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.

JUNE 2024

DAVE BURRELL

Dave and Joan Farmer testing a water sample on the banks of the Par River.

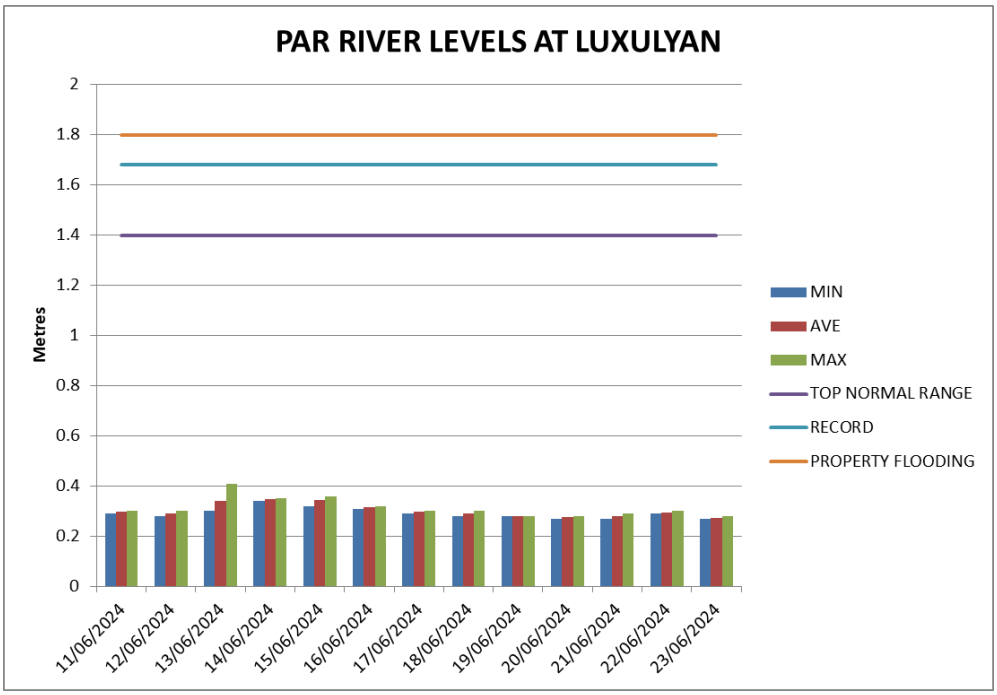
Sadly, we lost one of our citizen scientists this month. Dave Burrell had been ill for some time but, despite that, he still took part in our monitoring, especially in his beloved Luxulyan Valley. For years Dave took part in the quarterly otter-spotting surveys run by the Friends of Luxulyan Valley and jumped at the chance of undertaking the Westcountry Rivers Trust's river monitoring. Besides being very knowledgeable about wildlife, he was an excellent photographer and applied scientific rigour to the monthly reports. We will miss him terribly in many ways, not least his cheerfulness, commitment and boundless curiosity. He was a countryman and a true gentleman.

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

1. We sampled at 15 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) 5 TESTING LOCATIONS	TRIBUTARY OF LOWER PAR (POLMEAR STREAM) 2 TESTING LOCATIONS
TEMPERATURE (SHOULD NOT EXCEED 18˚ CELSIUS)	Average 13.88˚ Celsius	Average 16.46˚ Celsius	Average 14.28˚ Celsius	Average 16.05˚ Celsius
TOTAL DISSOLVED SOLIDS (SHOULD NOT EXCEED 300 PPM)	94.4 PPM	**352.6 PPM** (811 Par Beach slipway, average of other 2 = 123.5)	123.6 PPM	143 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)	**200 PPB**	**333.3 PPB**	0 PPB	0 PPB
RIVERFLY SCORE (TRIGGER LEVEL SHOULD BE ≥ 6)	N/A	12	N/A	N/A
WILDLIFE EVIDENCE	Deer, chiffchaff, jay, dipper, otter spraint, Speckled Wood butterfly, buzzard	Riverflies (cased caddis, caseless caddis, mayfly, blue-winged olive, flat-bodied upwing, olives, stoneflies, gammarus)), grey wagtail, gulls	Chiffchaff, dragonflies, Speckled Wood butterfly, buzzard	Green woodpecker, blackbird, goldfinch, chiffchaff, fish
EVIDENCE OF POLLUTION	Foam, smell	Foam, smell	Litter	None

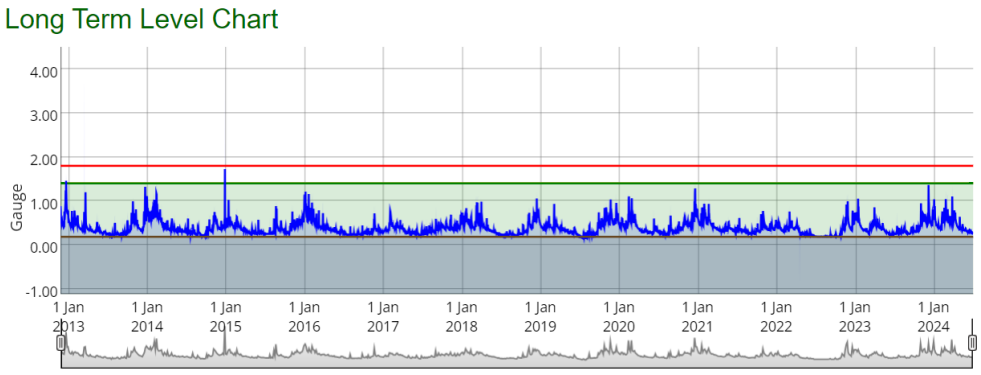
2. **Par River levels at Luxulyan preceding and during surveys.** These are available here: https://check-for-flooding.service.gov.uk/station/3159). The following graph uses data recorded at this website: https://riverlevels.uk/par-river-luxulyan .



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

Long term data taken from: https://riverlevels.uk/par-river-luxulyan :



Darker blue shaded areas on long term data indicate maximum and minimum levels for the date (you may need to zoom in closer to see them).

Long term data may have gaps where the API data was not available.

3. Key points:

(a) Positive signs

(i) The redundant SWW pumping station discharge point (SX 0504 5783) near Luxulyan that we have long had concerns about has now been removed:

(ii) There were some interesting wildlife sightings. Our riverfly survey met the trigger level. Otter spraint was found. Also a dipper and grey wagtail were seen, both indicators of healthy water quality.

(c) A new monitoring site, on the Molinnis Stream near Bugle, was added to the list.

(b) Points of concern

(i) The second highest score for Total Dissolved Solids (811 ppm) was recorded at Par Beach. The guidance is that this should not exceed 300 ppm.

(ii) Phosphate levels downstream from St Austell North STW at Luxulyan remained too high.

(iii) The smell in the main river was noticeable again at Cam Bridges and in Luxulyan Valley.

(iv) Signal crayfish were found by the Environment Agency on the Treskilling/Treverbyn Stream.

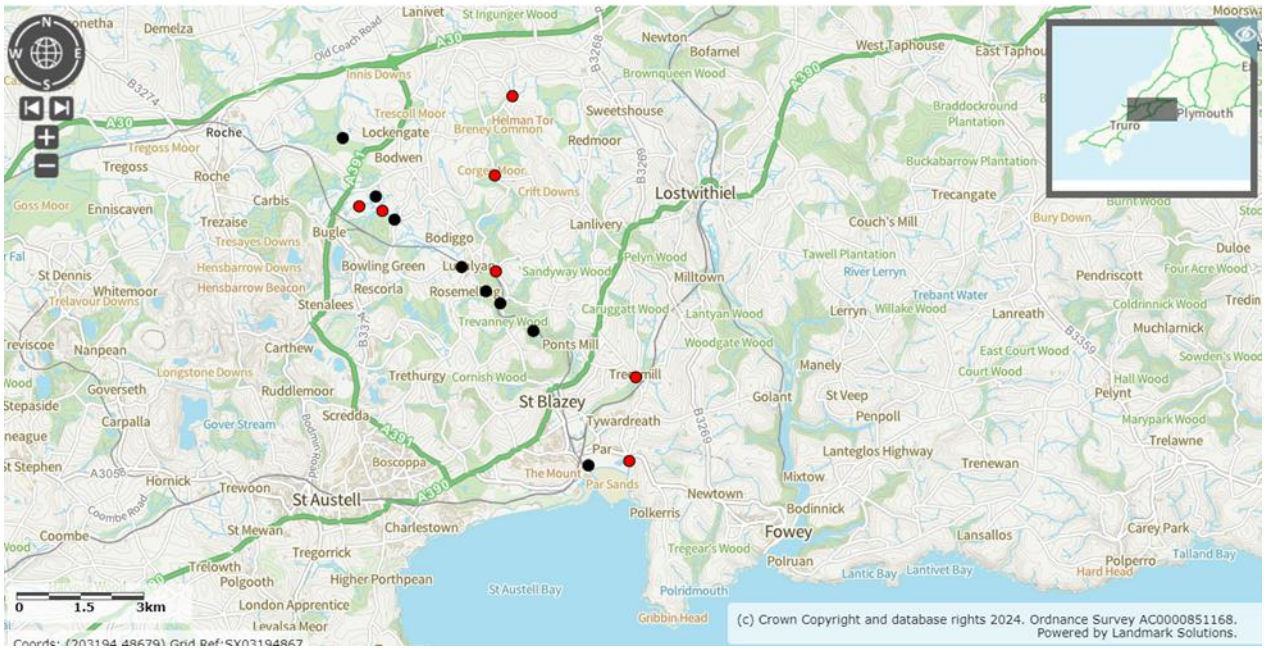
(v) Japanese knotweed is well established on the Molinnis and Treskilling streams.

(c) Areas of Doubt

Will the change in government lead to the investment in environmental protection that is desperately needed?

B. JUNE 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



The times have been included in case that explains some of the variations in water temperature.

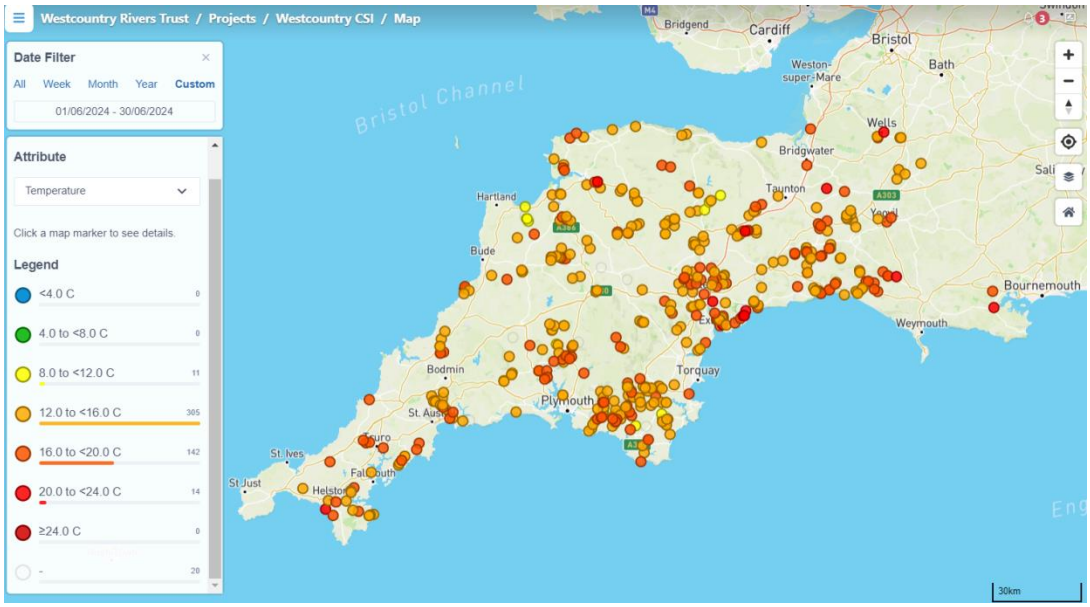
LOCATION	PAR/TRIBUTARY	DATE/TIME	TYPE OF CHECK	MONITORED BY
Criggan Moors, Par River, SX 01882 61133	**PAR**	12/6/2024 8.10 am	CSI sample & Cartographer record.	Roger Smith
South of Minorca Lane, Par River, SX02668 59747	**PAR**	12/6/2024 7.25 am	CSI sampling. Cartographer record.	Roger Smith
Near Forkandles farm, Molinnis Stream, SX 02460 59271	**SECONDARY TRIBUTARY (OF CARBIS STREAM)**	12/6/2024 9.30 am	CSI sample & Cartographer record.	Roger Smith
Carbis Stream SX 02834 59401	**TRIBUTARY**	12/6/2024 9.07 am	CSI sampling. Cartographer record.	Roger Smith
Lavrean, Par River SX 03134 59164	**PAR**	12/6/2024 9.55 am	CSI sampling. Cartographer record.	Roger Smith
Luxulyan allotments, Par River, SX 04732 58045	**PAR**	12/6/2024 10.45 am	CSI sampling. Cartographer record.	Roger Smith
Cam Bridges, Par River, SX 05292 57454	**PAR**	12/6/2024 12.55 pm	CSI sampling. Cartographer record.	Roger Smith
Trebell Green, Bokiddick Stream SX 0551960226	**TRIBUTARY**	11/6/2024 12.10 pm	CSI sampling. Cartographer record.	Roger Smith, Linda Smith
Corgee Moor, Bokiddick Stream SX 0593462167	**TRIBUTARY**	11/6/2024 11.20 am	CSI sampling. Cartographer record.	Roger Smith, Linda Smith
Gatty's Bridge, Bokiddick Stream SX 05531 57953	**TRIBUTARY**	12/6/2024 7.40 pm	CSI sampling. Cartographer record.	Joan Farmer
Treffry Viaduct, Par River, SX 05650 57179	**PAR**	12/6/2024 1.40 pm	CSI sampling. Cartographer record.	Joan Farmer
Lady Rashleigh Mine, Par River, SX 06451 56509	**PAR**	12/6/2024 1.35 pm	CSI sampling. Cartographer record. Riverfly.	Joan Farmer, Roger Smith
Treesmill, Tywardreath Stream, SX 08873 55385	**TRIBUTARY**	23/6/2024 1.50 pm	CSI sampling. Cartographer record.	Maggie Tagney
Par Beach slipway, SX 0776 53261	**PAR**	13/6/2024 10 am	CSI sampling. Cartographer record.	Brian Harrisson
Polmear Stream, Ship Inn SX 08749 53417	**TRIBUTARY**	11/6/2024 5 pm	CSI sampling. Cartographer record.	Simon Tagney

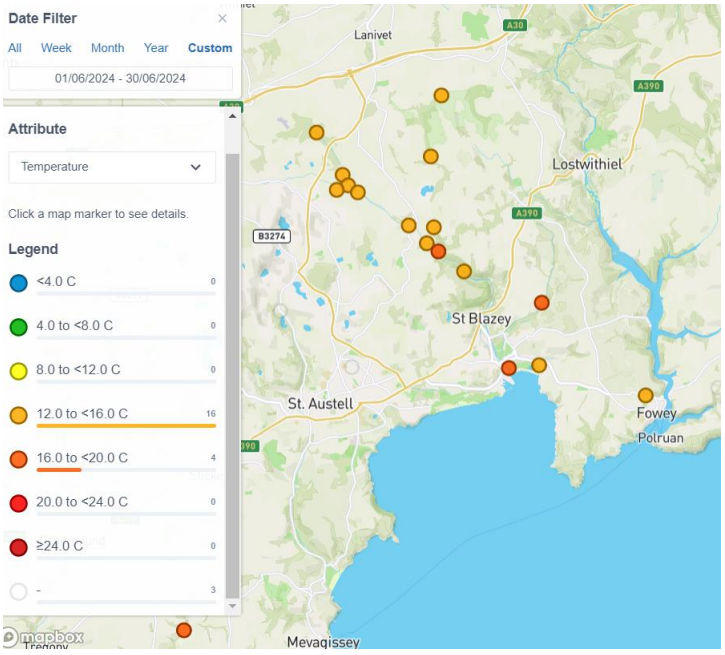
C. TEMPERATURE

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, Par River, SX 01882 61133	12.5
Par	South of Minorca Lane, Par River, SX 02657 59788	13.3
Secondary tributary	Near Forkandles Farm, Molinnis Stream, SX 02460 59271	15.2
Tributary	Carbis Stream SX 02834 59401	14.6
Par	Lavrean, Par River SX 03134 59164	14
Par	Luxulyan allotments, Par River, SX 04732 58045	14.4
Par	Cam Bridges, Par River, SX 05292 57454	15.2
Tributary	Trebell Green, Bokiddick Stream SX 0551960226	13.8
Tributary	Corgee Moor, Bokiddick Stream SX 0593462167	13.6
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	14.2
Par	Treffry Viaduct, Par River, SX 05650 57179	17.5
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	15.2
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385	17.3
Par	Par Beach slipway, SX 0776 53261	16.7
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	14.8

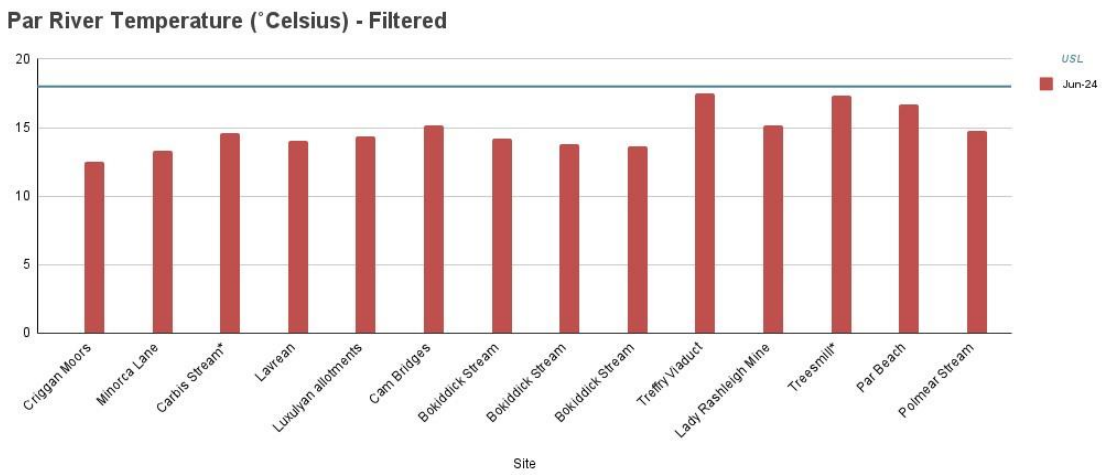
Results above the temperature at which fish and other organisms can function healthily will be shown in red. At present, 18 ˚Celsius is being used as the upper safe limit for fish and other creatures, although 20˚ Celsius has recently been suggested by WRT instead. The Yealm Estuary to Moor Project (YEM)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

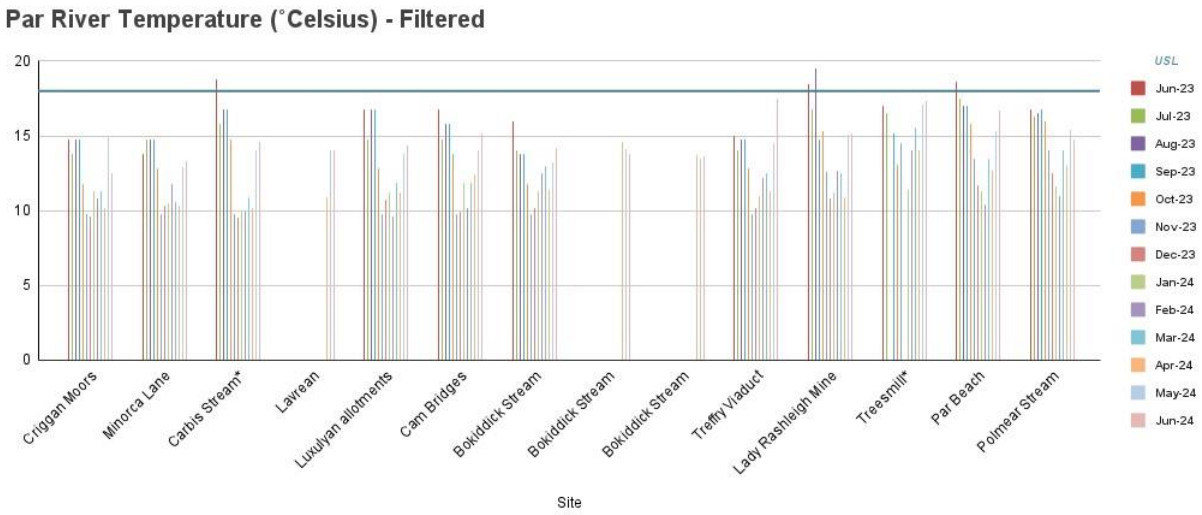
4. Graphs

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.

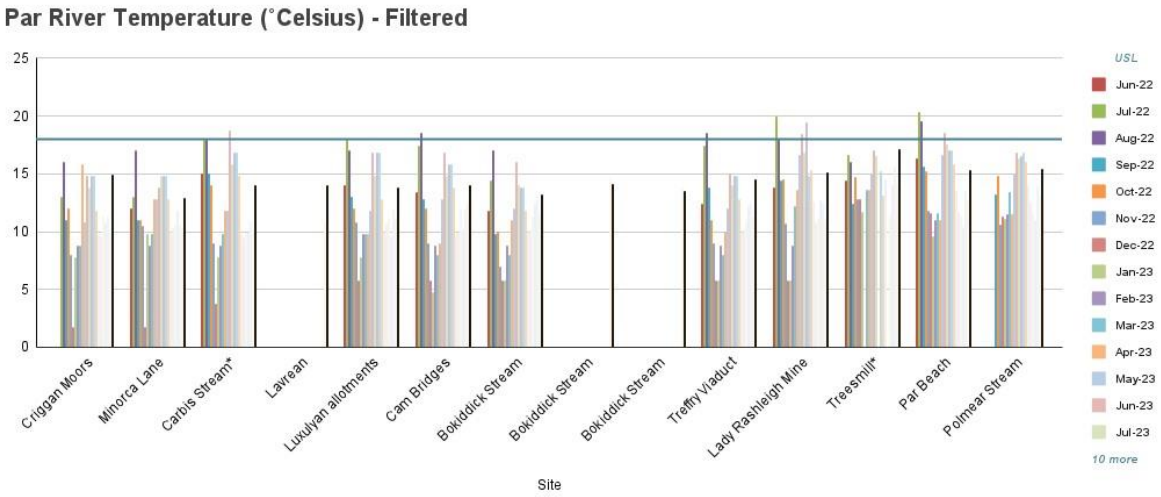
(a) This month:



(b) From 1st June 2023 until now:



(c) From 1st June 2022 until now:



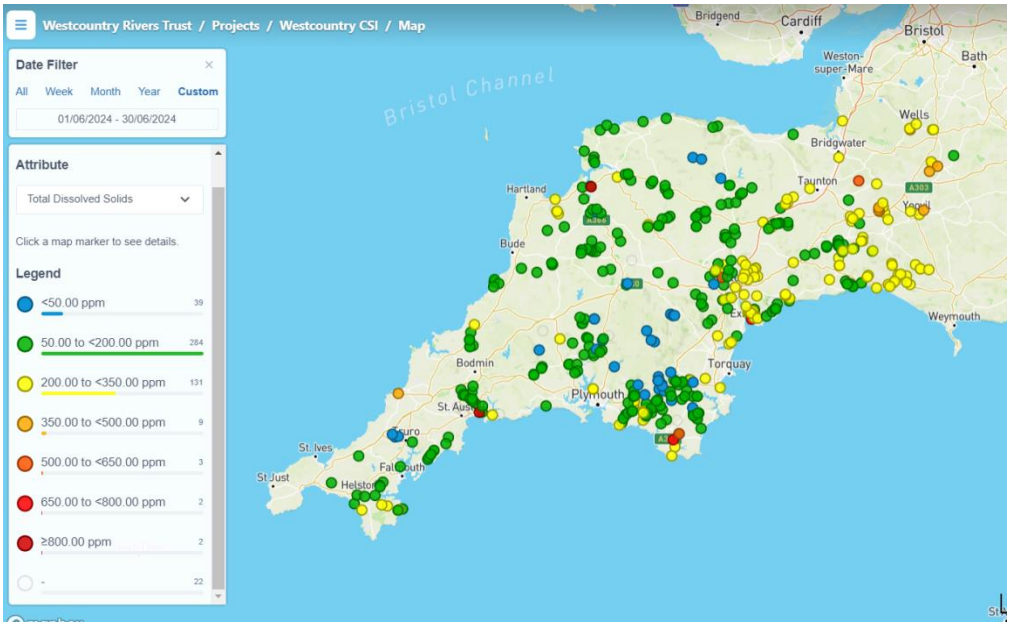
D. TOTAL DISSOLVED SOLIDS

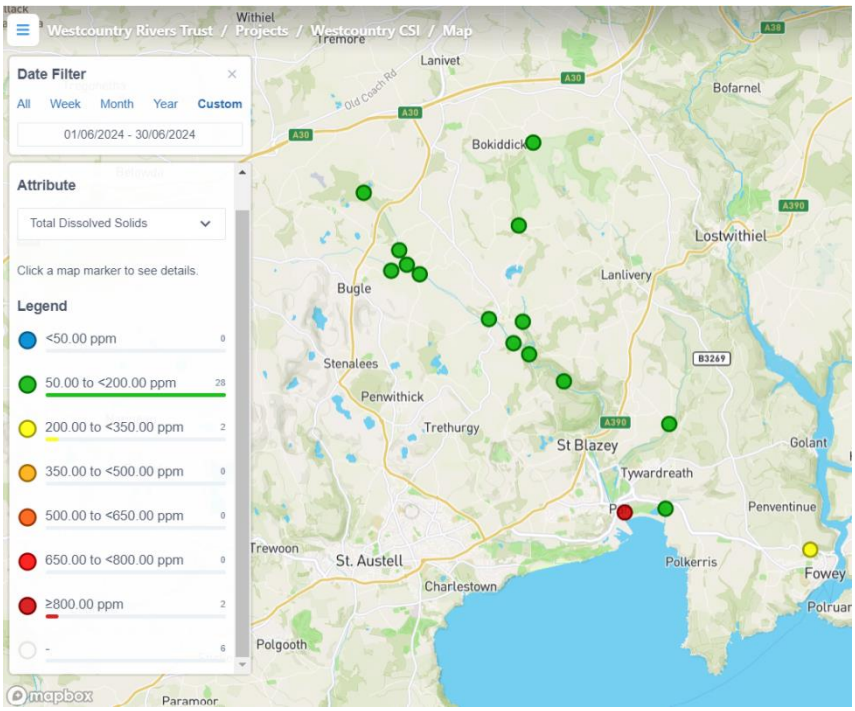
1. We measure these in ppm (parts per million). This is the WRT's explanation:

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.



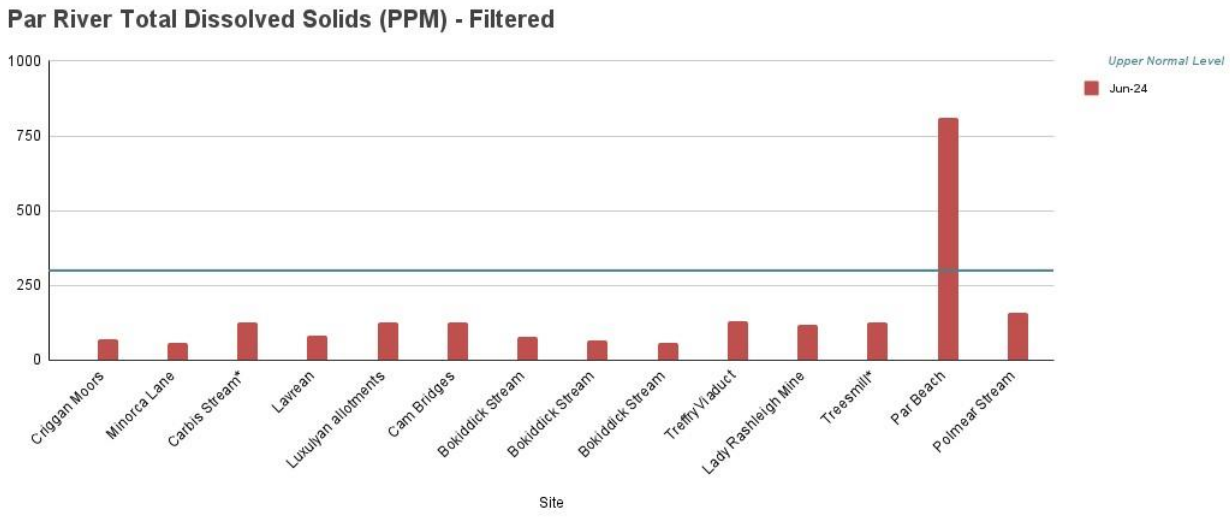


3. Results June 2024

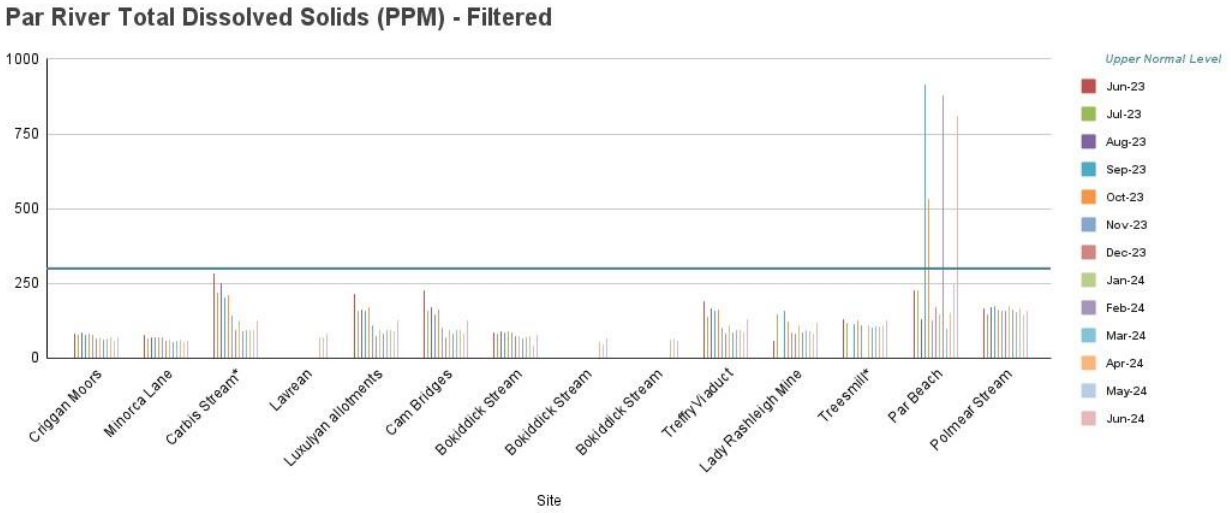
PAR RIVER/TRIBUTARY	LOCATION	Total Dissolved Solids PPM
Par	Criggan Moors, SX 01882 61133	70
Par	South of Minorca Lane, Par River, SX 02657 59788	57
Secondary tributary	Near Forkandles Farm, Molinnis Stream, SX 02460 59271	163
Tributary	Carbis Stream SX 02834 59401	126
Par	Lavrean, Par River SX 03134 59164	84
Par	Luxulyan allotments, Par River, SX 04732 58045	125
Par	Cam Bridges, Par River, SX 05292 57454	136
Tributary	Trebell Green, Bokiddick Stream SX 0551960226	67
Tributary	Corgee Moor, Bokiddick Stream SX 0593462167	58
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	79
Par	Treffry Viaduct, Par River, SX 05650 57179	129
Par	Lady Rashleigh Mine, Par River, SX 06451 56509	118
Tributary	Treesmill, Tywardreath Stream, SX 08873 55385	128
Par	Par Beach slipway, SX 0776 53261	811
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	158

4. Graphs

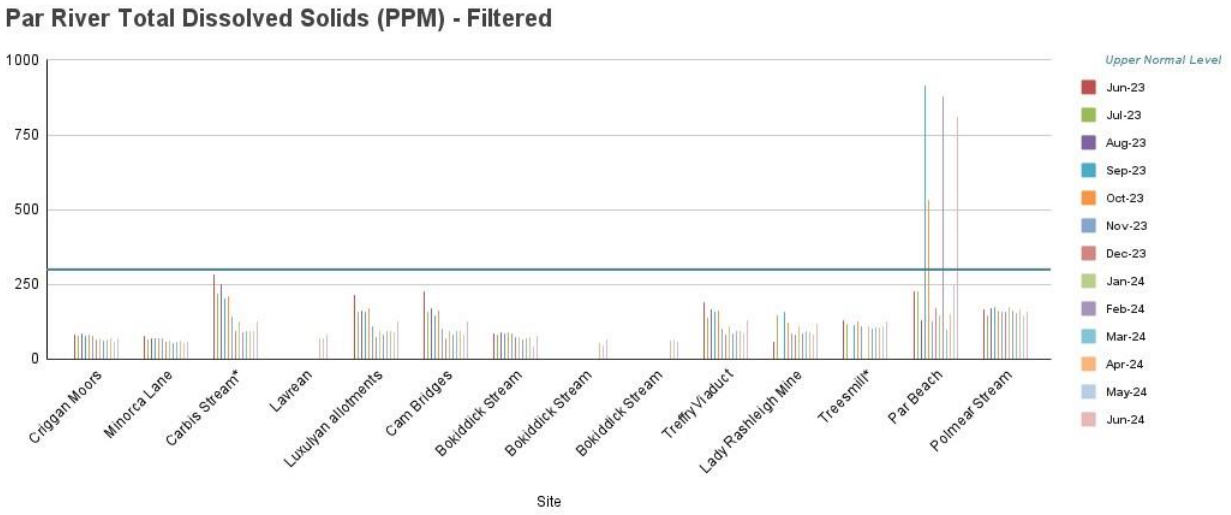
(a) This month



(b) June 2023 until now:



(c) June 2022 until now:



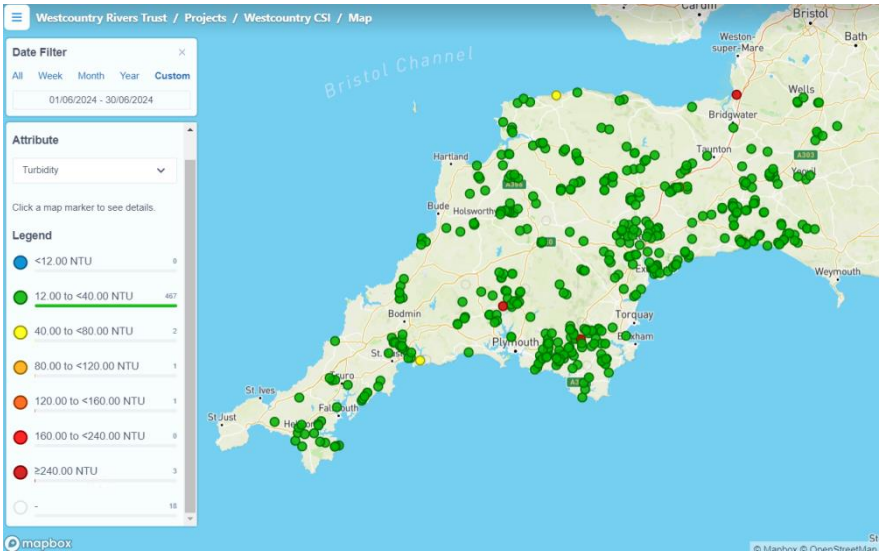
E. TURBIDITY

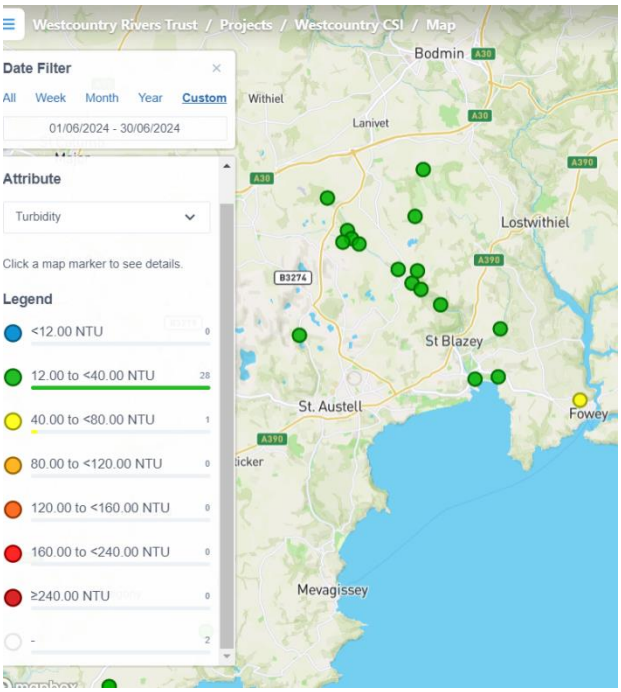
1. This is the WRT explanation of this measure:

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).





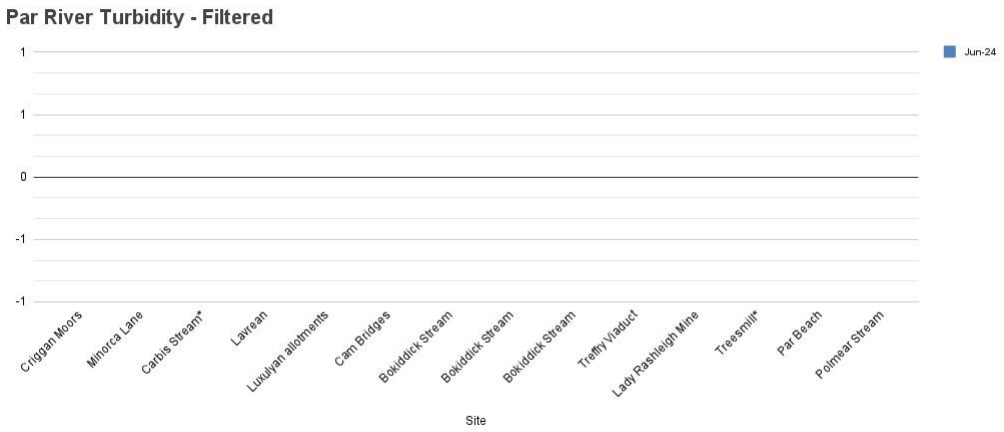
3. Results June 2024:

PAR RIVER/TRIBUTARY	LOCATION	Turbidity (NTU)
Par	Criggan Moors, SX 01882 61133	<12
Par	South of Minorca Lane, Par River, SX 02657 59788	<12
Secondary tributary	Near Forkandles farm, Molinnis Stream, SX 02460 59271	<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	<12
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	<12
Par	Par Beach slipway, SX 0776 53261	<12
Tributary	Polmear Stream, Ship Inn, SX 08749 53417	<12

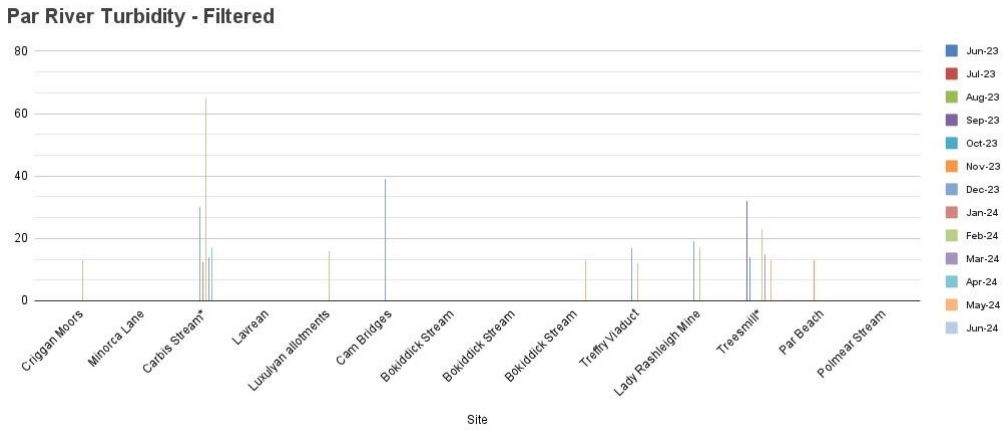
4. Graphs

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.

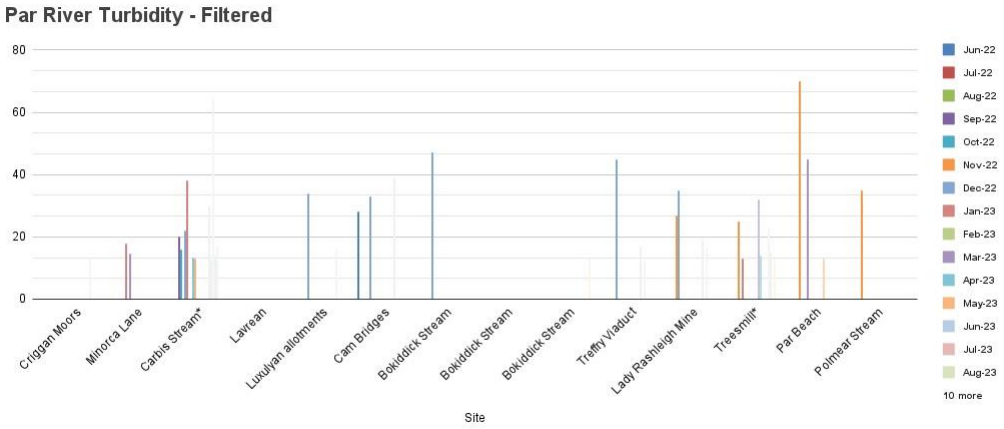
(a) This month



(b) June 2023 until now:



(c) June 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.)

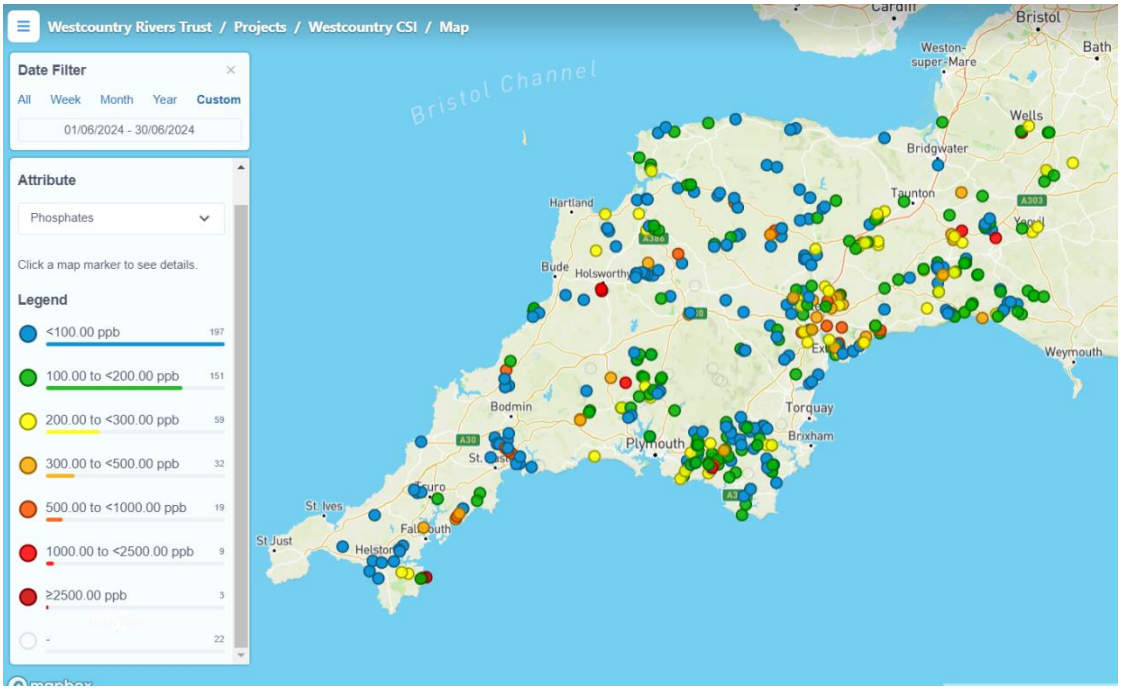
Ranges on phosphate diagnostic colour chart:

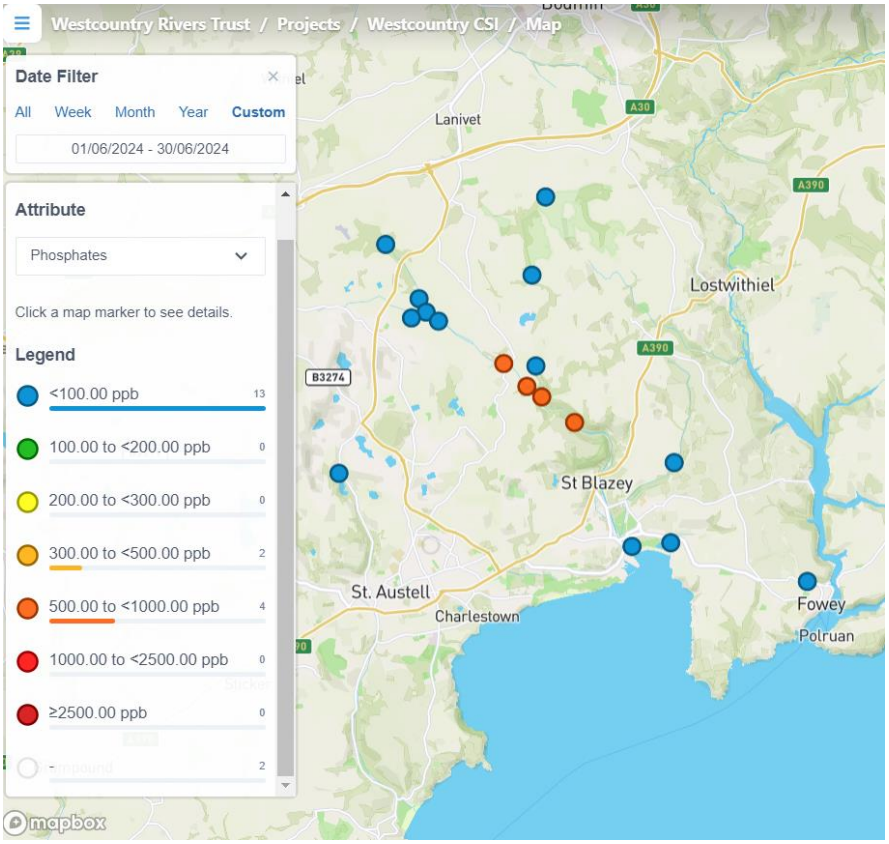
0 – 100 OK

200 – 300 HIGH

500 – 2500 – TOO HIGH

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





3. Results June 2024

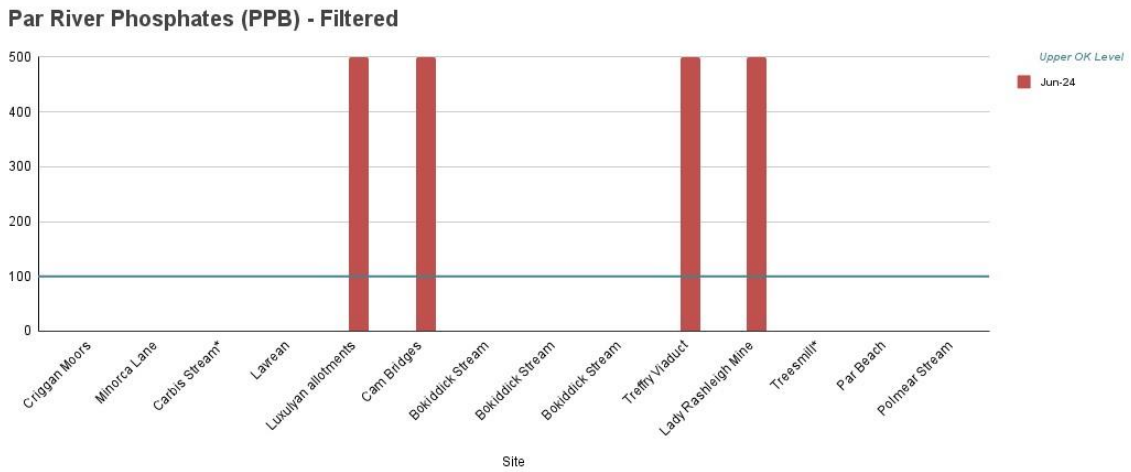
Results in red show phosphate levels that are classified as 'High' (above the upper safe level). WRT advice is that this is 100 Parts per Billion (0.1 mg/l).

PAR RIVER/TRIBUTARY	LOCATION	Phosphates PPB
Par	Criggan Moors, SX 01882 61133	0
Par	South of Minorca Lane, Par River, SX 02657 59788	0
Secondary tributary	Near Forkandles Farm, Molinnis Stream, SX 02460 59271	0
Tributary	Carbis Stream SX 02834 59401	0
Par	Lavrean, Par River SX 03134 59164	0
Par	Luxulyan allotments, Par River, SX 04732 58045	500
Par	Cam Bridges, Par River, SX 05292 57454	500
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	500
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

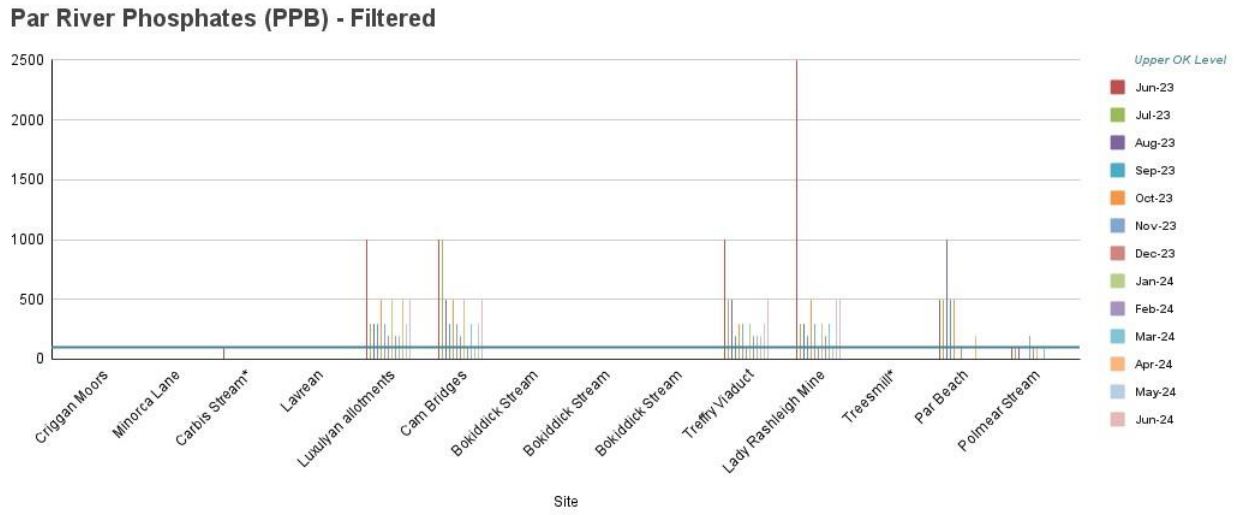
4. Graphs

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.

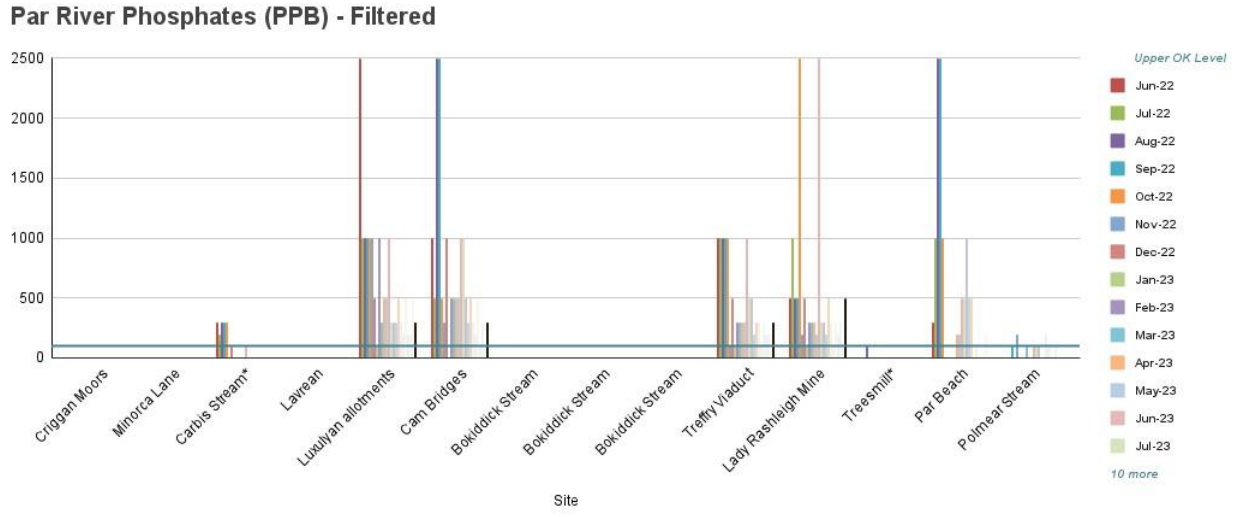
(a) This month:



(b) June 2023 until now:



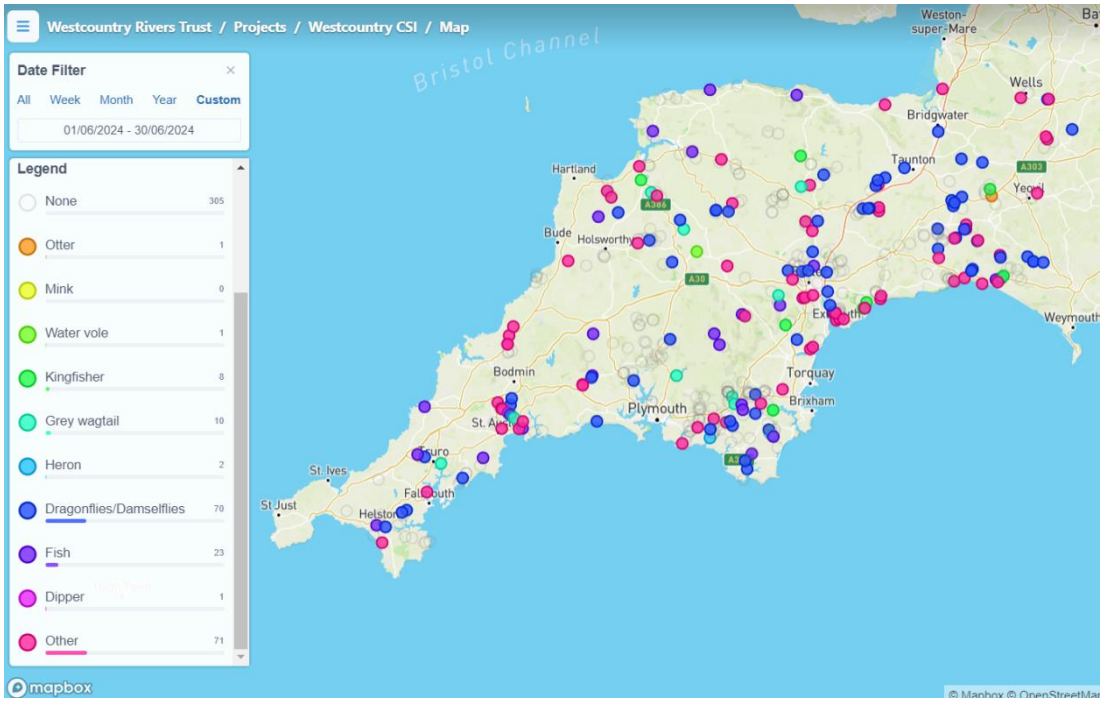
(c) June 2022 until now:

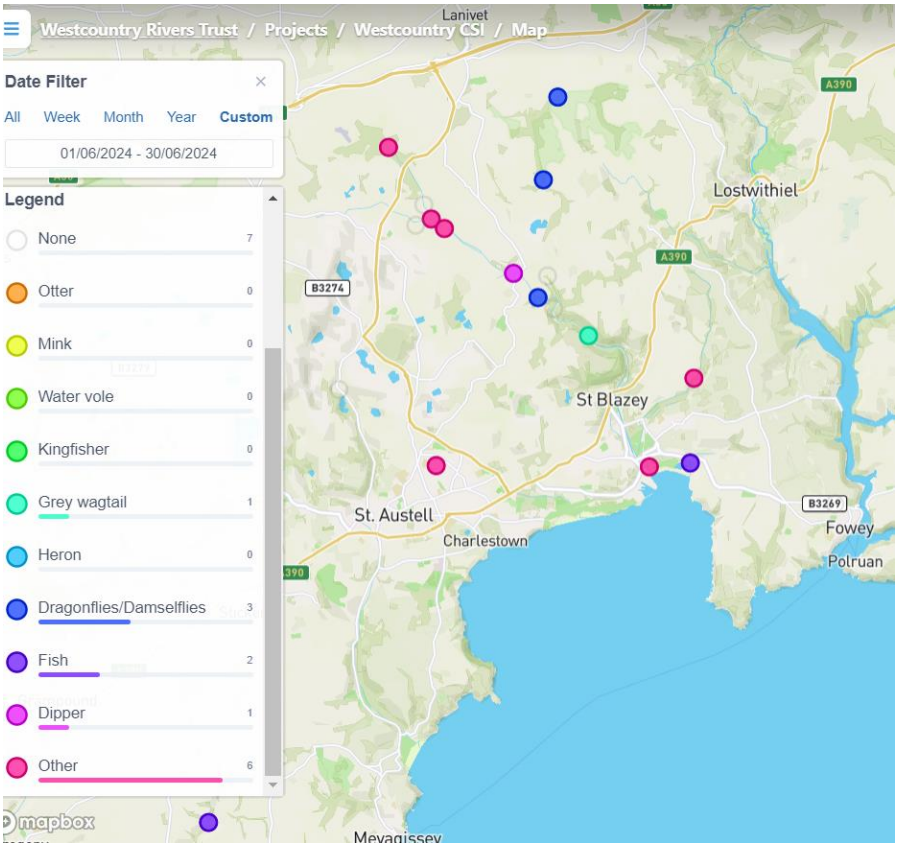


G. WILDLIFE & INVASIVE PLANTS

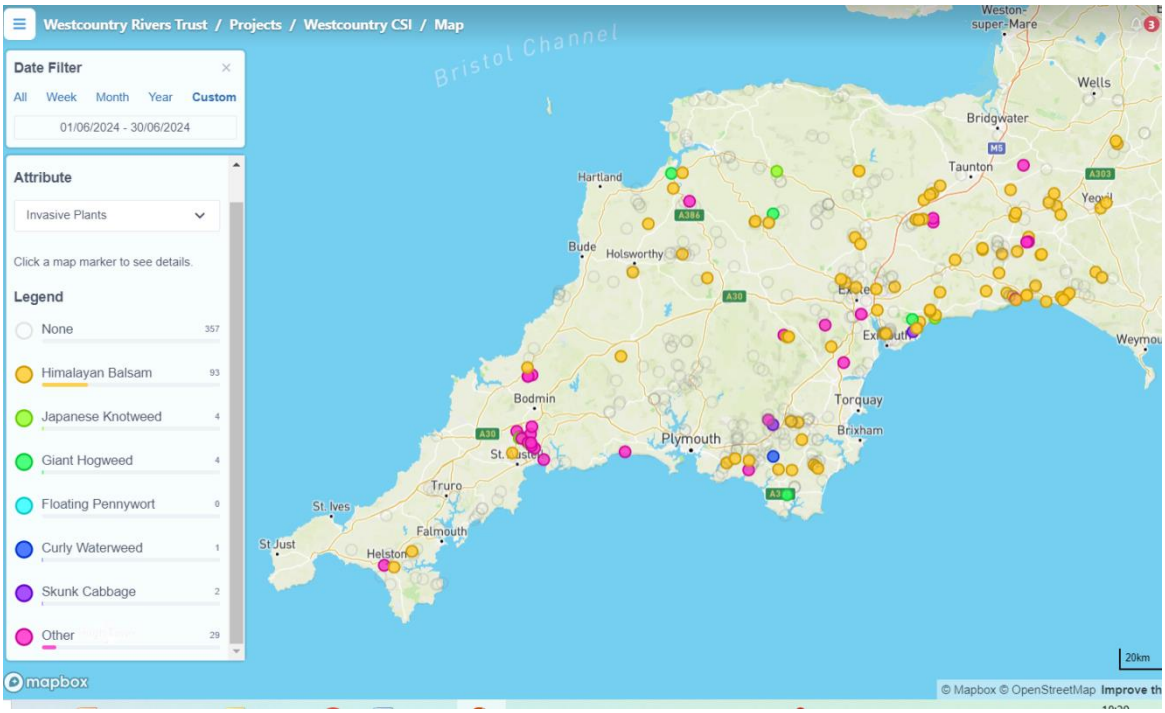
(a) Wildlife maps

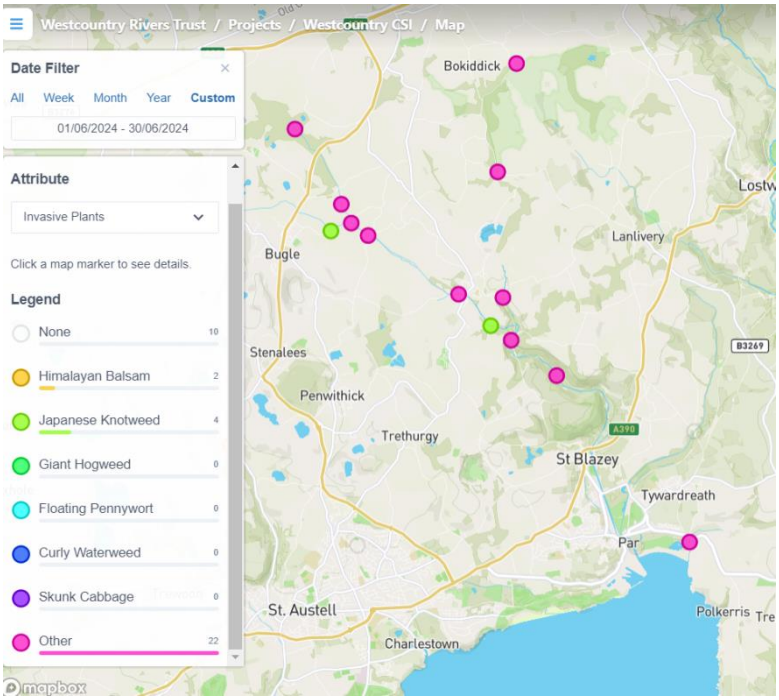
Evidence of otters is found nearly every month, but frequently it is not found at our monitoring points and when it is it will be entered under 'Other' because live sightings are extremely rare.





(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	Deer, chiffchaff	Hemlock Water Dropwort
South of Minorca Lane, Par River, SX 02657 59788	None	Hemlock Water Dropwort
Forkandles Farm, Molinnis Stream, SX 02460 59271	None	Hemlock Water Dropwort, Japanese Knotweed
Carbis Stream SX 02834 59401	Chiffchaff	Hemlock Water Dropwort
Lavrean, Par River SX 03134 59164	Chiffchaff, jay	Hemlock Water Dropwort
Luxulyan allotments, Par River, SX 04732 58045	Dipper, recent otter spraint	Hemlock Water Dropwort
Cam Bridges, Par River, SX 05292 57454	Specked Wood butterfly, dragonflies, buzzard	Hemlock Water Dropwort, Japanese Knotweed
Trebell Green, Bokiddick Stream SX 0551960226	Specked Wood butterfly, dragonflies, buzzard, chiffchaff	Hemlock Water Dropwort
Corgee Moor, Bokiddick Stream SX 0593462167	Dragonflies	Hemlock Water Dropwort
Gatty's Bridge, Bokiddick Stream SX 05531 57953	None	Hemlock Water Dropwort
Treffry Viaduct, Par River, SX 05650 57179	None	Hemlock Water Dropwort
Lady Rashleigh Mine, Par River, SX 06451 56509	Grey wagtail, riverflies (Cased Caddis, Caseless Caddis, Mayfly, Blue-winged Olive, Flat-bodied Upwings, Olives, Stoneflies, Gammarus)	Hemlock Water Dropwort
Treesmill, Tywardreath Stream, SX 08873 55385	Green Woodpecker, blackbird, goldfinch	Possible Hemlock Water Dropwort
Par Beach slipway, SX 0776 53261	Gulls	None
Polmear Stream, Ship Inn, SX 08749 53417	Fish, chiffchaff	Hemlock Water Dropwort

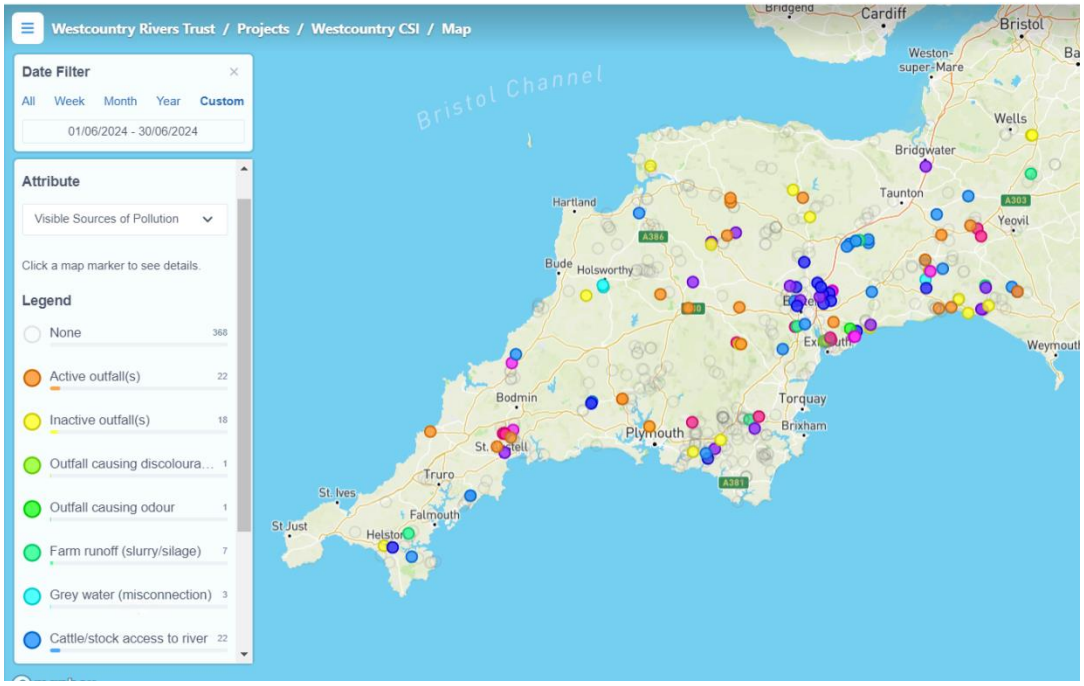
(d)

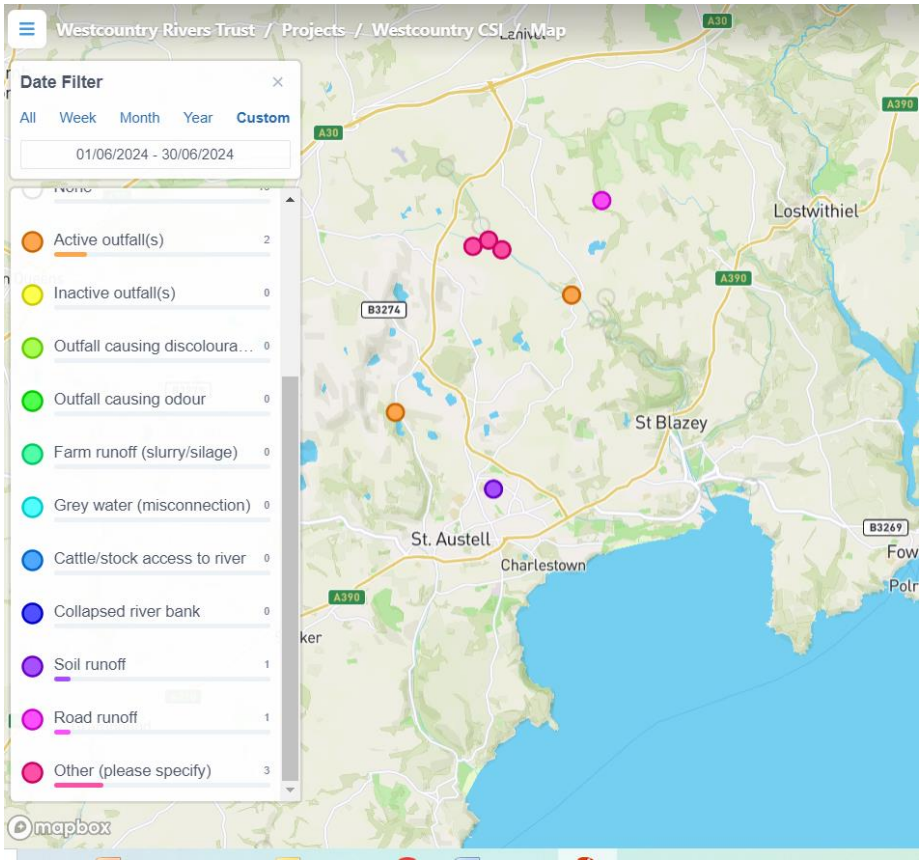
Sightings elsewhere in the Par Catchment but not at CSI monitoring sites:

LOCATION	WILDLIFE	REPORTED BY
Ponts Mill canal bridge SX 07312 56164	Old otter spraint	Roger Smith
Treskilling Stream	Signal crayfish	Environment Agency

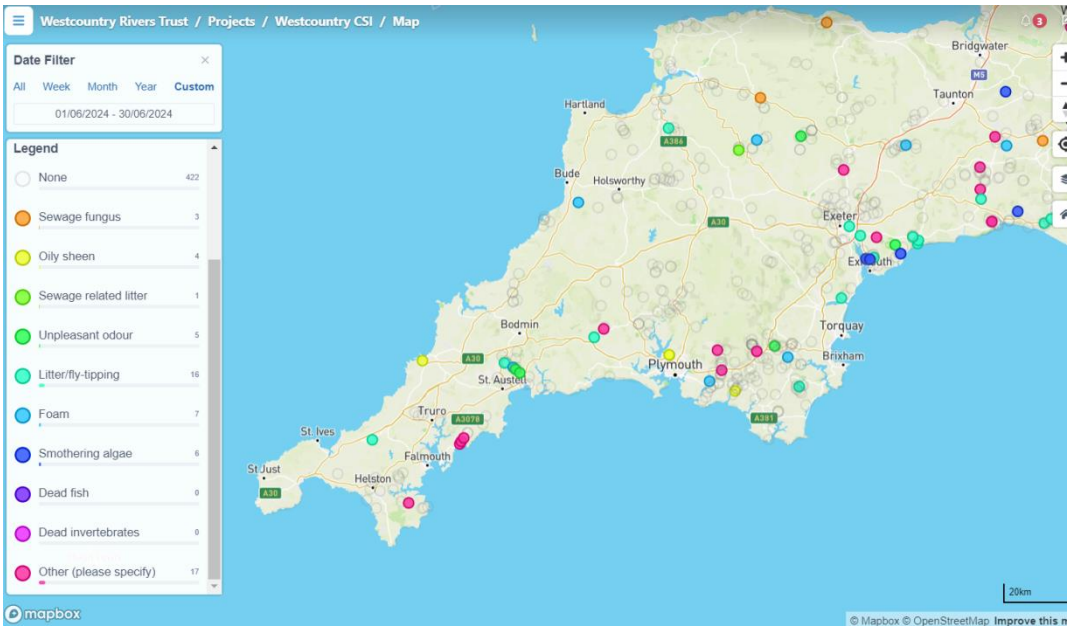
H. POLLUTION SOURCES AND EVIDENCE

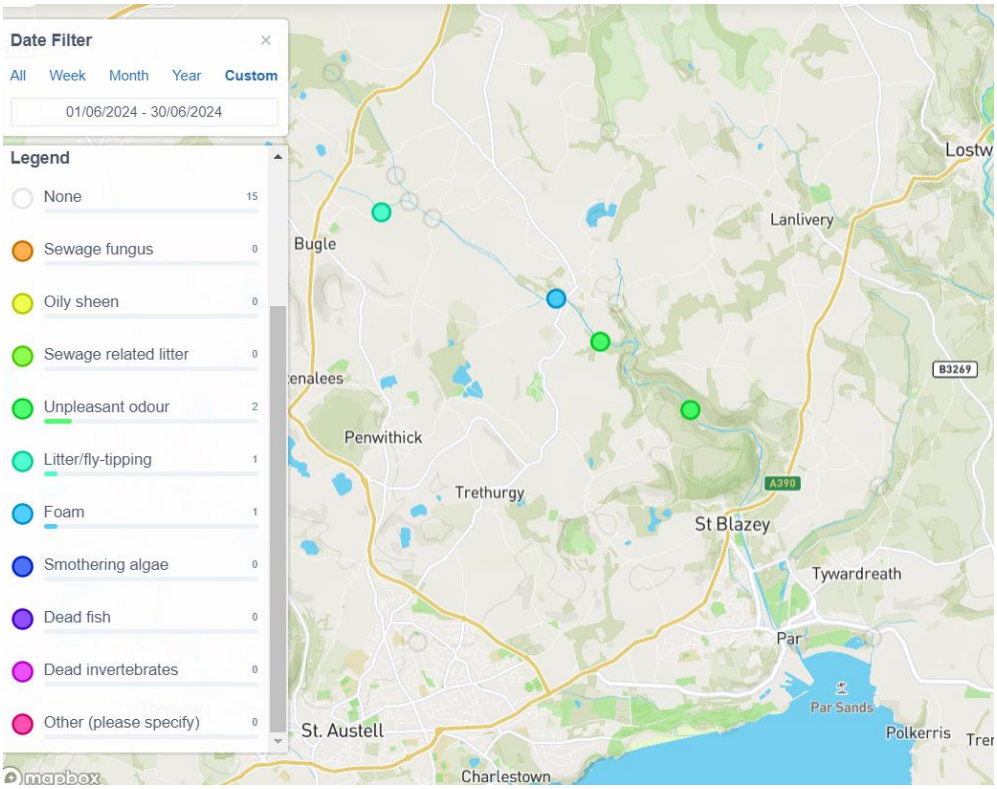
1. Pollution sources





2. Evidence of recent pollution:





I. 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:

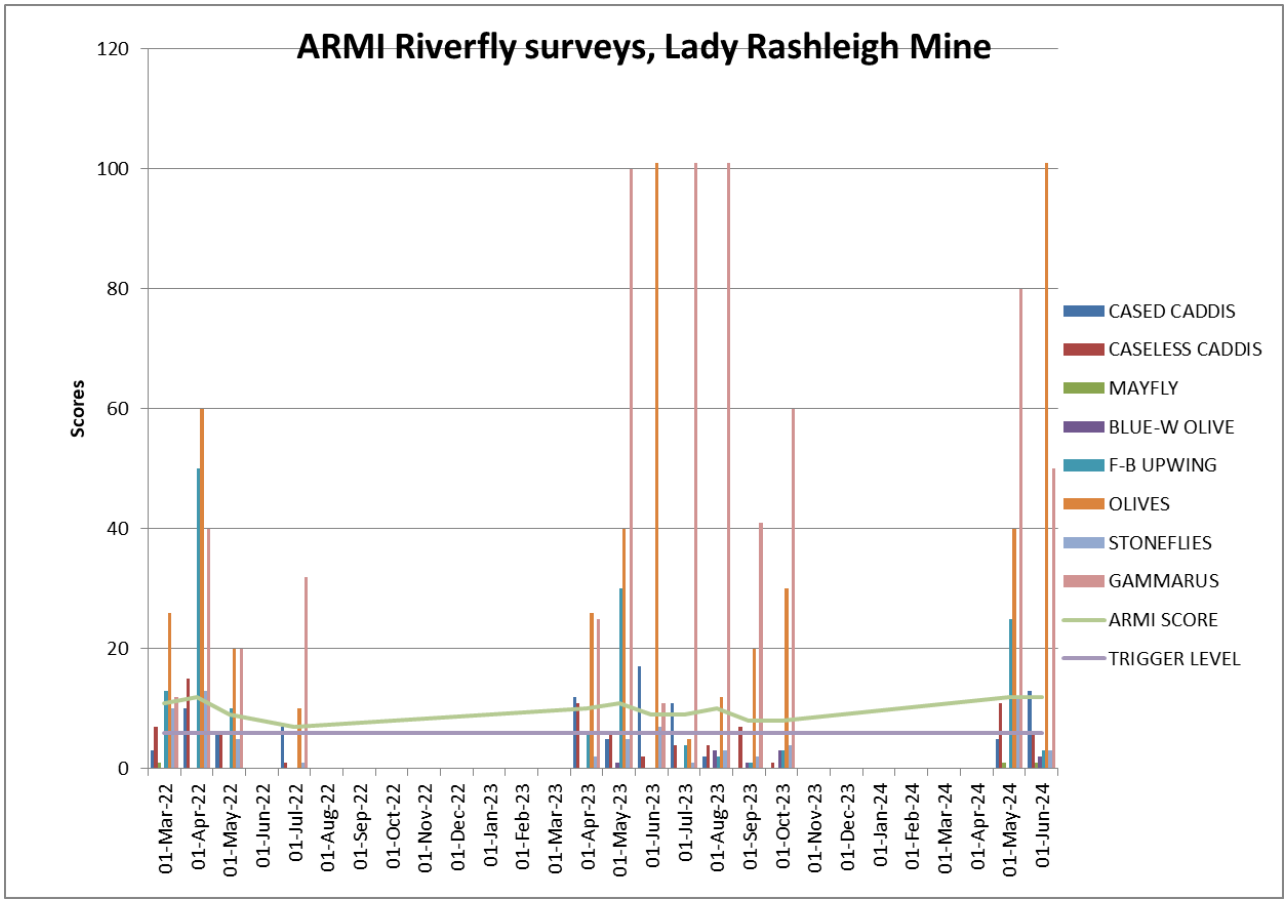
Abundance	Score	Estimated Number
1-9	1	Quick count
10-99	2	Nearest 10
100-999	3	Nearest 100
>1000	4	Nearest 1000

Results of survey at Lady Rashleigh Mine (SX 06451 56509) carried out by Joan Farmer and Roger Smith on 12th June 2024:

	SPECIES	NUMBER	CATEGORY
Trichoptera			
1	Cased Caddisfly	13	2
2	Caseless Caddisfly	6	1
Ephemeroptera 3 tails			
3	Mayfly (Ephemeridae)	1	1
4	Blue-winged olive (Ephemerellidae)	2	1
5	Flat-bodied up-wings (Heptageniidae)	3	1
6	Olives (Baetidae)	101	3
Plecoptera 2 tails			
7	Stoneflies	3	1
Gammaridae			
8	Freshwater Shrimp	50	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.


ARMI Riverfly surveys, Lady Rashleigh Mine
Scores
120
100
80
60
40
20
0
01-Mar-22
01-Apr-22
01-May-22
01-Jun-22
01-Jul-22
01-Aug-22
01-Sep-22
01-Oct-22
01-Nov-22
01-Dec-22
01-Jan-23
01-Feb-23
01-Mar-23
01-Apr-23
01-May-23
01-Jun-23
01-Jul-23
01-Aug-23
01-Sep-23
01-Oct-23
01-Nov-23
01-Dec-23
01-Jan-24
01-Feb-24
01-Mar-24
01-Apr-24
01-May-24
01-Jun-24
CASED CADDIS
CASELESS CADDIS
MAYFLY
BLUE-W OLIVE
F-B UPWING
OLIVES
STONEFLIES
GAMMARUS
ARMI SCORE
TRIGGER LEVEL

J. 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, Jenny Heskett, Nick Taylor, Jeremy Roberts, Mat Bateman, Colin Pringle, Matt Healey, Simon Browning, Lydia Deacon, Jack Middleton, Anna Seal, Anna Crane, Jade Neville, Lauren Jasper and Callum Lewis is greatly appreciated. The interest and encouragement offered by Environment Agency officers, especially Lisa Best, Lisa Goodall, Layla Ousley, Jenny Davies, Leah Steward, Nicola Rogers and Peter Scobie, have been invaluable.

Dave Burrell at the riverfly monitoring in May 2024: a countryman and a gentleman.

Photo: Jenny Davies.

Report compiled by Joan Farmer and Roger Smith, July 2024