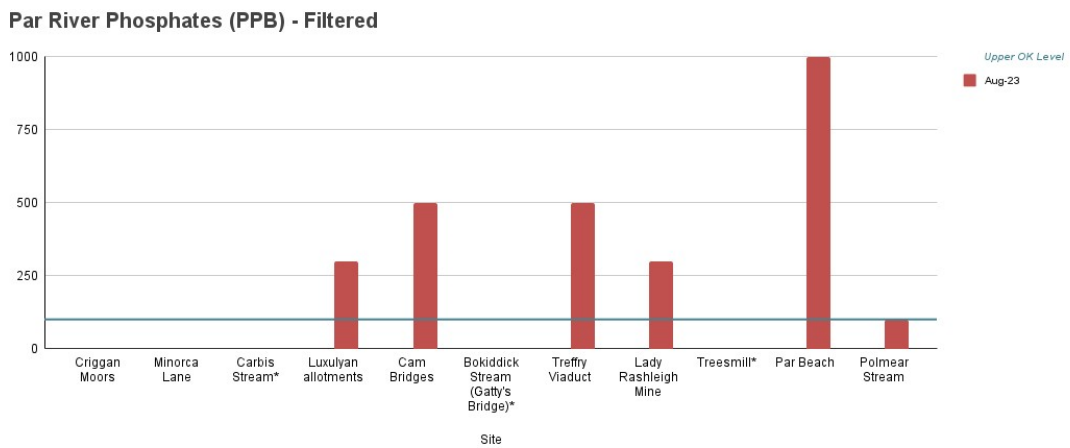
**3. Results August 2023**

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	500
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
Par	Par Beach slipway, SX 0776 53261	1000
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	100

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

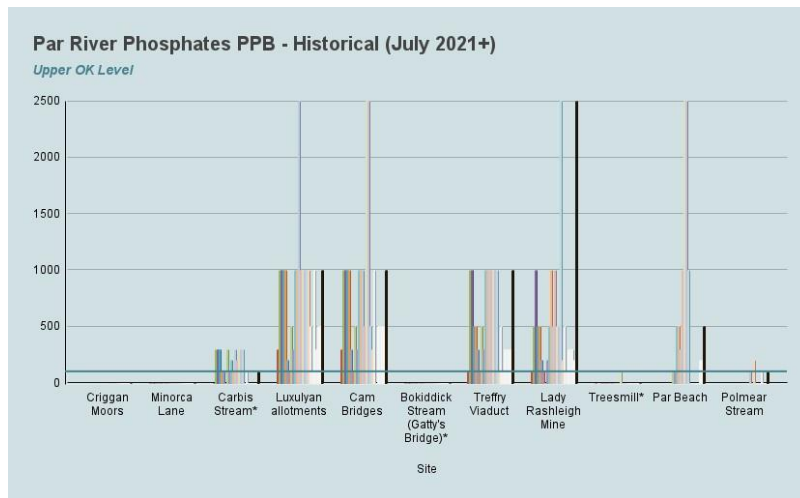
**4. Graphs**

**(a) This month**



\*Indicates a tributary.

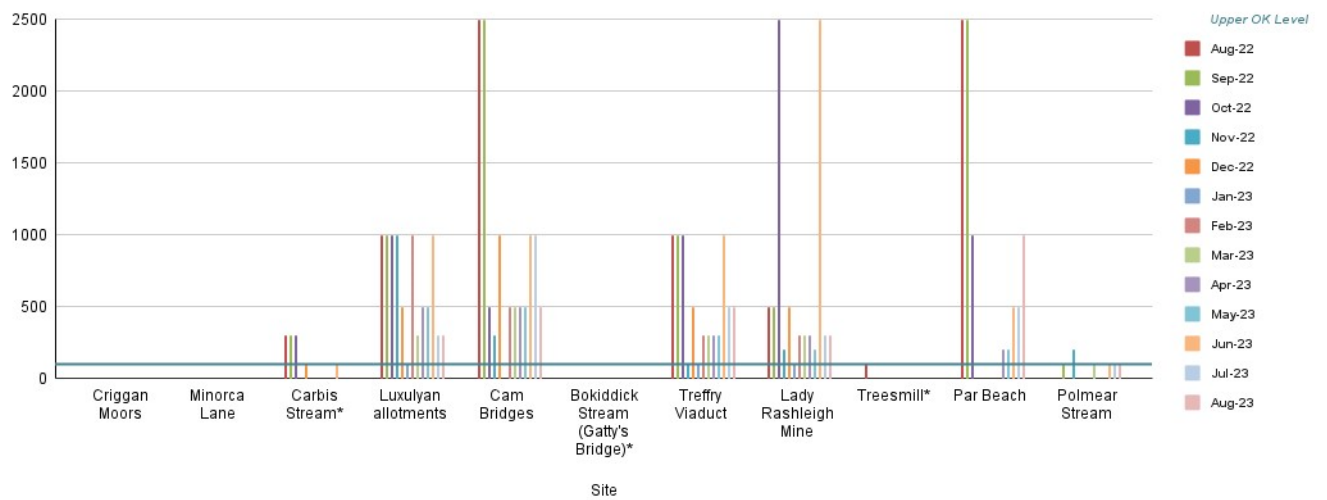
**(b) Historical**



\*Indicates a tributary.

**(c) The last year**

**Par River Phosphates (PPB) - Filtered**



\*Indicates a tributary.

**G. REVIEW OF BACTERIA TESTING TRIAL 2022-2023 BY JOAN FARMER**

The 3 figures of Aquagenx safe levels are: low risk probably safe; low risk possibly safe; and intermediate risk possibly safe. Anything higher is in the High risk or very high risk category. I have added the EA results as well.

What I think it shows is that USA standards far exceed standards in the UK.

We consistently got the 2nd highest reading on our chart: 483 categorised as Very high risk/Unsafe in the USA, but Excellent in the UK, for inland waters. However, in November 22, when the EA took readings at the same time, they got readings of 2200 and 860 when we got 483. While the EA do not use the same measurements, they should broadly correlate. When the EA got a reading of 6600 in June 2023 after heavy rain, we got >1000 2 days later, which is our highest possible reading. We consistently got over 1000 for total coliforms.

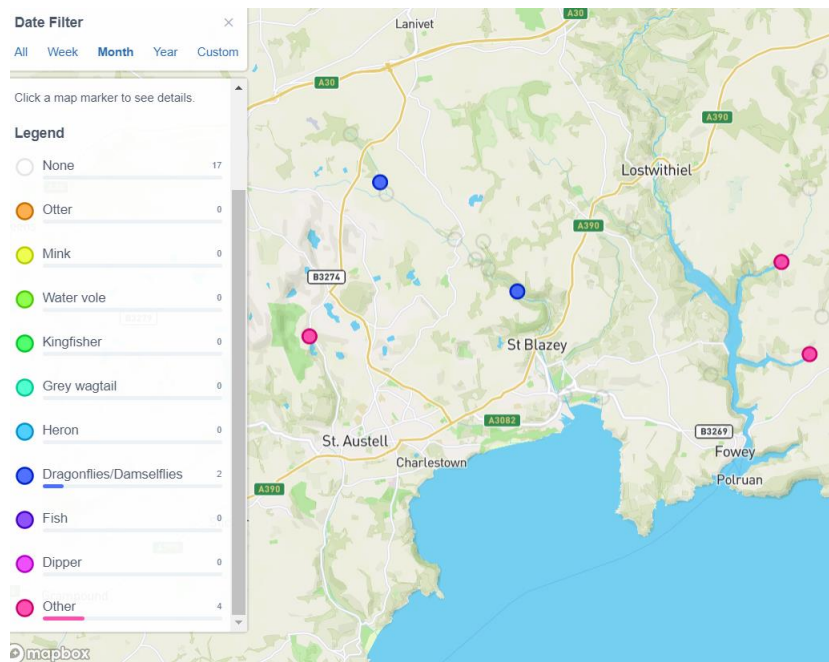
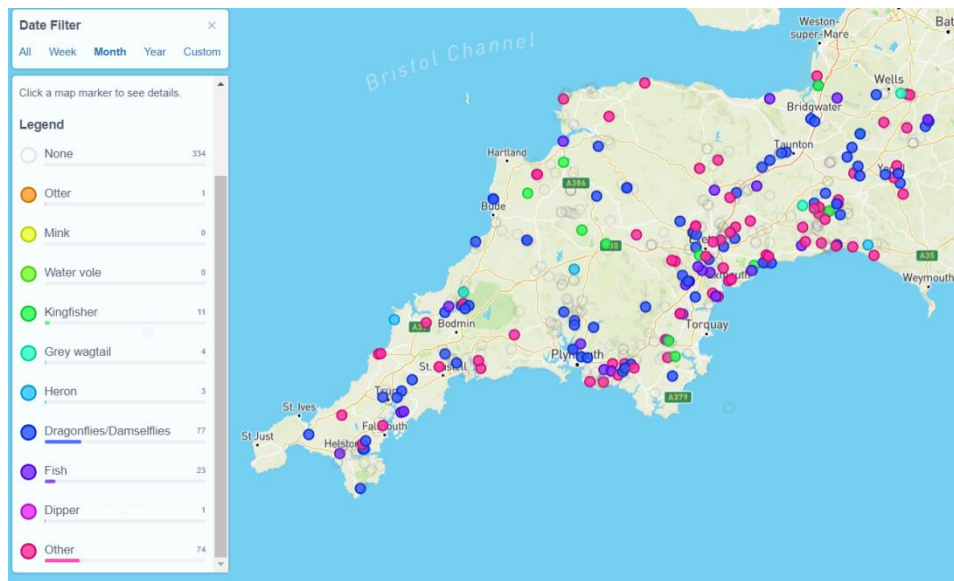
The 32 point chart is not really fit for our purpose as readings are consistently high but anything under 1000 is deemed good in the UK, so the Aquagenx test is not very useful for flagging up higher levels of pollution.

A	B	C	D	E	F	G	H	I	J	K
<b>E.coli Par River MPN/100ml</b>										
Criggan Moor, SX 01882 61133										
Minorca Lane, SX 02657 59788										
Lady Rashleigh Mine, SX 06451 56509										
	<b>Aquagenx</b>									
	<b>Upper Safe Level</b>	<b>Criggan Moor</b>	<b>Minorca Lane</b>	<b>Lady Rashleigh Mine</b>	<b>Gattys trib</b>	<b>EA Min Lane</b>	<b>EA LRM</b>	<b>EA Allotmer</b>	<b>EA ST Blazey Bridge</b>	
Feb-22	40/84/96				483					
Mar-22	40/84/96				136					
Apr-22					326					
May-22					136					
Jun-22					483					
Jul-22				47* error						
Aug-22		483	483		483					
Sep-22		483	136		483					
Oct-22		483	47		483					
Nov-22			483		483	2200	860	1500		
Dec-22					483					
Jan-23										
Feb-23					136					
Mar-23				>1000						
Apr-23					483	136				
May-23					136	483				
Jun-23				>1000		136				6600 heavy rain
Jul-23					483					

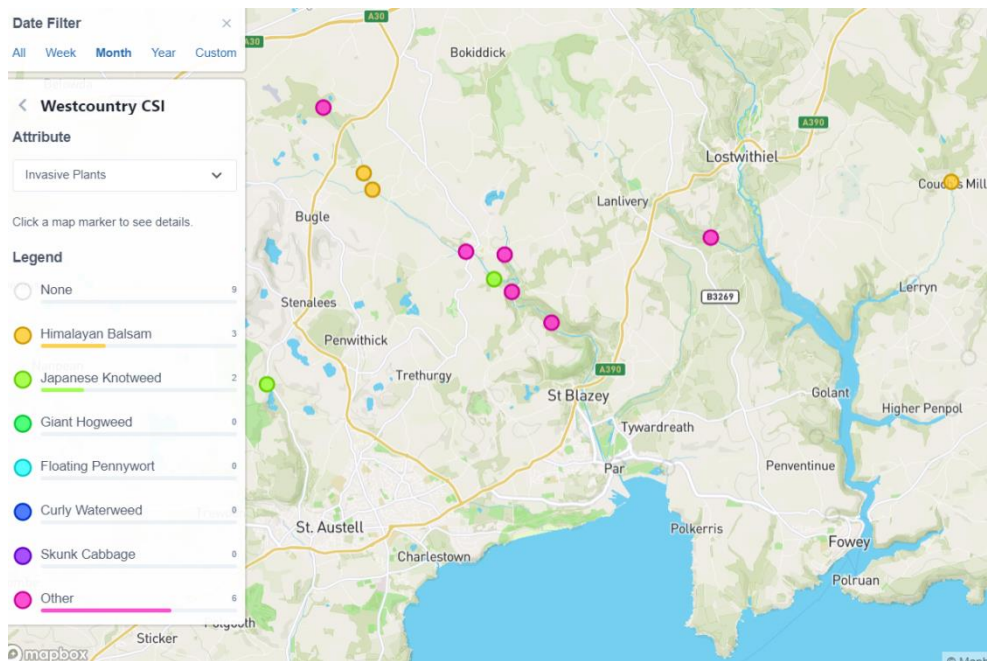
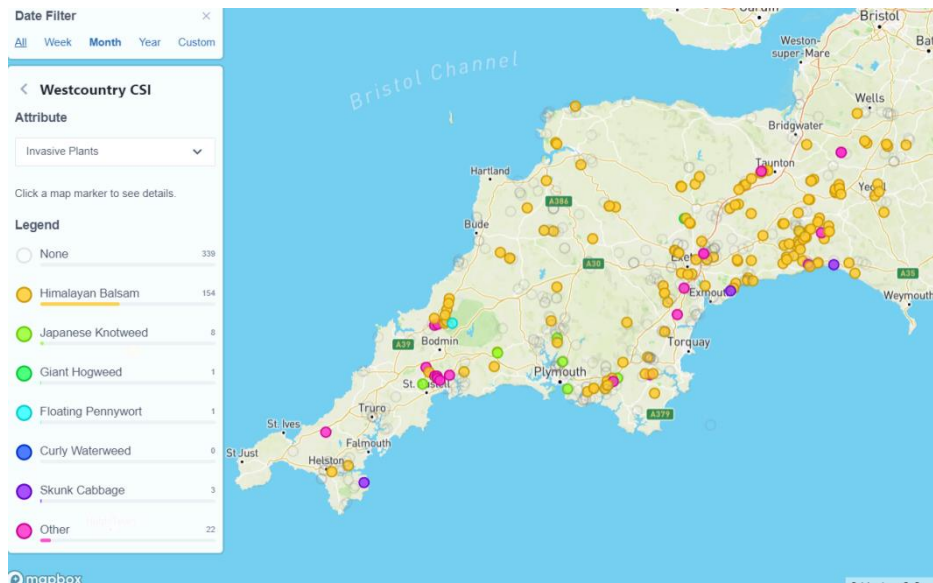


**H. WILDLIFE (FOR OTTER REPORT SEE SECTION I) & INVASIVE PLANTS**

**(a) Wildlife maps**



(b) Invasive plants maps



**(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	Dragonfly, pond skaters, a roe deer	Hemlock Water Dropwort, Himalayan Balsam
Tributary	Carbis Stream SX 02834 59401	None	Hemlock Water Dropwort
Par	Luxulyan allotments, Par River, SX 04732 58045	None	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	Dragonflies. Riverfly nymphs: Cased Caddisflies, Caseless Caddisflies, Blue-winged Olive, Olives, Flat-bodied Upwing, and Freshwater Shrimps	
Par	Par Beach slipway, SX 0776 53261	None	
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	None	

**I. OTTER SURVEY AUGUST 2023****1. SURVEY CONDITIONS**

<b>Date &amp; time</b>	15/8/2023 & 16/8/2023
<b>Surveyors</b>	Roger Smith, Veronica Jones, Joan Farmer
<b>Areas surveyed</b>	Upper Par (Criggan Moors and Minorca Lane); Par River from STW to Cam Bridges; Par River from Treffry Viaduct to Tywardreath Highway.
<b>Weather</b>	Light rain in previous 24 hours
<b>River level</b>	Low
<b>River flow</b>	Steady
<b>Water quality</b>	Phosphate readings 300 PPB at the highest (Luxulyan allotments), 500 at Cam Bridges, 500 at Treffry Viaduct and 300 at Lady Rashleigh Mine and 1000 at Par Beach slipway. All readings zero upstream from the allotments. High bacteria
<b>Other wildlife</b>	Dragonfly and pond skaters near Minorca Lane. Dragonflies and riverfly nymphs at Lady Rashleigh Mine. Possible rat footprints under canal bridge at Pontois Mill.

## 2. EVIDENCE FOR OTTERS ✓

EVIDENCE	SEEN/ ORKS*	LOCATION	NOTES
Spraint - fresh		Under canal bridge at Ponto Mill, SX 07312 56164	
Spraint – recent	✓*		
Spraint - old			
Anal jelly			
Sign heap			
Staining			
Tracks	✓*	Under canal bridge at Ponto Mill, SX 07312 56164	
Path			
Slide			
Holt			
Hover			
Couch			
Live sighting			
Corpse			

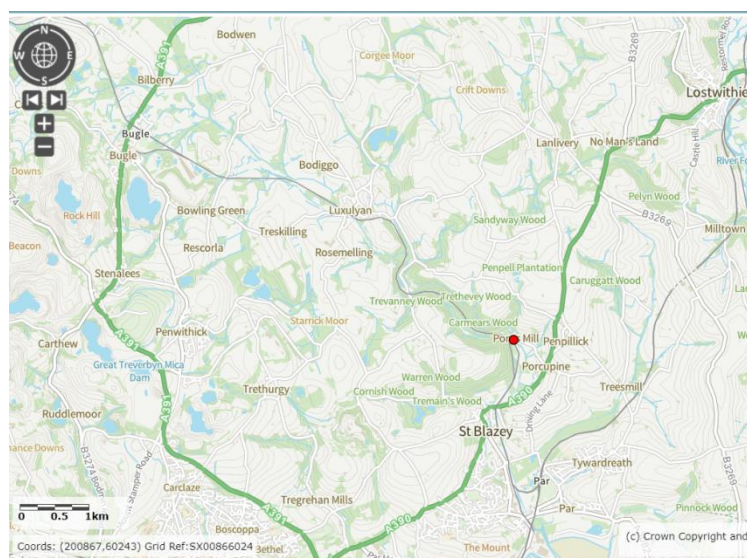
\*Report sent to ORKS: <https://ercis.org.uk/>

## 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)



Recent otter spraint at Ponto Mill, SX 07312 56164

(b)



Otter footprints at Ponto Mill, SX 07312 56164

(c)



Otter footprints at Ponto Mill, SX 07312 56164

(d)



Possible rat footprints at Ponto Mill, SX 07312 56164

## 5. COMMENTS

Recent surveys have shown little evidence of otter presence at the expected locations, especially in Luxulyan Valley. Does this reflect seasonal behaviour?

## 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.

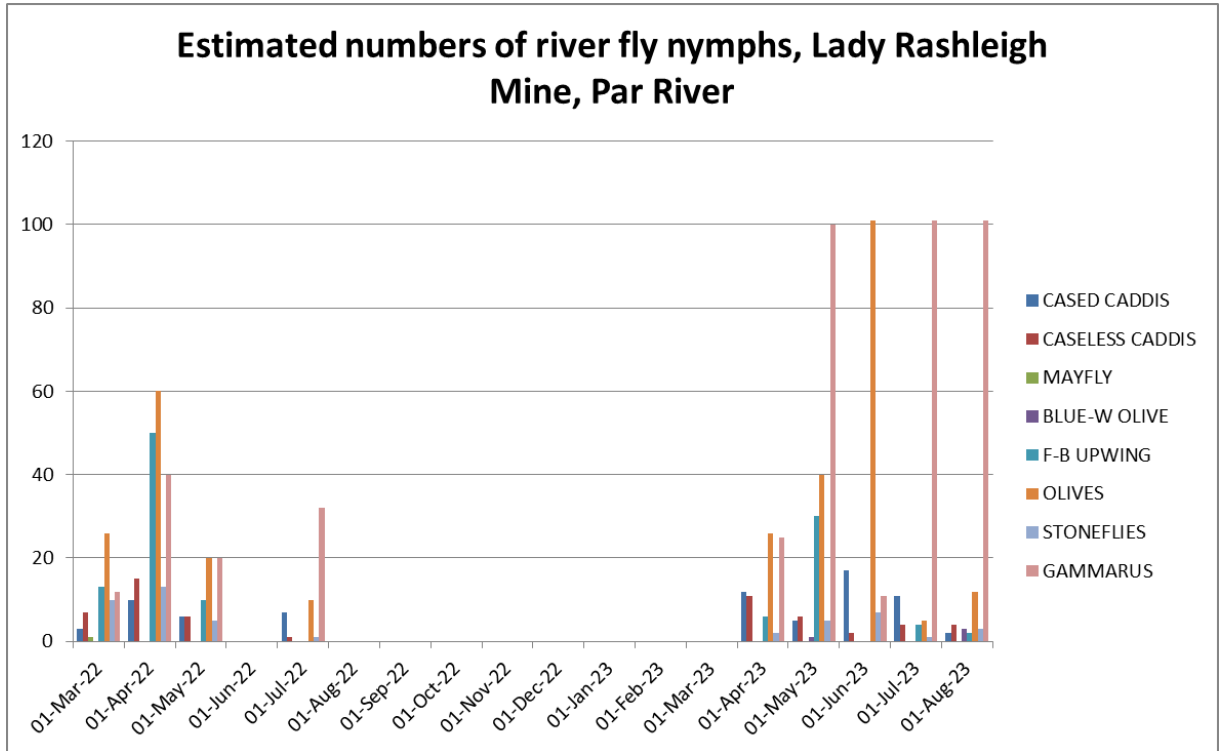
It is impossible to count every invertebrate so this counting method is used:

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

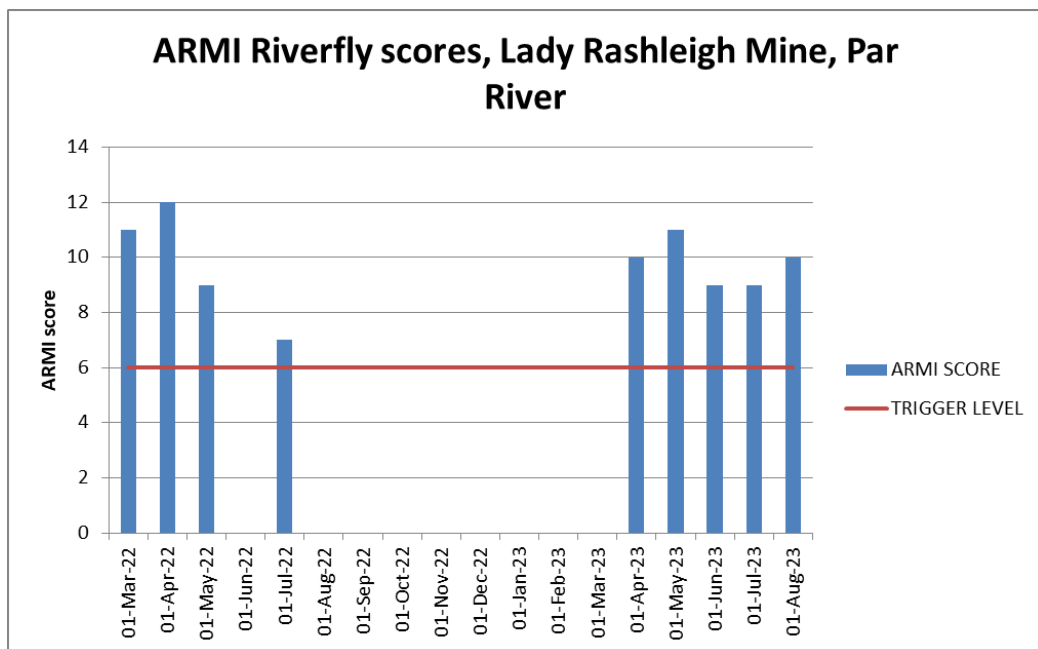
Results of survey at Lady Rashleigh Mine (SX 06451 56509) carried out by Veronica Jones, Joan Farmer, and Roger Smith on 15<sup>th</sup> August 2023

	SPECIES	NUMBER	CATEGORY
<b>Trichoptera</b>			
1	Cased Caddisfly	2	1
2	Caseless Caddisfly	4	1
<b>Ephemeroptera 3 tails</b>			
3	Mayfly (Ephemeraidae)	0	0
4	Blue-winged olive (Ephemerellidae)	3	1
5	Flat-bodied up-wings (Heptageniidae)	2	1
6	Olives (Baetidae)	12	2
<b>Plecoptera 2 tails</b>			
7	Stoneflies	3	1
<b>Gammaridae</b>			
8	Freshwater Shrimp	100+	3
			<b>10</b>

<b>CATEGORY TOTAL</b>	<b>10</b>
<b>TRIGGER LEVEL</b>	<b>6</b>



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 riverfly trigger level was met comfortably.

(b) Evidence for otters was found, albeit in one location only.

(c) Major work has commenced at the South West Water St Austell North STW at Luxulyan, although the nature of the work is unknown.

(d) The motorbike has been removed from the river near Minorca Lane. It was stolen and is the subject of a police case. Credit must be given to the unnamed Cornwall Council officer who went to such lengths to follow this matter up and keep me regularly informed. It is another good example of why a civilised society needs the public sector.

### 2. Points of concern

(a) Phosphate levels remain too high, with the worst reading of the month (1000 ppb) at Par Beach slipway. It is known that one contributory factor is the South West Water St Austell North STW. A recent government announcement indicates that a reduction in nutrient levels in rivers is no longer a priority (<https://www.theguardian.com/environment/2023/aug/28/uk-rivers-at-risk-as-michael-gove-rips-up-rules-on-new-housing> ).

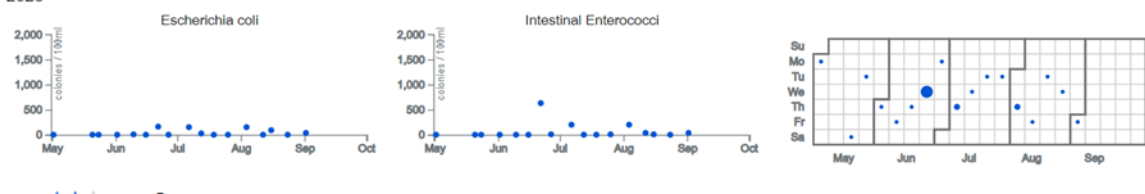
(b) The presence of harmful bacteria (E.coli, total coliforms and intestinal enterococci) in the river and at Par Sands is a concern. An alarming report appeared recently in some local media outlets condemning water quality at Par Sands (<https://www.cornwalllive.com/news/cornwall-news/nine-cornwall-beaches-unsafe-swim-7471337> ) but apart from saying that the data ‘comes from the government’ it didn’t provide a full explanation.

Environment Agency data for 2023 can be found at

<https://environment.data.gov.uk/bwq/profiles/data-samples.html?bw=ukk3106-27300#current>

#### Par Sands

2023



Guidance about the figures is also provided by the EA (<https://environment.data.gov.uk/bwq/profiles/help-understanding-data.html#water-quality-assessments>):

### Coastal Bathing Waters

Excellent	EC: $\leq 250$ cfu/100ml ; IE: $\leq 100$ cfu/100ml (95th percentile)
Good	EC: $\leq 500$ cfu/100ml ; IE: $\leq 200$ cfu/100ml (95th percentile)
Sufficient	EC: $\leq 500$ cfu/100ml ; IE: $\leq 185$ cfu/100ml (90th percentile)
Poor	means that the values are worse than the sufficient

(c) Although there have been wildlife sightings, and allowance has to be made for our lack of professional expertise in noting wildlife, it has to be said that there isn't a lot, even in Luxulyan Valley where great work is done to encourage biodiversity.

(d) There is a discrepancy between the readings for temperature and Total Dissolved Solids produced on the old and new devices, which means that the accuracy we require is not achieved (see sections C and D).

(e) The temperature exceeded 18 ° Celsius at Lady Rashleigh Mine and, using the newer thermometer, in the Carbis Stream. This is despite the poor weather of August and is conceivably a result of the climate breakdown ('the era of global boiling has arrived', according to the UN secretary general, António Guterres).

### 3. Areas of doubt

(a) Joan Farmer's summary of the bacteria testing trial (section G) shows alarming areas of doubt, in particular: how useful is the Aquagenx test for rivers? How serious are our findings really? How do they match with EA data? How can we take this forward? The WRT River Guardians meeting in August demonstrated widespread concern amongst citizen scientists over this issue and a desire for expert support.

(b) As amateurs, it is very difficult to make sense of not only the science of river monitoring but also the legal framework and network of responsible or interested organisations. Citizen science can be useful, even at a low level of expertise, but is it possible to do it more effectively?

### L. OUR GROUP AND SUPPORTERS

Monitoring is part of the Citizen Science programme run by the West Country Rivers Trust (WCRT) and is carried out monthly by volunteers, including Dave Burrell; Joan Farmer; Veronica Jones; Sue Perry; Roger Smith; Simon Tagney; Maggie Tagney; and Brian Harrisson. They have received training from Lydia Ashworth, Junior Evidence and Engagement Officer of the West Country Rivers Trust

<https://wrt.org.uk/project/become-a-citizen-scientist/>). Results are logged on the Cartographer website. The support and advice given by Ross Tonkin, Chloe Lake, David Edwards, Claire and Gary Phillips, Jenny Heskett, Nick Taylor, Jeremy Roberts, Mat Bateman, Colin Pringle, Matt Healey, Simon Browning, Lydia Deacon, Layla Ousley, Jack Middleton, Anna Seal, 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, September 2023**