

WESTCOUNTRY RIVERS TRUST CITIZEN SCIENCE



MONITORING OF THE PAR RIVER AND ITS TRIBUTARIES

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

APRIL 2023

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A. KEY POINTS FROM WRT CSI MONITORING IN APRIL 2023

1. Sampling occurred in different weather conditions: following a dry period for the earlier dates (16th, 17th, and 18th April) and after heavy rain later on 22nd and 24th April.
2. The results of sampling the Treverbyn Stream (CSI and riverfly) are presented separately as they are part of quarterly surveys.

3. It was not possible to conduct a thorough otter survey although evidence for their continued presence was found.

4. The riverfly survey at Lady Rashleigh Mine (SX 06451 56509) met the Trigger Level, which is a positive finding for the health of the river. No Trigger Levels have been given for the Treverbyn Stream but the scores were nonetheless low; hopefully the Par Improvement Plan habitat improvements being introduced by the Environment Agency and Westcountry Rivers Trust will, in time, alter this.

5. Phosphate levels were as might be expected given the weather conditions, i.e. high but not very high on the Lower Par. However, a score of 200 ppb was recorded at Par Beach slipway, added to which the Total Dissolved Solids score there was once again high.

6. Bacteria readings cause us concern.

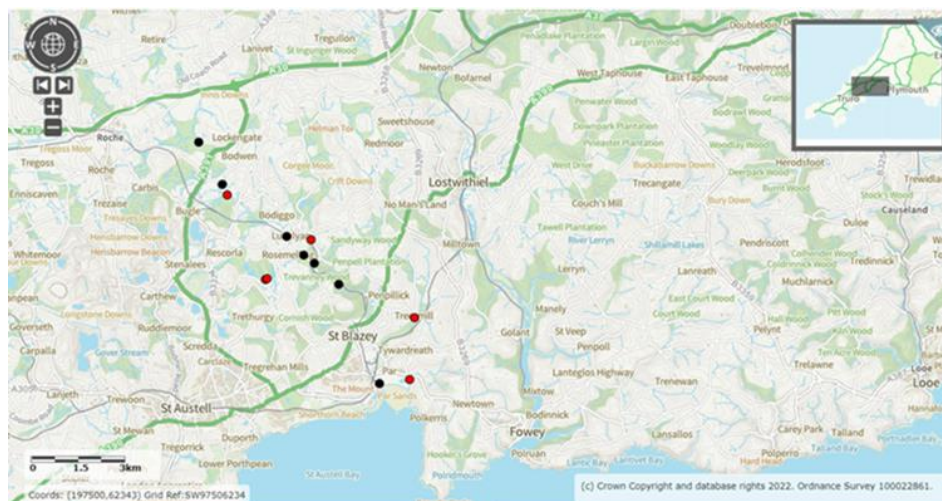
B. OUR GROUP

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

C. APRIL 2023 MONITORING POINTS

This month monitoring occurred at the 11 regular locations, plus the spring riverfly and CSI monitoring at 2 additional locations on a tributary, the Treverbyn Stream, at Innis. 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	17/4/2023	CSI sample & Cartographer record.	Roger Smith
South of Minorca Lane, Par River, SX02668 59747	17/4/2023	CSI sampling. Cartographer record.	Roger Smith
Carbis Stream SX 02834 59401	17/4/2023	CSI sampling. Cartographer record.	Roger Smith
Luxulyan allotments, Par River, SX 04732 58045	18/4/2023	CSI sampling. Cartographer record.	Roger Smith
Cam Bridges, Par River, SX 05292 57454	18/4/2023	CSI sampling. Cartographer record.	Joan Farmer,
Gatty's Bridge, Bokiddick Stream SX 05531 57953	18/4/2023	CSI sampling. Cartographer record.	Joan Farmer, Roger Smith
Treffry Viaduct, Par River, SX 05650 57179	18/4/2023	CSI sampling. Cartographer record.	Joan Farmer, Roger Smith
Lady Rashleigh Mine, Par River, SX 06451 56509	18/4/2023	CSI sampling. Cartographer record. Riverfly. Bacteria sample.	Dave Burrell, Joan Farmer, Veronica Jones, Roger Smith
Treesmill, Tywardreath Stream, SX 08873 55385	16/4/2023	CSI sampling. Cartographer record.	Maggie Tagney
Par Beach slipway, SX 0776 53261	22/4/2023	CSI sampling. Cartographer record.	Brian Harrison
Polmear Stream, Ship Inn SX 08749 53417	22/4/2023	CSI sampling. Cartographer record.	Simon Tagney

Spring surveys near Innis:

SX 04058 56650: Treverbyn/Treskillig Stream upstream from confluence with Innis Stream.	27/4/2023	CSI sampling. Cartographer record. Riverfly.	Joan Farmer, Veronica Jones, Roger Smith
SX 04113 56670: Treverbyn/Treskillig Stream downstream from confluence with Innis Stream.	27/4/2023	CSI sampling. Cartographer record. Riverfly.	Joan Farmer, Veronica Jones, Roger Smith

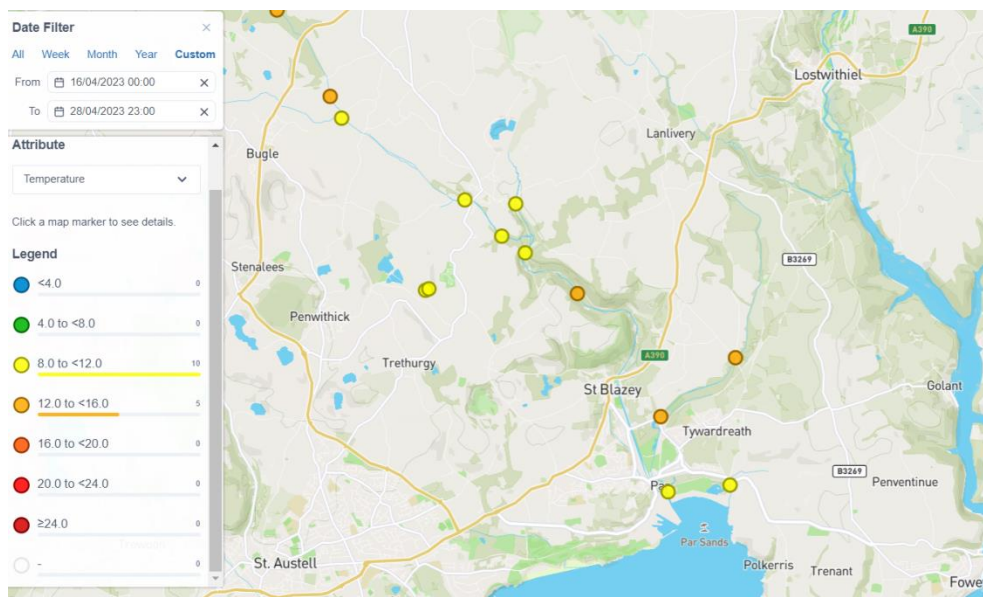
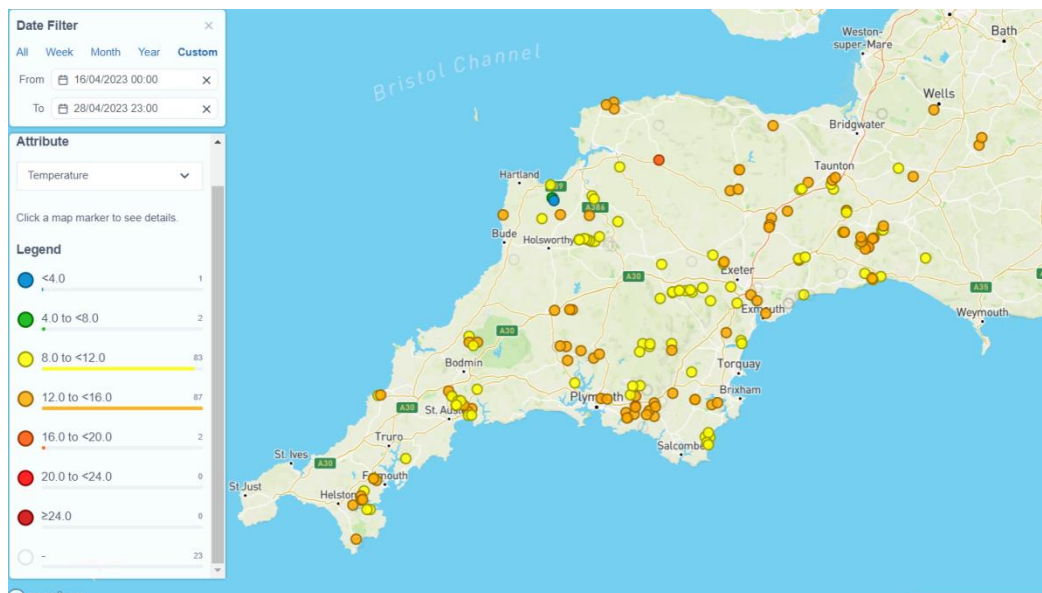
N.B. The maps show results from our 11 regular locations plus the Innis surveys. Additionally, another citizen scientist has entered results for another location on the Treemill/Tywardreath Marsh Stream. Hopefully we can make contact with this person to share observations.

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.

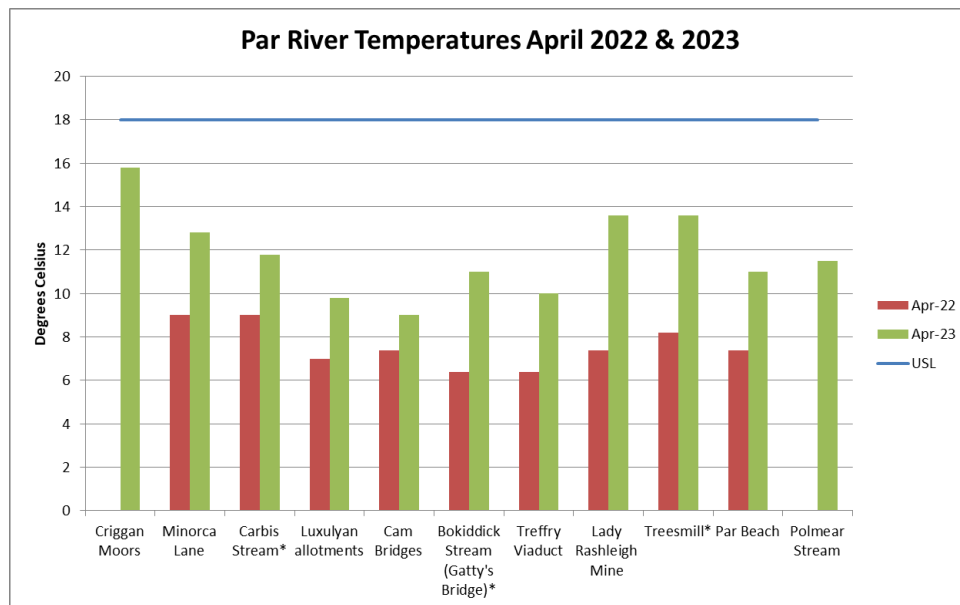


PAR RIVER/TRIBUTARY	LOCATION	Temperature °Celsius
Par	Criggan Moors, SX 01882 61133	16
Par	South of Minorca Lane, Par River, SX 02657 59788	12.8
Tributary	Carbis Stream SX 02834 59401	11.8
Par	Luxulyan allotments, Par River, SX 04732 58045	9.8
Par	Cam Bridges, Par River, SX 05292 57454	9
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	11
Par	Treffry Viaduct, Par River, SX 05650 57179	10
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	13.6
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385	13.6
Par	Par Beach slipway, SX 0776 53261	11
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	11.5

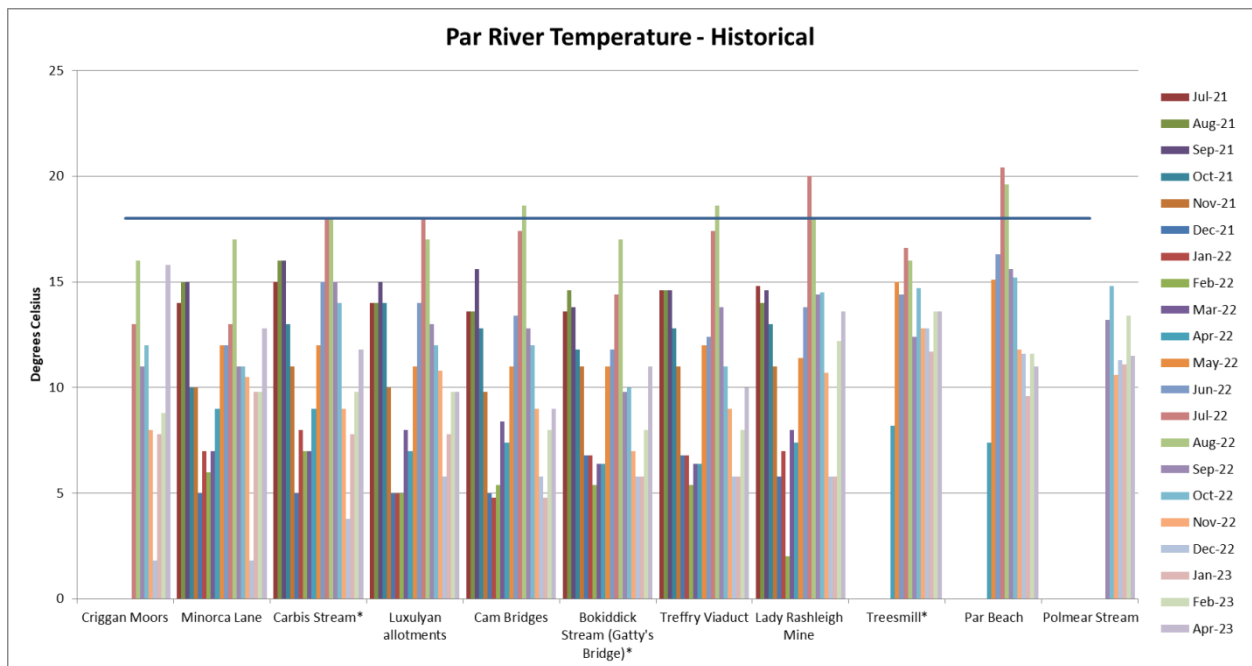
1. Graph April 2023 (and April 2022 for comparison)

*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:

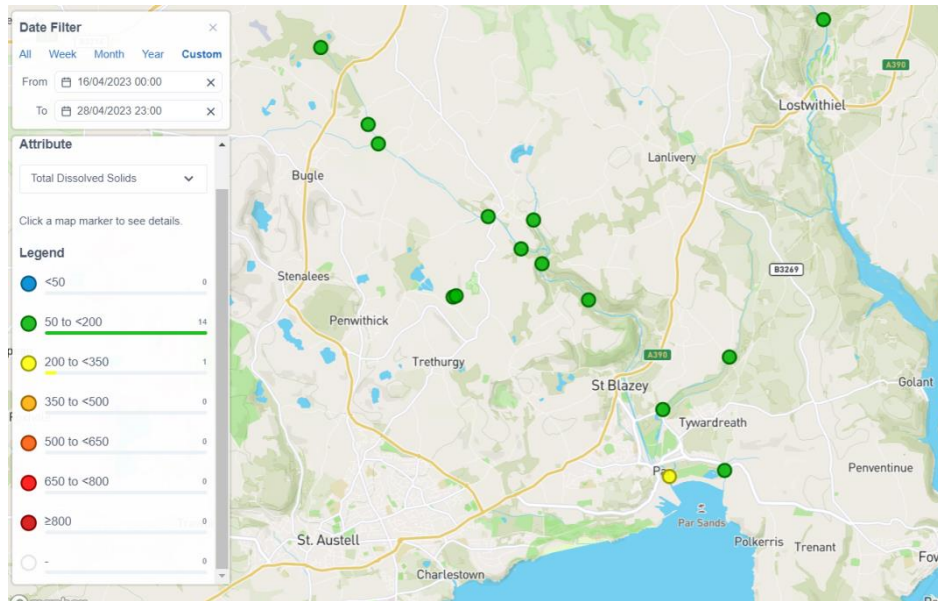
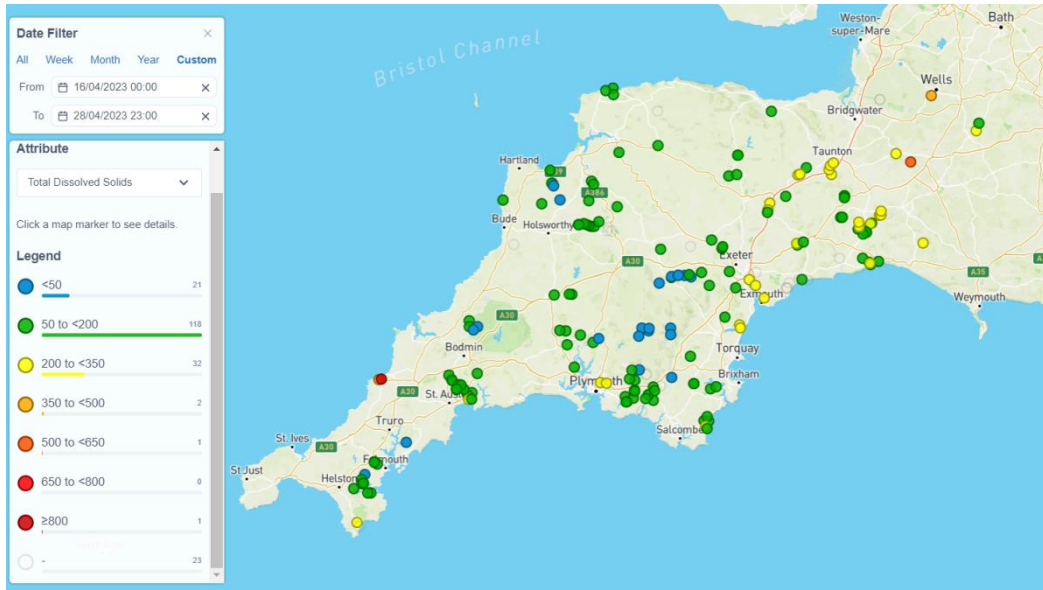


E. TOTAL DISSOLVED SOLIDS

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 April 2023

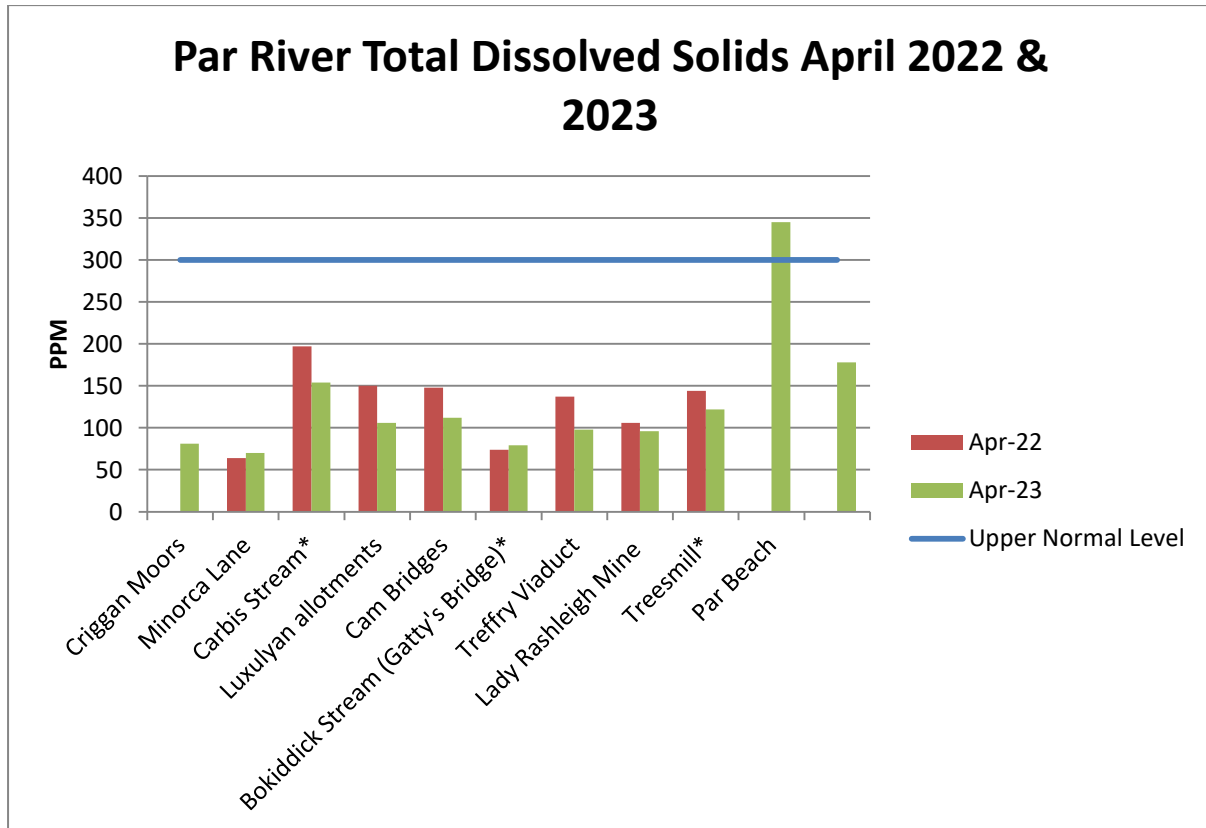
PAR RIVER/TRIBUTARY	LOCATION	Total Dissolved Solids PPM
Par	Criggan Moors, SX 01882 61133	81
Par	South of Minorca Lane, Par River, SX 02657 59788	70
Tributary	Carbis Stream SX 02834 59401	154
Par	Luxulyan allotments, Par River, SX 04732 58045	106
Par	Cam Bridges, Par River, SX 05292 57454	112
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	79
Par	Treffry Viaduct, Par River, SX 05650 57179	98
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	96
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385	122
Par	Par Beach slipway, SX 0776 53261	345
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	178

*indicates a tributary of the Par River.

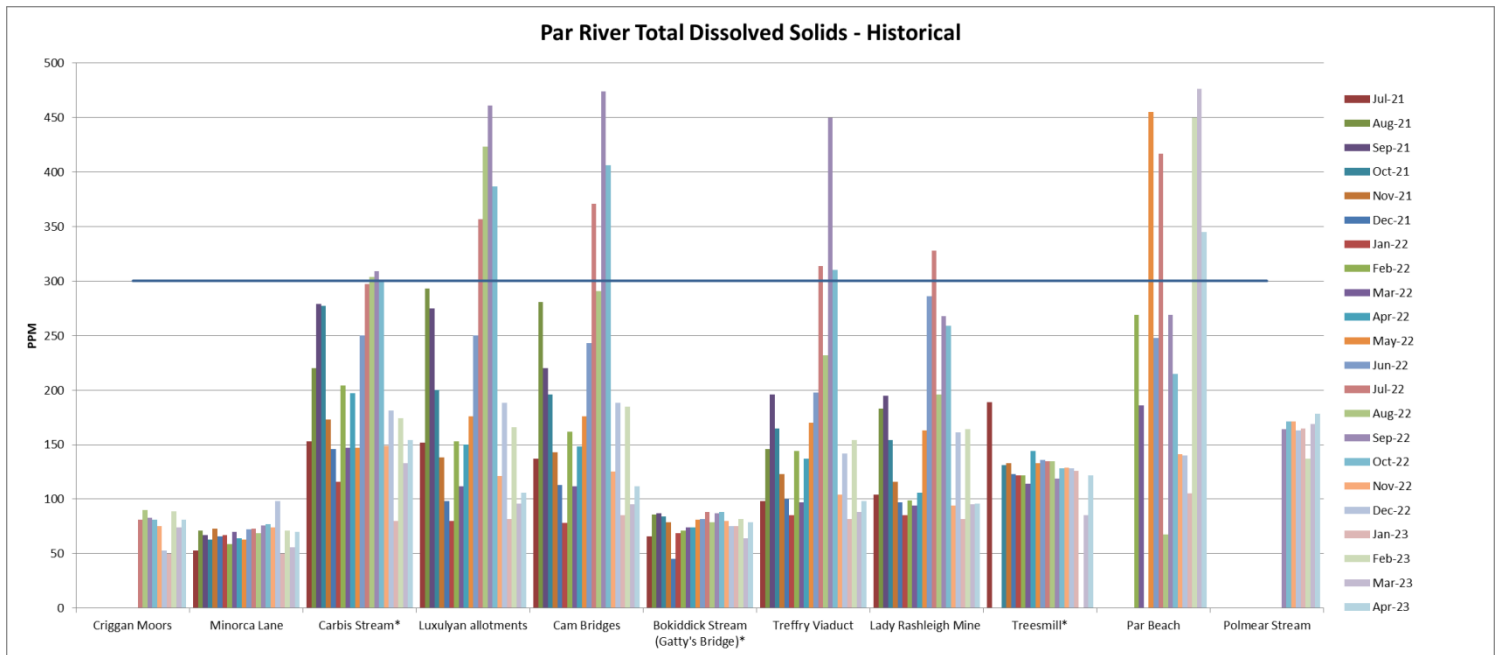
4. Graph April 2023 (and April 2022 for comparison)

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.'



5. Historical data on Total Dissolved Solids



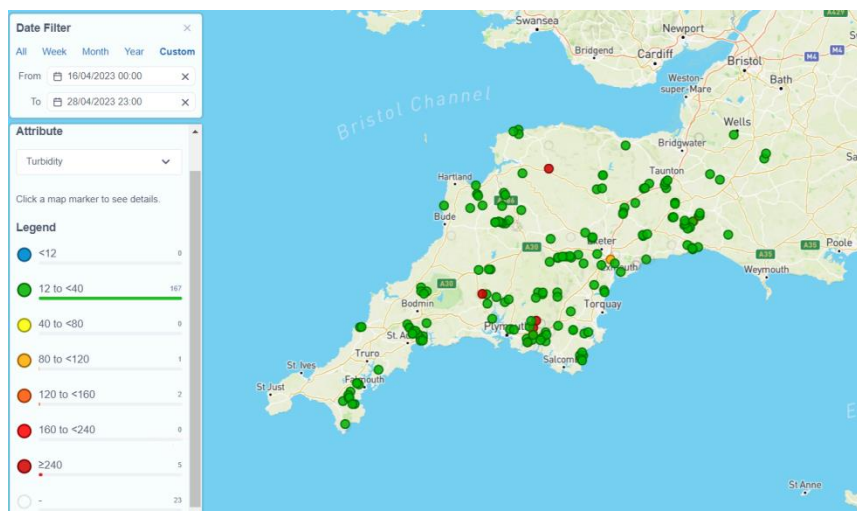
*indicates a tributary of the Par River.

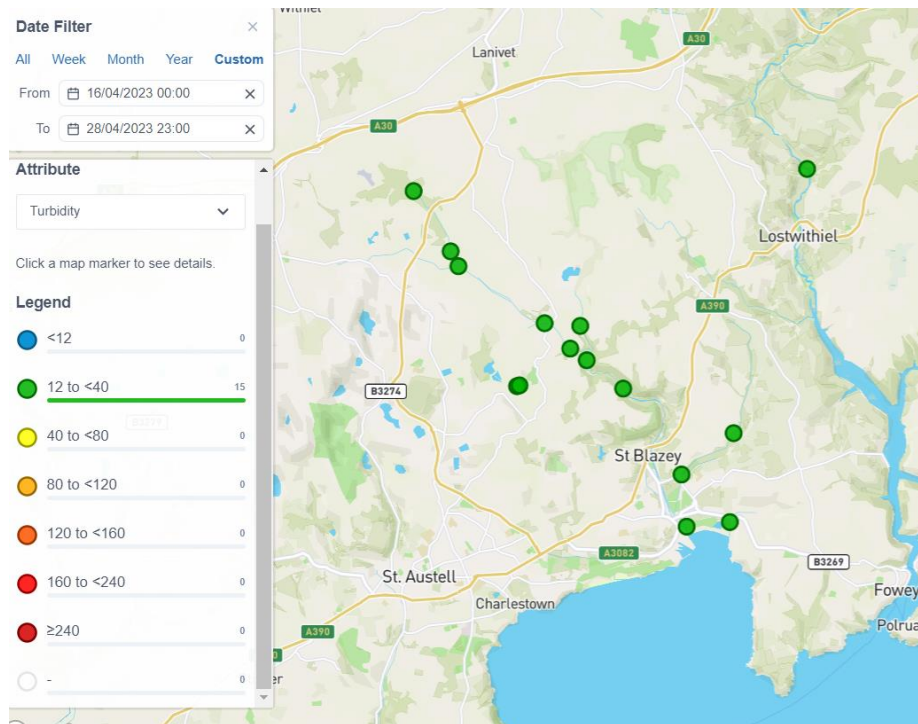
F. TURBIDITY

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.

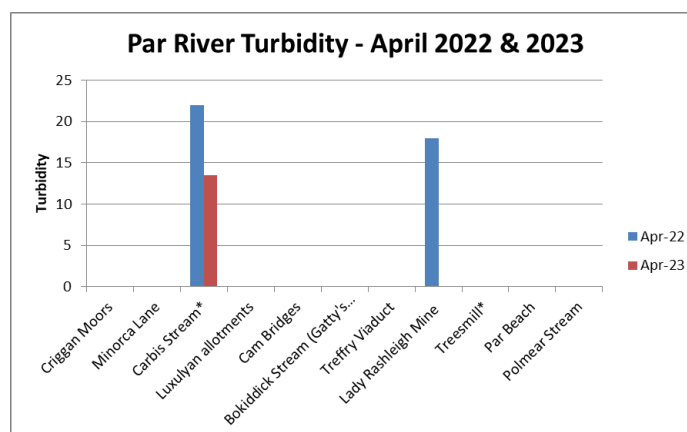
2. **Geographical comparison.** Where scores are shown as 0, it means that the reading using the Secchi tube was <12. Source: Cartographer.



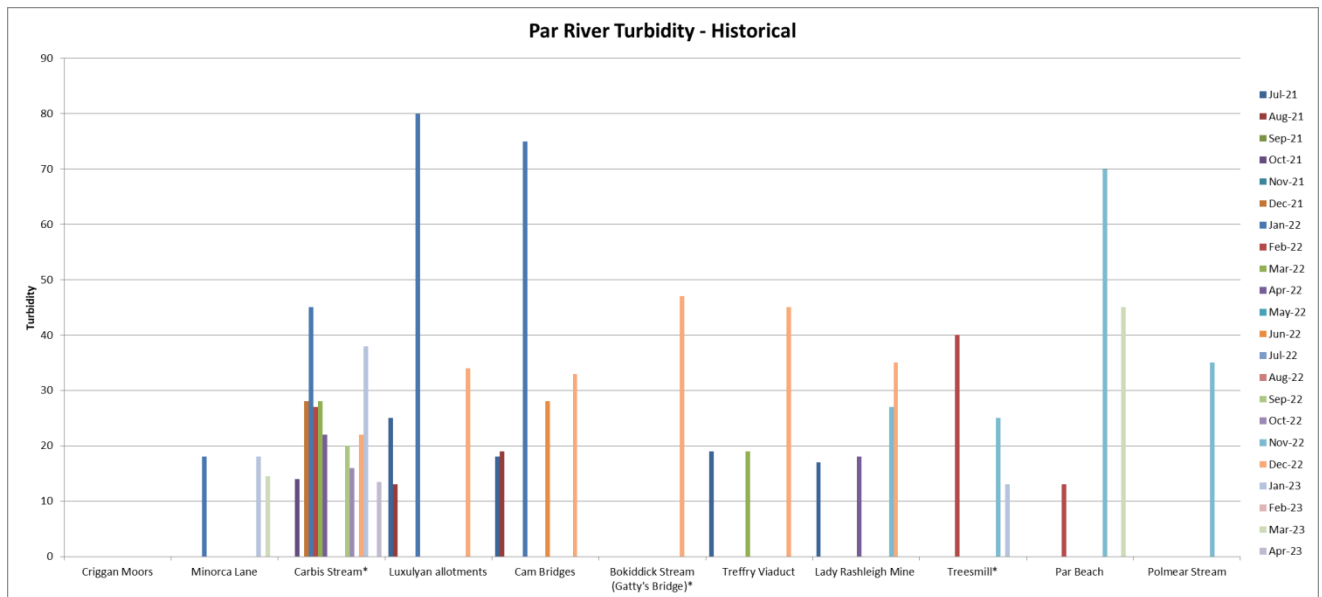


PAR RIVER/TRIBUTARY	LOCATION	Turbidity
Par	Criggan Moors, SX 01882 61133	0
Par	South of Minorca Lane, Par River, SX 02657 59788	0
Tributary	Carbis Stream SX 02834 59401	13.5
Par	Luxulyan allotments, Par River, SX 04732 58045	0
Par	Cam Bridges, Par River, SX 05292 57454	0
Tributary	Gatty's Bridge, Bokiddick 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

3. Results April 2022 and 2023



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.)

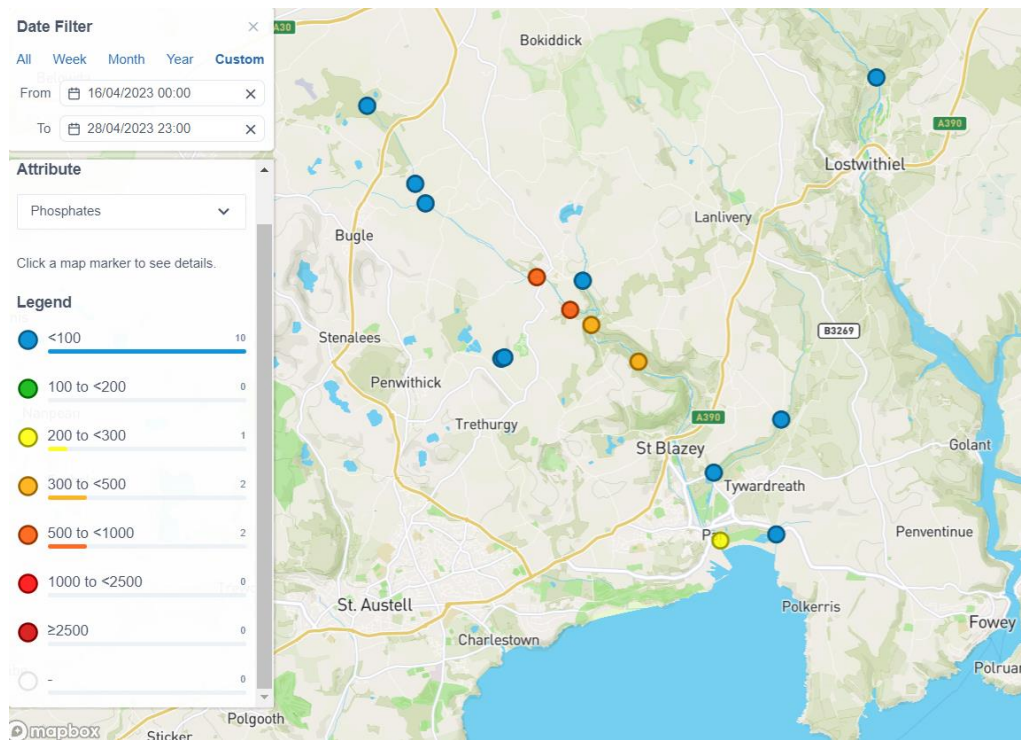
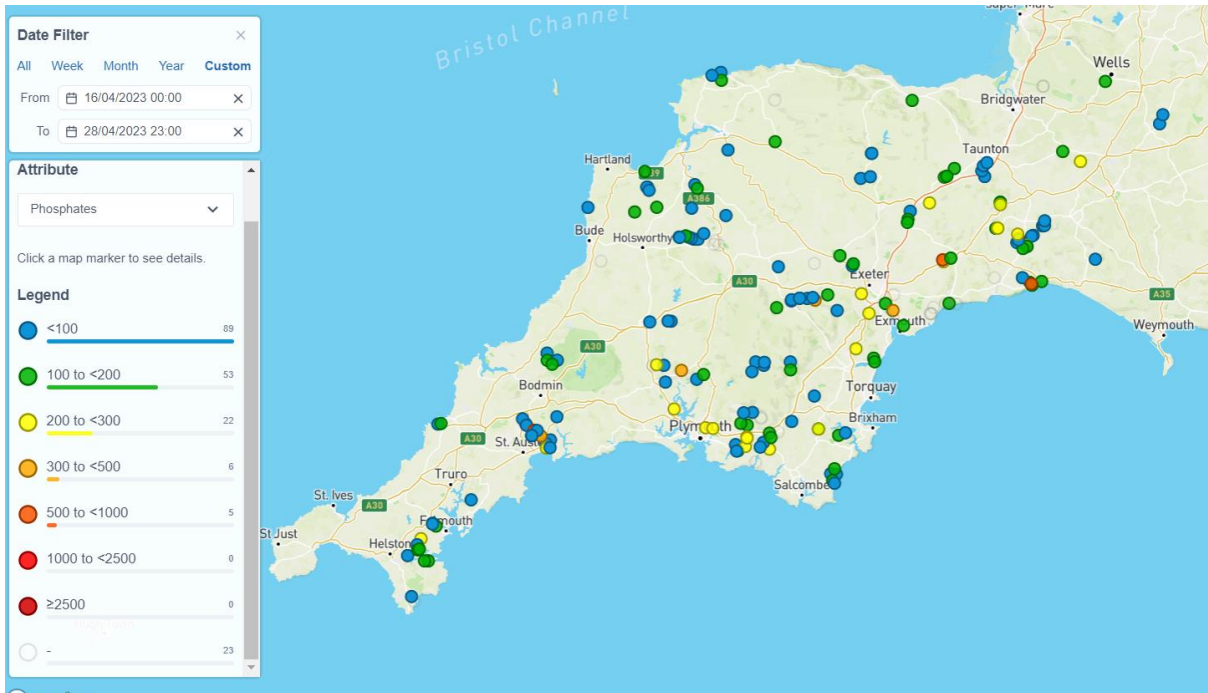
Ranges on phosphate diagnostic colour chart:

0 – 100 OK

200 – 300 HIGH

500 – 2500 – TOO HIGH

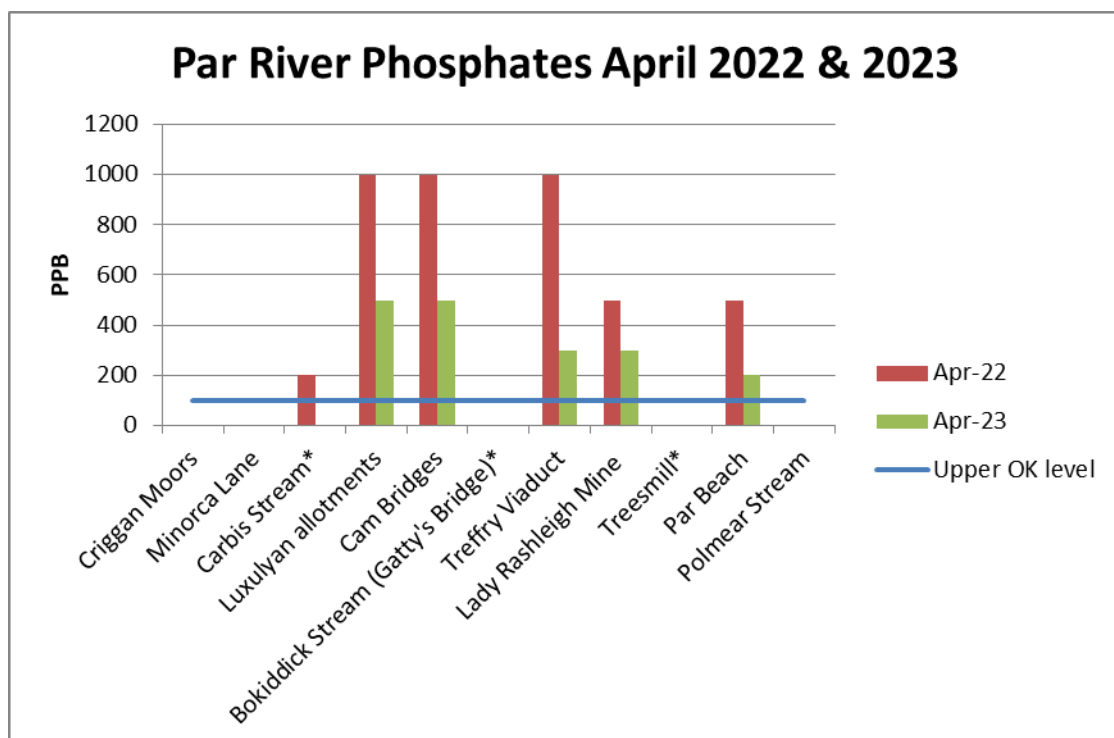
2. Geographical comparison. Source: Cartographer

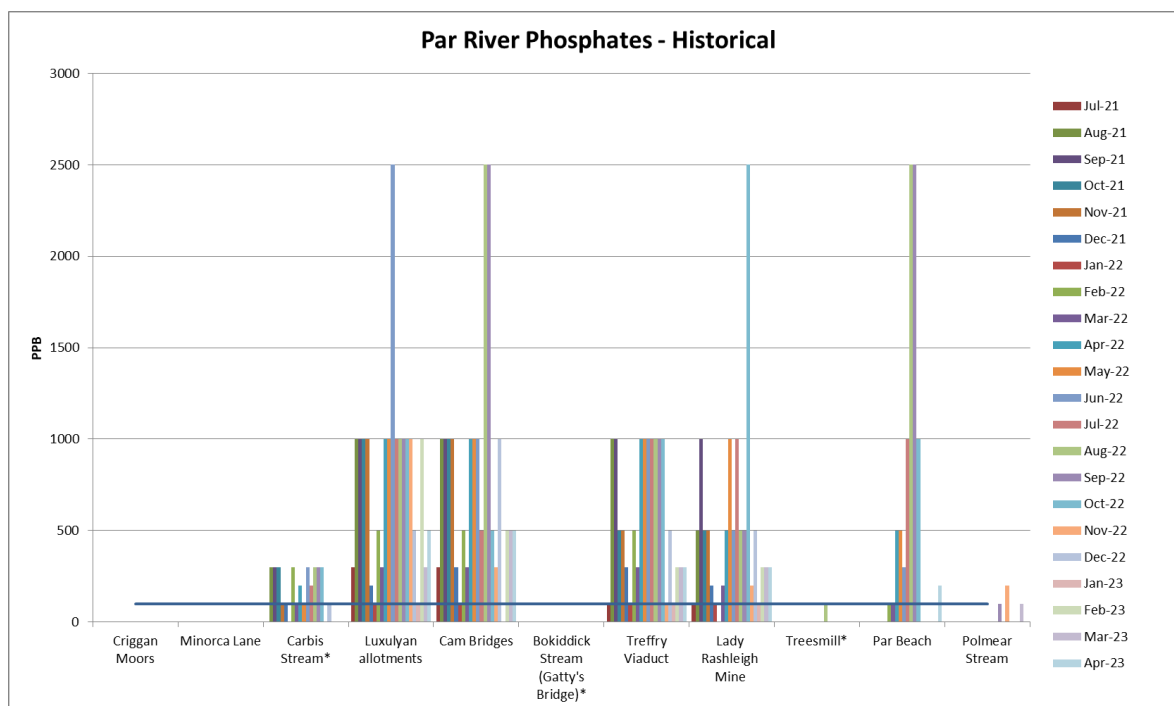


3. Results April 2023

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	500
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	300
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	300
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385	0
Par	Par Beach slipway, SX 0776 53261	200
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	0

4. Phosphates April 2022 and 2023





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

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

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

2. Key information:

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

Total coliform is a large collection of different kinds of bacteria. Faecal coliform are types of total coliform that exist in faeces. E. coli is a subgroup of faecal coliform.

<https://doh.wa.gov/sites/default/files/legacy/Documents/Pubs//331-181.pdf>

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

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

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

(c) Interpreting the river group results:

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

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

3. Monthly results including April 2023

MONTH & TEST	Criggan Moor (Upper Par) SX01882 61133 Sample & Result Dates, Score & Health Risk	Minorca Lane (Upper Par) SX02657 59788 Sample & Result Dates, Score & Health Risk	Lady Rashleigh Mine (Lower Par) SX06451 56509 Sample & Result Dates, Score & Health Risk	NOTES ON WEATHER, TEST ETC
FEBRUARY 2022				
E.coli	n/a	n/a	21/02/2022 (23/02/2022; 24/02/2022) 483 ¹ Very High/ Unsafe 483 ² Very High Risk /Unsafe	Rain prev. 24 hrs
Total Coliform	n/a	n/a	21/02/2022 (23/02/2022; 24/02/2022) >1000 Very Unsafe >1000 Very Unsafe	Rain prev. 24 hrs
MARCH 2022				
E.coli	n/a	n/a	21/03/2022; 24/02/2022	Dry

			136 High Risk. Probably unsafe.	
Total Coliform	n/a	n/a	21/03/2022; 24/02/2022 >1000³ 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 Safe⁴	Dry
Total Coliform 18/07/2022; 20/07/2022	n/a	n/a	18/07/2022; 20/07/2022 483 Very High Risk/ Unsafe	Dry
AUGUST 2022				
	Criggan	Minorca Lane	Lady Rashleigh	

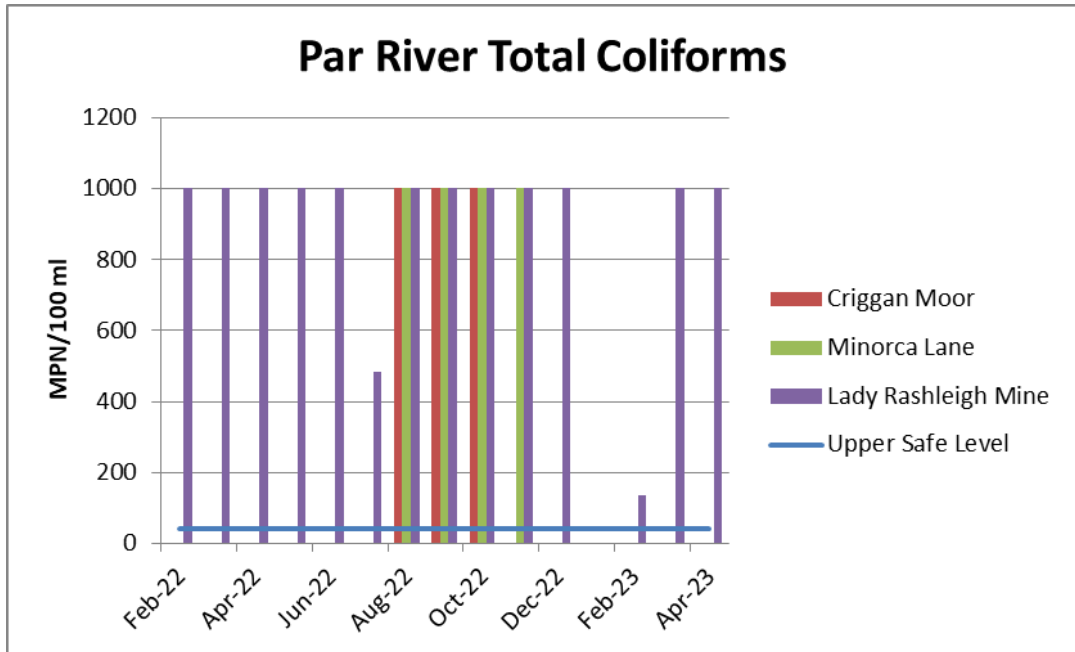
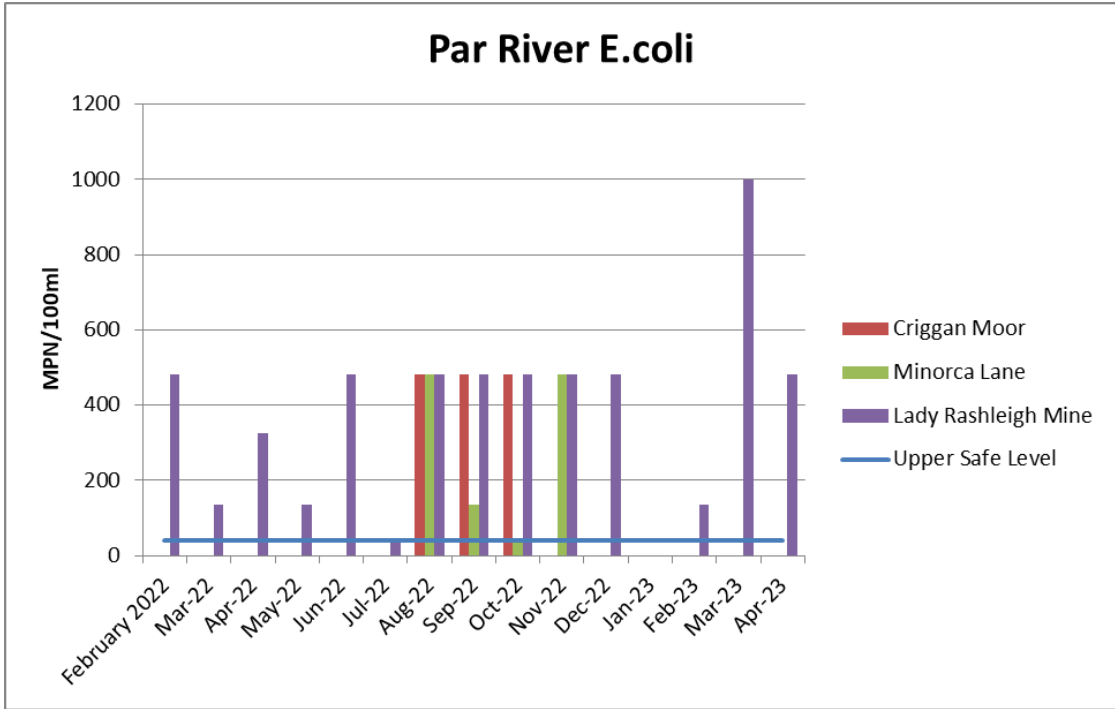
E.coli	19/08/2022 483 Very High Risk/ Unsafe	19/08/2022 483 Very High Risk/ Unsafe	21/08/2022; 23/08/2022 483 Very High Risk/ Unsafe	
Total Coliform	19/08/2022 >1000 Very Unsafe	19/08/2022 >1000 Very Unsafe	21/08/2022; 23/08/2022 >1000 Very Unsafe	Light rain
SEPTEMBER 2022	Criggan	Minorca Lane	Lady Rashleigh	
E.coli	16/09/2022 483 Very High Risk/ Unsafe	16/09/2022 136 High Risk/Probably Unsafe	17/09/2022; 19/09/2022 483 Very High Risk/ Unsafe	No rain
Total Coliform	16/09/2022 >1000 Very Unsafe	16/09/2022 >1000 Very Unsafe	17/09/2022; 19/09/2022 >1000 Very Unsafe	No rain
OCTOBER 2022	Criggan	Minorca Lane	Lady Rashleigh	
E.coli	17/10/2022 483 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.
NOVEMBER 2022	Criggan	Minorca Lane	Lady Rashleigh	
E.coli	No sample	16/11/2022 483 Very High Risk/ Unsafe	16/11/2022 483 Very High Risk/ Unsafe	Heavy rain
Total Coliform	No sample	16/11/2022 >1000 Very Unsafe	16/11/2022 >1000 Very Unsafe	Heavy rain
DECEMBER 2022	Criggan	Minorca Lane	Lady Rashleigh	
E.coli	No sample	No sample	18/11/2022 483 Very High Risk/ Unsafe	Heavy rain
Total Coliform	No sample	No sample	18/11/2022 >1000 Very Unsafe	Heavy rain
JANUARY 2023	Criggan	Minorca Lane	Lady Rashleigh	
E.coli	No sample	No sample	No sample	
Total Coliform	No sample	No sample	No sample	
FEBRUARY 2023	Criggan	Minorca Lane	Lady Rashleigh	
E.coli	No sample	No sample	136 High Risk. Prob. Unsafe	Light rain in previous 24 hours. River level average or slightly lower.
Total Coliform	No sample	No sample	136 High Risk. Prob.	Light rain in previous 24

			Unsafe	hours. River level average or slightly lower.
MARCH 2023	Criggan	Minorca Lane	Lady Rashleigh	
E.coli	No sample	No sample	22/3/2022 >1000 Very Unsafe	Light rain in previous 24 hours.
Total Coliform	No sample	No sample	22/3/2022 >1000 Very Unsafe	Light rain in previous 24 hours.
APRIL 2023	Criggan	Minorca Lane	Lady Rashleigh	
E.coli			18/4/2023 483 Very High Risk/Unsafe	No rain in previous 24 hours. River level average
Total Coliform			18/4/2023 >1000 Very Unsafe	No rain in previous 24 hours. River level average

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.

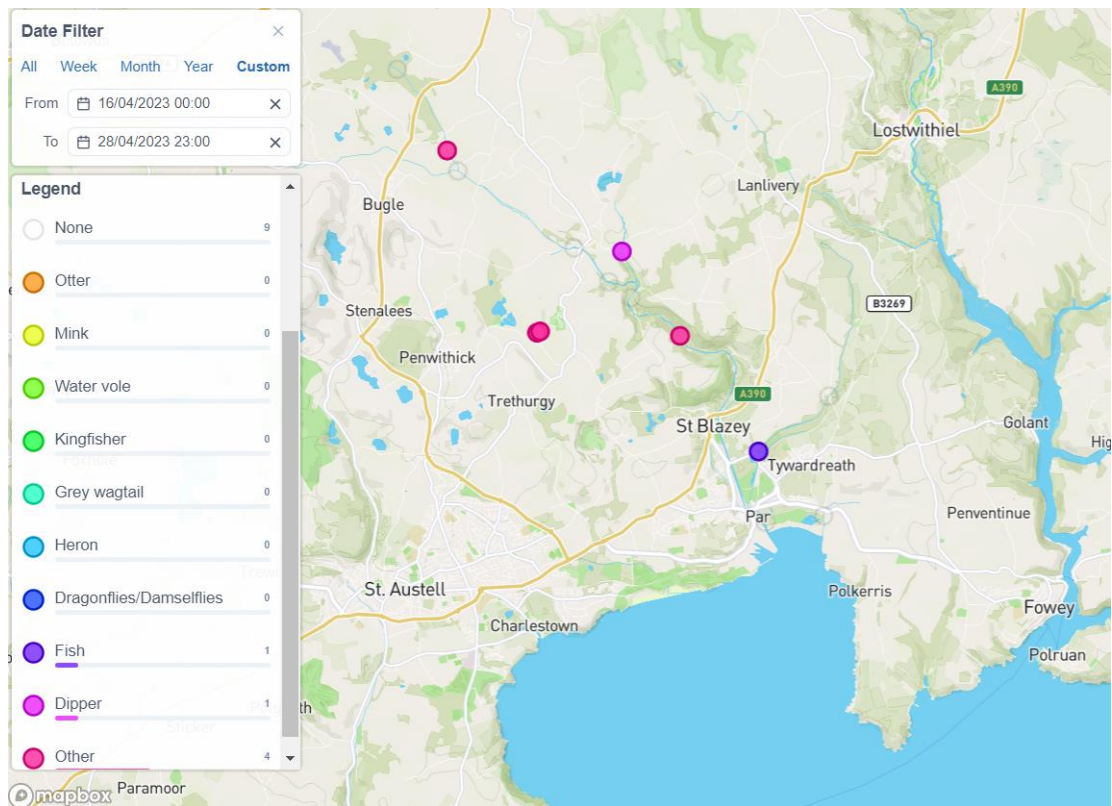
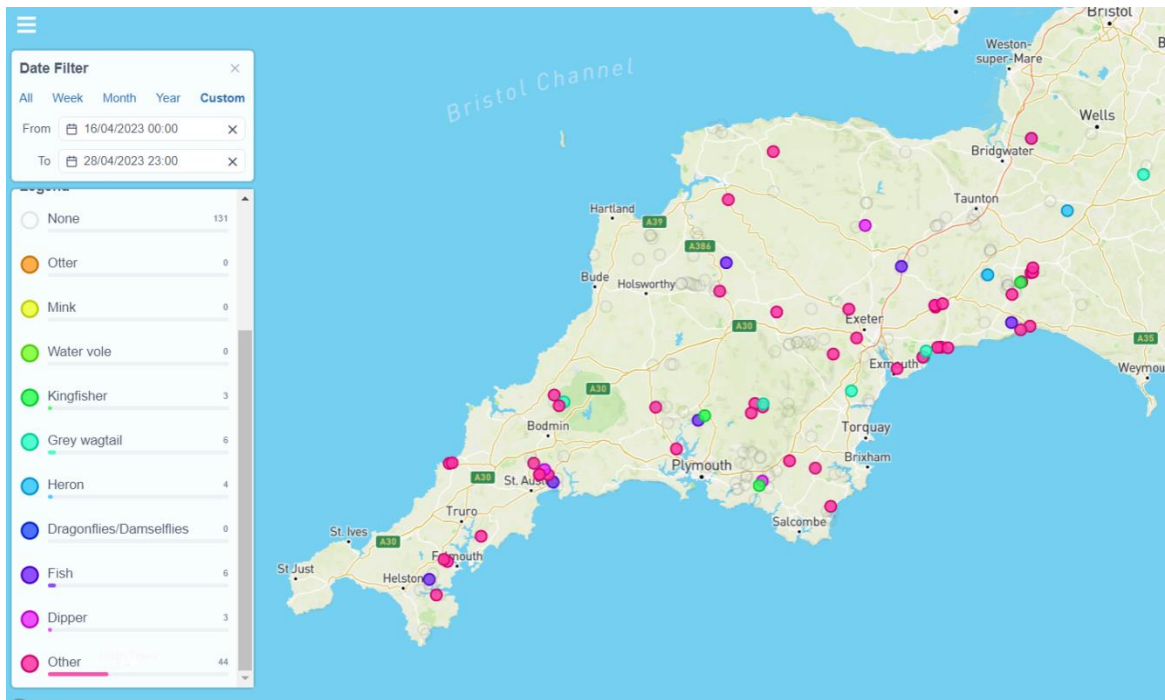
An additional sample was taken from the Bokiddick Stream at Gatty's (SX 05531 57953):

E.coli			18/4/2023 136mpn/100ml, so High Risk/Probably Unsafe	No rain in previous 24 hours. River level average
Total Coliform			18/4/2023 >1000 Very Unsafe	No rain in previous 24 hours. River level average



I. WILDLIFE (FOR OTTER REPORT SEE SECTION J)

(a) Maps



The category 'Other' includes: otter spraint, riverflies and pond skaters.

(b) Wildlife sightings at the monitoring points included:

PAR RIVER/TRIBUTARY	LOCATION	WILDLIFE NOTED
Par	Criggan Moors, SX 01882 61133	None.
Par	South of Minorca Lane, Par River, SX 02657 59788	Pond skater
Tributary	Carbis Stream SX 02834 59401	None.
Par	Luxulyan allotments, Par River, SX 04732 58045	None.
Par	Cam Bridges, Par River, SX 05292 57454	None
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	Dipper
Par	Treffry Viaduct, Par River, SX 05650 57179	None
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	Dipper Riverfly nymphs: Cased Caddisfly, Caseless Caddisflies, Flat-bodied upwings, Olives, Stoneflies, and Freshwater Shrimps.
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385	Birdsong: blackbirds, robin, blue tit, great tit and coal tit.
Tributary	Survey by Cathy Trodd: Treesmill, Tywardreath Stream, Bridge Park SX 07696 54529	Fish
Par	Par Beach slipway, SX 0776 53261	None
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	None

J. OTTER SURVEY**1. SURVEY CONDITIONS**

Date & time	16/4/2023, 17/4/2023, 18/4/2023
Surveyors	Roger Smith, Dave Burrell, Joan Farmer, Veronica Jones
Areas surveyed	Upper Par (Criggan Moors and Minorca Lane); Par River from STW to Cam Bridges; Par River from Treffry Viaduct to Lady Rashleigh Mine, Bokiddick Stream at Gatty's Bridge.
Weather	No rain previously
River level	Average
River flow	Steady
Water quality	Phosphate readings 500 PPB at the highest (Luxulyan allotments), 500 at Cam Bridges, 300 at Treffry Viaduct and Lady Rashleigh Mine. All readings zero upstream from the allotments. High bacteria levels at LRM and Gatty's.
Other wildlife	Dipper and riverfly nymphs at LRM.

2. EVIDENCE FOR OTTERS ✓

EVIDENCE	SEEN/ ORKS*	LOCATION	NOTES
Spraint - fresh			
Spraint – recent			
Spraint - old			
Anal jelly	✓*	Lady Rashleigh Mine, Par River, SX 06451 56509	
Sign heap			
Staining			
Tracks			
Path			
Slide			
Holt			
Hover			
Couch			
Live sighting			
Corpse			

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

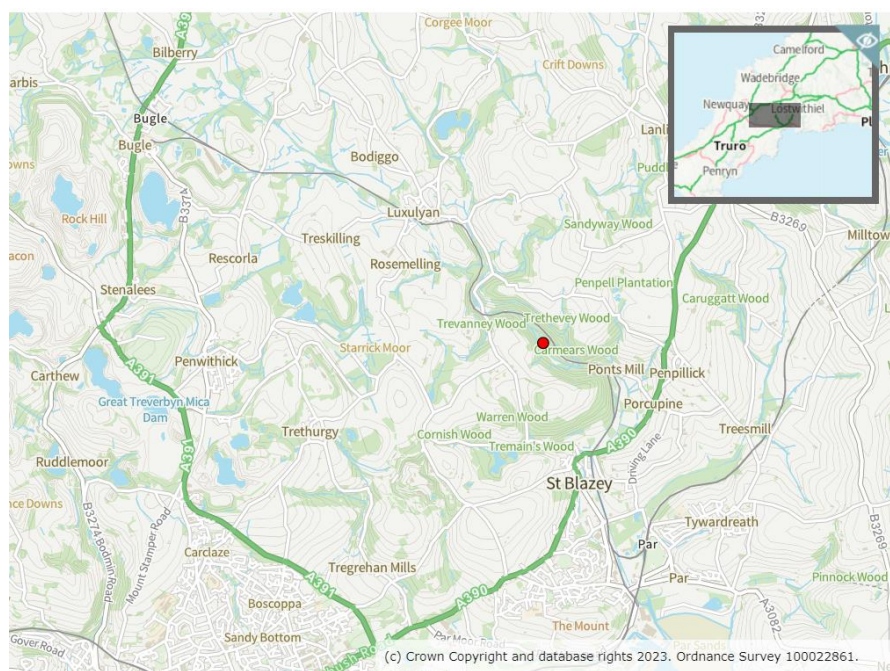
3. MAP

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



Looking downstream from boulder at Lady Rashleigh Mine

5. COMMENTS

The photograph above is remarkably similar to that taken on 25th March 2023. Both show anal jelly on the same boulder.

K. ARMI RIVERFLY SURVEY

Three of the group (Joan Farmer, Veronica Jones and Roger Smith) have undertaken the training to carry out Riverfly Surveys under the Anglers' Riverfly Monitoring Initiative (<https://www.riverflies.org/rp-riverfly-monitoring-initiative>). In short, sampling for 8 riverfly groups is carried out using standardised methods with scores calculated for their abundance. Information is passed to ARMI and the ORKS database. If the score does not reach a trigger level (in our case trigger level was raised from 5 to 6 in May 2022), the Environment Agency must be informed immediately since it is highly likely to indicate that the water is polluted. Our group received approval to sample at two sites: Luxulyan allotments (SX 04743 58054) and Lady Rashleigh Mine (SX 06453 56500). We have decided, for the time being, to concentrate on the latter.

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

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

Results of survey at Lady Rashleigh Mine (SX 06451 56509) carried out by Dave Burrell, Joan Farmer, Veronica Jones and Roger Smith on 18th April 2022

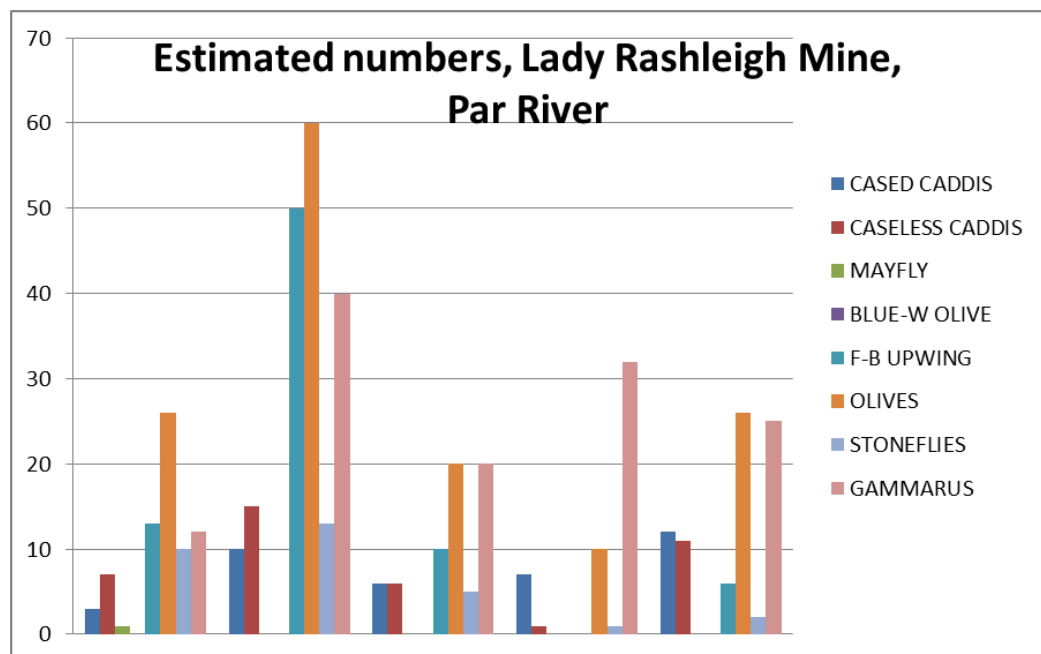
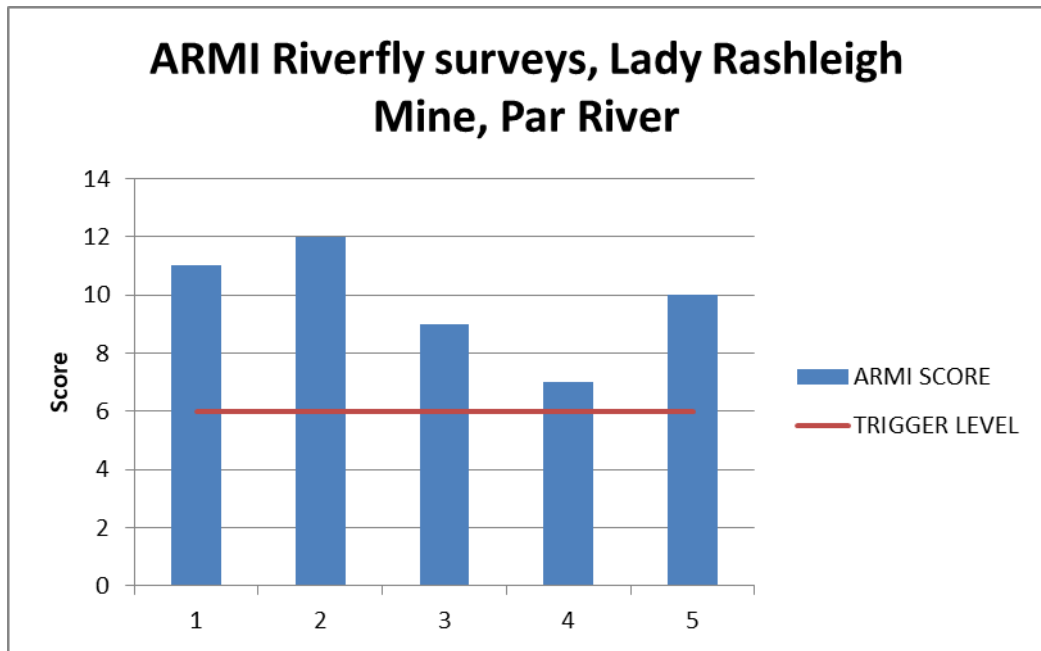
	SPECIES	NUMBER	CATEGORY
Trichoptera			
1	Cased Caddisfly	12	2
2	Caseless Caddisfly	11	2
Ephemeroptera 3 tails			
3	Mayfly (Ephemeridae)	0	0
4	Blue-winged olive (Ephemerellidae)	0	0
5	Flat-bodied up-wings (Heptageniidae)	6	1
6	Olives (Baetidae)	26	2
Plecoptera 2 tails			
7	Stoneflies	2	1
Gammaridae			
8	Freshwater Shrimp	25+	2
			10

CATEGORY TOTAL	10
TRIGGER LEVEL	6



Riverfly sampling at Lady Rashleigh Mine

Photo: Dave Burrell



Surveys conducted on these dates:

21-Mar-22

16-Apr-22

09-May-22

18-Jul-22

18-Apr-23

L. TREVERBYN STREAM NEAR INNIS – SPRING SURVEY

Various works are being carried out to improve the riparian habitat in this location and our group has been asked to carry out surveys 4 times a year. These are the results of the spring survey which was carried out on 27th April 2023.

	Temperature °Celsius	Total Dissolved Solids ppm	Turbidity	Phosphates ppb	ARMI RIVERFLY SCORE	RIVERFLIES
SX 04058 56650: Treverbyn/Treskilling Stream upstream from confluence with Innis Stream.	9.8	81	<12	0	5	Caseless caddis (1) Olives (2) Stonefly (1) Freshwater shrimp (24+) See photo and note below.
SX 04113 56670: Treverbyn/Treskilling Stream downstream from confluence with Innis Stream.	9.8	77	<12	0	5	Cased caddis (2) Caseless caddis (1) Olives (8) Stoneflies (2) Freshwater shrimp (6)

We were unable to identify some of the creatures at the upstream site but are grateful to Nick Taylor for providing the following information:



I can see two Golden-ringed Dragonfly nymphs in the sample (*Cordulegaster boltonii*). Left of the top dragonfly nymph there is a Jenkins Spire Snail (*Potamopyrgus antipodarum*). There may also be another two, partially obscured, to the left of the bottom nymph. The Victorians accidentally

introduced the Jenkins Spire Snails from New Zealand in the 1800s. They have done very well in the Cornish streams and can occur in large numbers. In fact, Lucy and I have found well over a hundred in a sample', **Nick Taylor** (pers. comm).

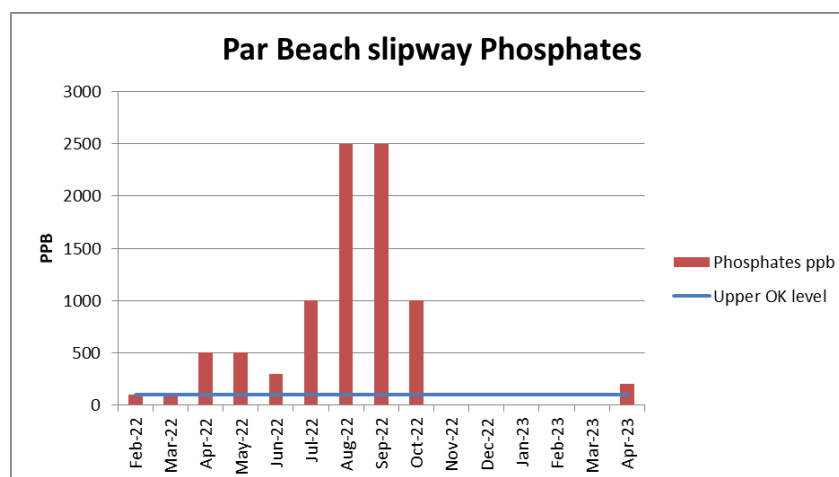
L. DISCUSSION

1. Positive observations

- (a) The ARMI riverfly trigger level was exceeded at Lady Rashleigh Mine on the Lower Par.
- (b) There were some encouraging wildlife sightings, including otter anal jelly and dippers. A citizen scientist not attached to this group recorded fish on the lower Treasmill stream.
- (c) Habitat improvements being carried out near Innis under the Par Improvement Plan were evident.
- (d) China clay pollution on the Carbis Stream was not on the scale seen at other times.

2. Points of concern

(a) High phosphate levels from Luxulyan allotments downstream. It is assumed those recorded at the allotments, Cam Bridges, Treffry Viaduct and Lady Rashleigh Mine come from treated effluent at St Austell North STW. Following investigations by the Environment Agency in October 2021 it seems likely that this STW is a source of high phosphates in the mid-sections of the river. A score of 200 ppb was also recorded at Par Beach slipway, which last occurred in November 2022. Much of our attention in the past has been on sites just downstream from the St Austell North STW in Luxulyan but, as this graph shows, very high phosphate levels have been recorded at Par Beach before.



This need not necessarily be linked to sewage discharges or treated effluent, so this point will be considered under **Areas of Doubt**.

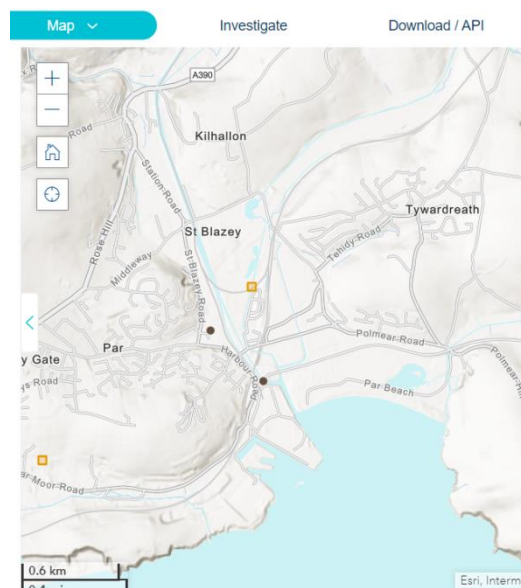
(b) Bacteria. Taken at face value the readings for E.coli and Total Coliforms are concerning, not only at the regular monitoring spot in Luxulyan Valley at Lady Rashleigh Mine but also in the Bokiddick Stream at Gatty's Bridge.

(c) The river has many long-term problems and some, including the physical modification of its course and banks will be hard to solve. In spite of some pleasing wildlife sightings, much of it seems to be depleted in terms of nature. This was shown by the poor results of the riverfly survey on the Treverbyn Stream near Innis.

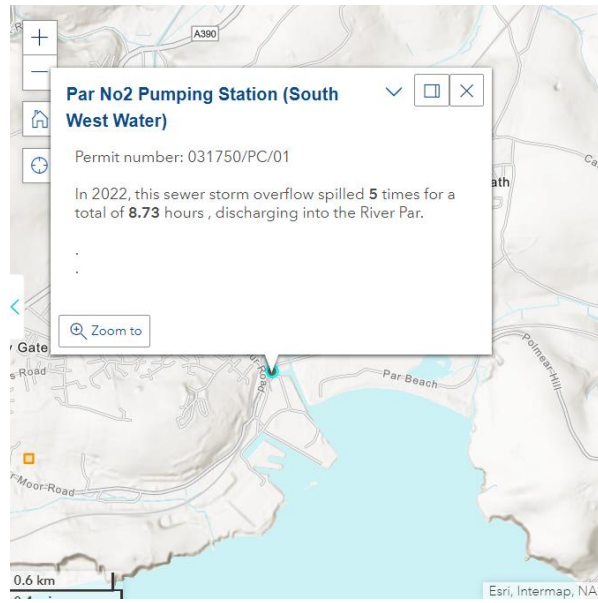
(d) Once again the Total Dissolved Solids reading (parts per million) at Par Beach slipway was very high, exceeding the rough figure of 300 ppm we have been advised is likely to be the norm for this river.

3. Areas of doubt

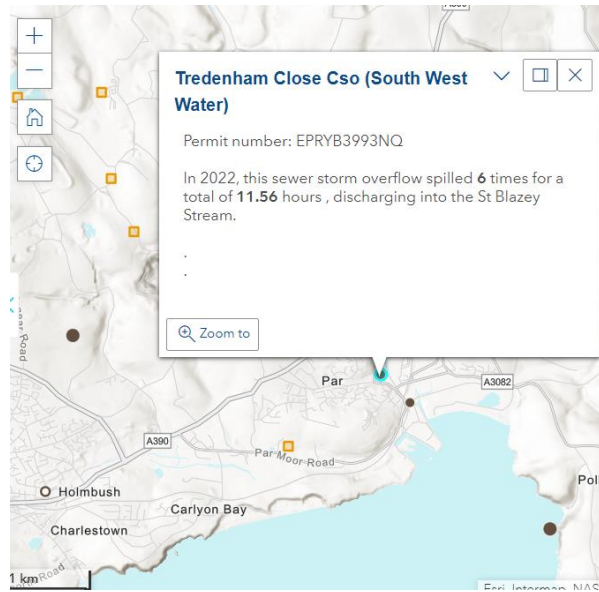
(a) High phosphate readings at Par Beach slipway. Unlike the situation closer to St Austell North STW at Luxulyan, the cause of high phosphates near the beach is unknown. The Rivers Trust's Sewage Map (<https://theriverstrust.org/sewage-map>) shows various possible sources closer to the beach, as the following map extracts from that map show.



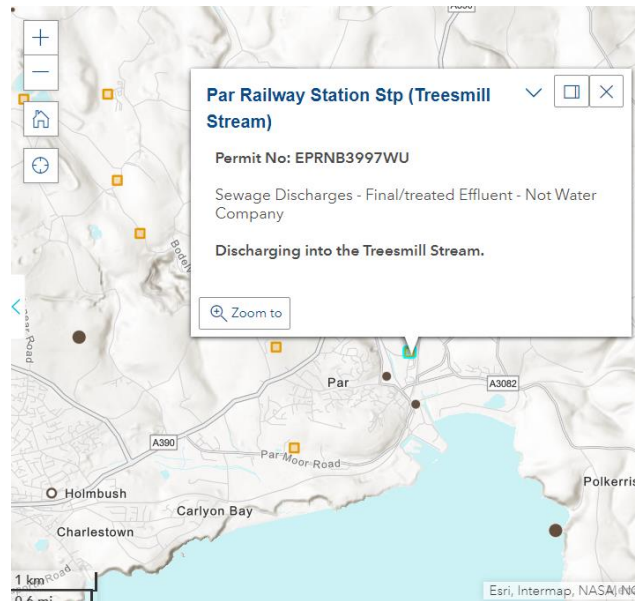
The source closest to the monitoring point is Par No. 2 Pumping Station:



Next is the Tredenham Close Combined Sewer Overflow:



The most distant of the 3 is at Par Railway Station:



However, this does not prove causation. The high phosphates could come from St Austell North STW, other sewage sources, or from some other cause.

(b) Bacteria sampling for E.coli and Total Coliforms has been introduced by the WRT as a pilot. It has been interesting and the results, on the face of it, are alarming. The process of incubating the samples is very unpleasant and Joan Farmer deserves credit for carrying this out at home. Hopefully, enough information has been gathered for WRT to be able to assess the efficacy of this test and maybe even to find a more satisfactory method. The main doubts are:

- (i) Is this method, which uses an American test, based on US standards that do not apply in this country, appropriate?
- (ii) What do our results mean? On the face of it there is a high concentration of bacteria almost the entire length of the river, with no obvious cause. The Environment Agency monitors at many sites, and for Intestinal Enterococci as well, but using different measures which are difficult to reconcile with our tests. Our results are categorised by terms including 'High Risk, Very unsafe' but is that really so?

Report compiled by Dave Burrell, Joan Farmer & Roger Smith for the Par River Monitoring Group, 18th May 2023.