MONITORING OF THE PAR RIVER AND ITS TRIBUTARIES

The monitoring group operates under the citizen science scheme run by the Westcountry Rivers Trust. Comments and opinions in this report are those of the authors only.

MAY 2024

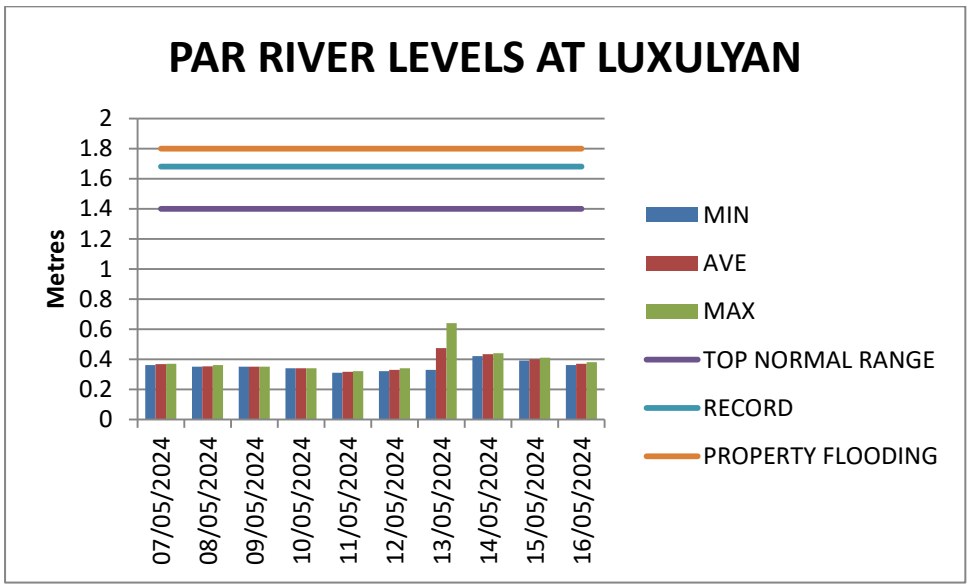
The upper reaches of the Bokiddick Stream (or Brook) near Helman Tor

A. OUR MAY 2024 FINDINGS AT A GLANCE (SEE SECTIONS C TO J FOR FULL PICTURE)

1. We sampled at 14 locations. The red highlighting shows points of concern.

CRITERIA	UPPER PAR (UPSTREAM OF CONFLUENCE WITH BOKIDDICK STREAM NEAR BLACK HILL CAR PARK) 5 TESTING LOCATIONS	LOWER PAR (FROM CONFLUENCE WITH BOKIDDICK STREAM TO SEA) 3 TESTING LOCATIONS	TRIBUTARIES OF UPPER PAR (CARBIS STREAM, BOKIDDICK STREAM) 4 TESTING LOCATIONS	TRIBUTARY OF LOWER PAR (POLMEAR STREAM) 2 TESTING LOCATIONS
TEMPERATURE (SHOULD NOT EXCEED 18˚ CELSIUS)	Average 13.92˚ Celsius	Average 14.96 ˚ Celsius	Average 13.7˚ Celsius	Average 16.25˚ Celsius
TOTAL DISSOLVED SOLIDS (SHOULD NOT EXCEED 300 PPM)	71 PPM	139.33 PPM (250 Par Beach slipway, average of other 2 = 84)	62.5 PPM	128 PPM
TURBIDITY (SHOULD BE <12 ON SECCHI TUBE. FOR AVERAGING ANY READING <12 IS COUNTED AS 11)	0	0	3.25	4.33
PHOSPHATES (SHOULD NOT EXCEED 100 PPB)	**120 PPB**	**266.66 PPB**	0 PPB	0 PPB
RIVERFLY SCORE (TRIGGER LEVEL SHOULD BE ≥ 6)	N/A	12	N/A	N/A
WILDLIFE EVIDENCE	Chiffchaff, cuckoo, robin, blackbird	Dipper, herring gull, Canada goose	Chiffchaff, buzzard, blackbird	Wren, chaffinch, chiffchaff
EVIDENCE OF POLLUTION	Foam, smell	None	China clay	None

2. **Par River levels at Luxulyan preceding and during surveys.** These are available here: https://check-for-flooding.service.gov.uk/station/3159). The following graph uses data recorded at this website: https://riverlevels.uk/par-river-luxulyan .

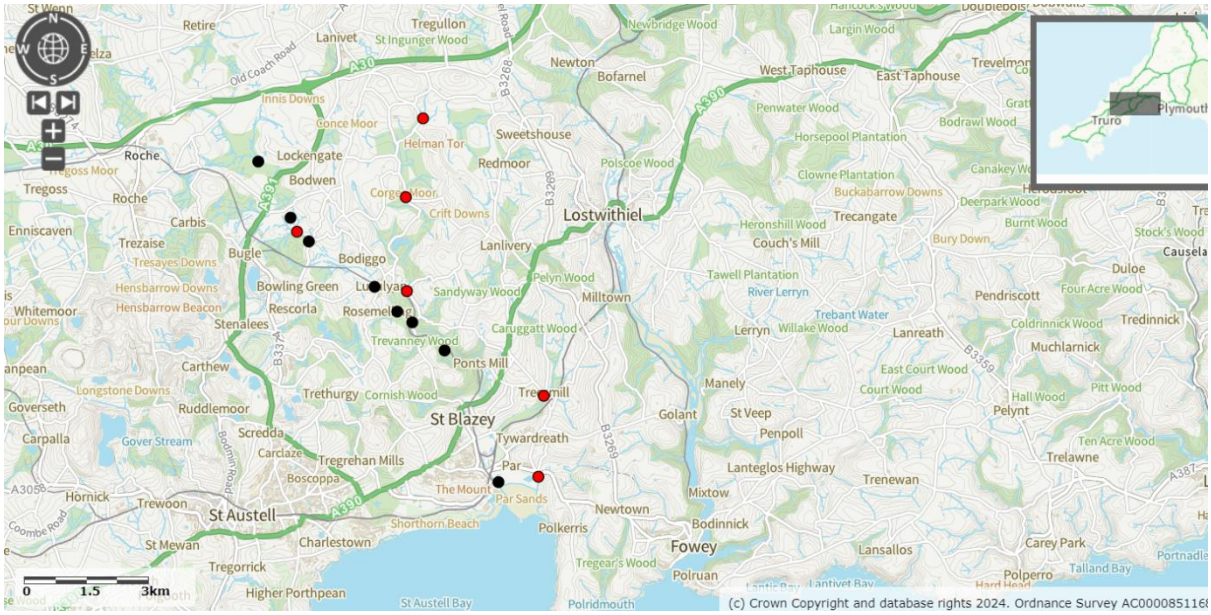


How levels here could affect nearby areas

1.80m	Property flooding is possible above this level. One or more flood warnings may be issued
1.68m	Water reaches the highest level recorded at this measuring station (recorded on 19 December 1999)
1.40m	Low lying land flooding is possible above this level. One or more flood alerts may be issued
	This is the top of the normal range

B. MAY 2024 MONITORING POINTS

This month monitoring occurred at 14 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



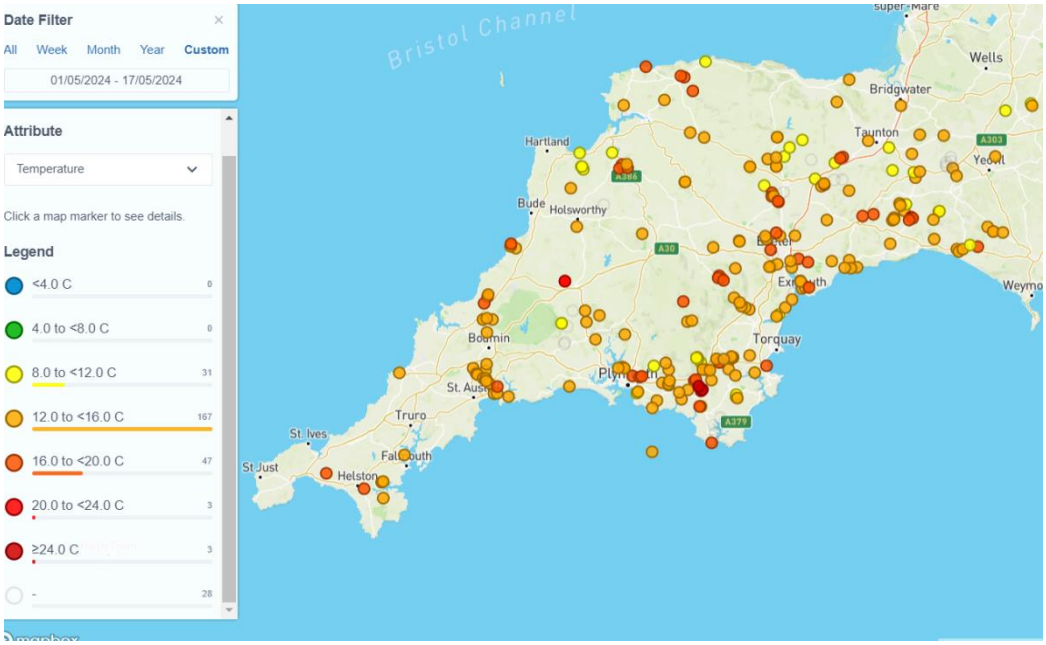
LOCATION	PAR/TRIBUTARY	DATE	TYPE OF CHECK	MONITORED BY
Criggan Moors, Par River, SX 01882 61133	**PAR**	15/5/2024	CSI sample & Cartographer record.	Roger Smith
South of Minorca Lane, Par River, SX02668 59747	**PAR**	15/5/2024	CSI sampling. Cartographer record.	Roger Smith
Carbis Stream SX 02834 59401	**TRIBUTARY**	15/5/2024	CSI sampling. Cartographer record.	Roger Smith
Lavrean, Par River SX 03134 59164	**PAR**	15/5/2024	CSI sampling. Cartographer record.	Roger Smith
Luxulyan allotments, Par River, SX 04732 58045	**PAR**	15/5/2024	CSI sampling. Cartographer record.	Roger Smith
Cam Bridges, Par River, SX 05292 57454	**PAR**	15/5/2024	CSI sampling. Cartographer record.	Roger Smith
Trebell Green, Bokiddick Stream SX 0551960226	**TRIBUTARY**	14/5/2024	CSI sampling. Cartographer record.	Roger Smith
Corgee Moor, Bokiddick Stream SX 0593462167	**TRIBUTARY**	14/5/2024	CSI sampling. Cartographer record.	Roger Smith
Gatty's Bridge, Bokiddick Stream SX 05531 57953	**TRIBUTARY**	15/5/2024	CSI sampling. Cartographer record.	Joan Farmer
Treffry Viaduct, Par River, SX 05650 57179	**PAR**	15/5/2024	CSI sampling. Cartographer record.	Joan Farmer
Lady Rashleigh Mine, Par River, SX 06451 56509	**PAR**	15/5/2024	CSI sampling. Cartographer record. Riverfly.	Veronica Jones, Dave Burrell, Joan Farmer, Jenny Davies, Layla Ousley, Leah Steward, Roger Smith
Treesmill, Tywardreath Stream, SX 08873 55385	**TRIBUTARY**	16/5/2024	CSI sampling. Cartographer record.	Maggie Tagney
Par Beach slipway, SX 0776 53261	**PAR**	14/5/2024	CSI sampling. Cartographer record.	Brian Harrisson
Polmear Stream, Ship Inn SX 08749 53417	**TRIBUTARY**	14/5/2024	CSI sampling. Cartographer record.	Simon Tagney

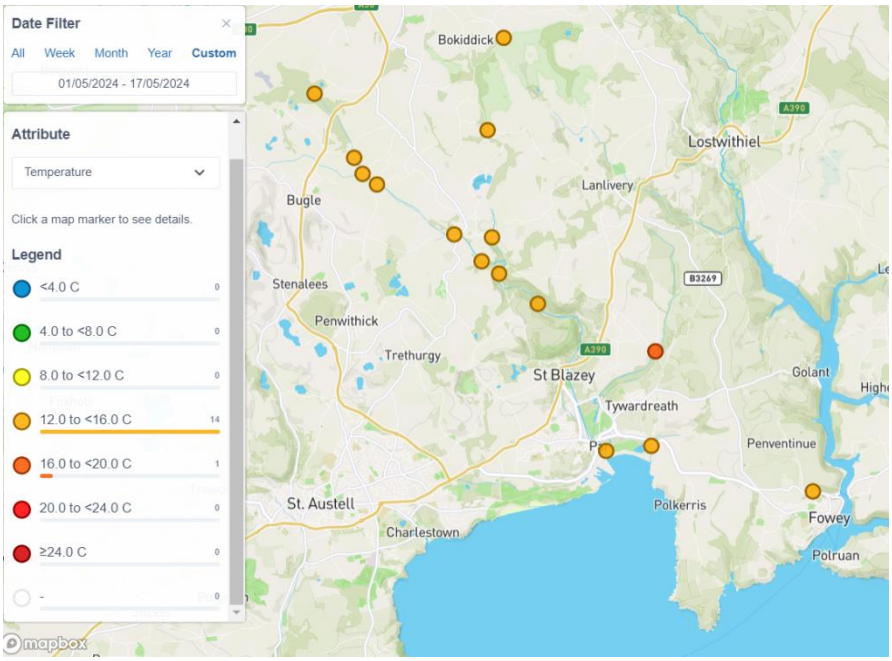
C. TEMPERATURE

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.

Geographical comparison. Source: Cartographer.





PAR RIVER/TRIBUTARY	LOCATION	Temperature ˚Celsius
Par	Criggan Moors, SX 01882 61133	14.9
Par	South of Minorca Lane, Par River, SX 02657 59788	12.9
Tributary	Carbis Stream SX 02834 59401	14
Par	Lavrean, Par River SX 03134 59164	14
Par	Luxulyan allotments, Par River, SX 04732 58045	13.8
Par	Cam Bridges, Par River, SX 05292 57454	14
Tributary	Trebell Green, Bokiddick Stream SX 0551960226	13.2
Tributary	Corgee Moor, Bokiddick Stream SX 0593462167	14.1
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	13.5
Par	Treffry Viaduct, Par River, SX 05650 57179	14.5
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	15.1
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385	17.1
Par	Par Beach slipway, SX 0776 53261	15.3
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	15.4

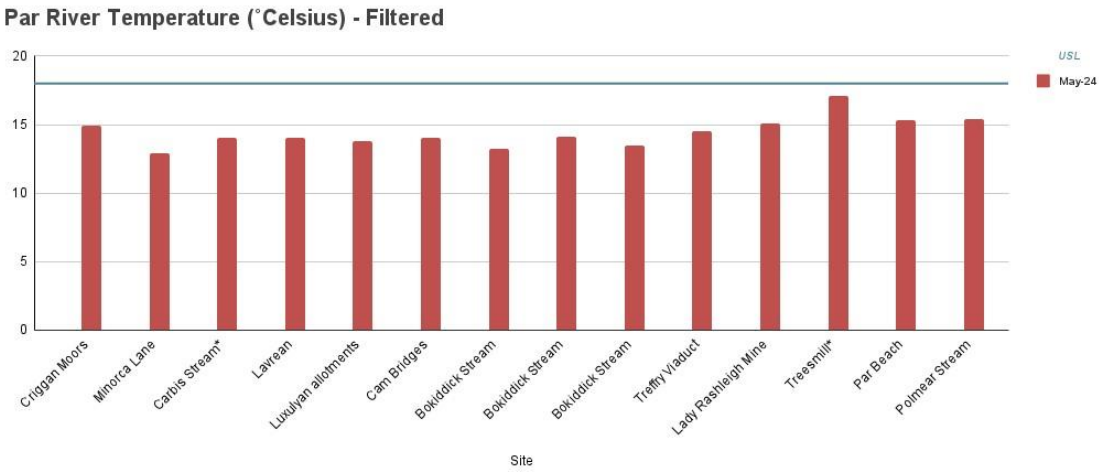
Results above the temperature at which fish and other organisms can function healthily will be shown in red. At present, 18 ˚Celsius is being used as the upper safe limit for fish and other creatures, although 20˚ Celsius has recently been suggested by WRT instead. The Yealm Estuary to Moor Project (YEM) in Devon considers that the upper safe level (USL) for temperature is 19.5 °C.

From December 2023 all readings have been taken with the new thermometer/TDS device. Previously, all Upper Par readings, except for Lady Rashleigh Mine, have been taken with the old device. There is a worrying discrepancy with the readings on the older devices.

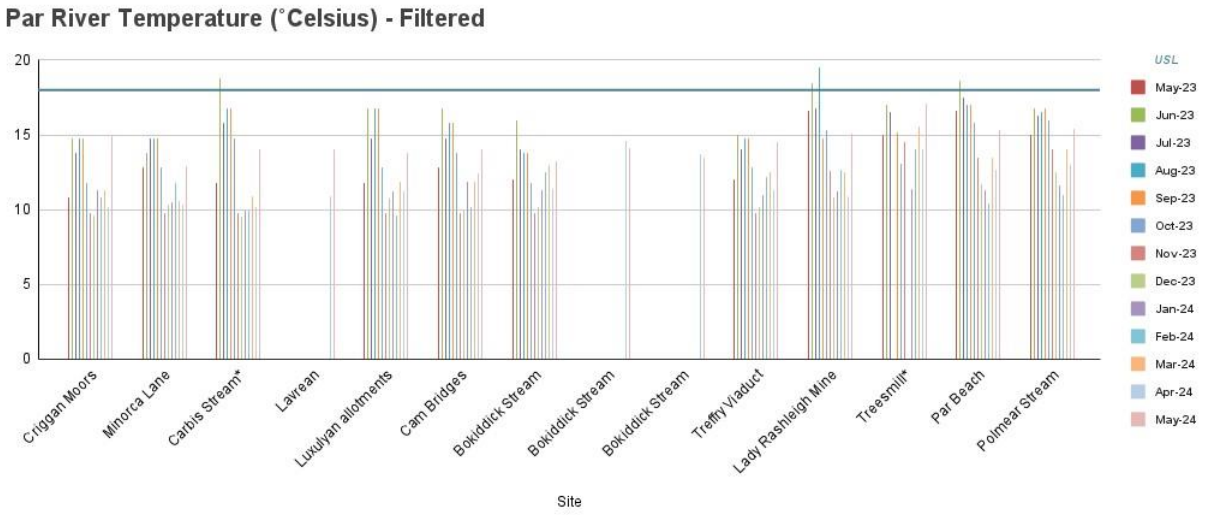
4. Graphs

N.B. The third site shown for the Bokiddick Stream should be the first, i.e. at Trebell Green. This is due to a temporary technical insuperability and will be remedied in due course.

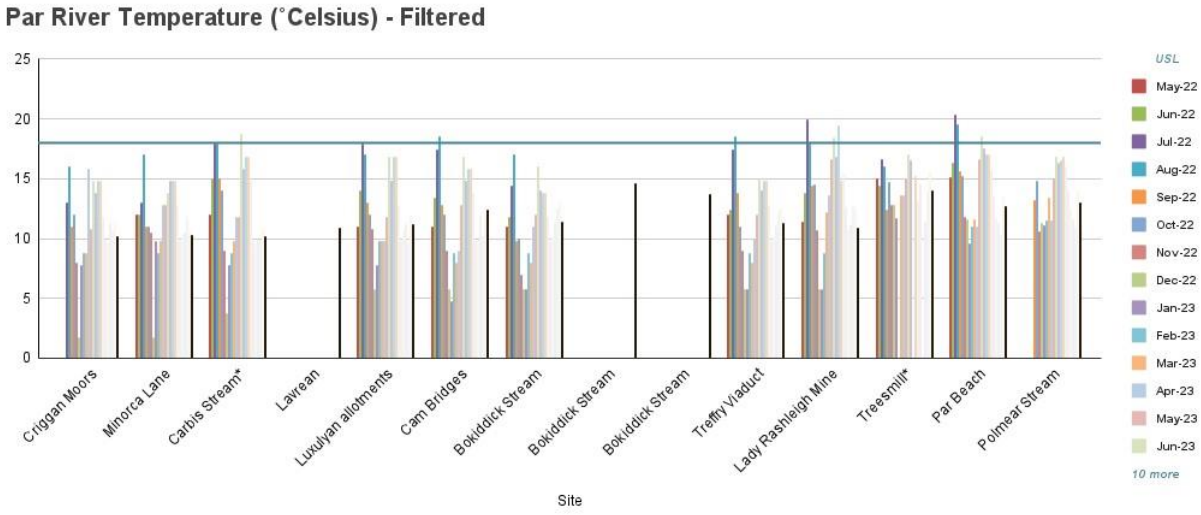
(a) This month



(b) **From 1st May 2023 until now:**



(c) From 1st May 2022 until now:



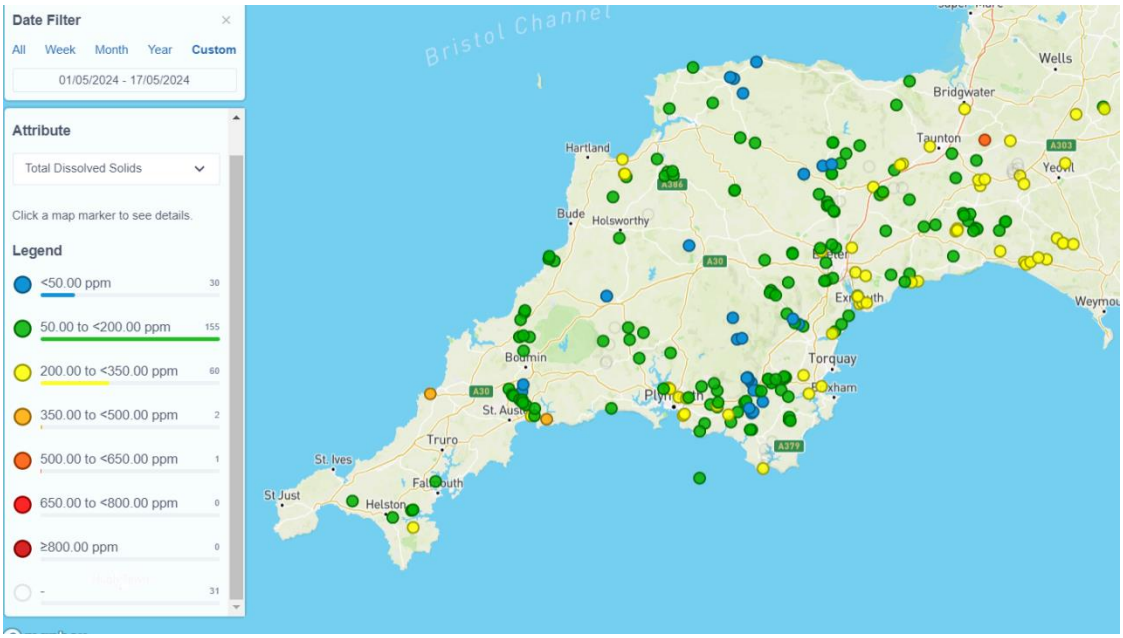
D. TOTAL DISSOLVED SOLIDS

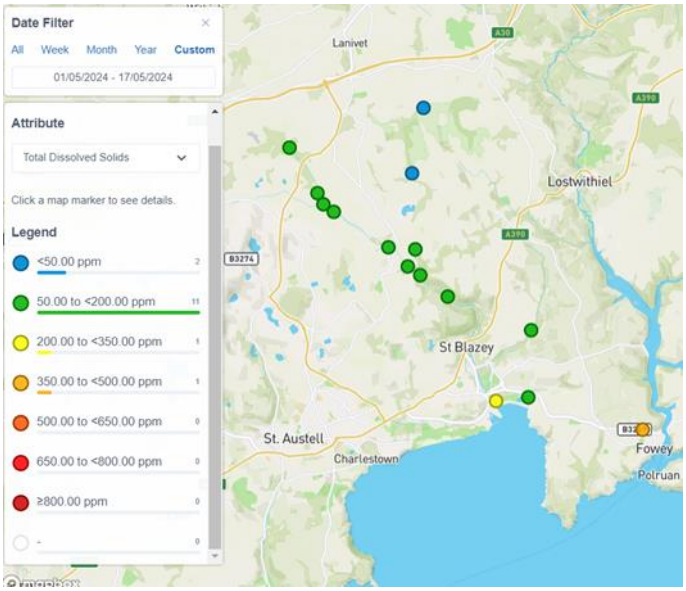
1. We measure these in ppm (parts per million). This is the WRT's explanation:

Total Dissolved Solids (TDS) is directly related to the conductivity of the water. The more minerals, salts and metals that are dissolved in the water the more conductive it gets. Low levels of dissolved solids in waters such as those on Dartmoor near to the source of the river are a result of very low levels of input from the surrounding landscape. As the river runs down to the sea it

collects material from many different inputs, some natural and some man-made such as farms, sewage plants, factories and residential areas. This typically increases the amount of solids dissolved in the water leading to a higher reading. Harmful pollution from things like sewage, slurry and factory discharge will usually elevate your TDS reading. However, some pollutants such as oil can lower conductivity; therefore it should be used as a general indicator of water quality not a specific measure of toxicity. Geology will influence the normal level of conductivity in a watercourse (e.g. Areas dominated by granite generally give a lower conductivity than those with limestone). Regular monitoring will allow the detection of changes in conductivity which can indicate pollution.

2. Geographical comparison. Source: Cartographer.



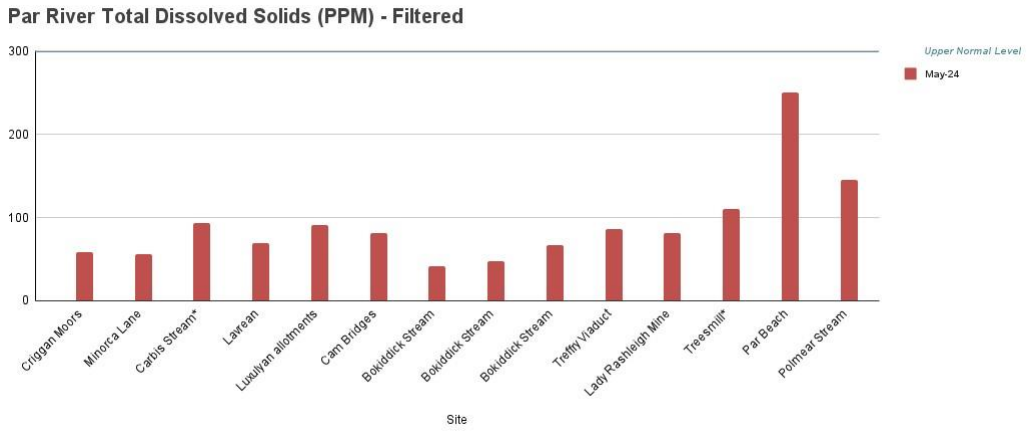


3. Results May 2024

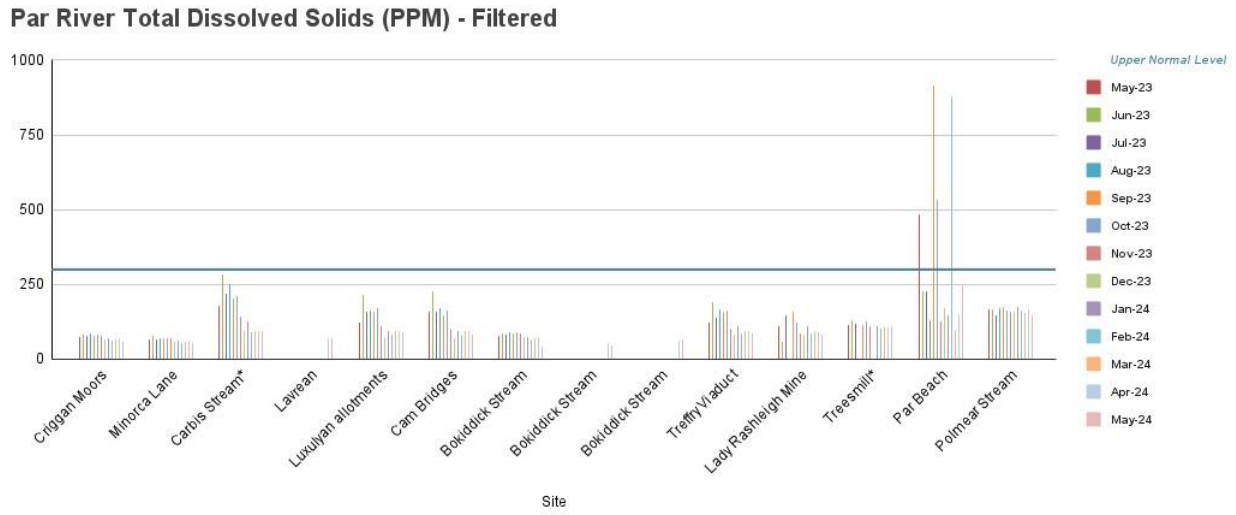
PAR RIVER/TRIBUTARY	LOCATION	Total Dissolved Solids PPM
Par	Criggan Moors, SX 01882 61133	58
Par	South of Minorca Lane, Par River, SX 02657 59788	56
Tributary	Carbis Stream SX 02834 59401	93
Par	Lavrean, Par River SX 03134 59164	69
Par	Luxulyan allotments, Par River, SX 04732 58045	91
Par	Cam Bridges, Par River, SX 05292 57454	81
Tributary	Trebell Green, Bokiddick Stream SX 0551960226	42
Tributary	Corgee Moor, Bokiddick Stream SX 0593462167	48
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	67
Par	Treffry Viaduct, Par River, SX 05650 57179	86
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	82
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385	111
Par	Par Beach slipway, SX 0776 53261	250
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	145

4. Graphs

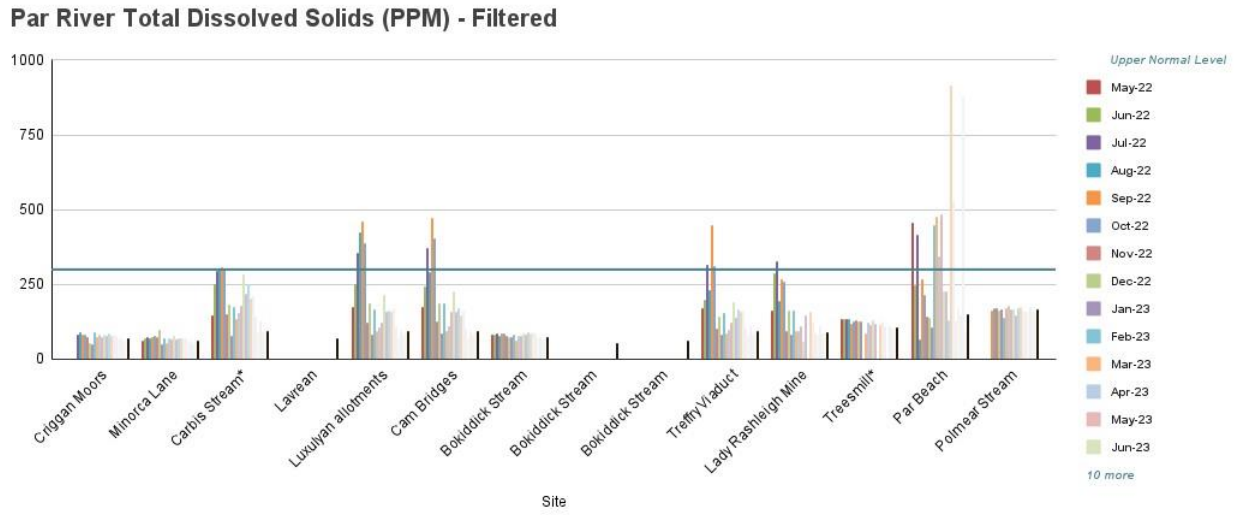
(a) This month



(b) From 1st May 2023 until now:



(c) From 1st May 2022 until now:



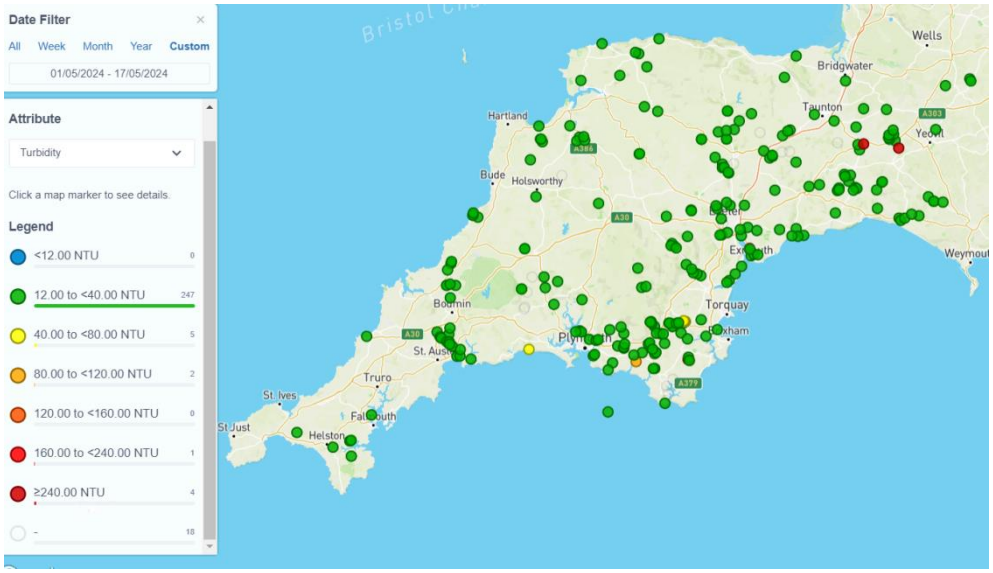
E. TURBIDITY

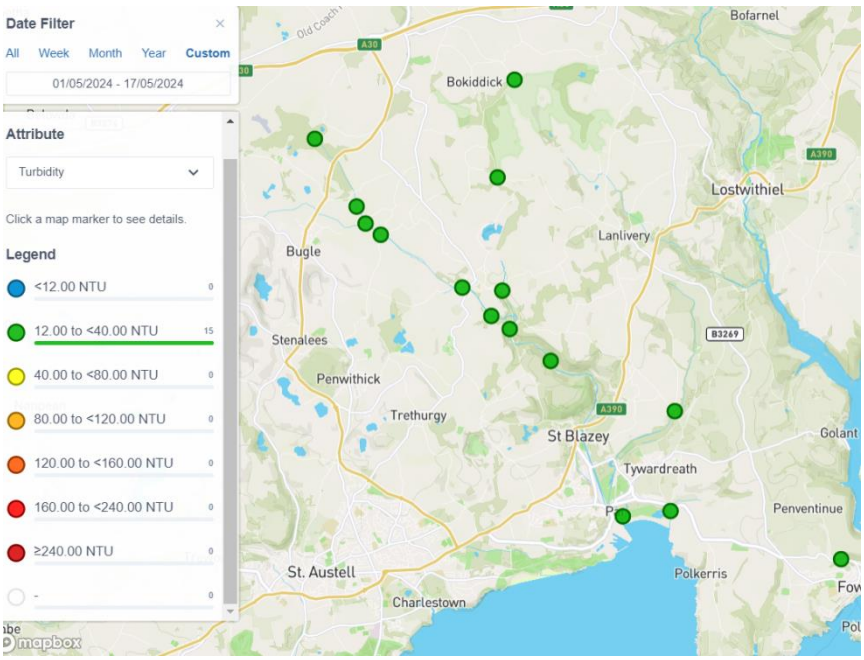
1. This is the WRT explanation of this measure:

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. The Yealm Estuary to Moor Project (YEM) in Devon considers that the upper safe level (USL) for turbidity is 75 NTU = 25 mg/l.

2. **Geographical comparison.** Where scores are shown as 0, it means that the reading using the Secchi tube was <12. Source: Cartographer. Most of our results should have blue dots (<12) but Cartographer shows them as 12 (green dots).





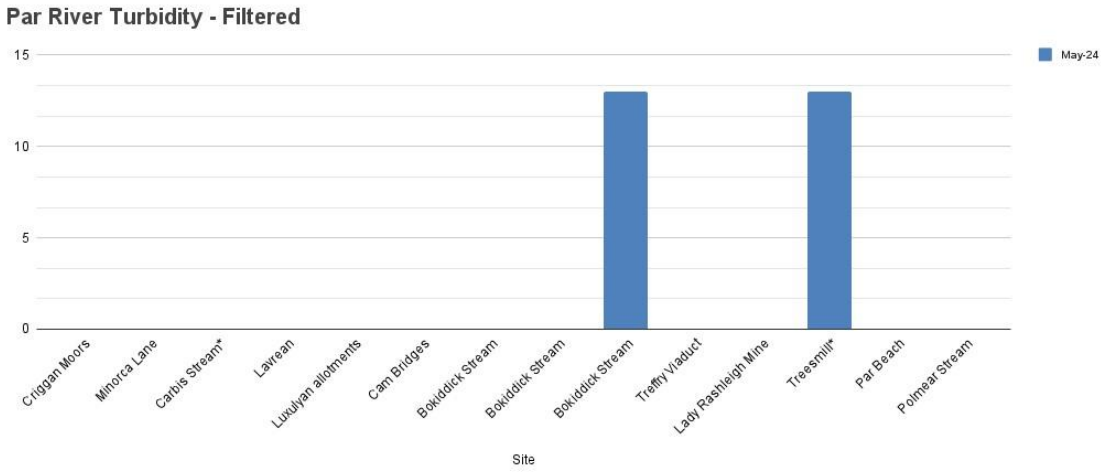
PAR RIVER/TRIBUTARY	LOCATION	Turbidity (NTU)
Par	Criggan Moors, SX 01882 61133	<12
Par	South of Minorca Lane, Par River, SX 02657 59788	<12
Tributary	Carbis Stream SX 02834 59401	<12
Par	Lavrean, Par River SX 03134 59164	<12
Par	Luxulyan allotments, Par River, SX 04732 58045	<12
Par	Cam Bridges, Par River, SX 05292 57454	<12
Tributary	Trebell Green, Bokiddick Stream SX 0551960226	13
Tributary	Corgee Moor, Bokiddick Stream SX 0593462167	<12
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	<12
Par	Treffry Viaduct, Par River, SX 05650 57179	<12
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	<12
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385	13
Par	Par Beach slipway, SX 0776 53261	<12
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	<12

3. Results May 2024

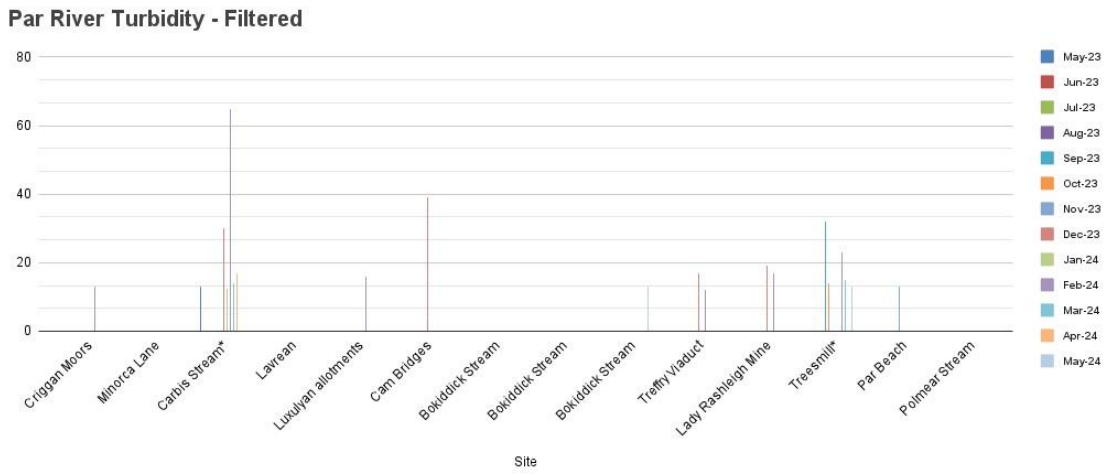
4. Graphs

N.B. The third site shown for the Bokiddick Stream should be the first, i.e. at Trebell Green. This is due to a temporary technical insuperability and will be remedied in due course.

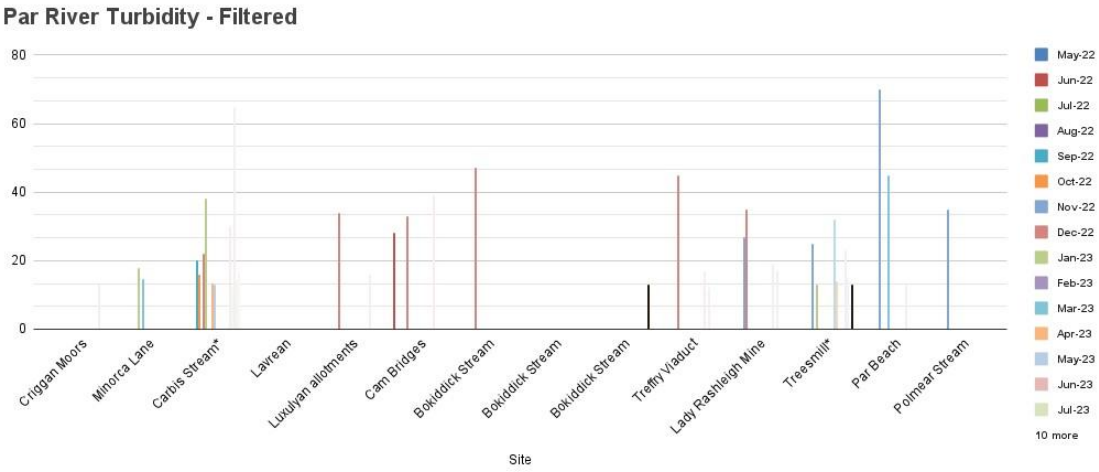
(a) This month



(b) From 1st May 2023 until now:



(c) From 1st May 2022 until now:



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.)

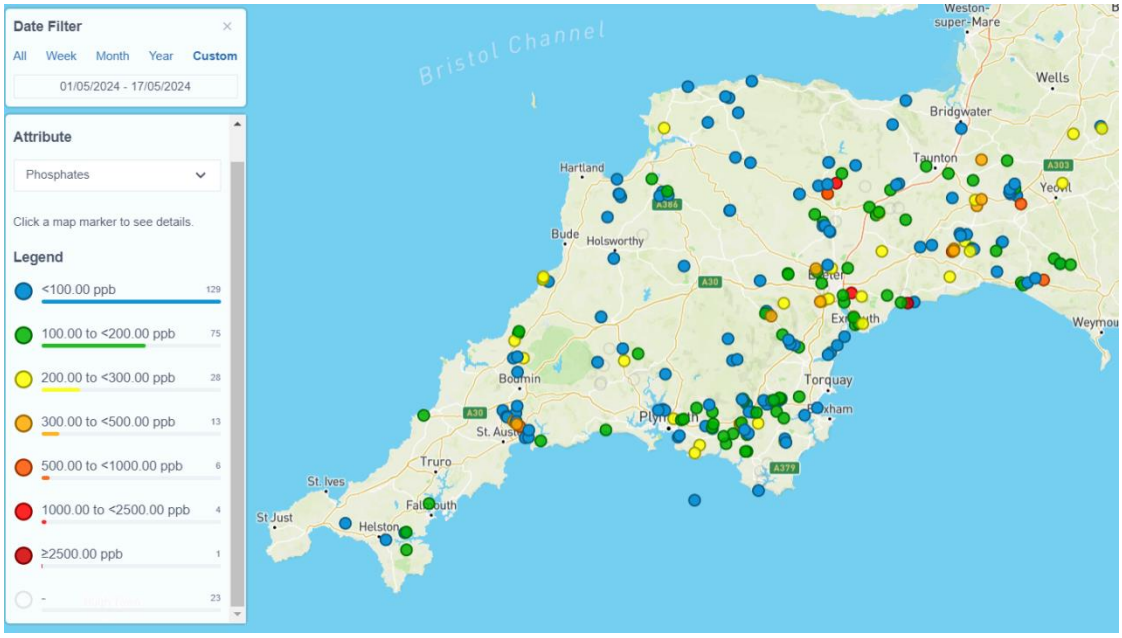
Ranges on phosphate diagnostic colour chart:

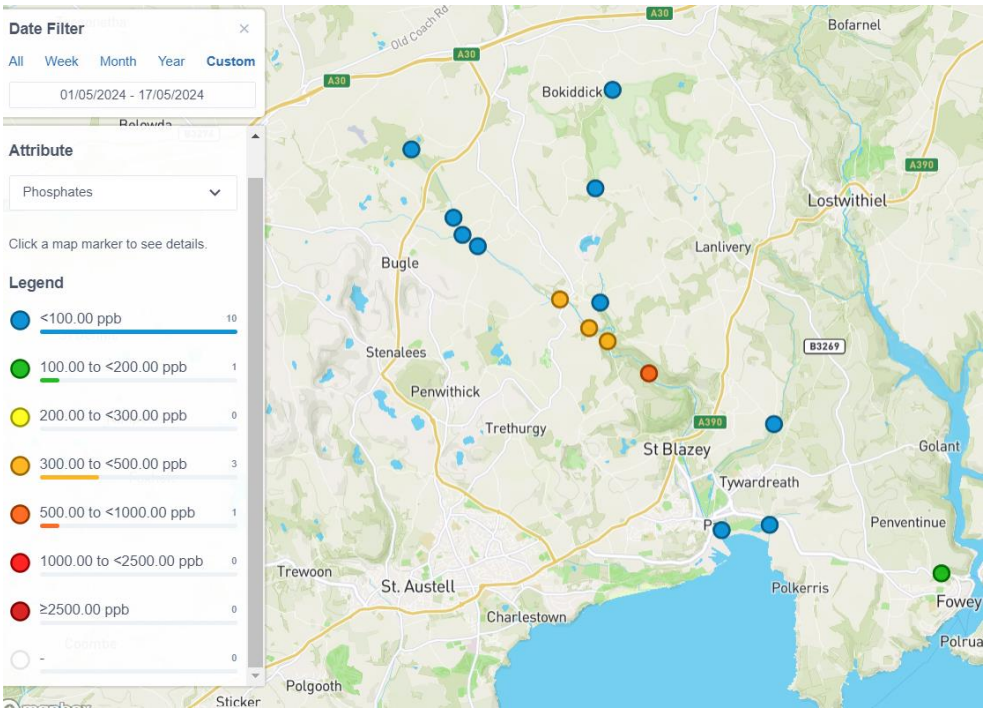
0 – 100 OK

200 – 300 HIGH

500 – 2500 – TOO HIGH

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





3. Results May 2024

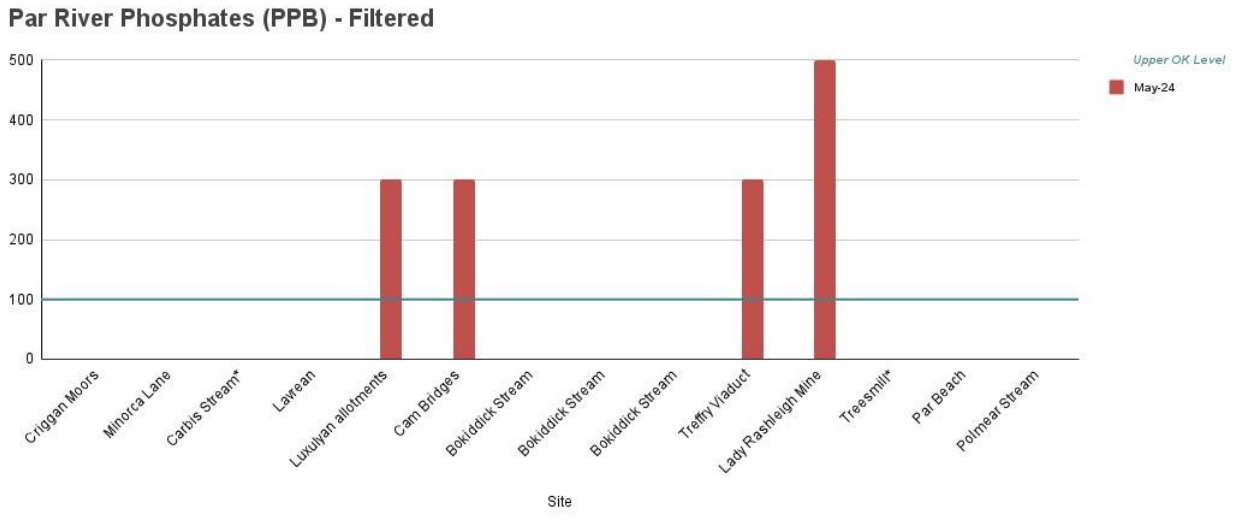
Results in red show phosphate levels that are 'High'/above the upper safe level. WRT advice is that this is 100 Parts Per Billion (0.1 mg/l).

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	Lavrean, Par River SX 03134 59164	0
Par	Luxulyan allotments, Par River, SX 04732 58045	300
Par	Cam Bridges, Par River, SX 05292 57454	300
Tributary	Trebell Green, Bokiddick Stream SX 0551960226	0
Tributary	Corgee Moor, Bokiddick Stream SX 0593462167	0
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	500
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385	0
Par	Par Beach slipway, SX 0776 53261	0
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	0

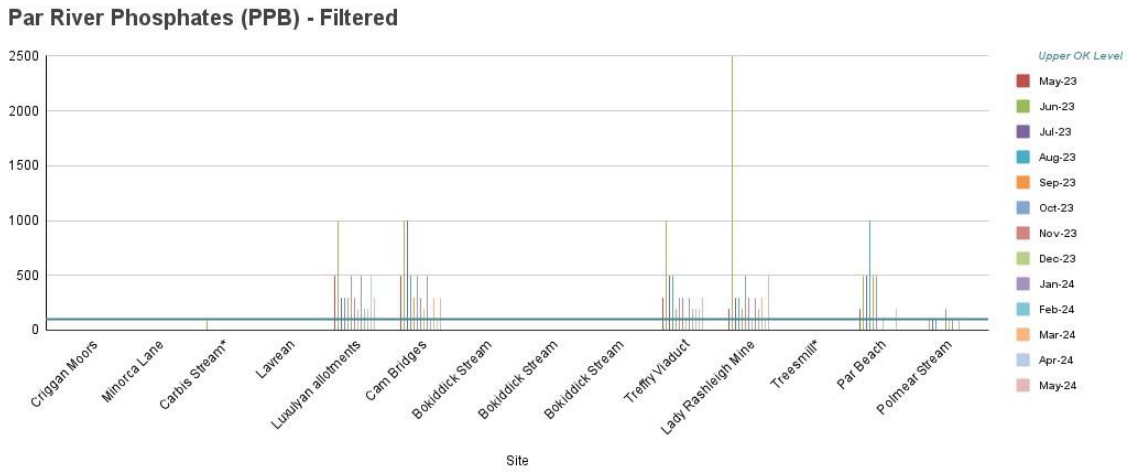
4. Graphs

N.B. The third site shown for the Bokiddick Stream should be the first, i.e. at Trebell Green. This is due to a temporary technical insuperability and will be remedied in due course.

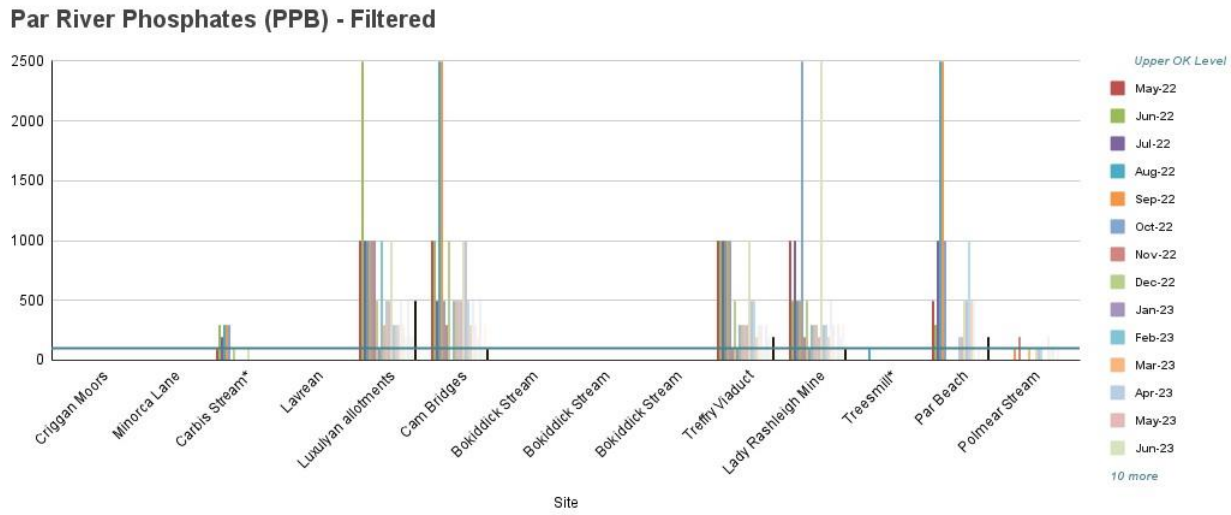
(a) This month



(b) From 1st May 2023 until now:



(c) From 1st May 2022 until now:



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

(a) Wildlife maps

Evidence of otters is found nearly every month, but frequently it is not found at our monitoring points and when it is it will be entered under 'Other' because live sightings are extremely rare.

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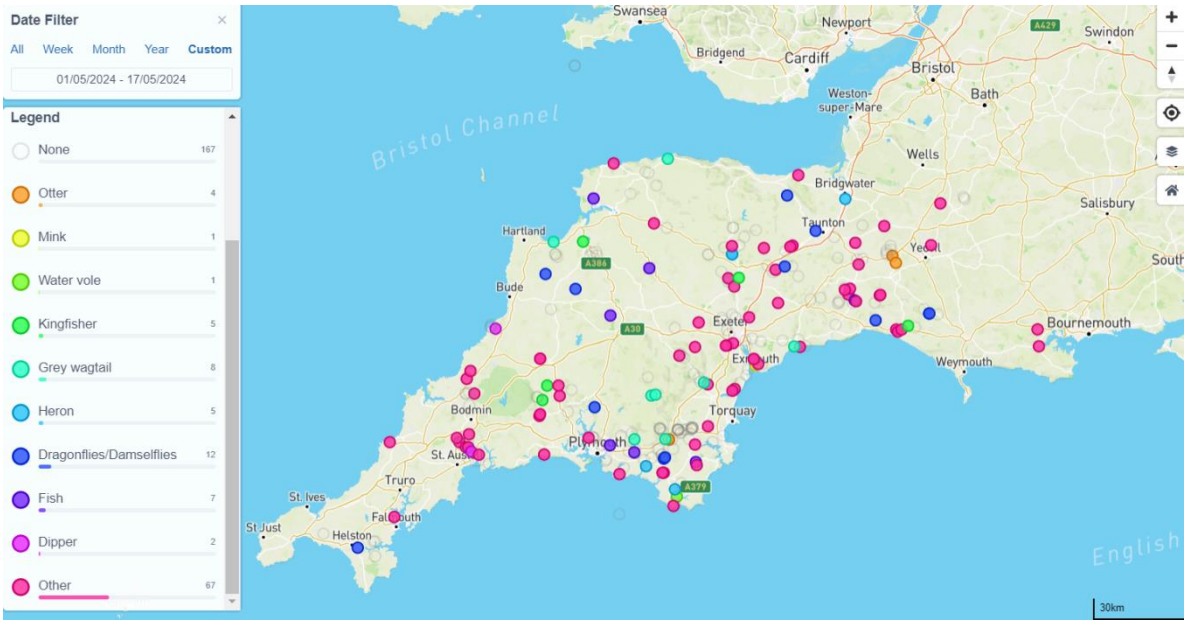
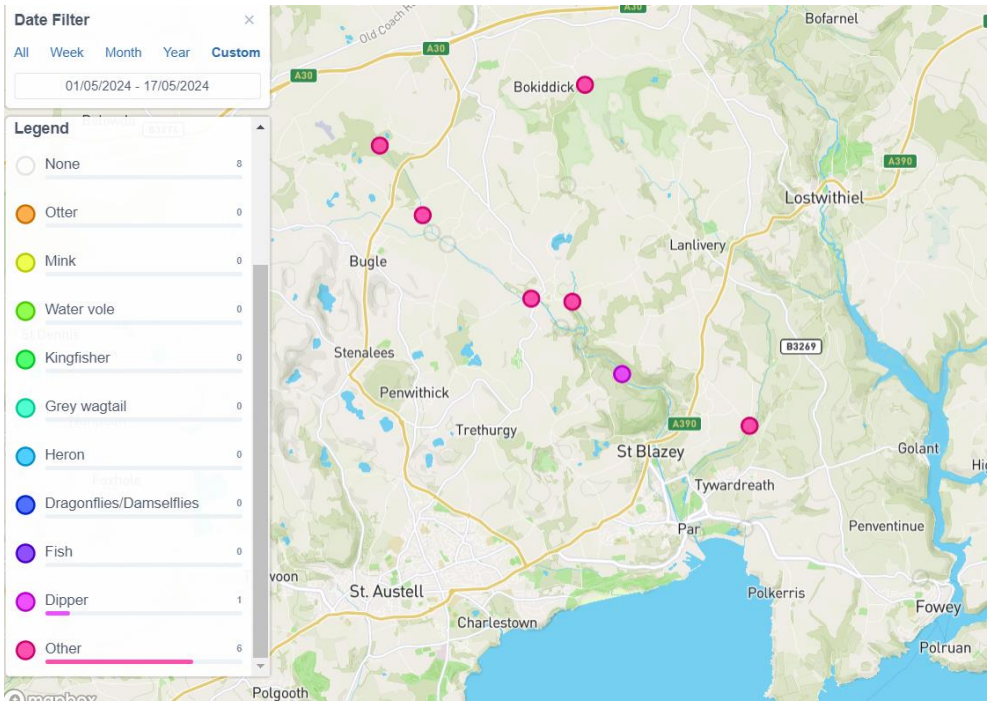
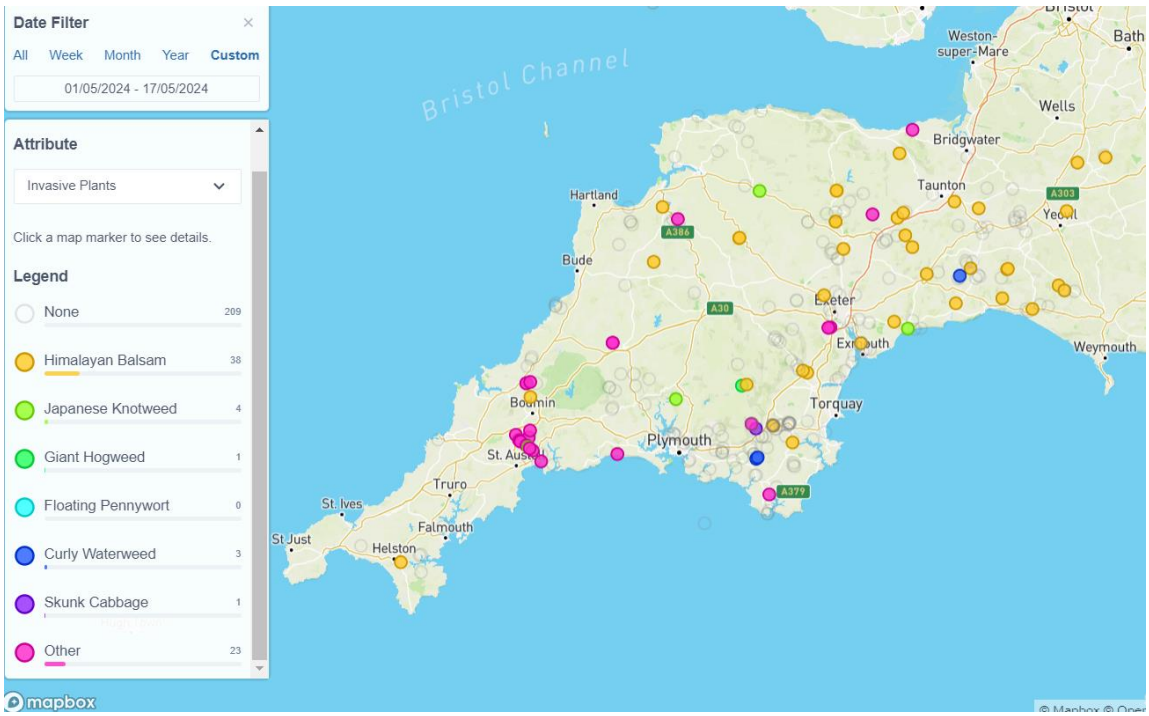
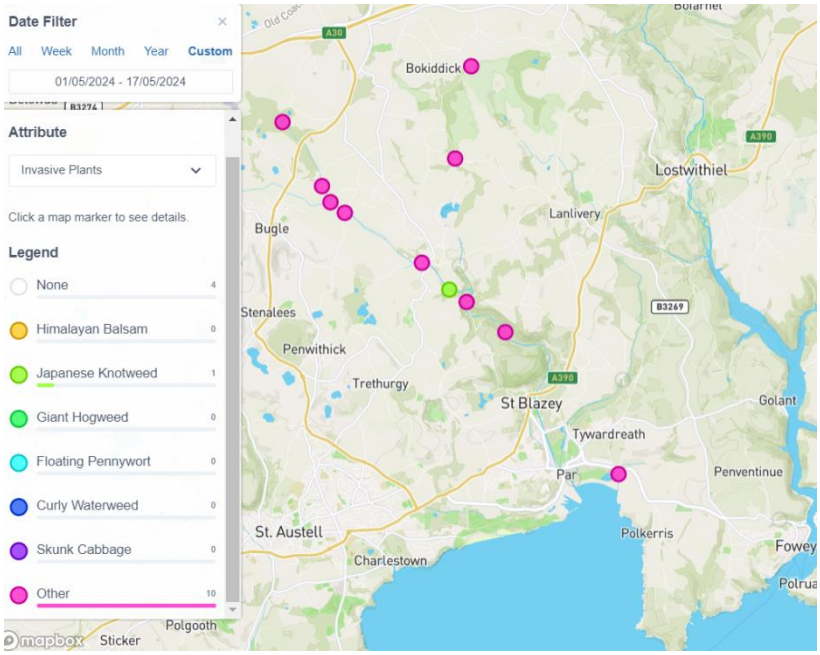




(b) Invasive plants maps





(c) Wildlife & Invasive Plants sightings at the monitoring points included:

LOCATION	WILDLIFE NOTED	INVASIVE PLANTS NOTED
Criggan Moors, SX 01882 61133	Chiffchaff, cuckoo	Hemlock Water Dropwort
South of Minorca Lane, Par River, SX 02657 59788	Chiffchaff	Hemlock Water Dropwort
Carbis Stream SX 02834 59401	None	Hemlock Water Dropwort
Lavrean, Par River SX 03134 59164	None	Hemlock Water Dropwort
Luxulyan allotments, Par River, SX 04732 58045	Robin, blackbird	Hemlock Water Dropwort
Cam Bridges, Par River, SX 05292 57454	None	Hemlock Water Dropwort, Japanese Knotweed
Trebell Green, Bokiddick Stream SX 0551960226	Chiffchaff, buzzard	Hemlock Water Dropwort
Corgee Moor, Bokiddick Stream SX 0593462167	None	Hemlock Water Dropwort
Gatty's Bridge, Bokiddick Stream SX 05531 57953	Blackbird	None
Treffry Viaduct, Par River, SX 05650 57179	None	Hemlock Water Dropwort
Lady Rashleigh Mine, Par River, SX 06451 56509	Dipper, riverflies (Cased Caddis, Caseless Caddis, Mayfly, Flat-bodied Upwings, Olives, Stoneflies, Gammarus)	Hemlock Water Dropwort
Treesmill, Tywardreath Stream, SX 08873 55385	Wren, chaffinch, chiffchaff	None
Par Beach slipway, SX 0776 53261	Herring gull, Canada goose	None
Polmear Stream, Ship Inn, SX 08749 53417	None	Hemlock Water Dropwort

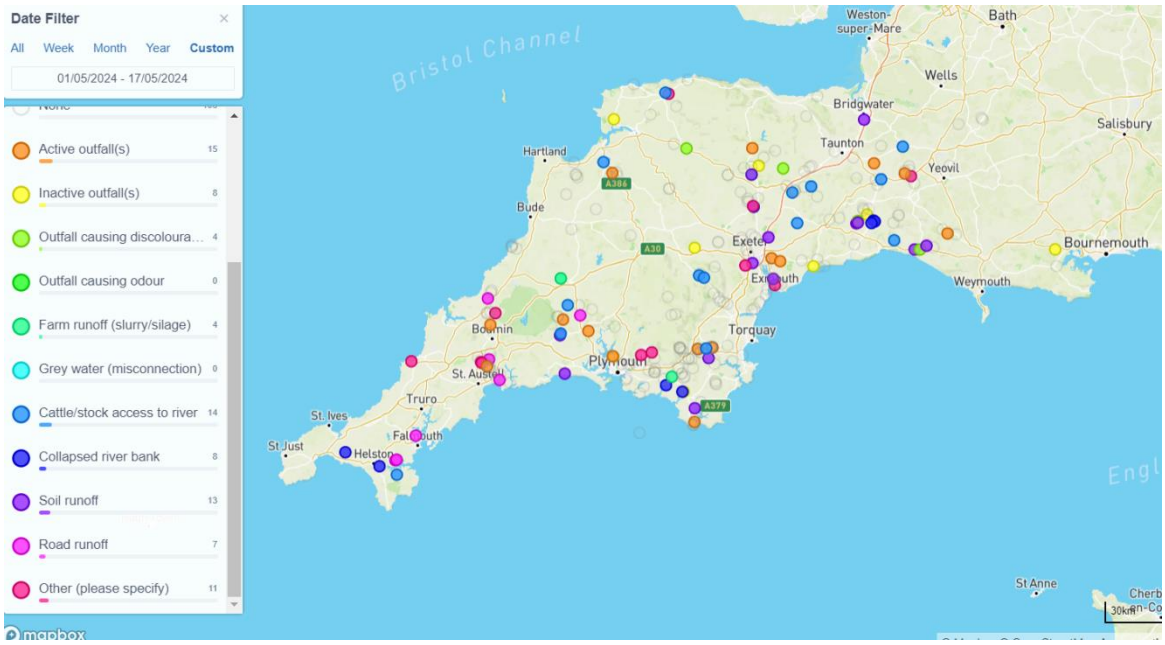
Heron on Treskilling Stream near Treskilling

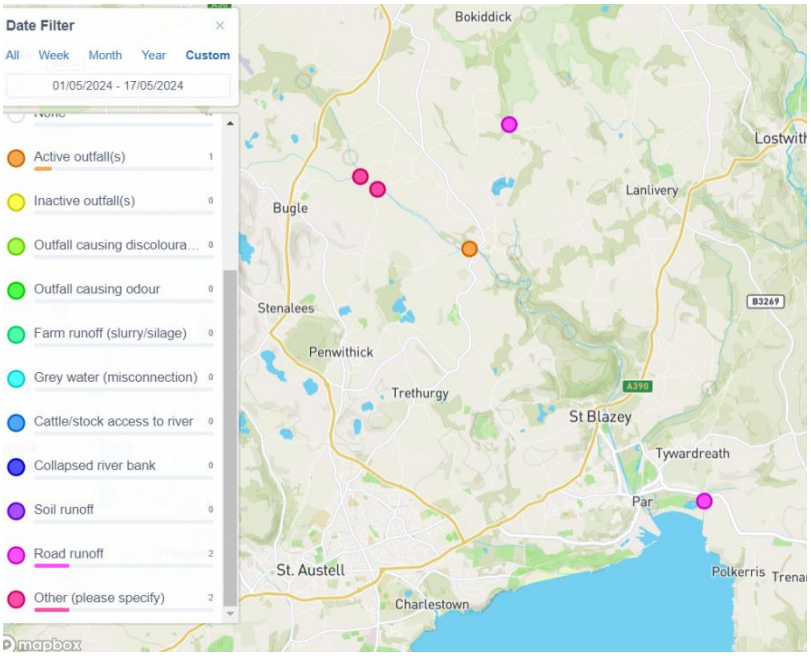
Dipper near Lady Rashleigh Mine

H.

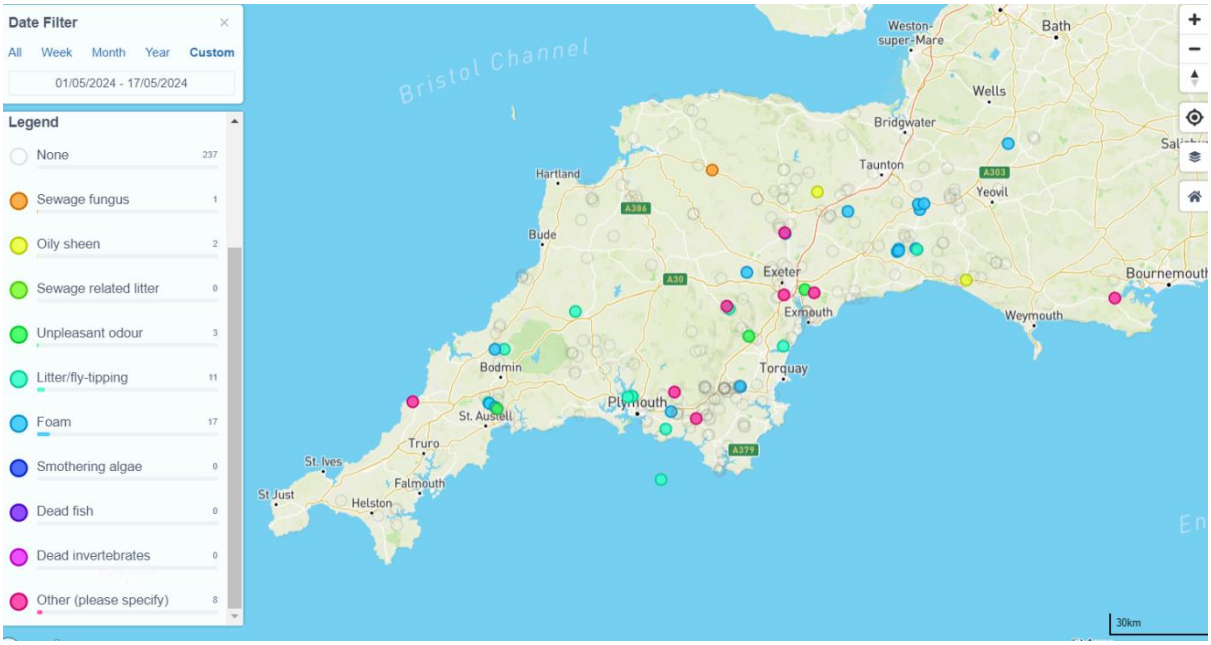
H. POLLUTION SOURCES AND EVIDENCE

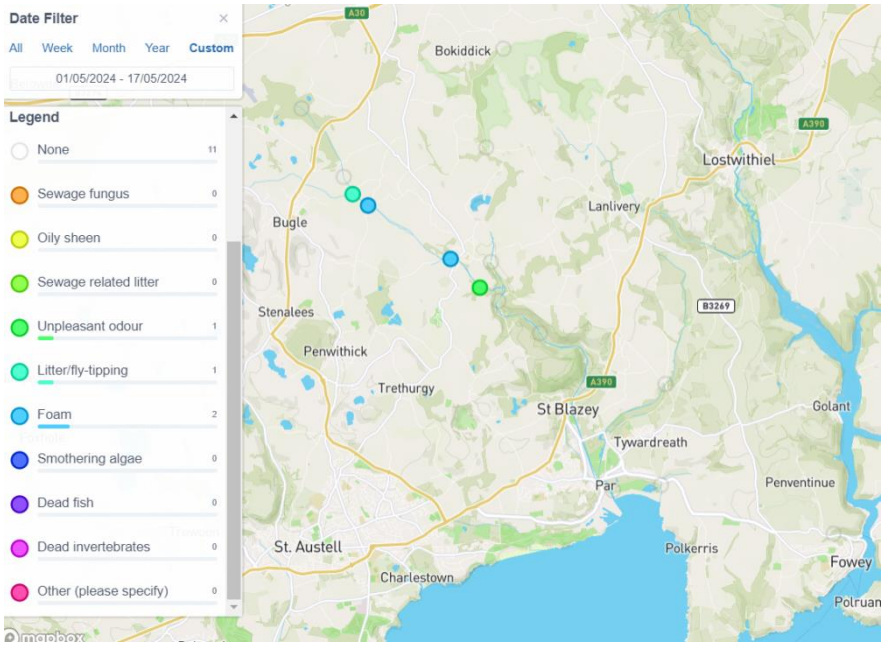
1. Pollution sources





2. Evidence of recent pollution





I. OTTER SURVEY, MAY 2024

1. SURVEY CONDITIONS

Date & time	14/5/2024; 15/5/2024; 16/5/2024
Surveyors	Roger Smith, Dave Burrell, Joan Farmer and Veronica Jones
Areas surveyed	Upper Par (Criggan Moors and Minorca Lane); Par River from STW to Cam Bridges; Par River from Treffry Viaduct to Ponts Mill sluice gates; Bokiddick Stream.
Weather	Heavy rain in previous 24 hours.
River level	High
River flow	
Water quality	Phosphate readings 500 PPB at the highest Lady Rashleigh Mine () 200 at Treffry Viaduct) and 300 at Luxulyan allotments and Cam Bridges. All readings zero upstream from the allotments and on Carbis and Bokiddick Streams.
Other wildlife	Dipper, chiffchaff, cuckoo, robin, blackbird, buzzard.

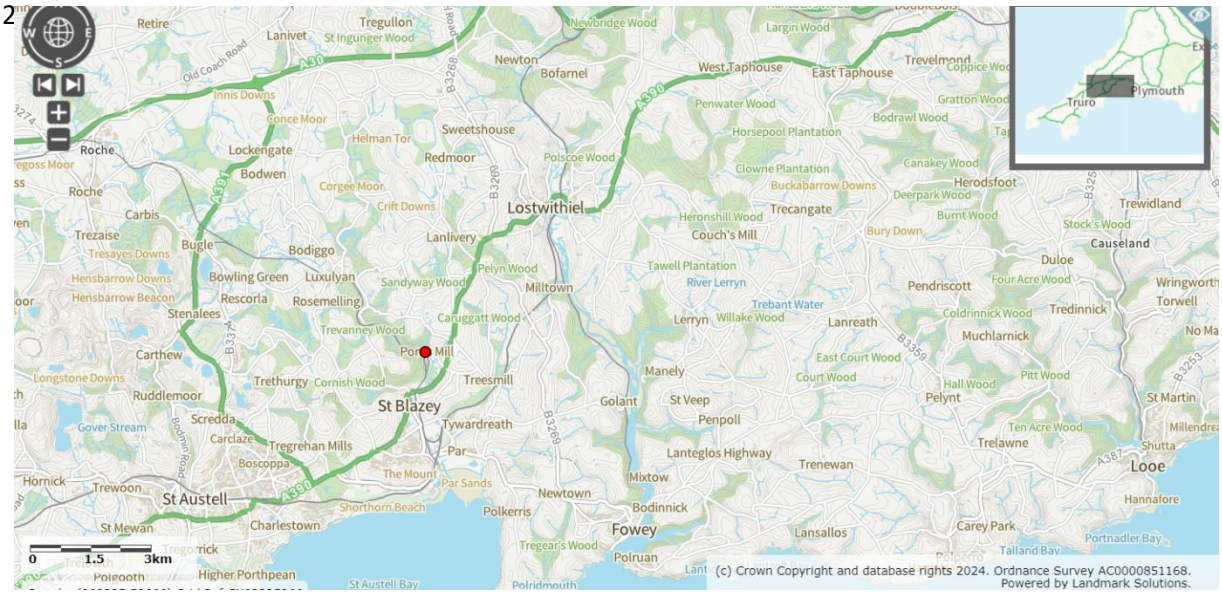
2. EVIDENCE FOR OTTERS ✓

EVIDENCE	SEEN/ ORKS*	LOCATION	NOTES
Spraint - fresh			
Spraint – recent	✓	Under the canal bridge at Ponts Mill.	
Spraint - old	✓	Gully upstream side Canal Bridge Ponts Mill)	
Anal jelly			
Sign heap			
Staining			
Tracks			
Path			
Slide			
Holt			
Hover			
Couch			
Live sighting			
Corpse			

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

3. MAP

Red dots – definite evidence recorded on ORKS.
Black dots – possible evidence. Not recorded on ORKS.
Green dots – definite evidence but may have been recorded in the previous month, e.g. old spraint.



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

4. PHOTOGRAPHS

Spraint under the canal bridge at Ponts Mill

View downstream from Ponts Mill canal bridge at otter-level

Old spraint in gully upstream of Ponts Mill bridge

5. COMMENTS

Few signs were found, which may be due in part to high river levels following recent rain.

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, but from May 2024 have moved the kick-sampling site a few metres downstream of the bridge where conditions are safer and easier. This amended site will be known as Lady Rashleigh 2 in the ARMI/ORKS record.

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, assisted by Jenny Davies, Layla Ousley and Leah Steward of the Environment Agency on 23rd May 2024

	SPECIES	NUMBER	CATEGORY
Trichoptera			
1	Cased Caddisfly	5	1
2	Caseless Caddisfly	11	2
Ephemeroptera 3 tails			
3	Mayfly (Ephemeridae)	1	1
4	Blue-winged olive (Ephemerellidae)	0	0
5	Flat-bodied up-wings (Heptageniidae)	25	2
6	Olives (Baetidae)	40	2
Plecoptera 2 tails			
7	Stoneflies	12	2
Gammaridae			
8	Freshwater Shrimp	80	2
			12

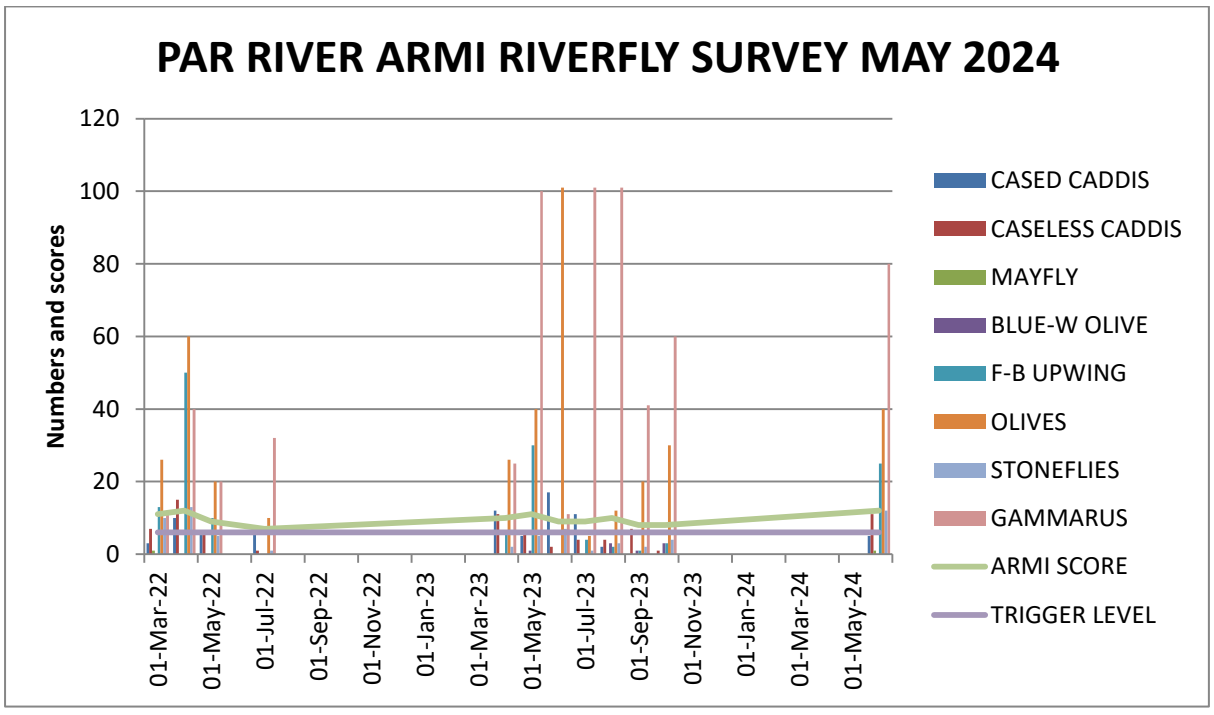
CATEGORY TOTAL	12
TRIGGER LEVEL	6

N.B. From May 2024 sampling has been done at Lady Rashleigh 2, downstream from the bridge.

Kick sampling has now been moved downstream from Lady Rashleigh Mine bridge

Photo: Dave Burrell

Sorting the riverfly nymphs **Photo: Dave Burrell**



K. DISCUSSION

1. Positive observations

(a) The support and encouragement of local Environment Agency staff for our citizen science work has been invaluable over the years. This month, EA officers, who are looking at the role played by citizen scientists, visited us in Luxulyan Valley and assisted with the water quality and riverfly monitoring. Often the EA is wrongly blamed for poor river quality, and other environmental problems, but it should be remembered that between 2010 and 2022, its budget was slashed by two-thirds, from £120 million a year to £40 million, which is one of the largest cuts for any Government body. In the opinion of this writer, the blame lies with extremist politicians (and their backers), who believe the state should be shrunk, that an economy is like a household, and who are content with private affluence (for the top 1%) and public squalor. But the positive news is that the EA, despite getting cut, hammered and abused, is still staffed with knowledgeable, dedicated people who really care about our environment and just need the resources (including more colleagues) to do the job that most of us want to be done.

(b) The riverfly score was comfortably above the trigger level, which shows that river, though not in an ideal state, is by no means a hopeless case.

(c) Otters are still present.

2. Points of concern

(a) Phosphate levels on the Par River remain High and Too High (WRT classifications) downstream from Luxulyan STW.

(b) An unpleasant odour persists near the main river from Cam Bridges downstream through Luxulyan Valley. This has been commented on by knowledgeable local people for a very long time. It is believed this may be related to the presence of sewage in the water but confirmation is needed.

(c) High TDS levels at Par Beach Slipway, and, to a lesser extent on the Polmear and Treesmill Streams, are concerning.

3. Areas of doubt

With a general election in the offing, a great area of doubt must be about the environmental policies of the next government and the health of rivers specifically.

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, Jenny Davies, Leah Steward, Jade Neville, Lauren Jasper 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, June 2024