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.

DECEMBER 2023

Recently works have been carried out near Cam Bridges weir. It is hoped that the channel to the right will serve as a fish-pass.

A. DECEMBER 2023 FINDINGS AT A GLANCE

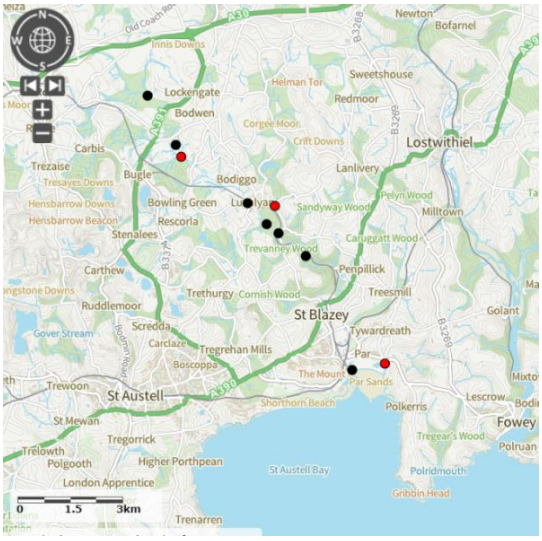
A. OUR DECEMBER 2023 FINDINGS AT A GLANCE (SEE SECTIONS C TO J FOR FULL PICTURE)

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 TESTING LOCATIONS	LOWER PAR (FROM CONFLUENCE WITH BOKIDDICK STREAM TO SEA) 3 TESTING LOCATIONS	TRIBUTARIES OF UPPER PAR (CARBIS STREAM, BOKIDDICK STREAM) 2 TESTING LOCATIONS	TRIBUTARY OF LOWER PAR (POLMEAR STREAM) 1 TESTING LOCATION
TEMPERATURE (SHOULD NOT EXCEED 18˚ CELSIUS)	Average 10.12˚ Celsius	Average 10.9˚ Celsius	Average 9.82˚ Celsius	Average 12.5˚ Celsius
TOTAL DISSOLVED SOLIDS (SHOULD NOT EXCEED 300 PPM)	68.25 PPM	112.33 PPM	83.5 PPM	159 PPM
TURBIDITY (SHOULD BE <12 ON SECCHI TUBE. FOR AVERAGING ANY READING <12 IS COUNTED AS 11)	9.75	12	15	0
PHOSPHATES (SHOULD NOT EXCEED 100 PPB)	100 PPB	100 PPB	0 PPB	100 PPB
RIVERFLY TRIGGER LEVEL (SHOULD BE ≥ 6)	N/A	Sampling suspended until next spring.	N/A	N/A
WILDLIFE EVIDENCE	Buzzard	Woodpigeon, ducks, otter spraint.	None	Mallard ducks
VISIBLE EVIDENCE OF POLLUTION	Smell (Cam Bridges).	None.	Debris, china clay	None

B. DECEMBER 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



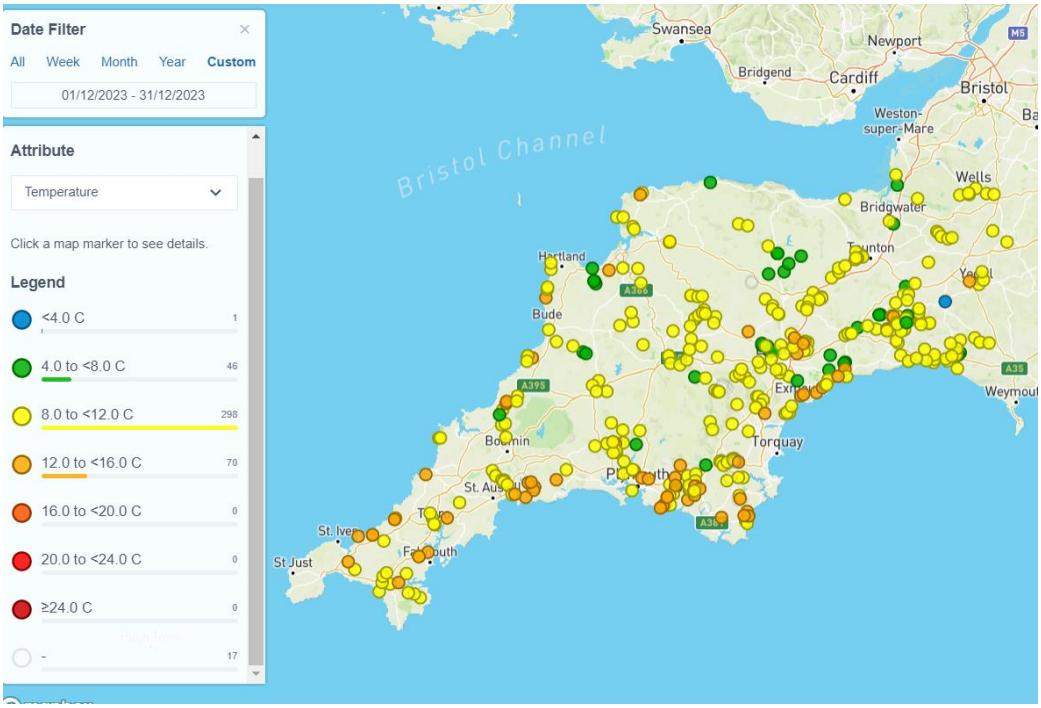
LOCATION	DATE	TYPE OF CHECK	MONITORED BY
Criggan Moors, Par River, SX 01882 61133	13/12/2023	CSI sample & Cartographer record.	Roger Smith
South of Minorca Lane, Par River, SX02668 59747	13/12/2023	CSI sampling. Cartographer record.	Roger Smith
Carbis Stream SX 02834 59401	13/12/2023	CSI sampling. Cartographer record.	Roger Smith
Luxulyan allotments, Par River, SX 04732 58045	13/12/2023	CSI sampling. Cartographer record.	Roger Smith
Cam Bridges, Par River, SX 05292 57454	13/12/2023	CSI sampling. Cartographer record.	Roger Smith
Gatty's Bridge, Bokiddick Stream SX 05531 57953	13/12/2023	CSI sampling. Cartographer record.	Joan Farmer
Treffry Viaduct, Par River, SX 05650 57179	13/12/2023	CSI sampling. Cartographer record.	Joan Farmer, Roger Smith
Lady Rashleigh Mine, Par River, SX 06451 56509	13/12/2023	CSI sampling. Cartographer record.	Dave BJoan Farmer, Veronica Jones, Roger Smith
Par Beach slipway, SX 0776 53261	15/12/2023	CSI sampling. Cartographer record.	Brian Harrisson
Polmear Stream, Ship Inn SX 08749 53417	15/12/2023	CSI sampling. Cartographer record.	Simon Tagney

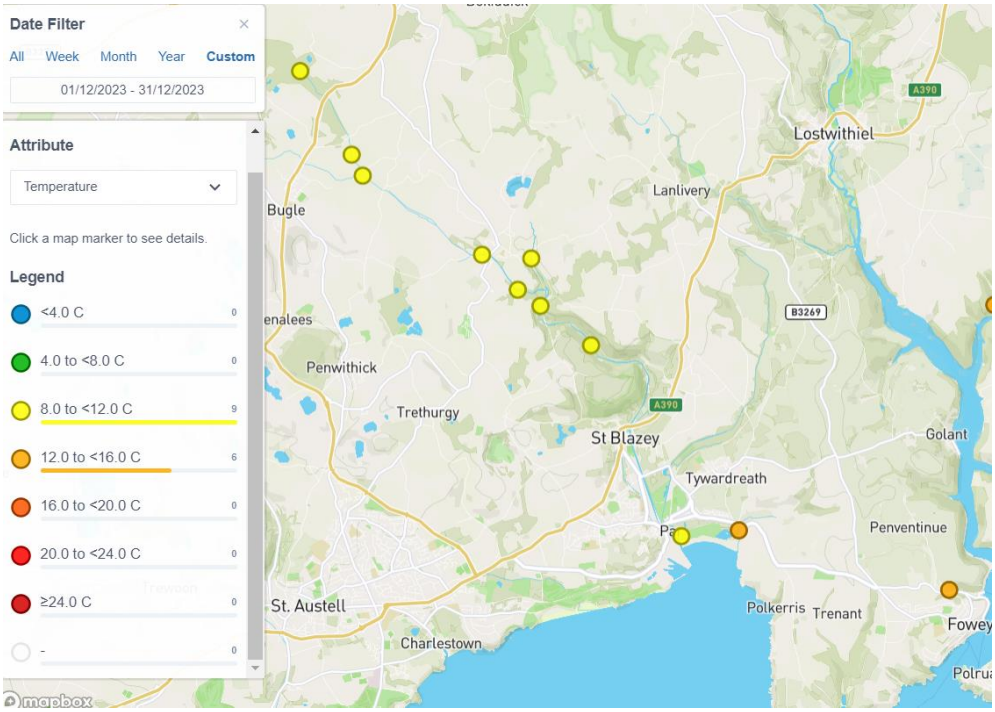
C. TEMPERATURE

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 December 2023

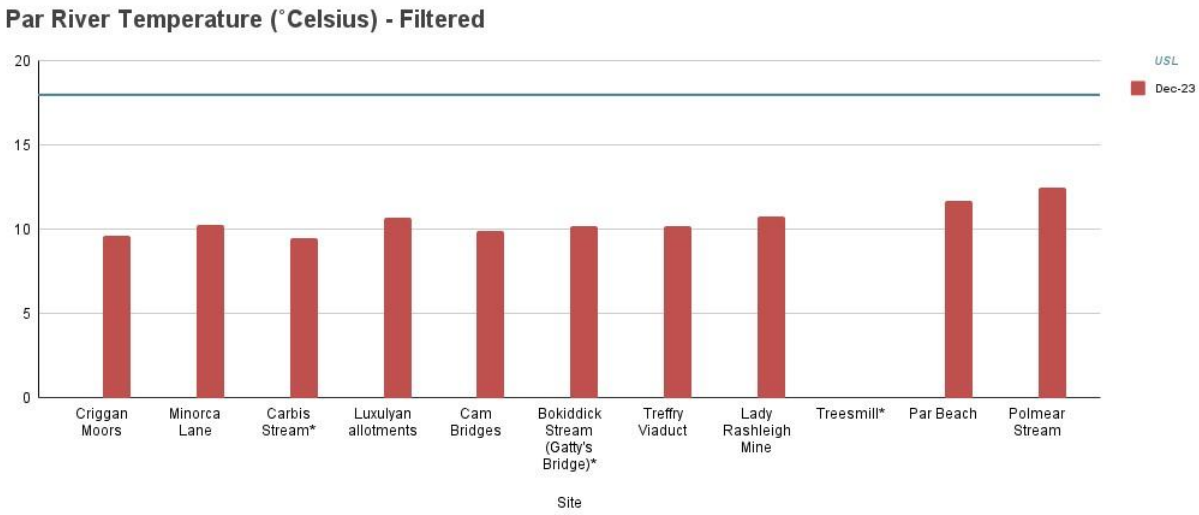
PAR RIVER/TRIBUTARY	LOCATION	Temperature ˚Celsius
Par	Criggan Moors, SX 01882 61133	9.6
Par	South of Minorca Lane, Par River, SX 02657 59788	10.3
Tributary	Carbis Stream SX 02834 59401	9.5
Par	Luxulyan allotments, Par River, SX 04732 58045	10.7
Par	Cam Bridges, Par River, SX 05292 57454	9.9
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	10.2
Par	Treffry Viaduct, Par River, SX 05650 57179	10.2
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	10.8
Par	Par Beach slipway, SX 0776 53261	11.7
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	12.5

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.

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.

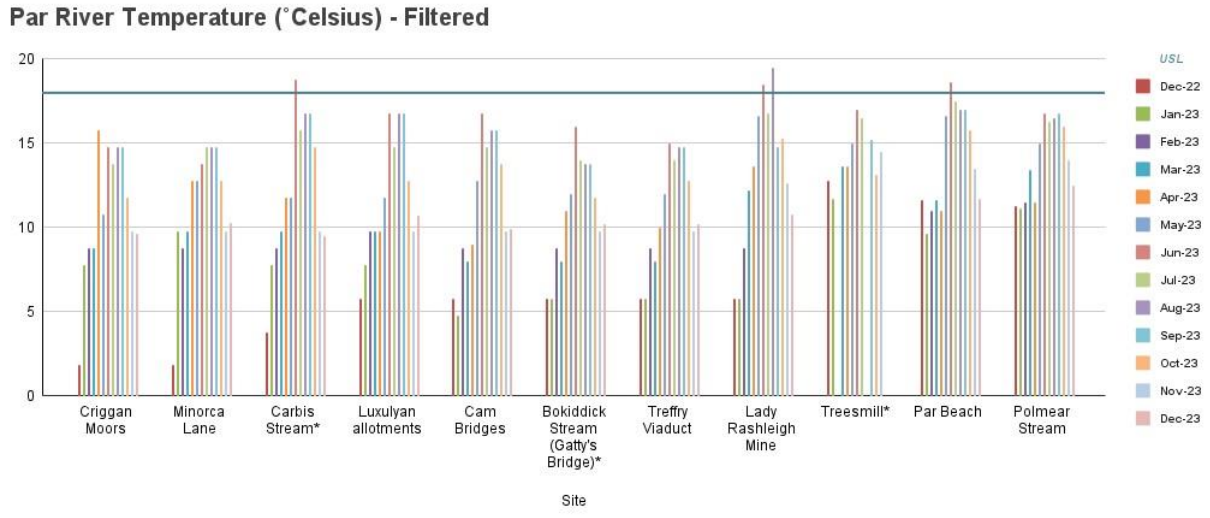
4. Graphs

(a) This month



***** Indicates a tributary.

(b) Historical



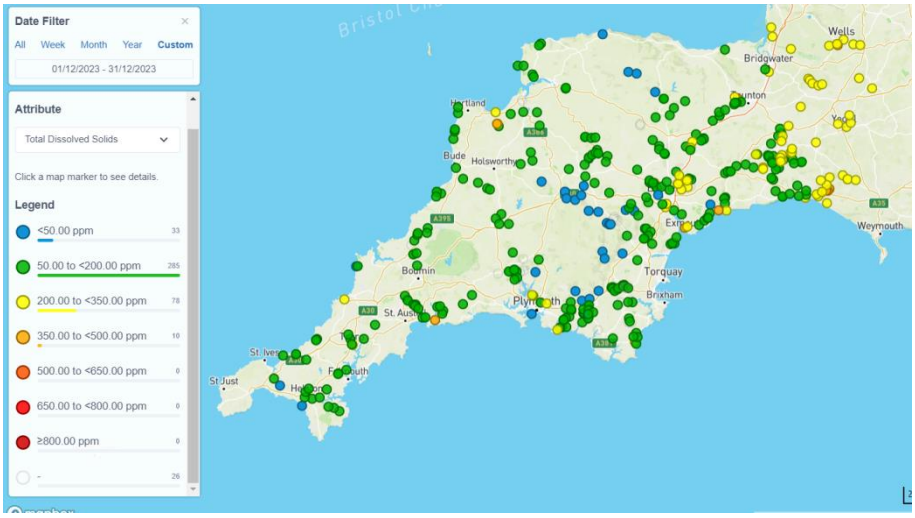
*Indicates a tributary.

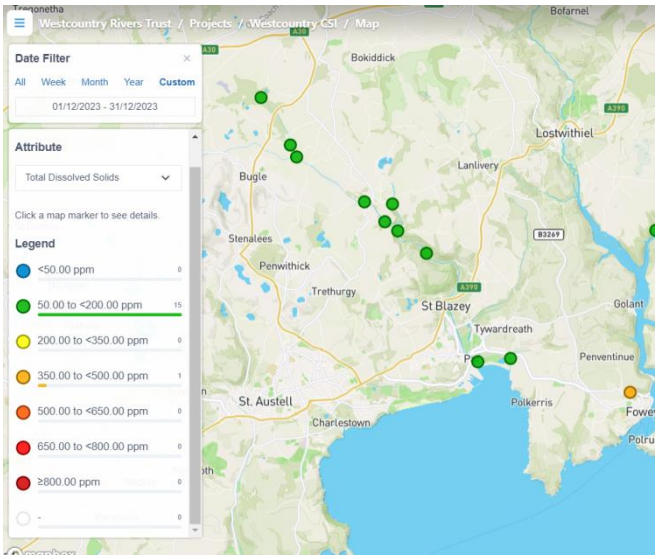
D. TOTAL DISSOLVED SOLIDS

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.





3. Results December 2023

PAR RIVER/TRIBUTARY	LOCATION	Total Dissolved Solids PPM
Par	Criggan Moors, SX 01882 61133	67
Par	South of Minorca Lane, Par River, SX 02657 59788	59
Tributary	Carbis Stream SX 02834 59401	93
Par	Luxulyan allotments, Par River, SX 04732 58045	76
Par	Cam Bridges, Par River, SX 05292 57454	71
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	74
Par	Treffry Viaduct, Par River, SX 05650 57179	83
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	84
Par	Par Beach slipway, SX 0776 53261	170
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	159

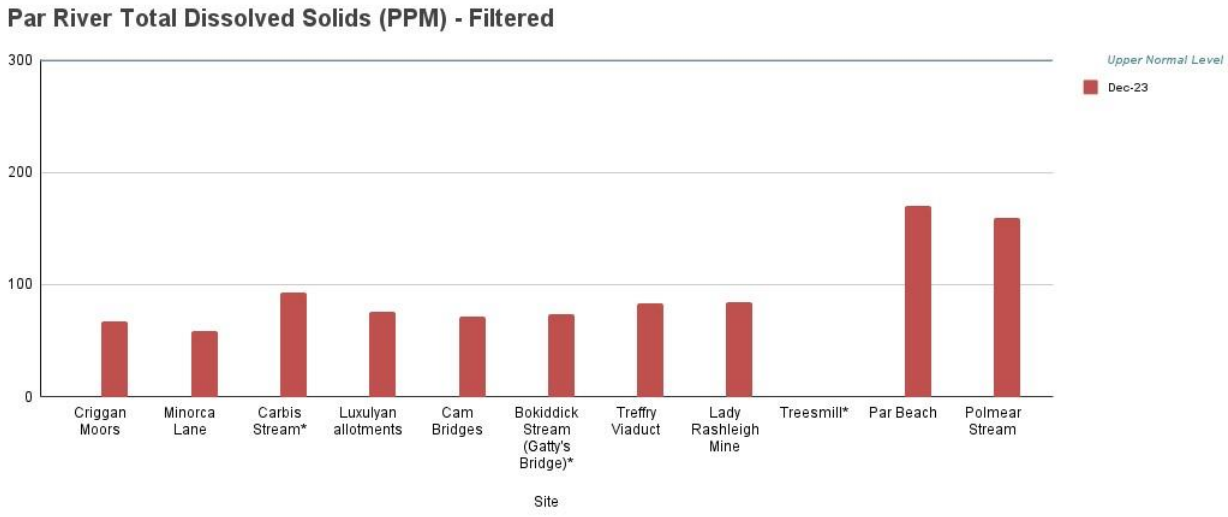
Upper Normal Level

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

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

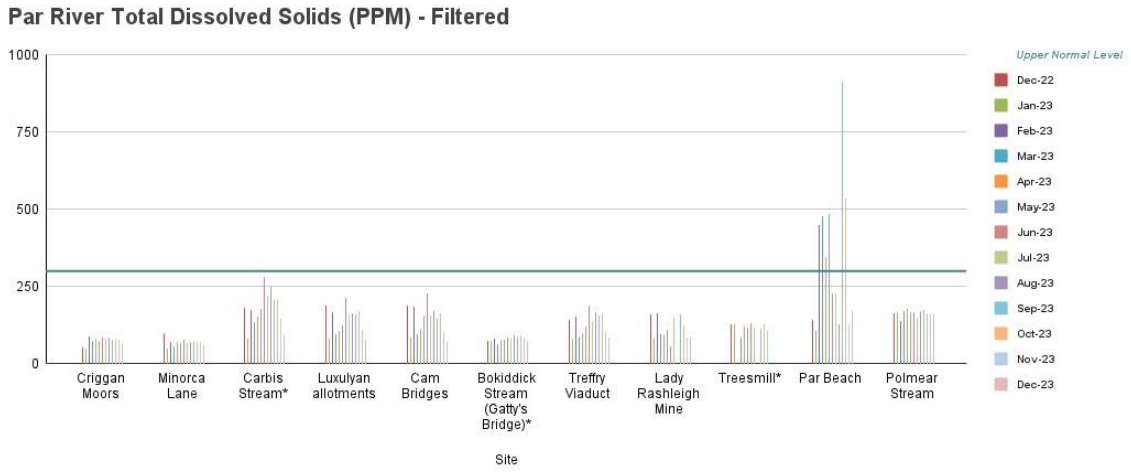
4. Graphs

(a) This month



*Indicates a tributary.

(b) Historical



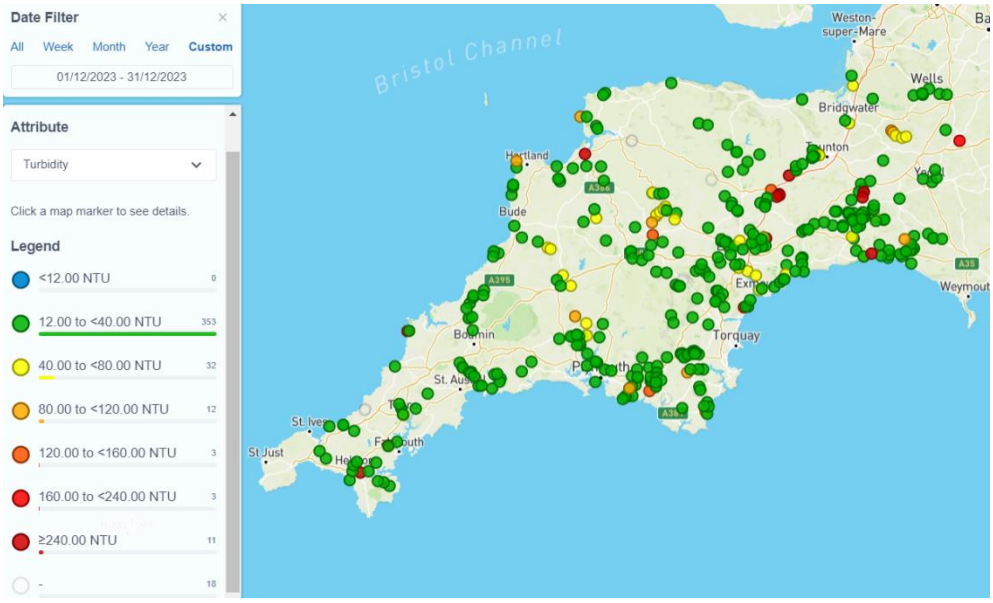
*Indicates a tributary.

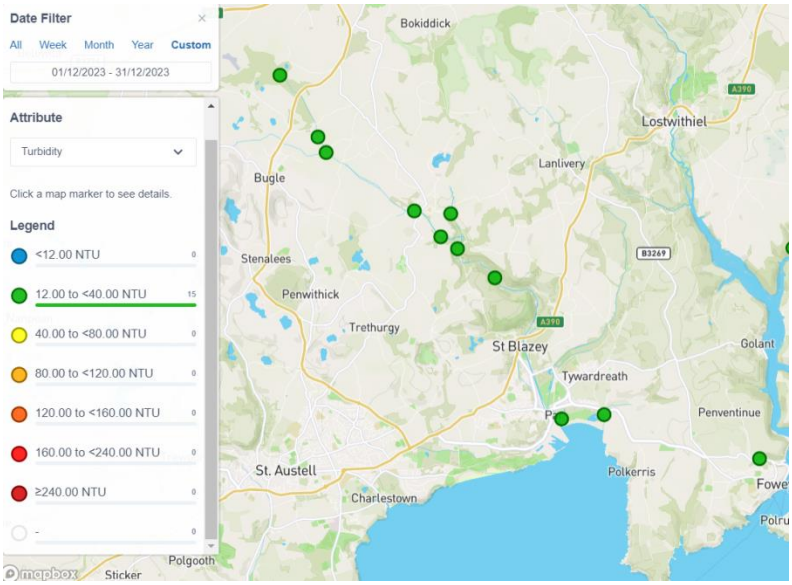
E. TURBIDITY

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.



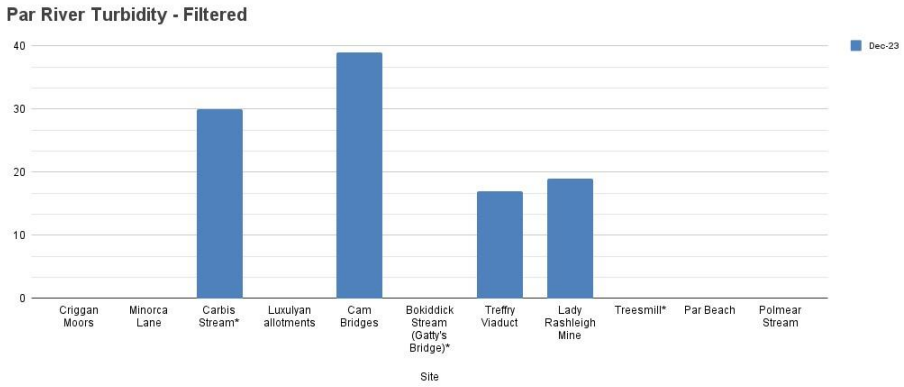


3. Results December 2023

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	30
Par	Luxulyan allotments, Par River, SX 04732 58045	0
Par	Cam Bridges, Par River, SX 05292 57454	39
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	0
Par	Treffry Viaduct, Par River, SX 05650 57179	17
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	19
Par	Par Beach slipway, SX 0776 53261	0
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	0

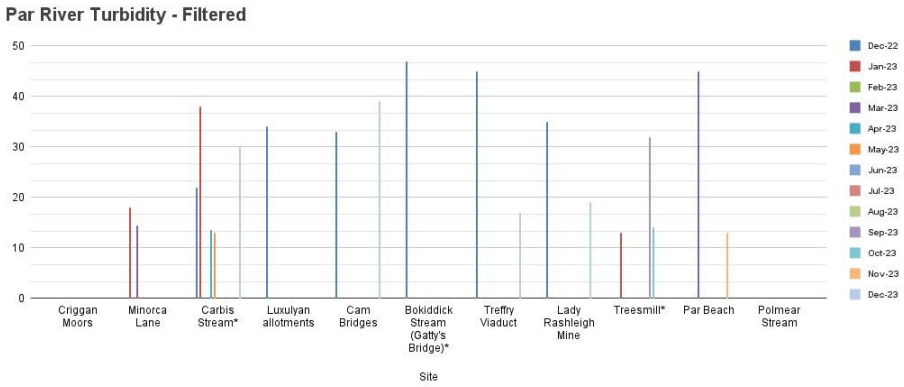
4. Graphs

(a) This month



*Indicates a tributary.

(b) Historical



*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.)

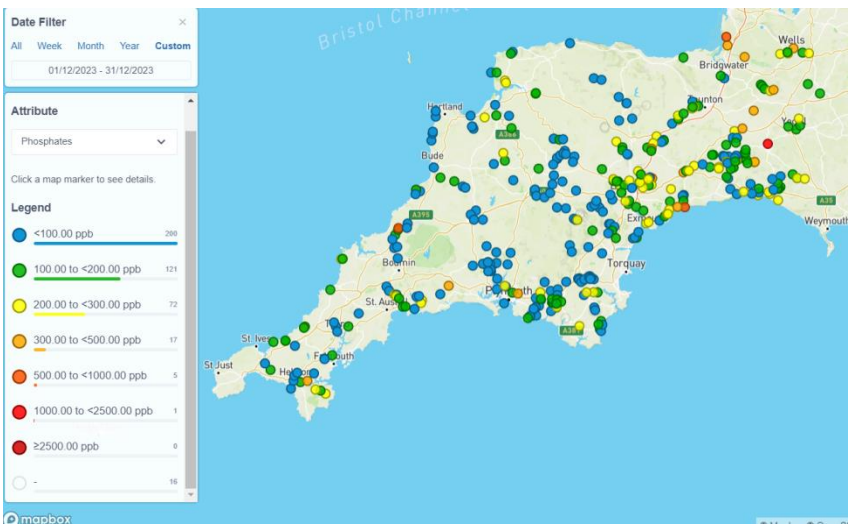
Ranges on phosphate diagnostic colour chart:

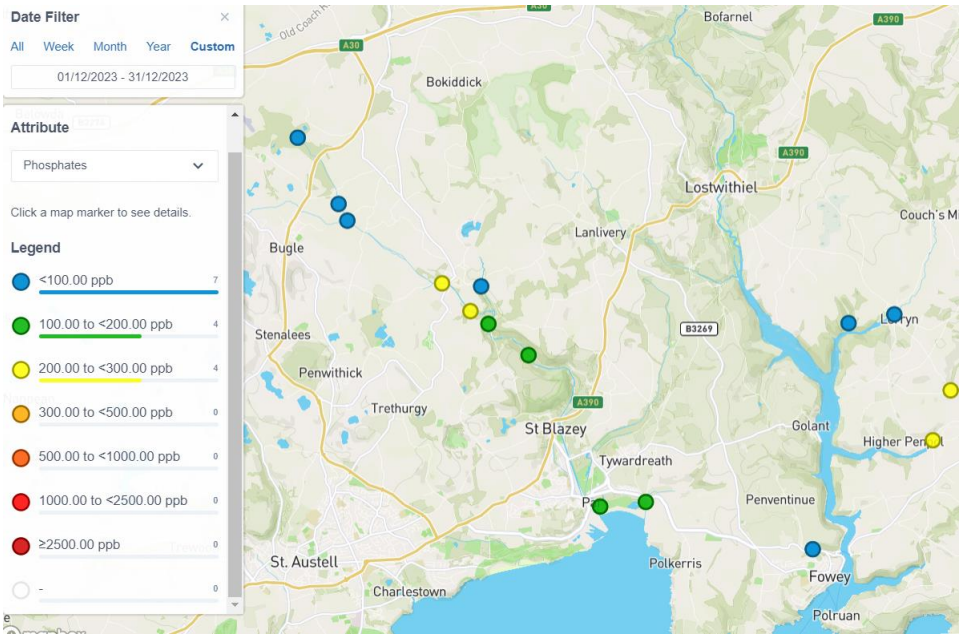
0 – 100 OK

200 – 300 HIGH

500 – 2500 – TOO HIGH

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





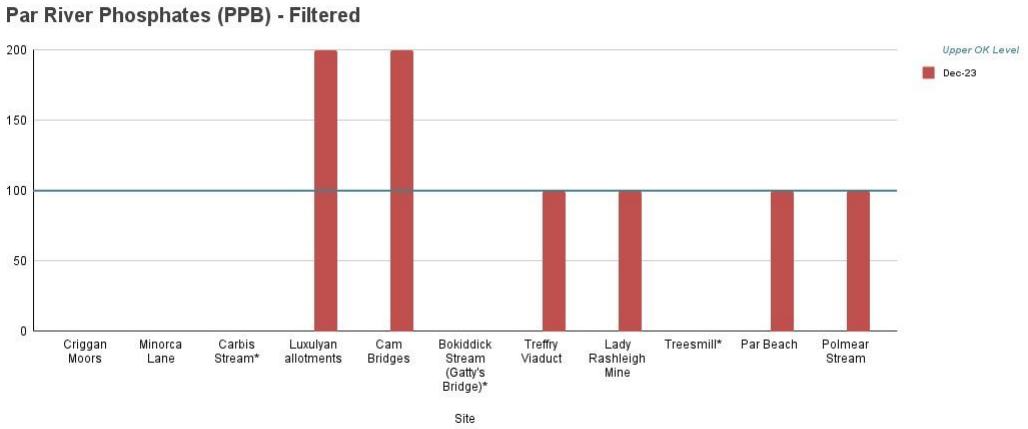
3. Results August 2023

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

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	200
Par	Cam Bridges, Par River, SX 05292 57454	200
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	0
Par	Treffry Viaduct, Par River, SX 05650 57179	100
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	100
Par	Par Beach slipway, SX 0776 53261	100
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	100

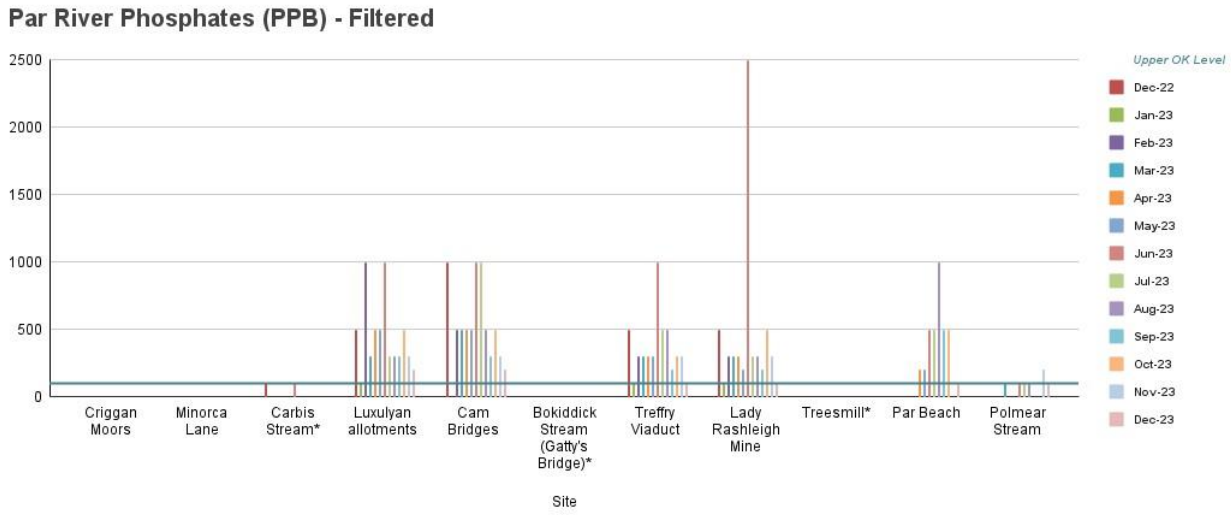
4. Graphs

(a) This month



*Indicates a tributary.

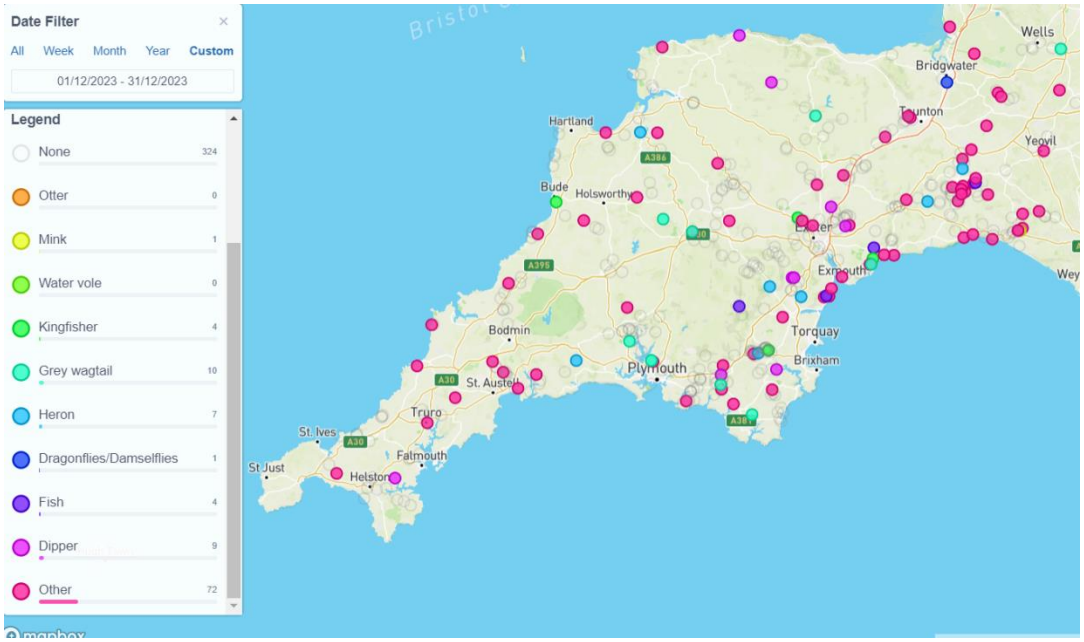
(b) Historical

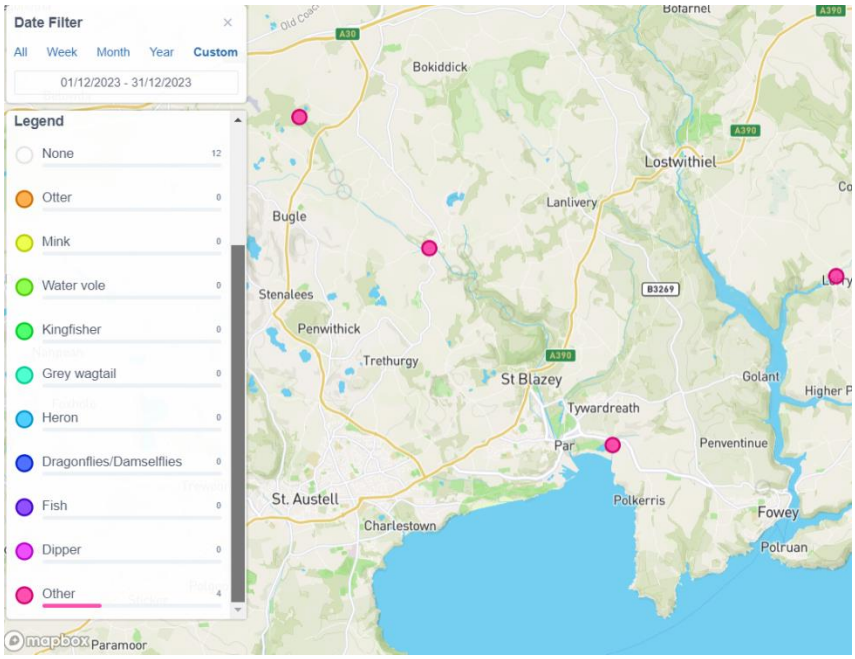


*Indicates a tributary.

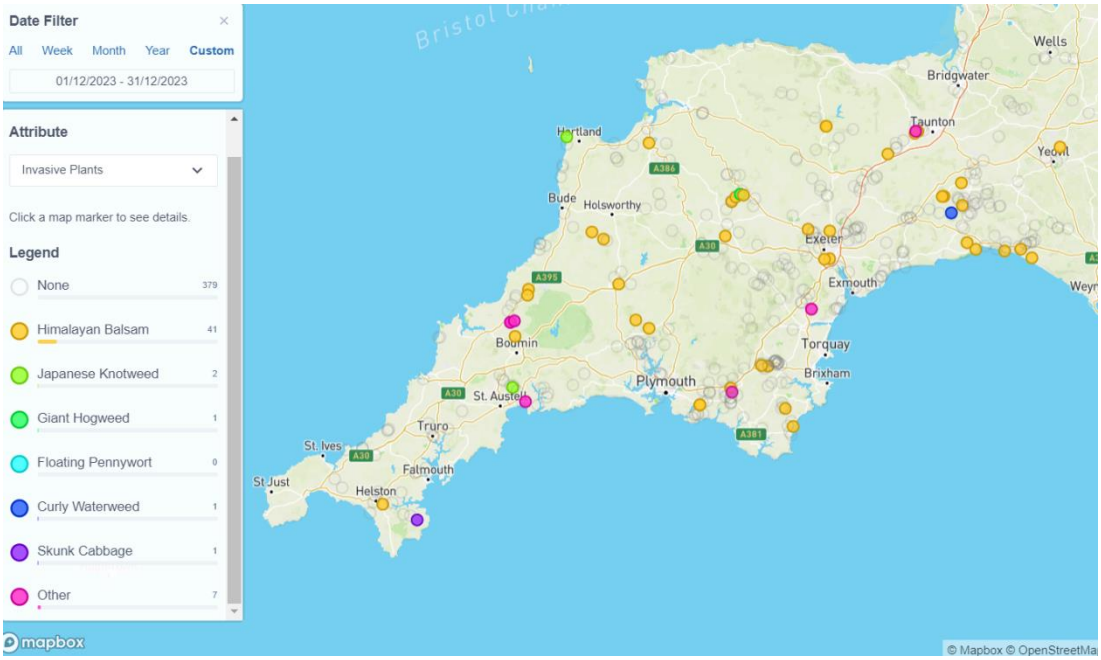
G. WILDLIFE (FOR OTTER REPORT SEE SECTION I) & INVASIVE PLANTS

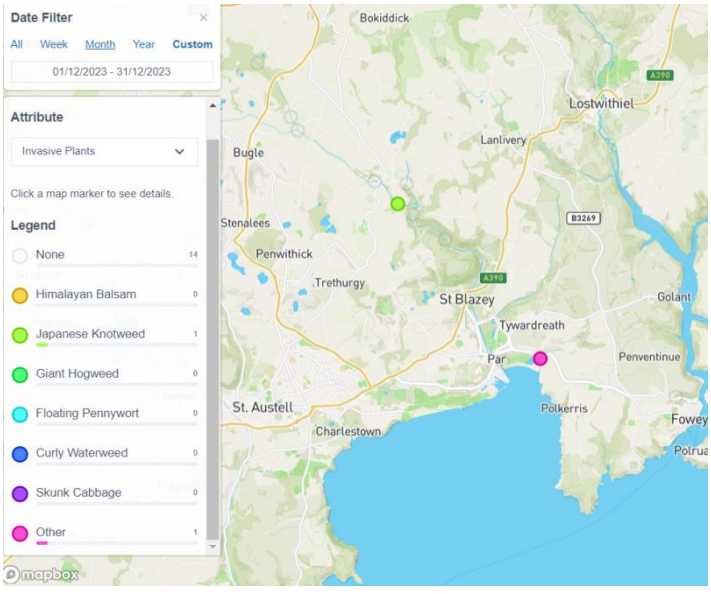
(a) Wildlife maps





(b) Invasive plants maps





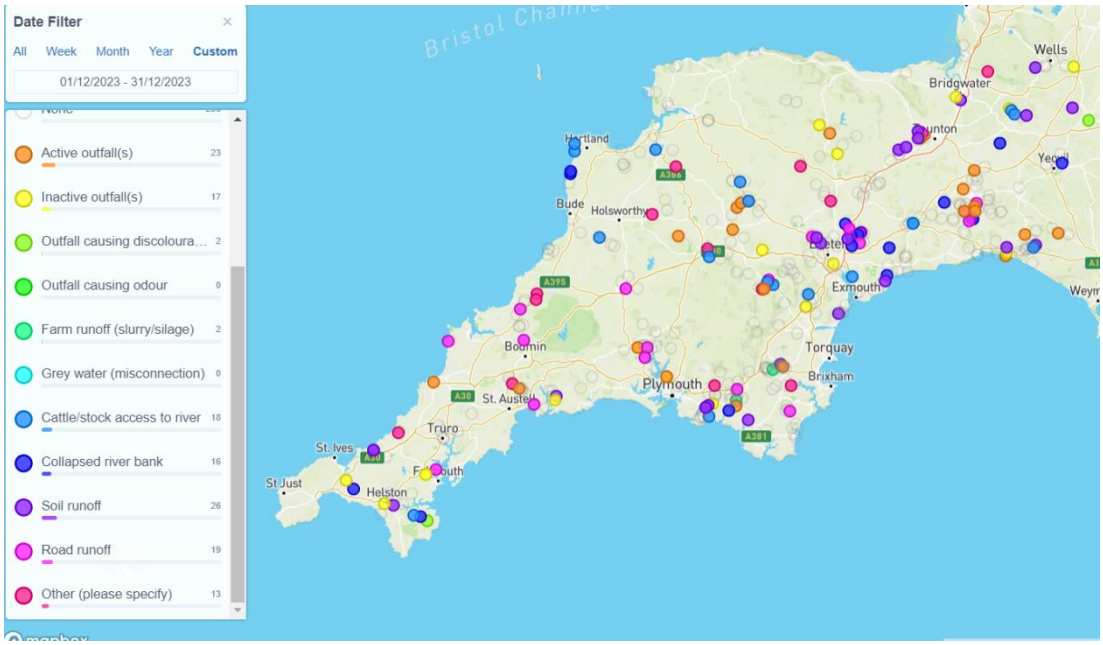
(c) Wildlife & Invasive Plants sightings at the monitoring points included:

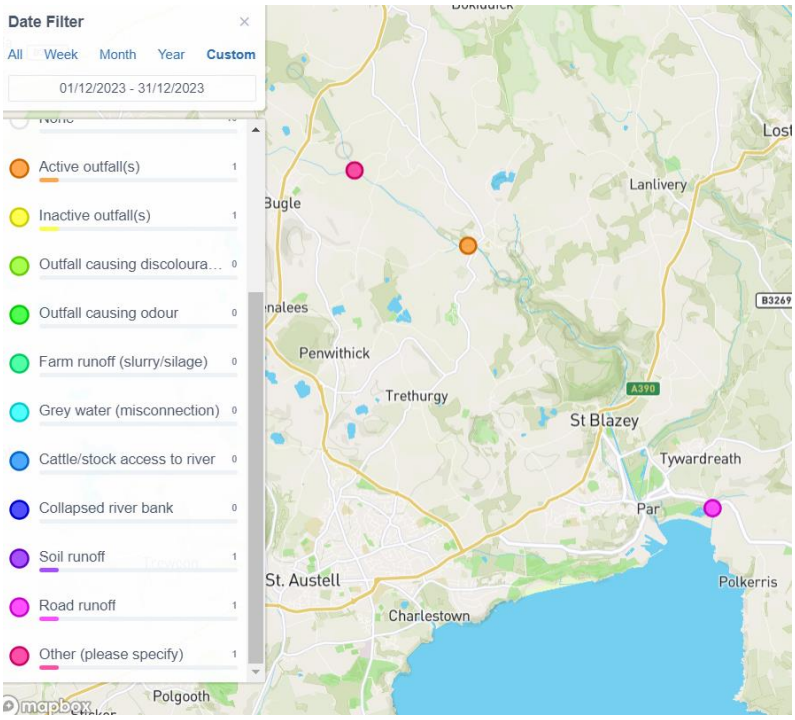
PAR RIVER/TRIBUTARY	LOCATION	WILDLIFE NOTED	INVASIVE PLANTS NOTED
Par	Criggan Moors, SX 01882 61133	Buzzard	None
Par	South of Minorca Lane, Par River, SX 02657 59788	None	None
Tributary	Carbis Stream SX 02834 59401	None	None
Par	Luxulyan allotments, Par River, SX 04732 58045	None	None
Par	Cam Bridges, Par River, SX 05292 57454	None	Japanese Knotweed
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	None	None
Par	Treffry Viaduct, Par River, SX 05650 57179	None	None
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	None.	None
Par	Par Beach slipway, SX 0776 53261	Ducks, woodpigeon.	None
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	Mallard ducks.	Hemlock water dropwort.

Otter spraint was found at Ponts Mill (downstream from Lady Rashleigh Mine), which is not a CSI monitoring point.

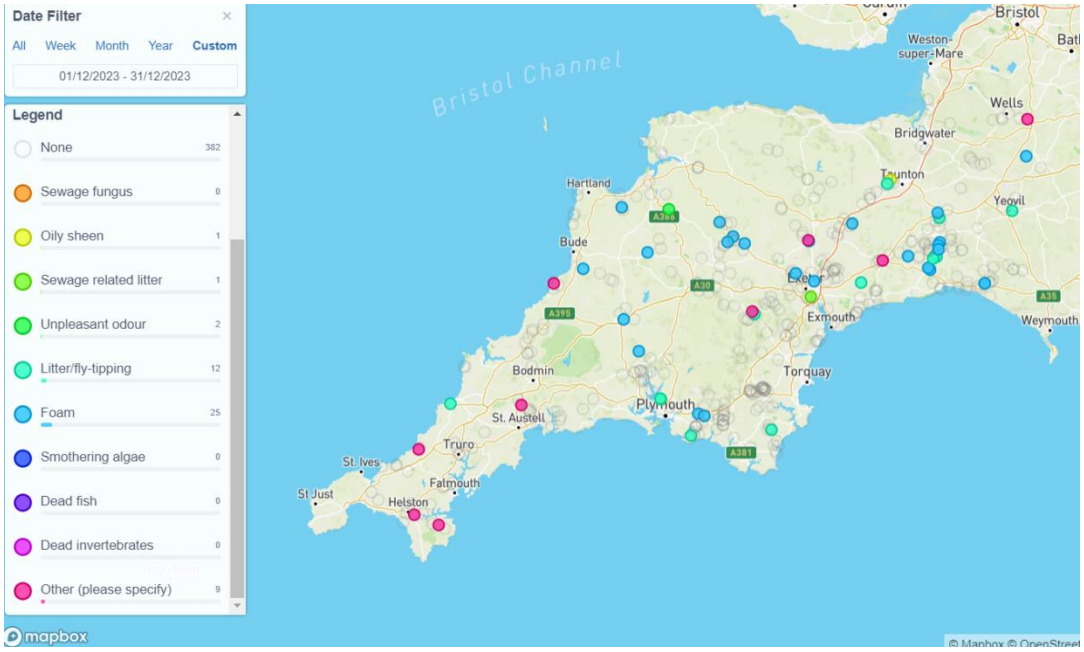
H. POLLUTION SOURCES AND EVIDENCE

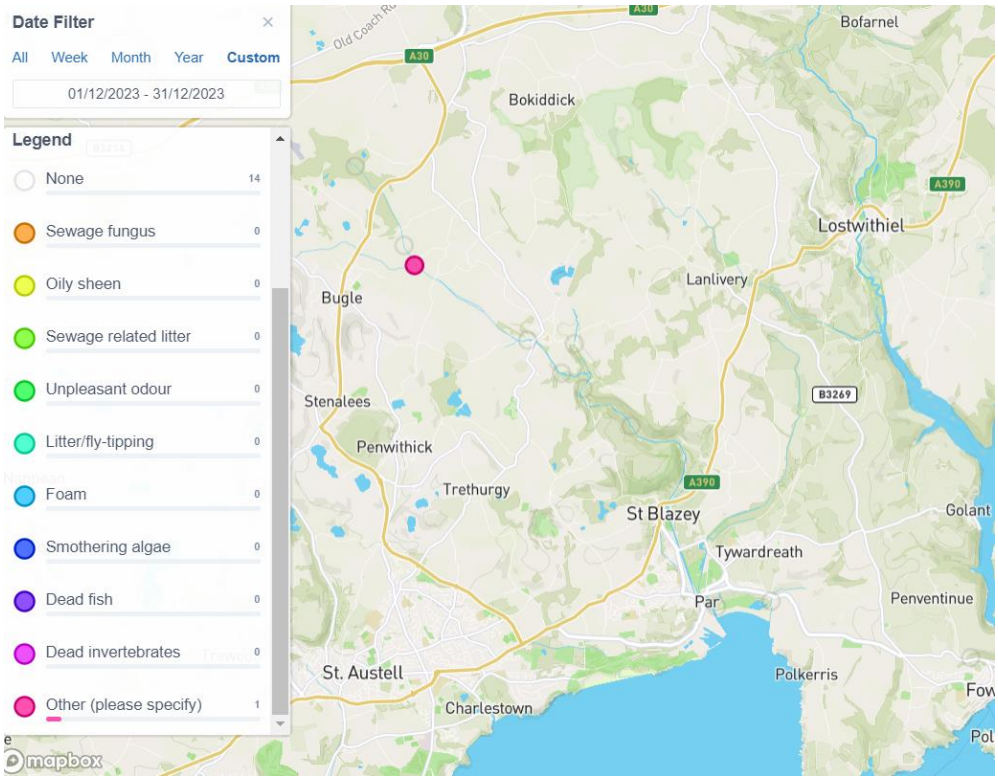
1. Pollution sources





2. Pollution evidence





I. OTTER SURVEY, DECEMBER 2023

1. SURVEY CONDITIONS

Date & time	13/12/2023
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 south of Prideaux Wood china clay works.
Weather	Heavy rain in previous 24 hours
River level	High
River flow	Steady to surging
Water quality	Phosphate readings 200 PPB at the highest (Luxulyan allotments), 200 at Cam Bridges, 100 at Treffry Viaduct and 100 at Lady Rashleigh Mine and 100 at Par Beach slipway. All readings zero upstream from the allotments.
Other wildlife	

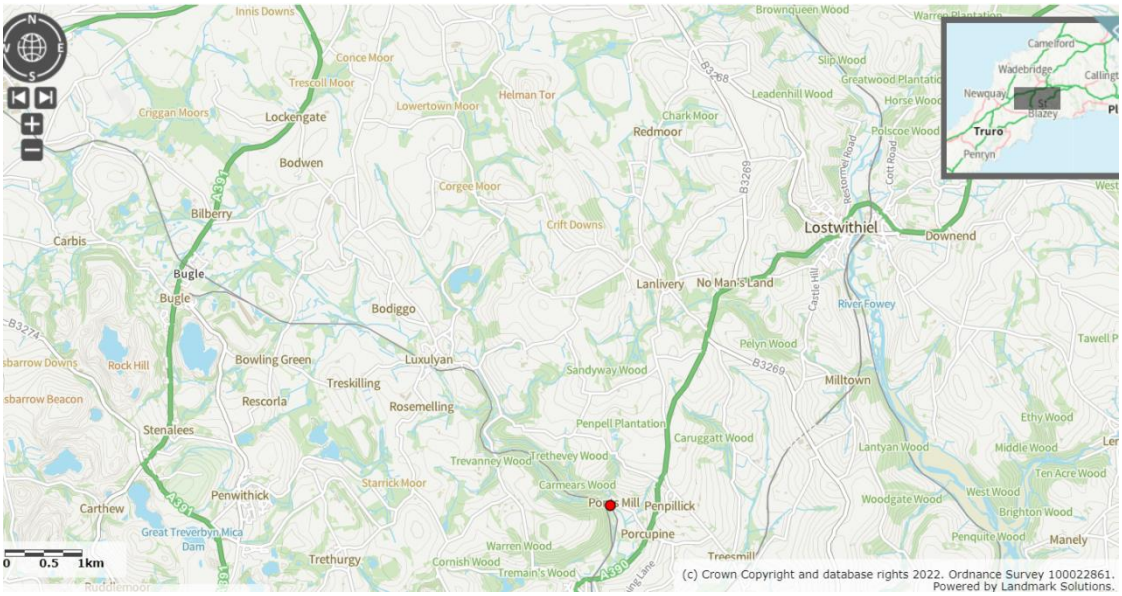
2. EVIDENCE FOR OTTERS ✓

EVIDENCE	SEEN/ ORKS*	LOCATION	NOTES
Spraint - fresh			
Spraint – recent	✓*	SX 07312 56164 Under the canal bridge at Ponts Mill.	
Spraint - old			
Anal jelly			
Sign heap			
Staining			
Tracks	✓*	SX 07312 56164 Under the canal bridge at Ponts Mill. Very feint.	
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

Recent spraint under canal bridge, Ponts Mill

Recent spraint under canal bridge, Ponts Mill

5. COMMENTS

High river levels meant that other regular sprainting spots were submerged.

L. DISCUSSION

1. Positive observations

(a) Once again, high water levels obscured boulders where otter spraint is often found but fresh spraint containing fish bones and scales was found at Ponts Mill.

(b) Phosphate levels were significantly below the norm.

(c) Recent work on the bank at Cam Bridges has created a potential fish passage although further work might be required to make it more manageable for fish.

(d) Simon Tagney has qualified to undertake riverfly surveys so additional work can be carried out.

2. Points of concern

(a) Phosphate levels were *High* (WRT classification) on the main river downstream from St Austell North STW, although the high volume of water probably diluted it.

(b) Our temperature readings vary according to the thermometer used. To now, the newer instruments have been used consistently at Par Beach, Polmear and Treesmill and on most occasions at Lady Rashleigh Mine, with the older instruments (which gave lower temperature readings and slightly different TDS scores) at all other sites. This inconsistency is unsatisfactory so a decision was made in December to use the newer instruments at all monitoring sites. Unfortunately, this reduces the value of our historical temperature and TDS readings.

(d) The water on the Carbis Stream was white once again, after several months of being clear. This may have resulted from china clay being washed from the banks by the increased flow following very heavy rain, rather than an increased discharge.

The white Carbis Stream entering the Par River near Higher Menadue.

(c) River levels have been very high. This is due to various factors including high recent rainfall, underlying geology (granite for the Upper Par), and the artificially straight course resulting from historical interventions. More recent development in certain locations, such as Rosevale

Gardens in Luxulyan, and in St Blazey and Par, added to the weather instability linked to the climate crisis, means that the risk of flooding is growing. Work to ameliorate the flow by slowing the river, especially in the Upper Par, would be advantageous but needs to be done only after proper investigation and calculation by professional agencies.

3. Areas of doubt

We have suspended riverfly monitoring for the winter months which limits our knowledge of river quality.

M. 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, Lloyd Paynter, Chloe Lake, David Edwards, Claire and Gary Phillips, Chris Bartram, Jenny Heskett, Nick Taylor, Jeremy Roberts, Mat Bateman, Colin Pringle, Matt Healey, Simon Browning, Lydia Deacon, Layla Ousley, Eva Edgeworth, Jack Middleton, Anna Seal, Jade Neville, 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.

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