



WESTCOUNTRY RIVERS TRUST CITIZEN SCIENCE

MONITORING OF THE PAR RIVER AND ITS TRIBUTARIES

JANUARY 2022



Par Canal at Middleway showing StARR project engineering works on left.

Photo: Veronica Jones

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It should be noted that no monitoring was done between January and March 2021 but the Excel graphs suggest otherwise.

A. KEY POINTS FROM WRT CSI MONITORING IN JANUARY 2022

1. River levels were high and the flow was fast at most points.
2. Phosphate readings were very low, with none exceeding 100 ppb.
3. Turbidity was very high in many places.
4. China clay in the Carbis stream is a concern.
5. A relatively high temperature was recorded again on the Tywardreath Marsh stream at Treemill.
6. Otters, dippers and herons continue to be present in the Luxulyan Valley section of the Par River.

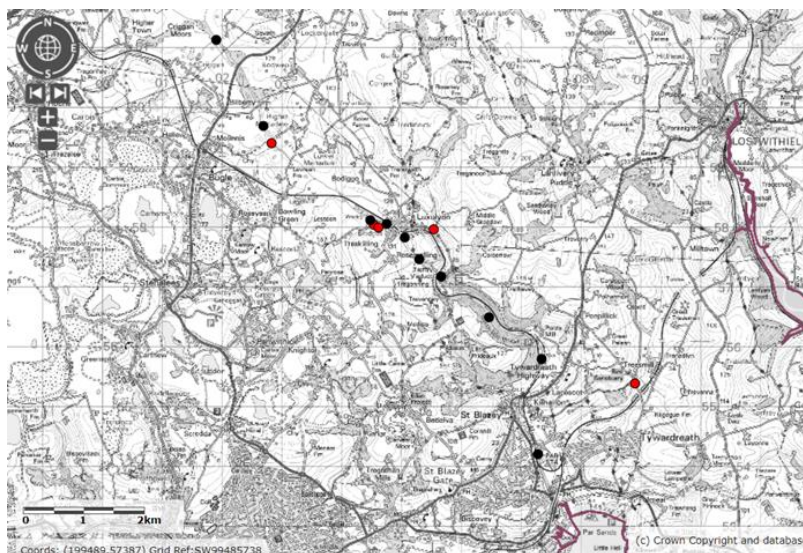
B. OUR GROUP

Monitoring is part of the Citizen Science programme run by the West Country Rivers Trust (WCRT) and is carried out monthly by volunteers from the Friends of Luxulyan Valley. The team comprises: Dave Burrell; Mandy Case; Joan Farmer; Veronica Jones; Sue Perry; Linda and Roger Smith; Dave Stillings. They have received training from Lydia Deacon, 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, Claire and Gary Phillips, David Edwards, Nick Taylor, Jeremy Roberts, Matt Healey, Simon Browning and Lydia Deacon is greatly appreciated. The interest and encouragement offered by Environment Agency officers, especially Lisa Best and Lisa Goodall, has been invaluable.

C. JANUARY 2022 MONITORING POINTS

This month we monitored at 15 locations.

This month's 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	MONITORED BY
Criggan Moors, Par River, SX 01882 61133	Roger Smith
South of Minorca Lane, Par River, SX 02657 59788	Roger Smith
Carbis Stream SX 02834 59401	Roger Smith
Luxulyan sewage treatment works, Par River, (SX 0455 58114 before Nov 2021)*	Joan Farmer & Roger Smith
Treverbyn Stream, SX 04532 58033	Joan Farmer & Roger Smith
Rosemullion, Tregarrick Stream, SX 04623 57990	Joan Farmer, & Roger Smith
Luxulyan allotments, Par River, SX 04732 58045	Joan Farmer & Roger Smith
Luxulyan SWW pumping station, Par River, SX 05033 57849	Joan Farmer & Roger Smith
Cam Bridges, Par River, SX 05292 57454	Joan Farmer & Roger Smith
Gatty's Bridge, Bokiddick Stream SX 05531 57953	Joan Farmer
Treffry Viaduct, Par River, SX 05650 57179	Joan Farmer, Veronica Jones, Mandy Case & Roger Smith
Lady Rashleigh Mine, Par River, SX 06451 56509	Joan Farmer, Veronica Jones, Mandy Case & Roger Smith
Ponts Mill, Par River, SX 07354 55875	Joan Farmer, Veronica Jones, Mandy Case & Roger Smith
Middleway, Par Canal, SX 07233 54299	Veronica Jones
Treesmill, Tywardreath Stream, SX 08873 55385	Veronica Jones

*Since November 2021 we had started to monitor near the northern bank near Luxulyan STW, downstream from the previous point. However, the high level and fast flow meant it was not possible to wade across to get a sample. Therefore, testing occurred at the original point (SX 0455 58114). Although this could mean that the water at that point might have been diluted by an adjacent twin outfall (from land drains), the universally low phosphate levels recorded at other points downstream suggest that the result reflected conditions in the whole river at that point.

Surveys conducted on these dates, each of which is colour-coded:

8th January 2022

9th January 2022

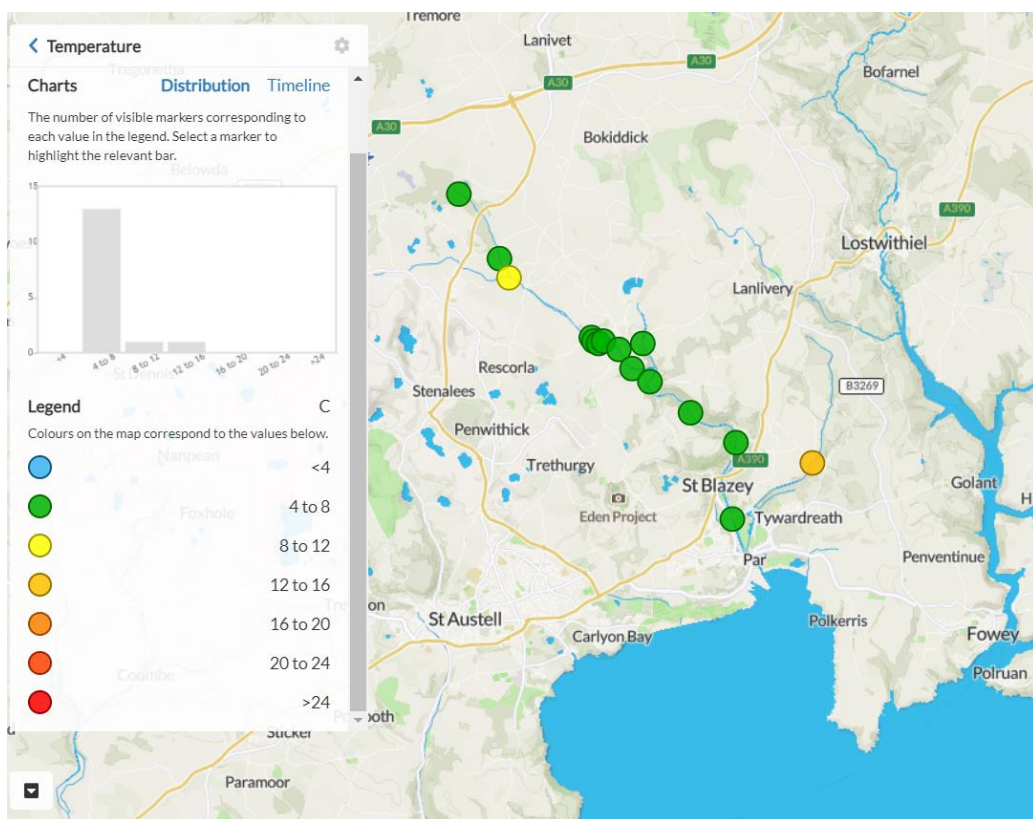
10th January 2022

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 (Bissa)	Criggan Moors, SX 01882 61133	7
Par	South of Minorca Lane, SX 02657 59788	7
Tributary	Carbis Stream SX 02834 59401	8
Par	Luxulyan sewage treatment works SX 04472 58114 (formerly SX 0455 58114)	6
Tributary	Treverbyn Stream, SX 04532 58033	5
Tributary	Tregarrick Stream, Rosemullion, SX 04623 57990	5
Par	Luxulyan allotments SX 04732 58045	5
Par	Luxulyan SWW pumping station SX 05033 57849	5
Par	Cam Bridges SX 05292 57454	4.8
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	6.8
Par	Treffry Viaduct SX 05650 57179	6.8

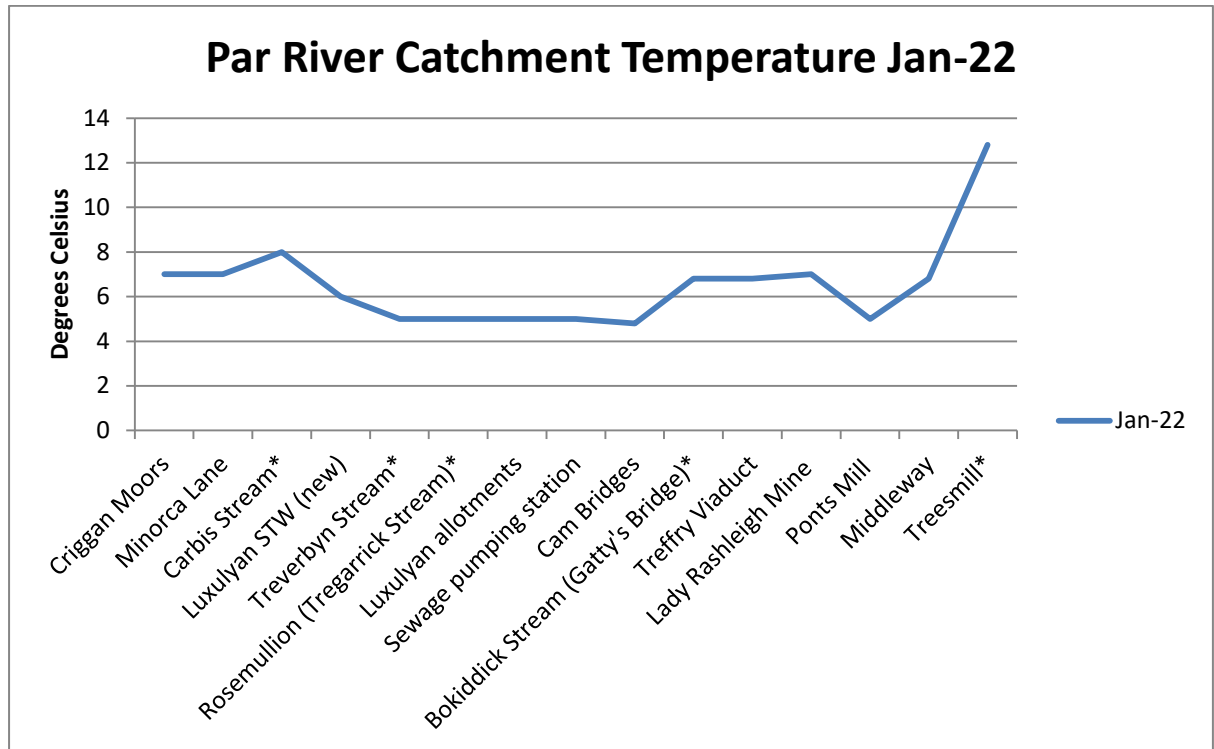
Par	Lady Rashleigh Mine SX 06451 56509	7
Par	Ponts Mill SX 07354 55875	5
Tributary	Tywardreath Marsh Stream (Treesmill) SX 08902 55414	6.8
Par	Middleway (Par Canal) SX 07238 54295	12.8

Surveys conducted on these dates, each of which is colour-coded:

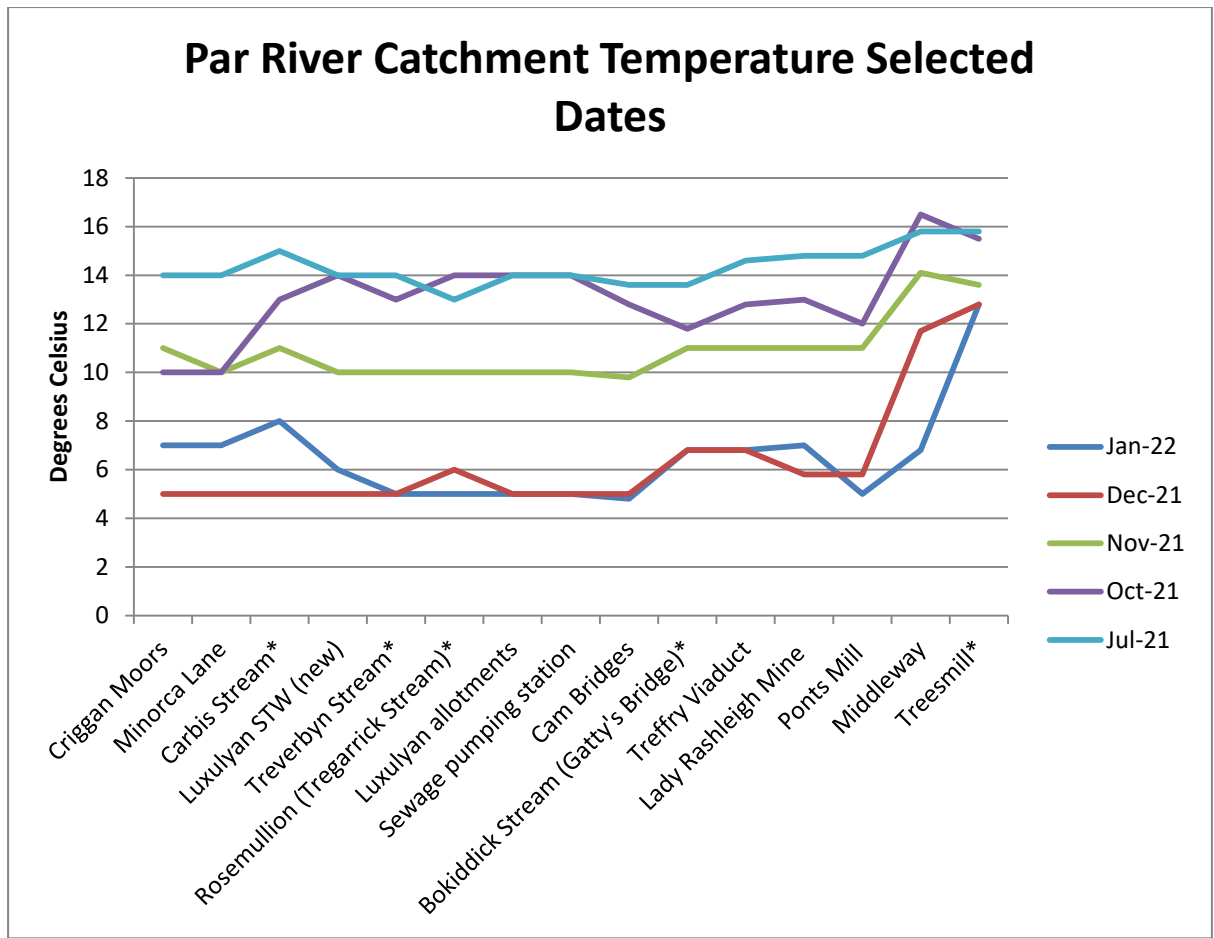
8th January 2022

9th January 2022

10th January 2022



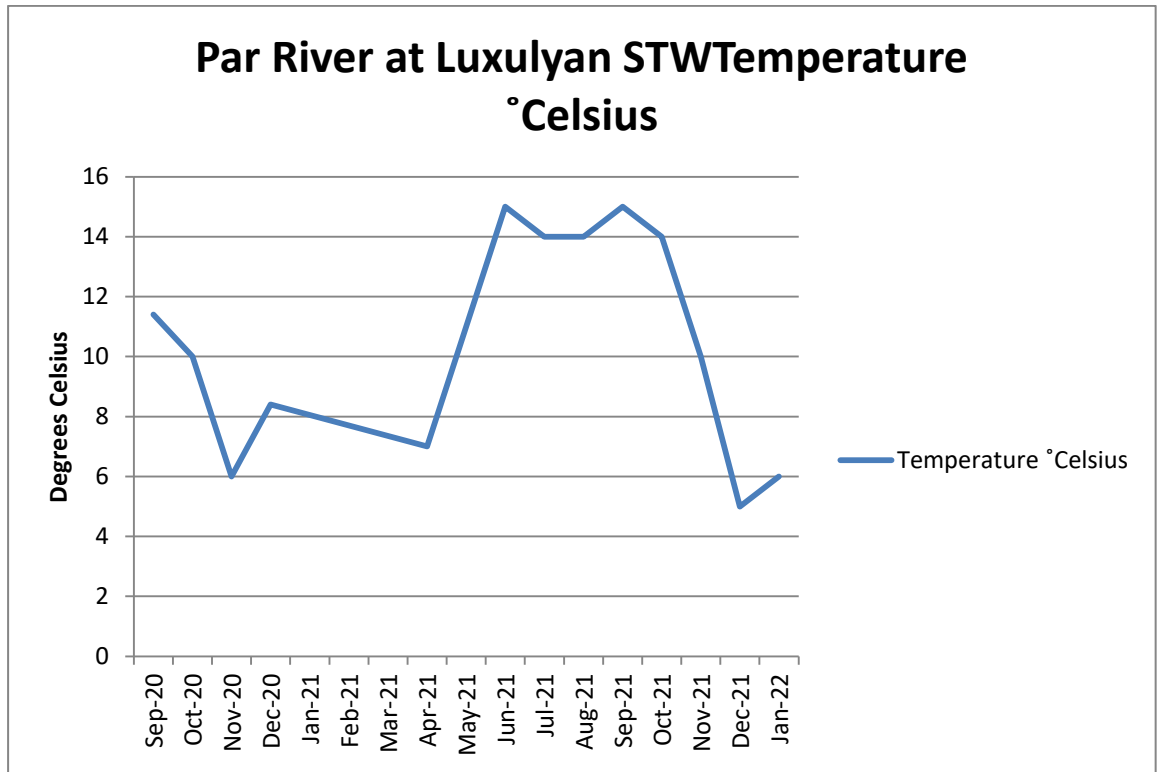
*indicates a tributary of the Par River.



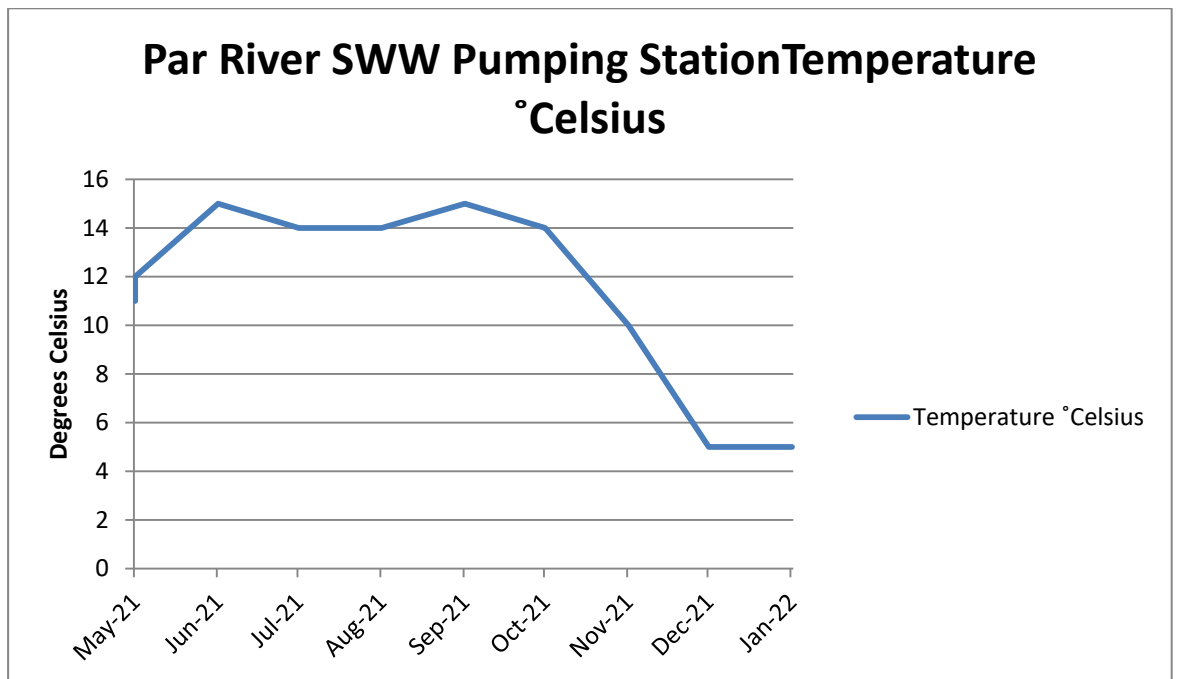
The Tywardreath Marsh Stream at Treesmill has had the highest temperature in 3 of the 5 months selected in the above graph. Middleway has had the highest temperature in the other months, including January 2022. This may be worth watching.

3. **Historical data** on temperature at selected sites (no monitoring January to March 2021):

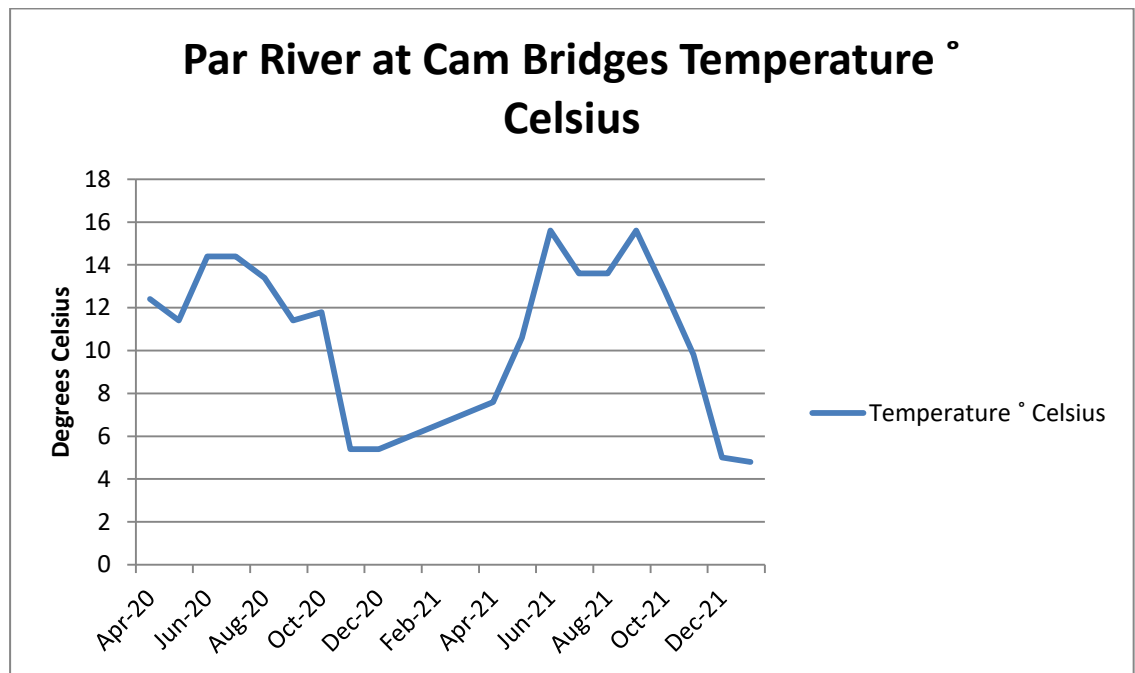
(a) Luxulyan sewage treatment works is usually measured from November 2021 at SX 04472 58114 (formerly at SX 0455 58114) but on this occasion the sample was taken at SX 0455 58114.



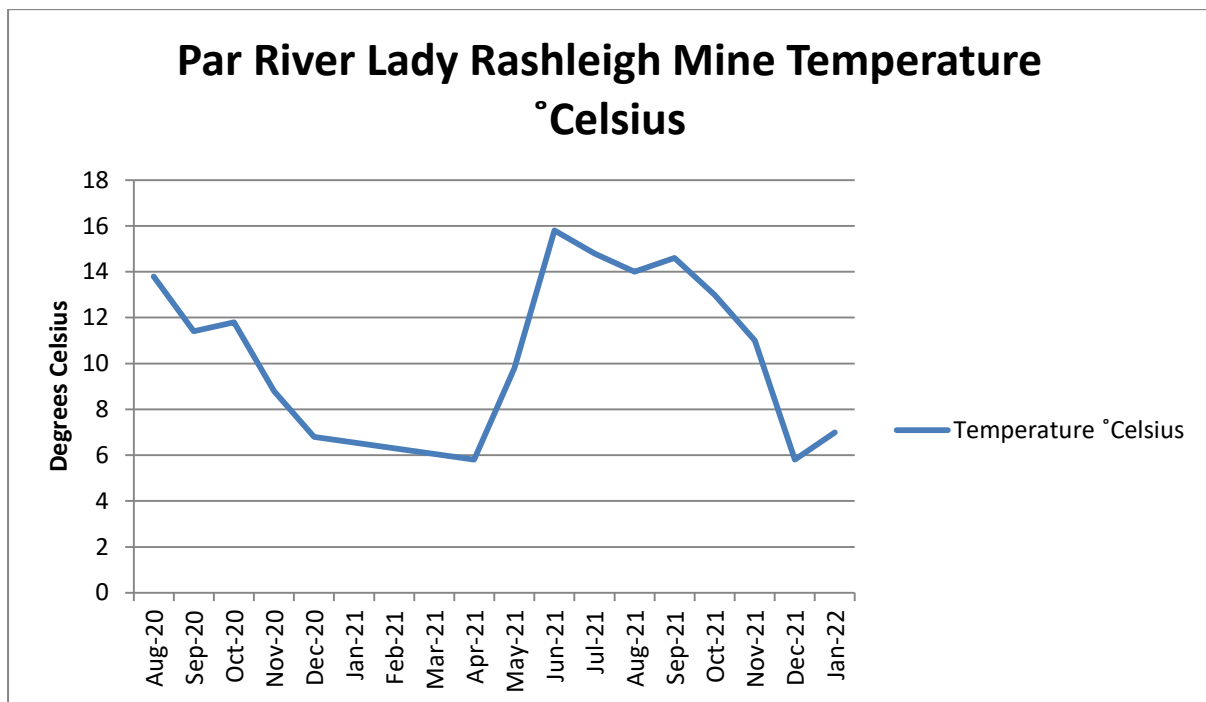
(b) Luxulyan SWW pumping station SX 05033 57849



(c) Cam Bridges SX 05292 57454



(d) Lady Rashleigh Mine SX 06451 56509



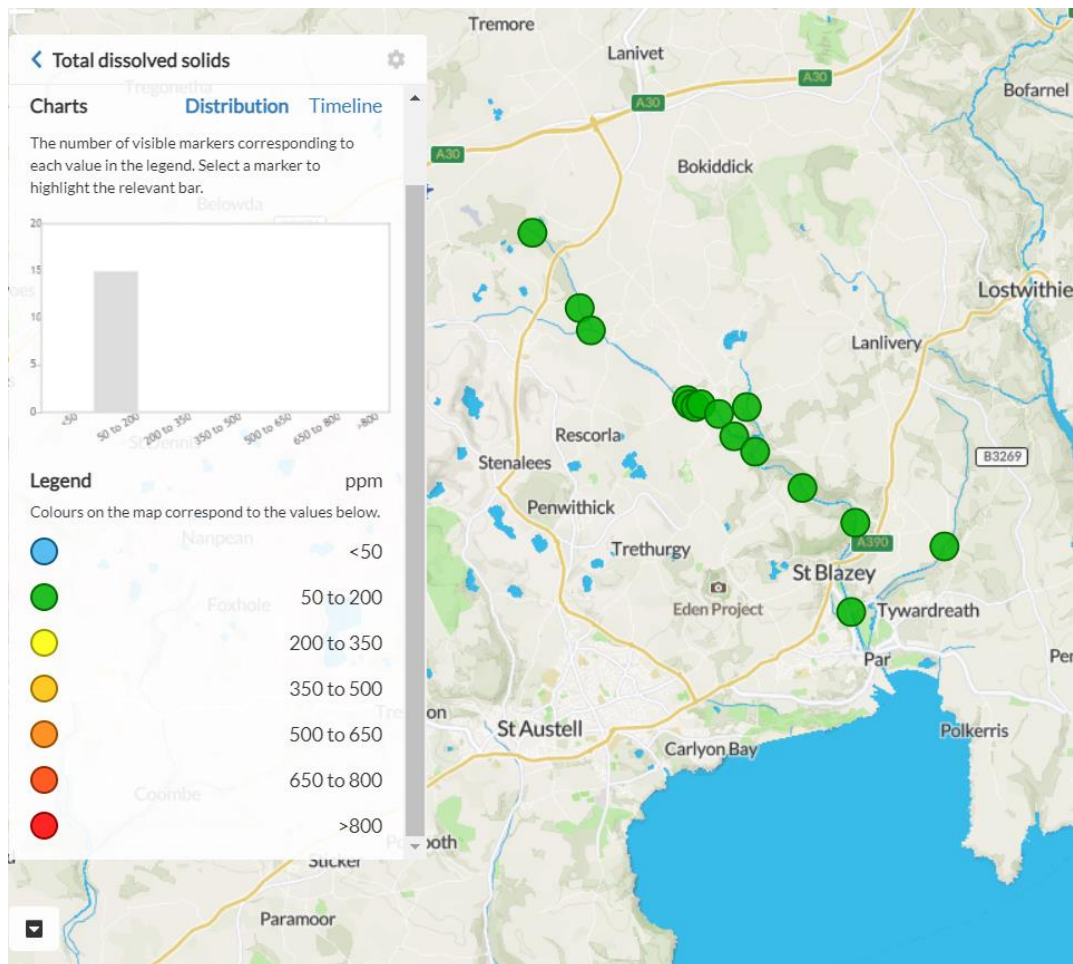
E. TOTAL DISSOLVED SOLIDS

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.



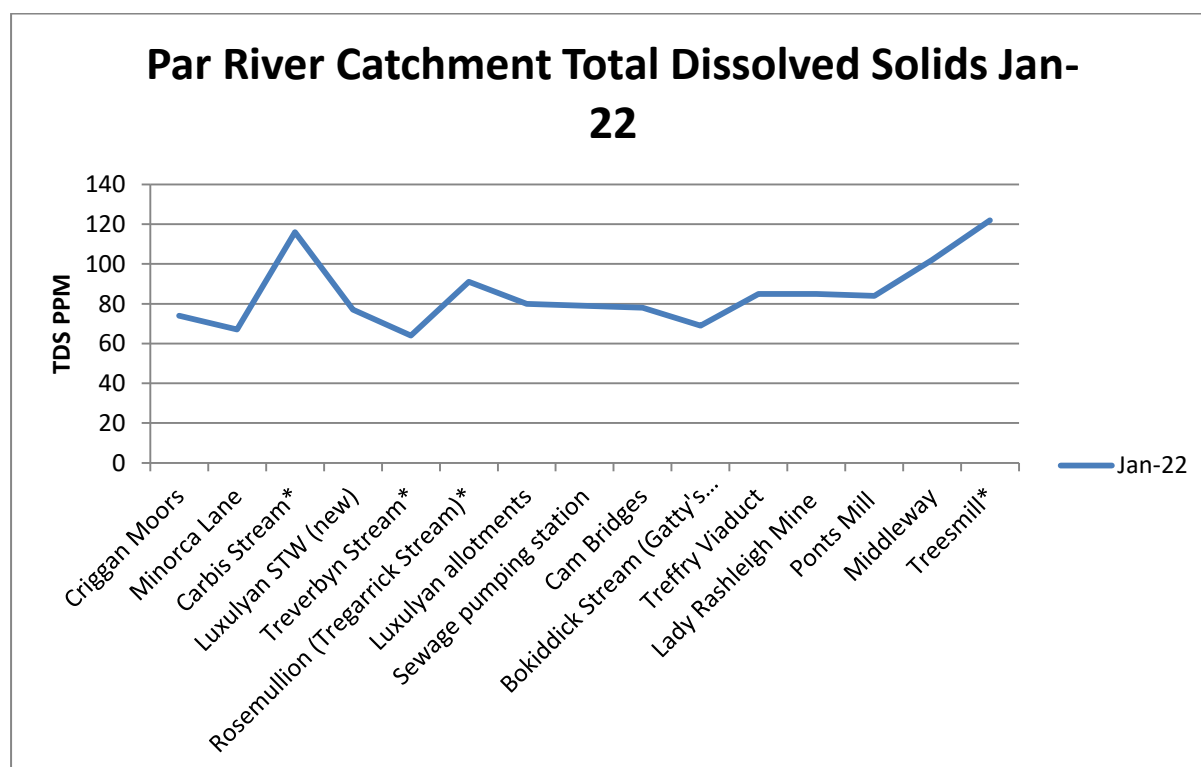
PAR RIVER/TRIBUTARY	LOCATION	Total Dissolved Solids ppm
Par (Bissa)	Criggan Moors, SX 01882 61133	74
Par	South of Minorca Lane, SX 02657 59788	67
Tributary	Carbis Stream SX 02834 59401	116
Par	Luxulyan sewage treatment works SX 04472 58114 (formerly SX 0455 58114)	77
Tributary	Treverbyn Stream, SX 04532 58033	64
Tributary	Tregarrick Stream, Rosemullion, SX 04623 57990	91
Par	Luxulyan allotments SX 04732 58045	80
Par	Luxulyan SWW pumping station SX 05033 57849	79
Par	Cam Bridges SX 05292 57454	78
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	69
Par	Treffry Viaduct SX 05650 57179	85
Par	Lady Rashleigh Mine SX 06451 56509	85
Par	Ponts Mill SX 07354 55875	84
Tributary	Tywardreath Marsh Stream (Treesmill) SX 08902 55414	102
Par	Middleway (Par Canal) SX 07238 54295	122

Surveys conducted on these dates, each of which is colour-coded:

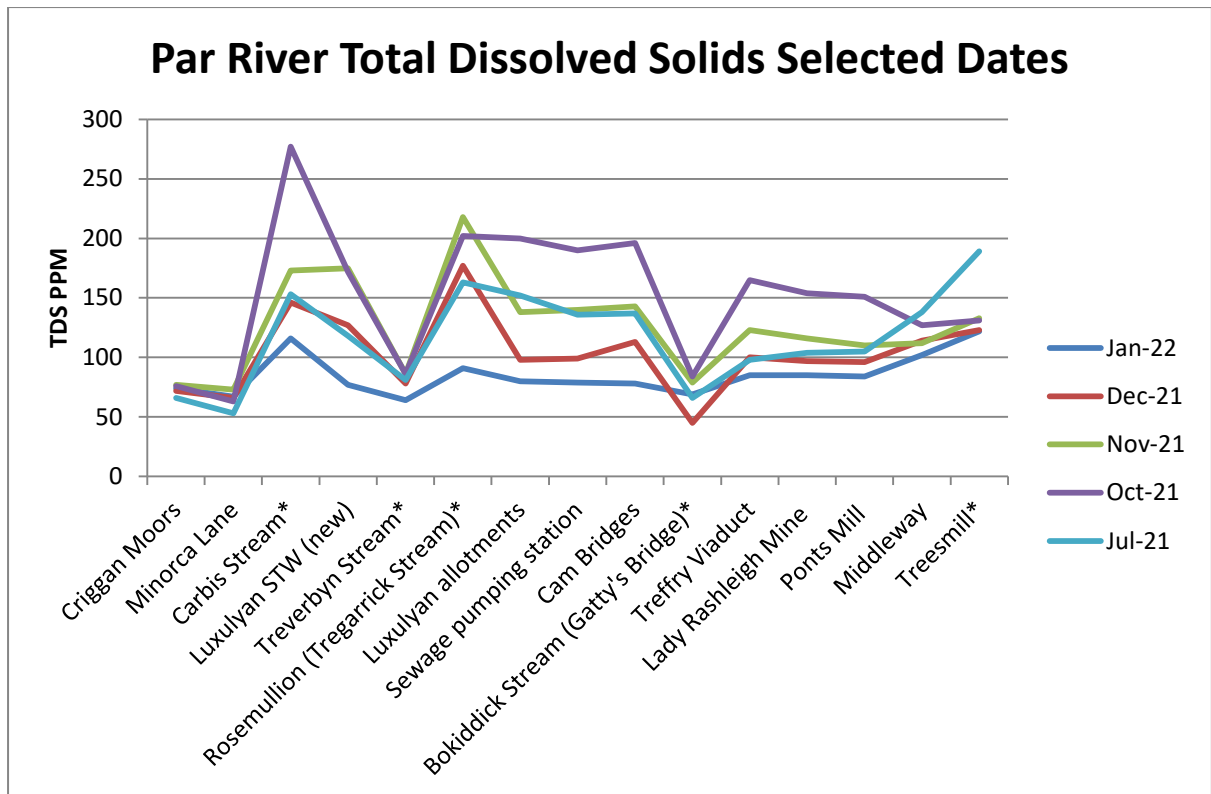
8th January 2022

9th January 2022

10th January 2022



*indicates a tributary of the Par River.



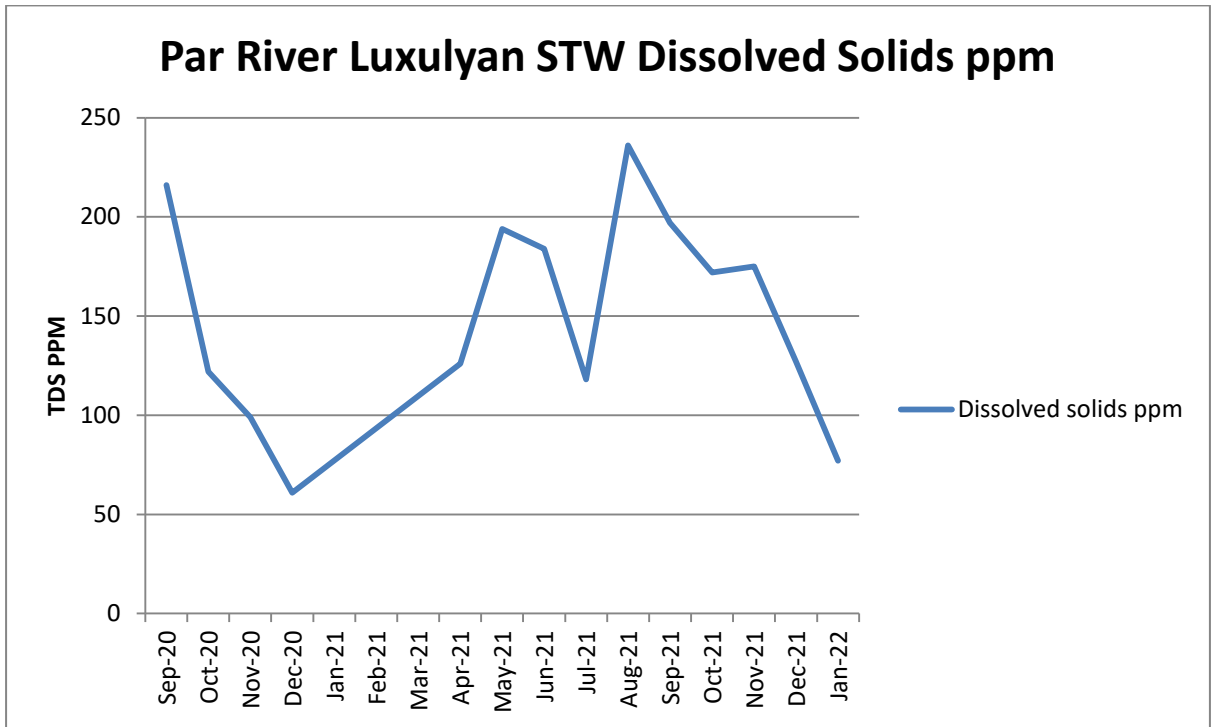
This month Middleway recorded the highest TDS, followed by the Carbis Stream and Treesmill. The Carbis Stream and the Tregarrick Stream at Rosemullion often show relatively high TDS scores. In the former case this is believed to be the result of china clay and in the latter it is believed to be silt that has accumulated as a result of slurry being sprayed on adjacent fields. It isn't known why Middleway and Treesmill should have had such a relatively high score in January 2022.



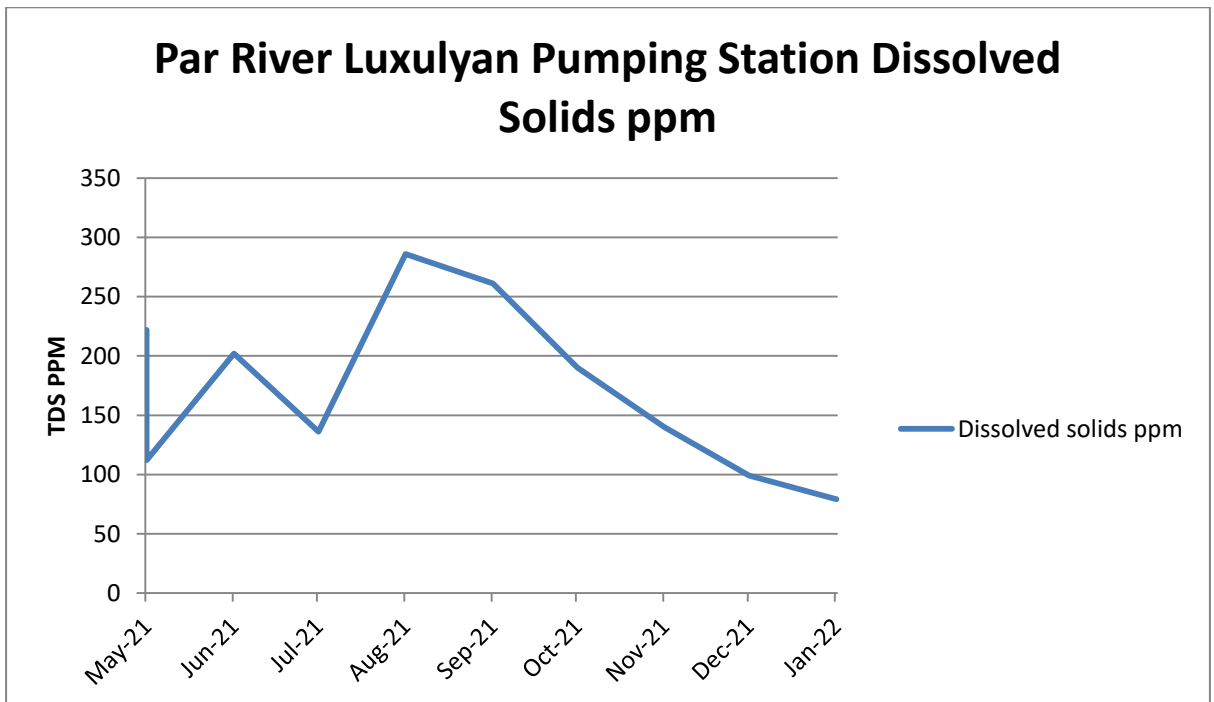
China clay-laden water from Carbis Stream (right) meets the main Par River

3. **Historical data** on total dissolved solids at selected sites (no monitoring January to March 2021):

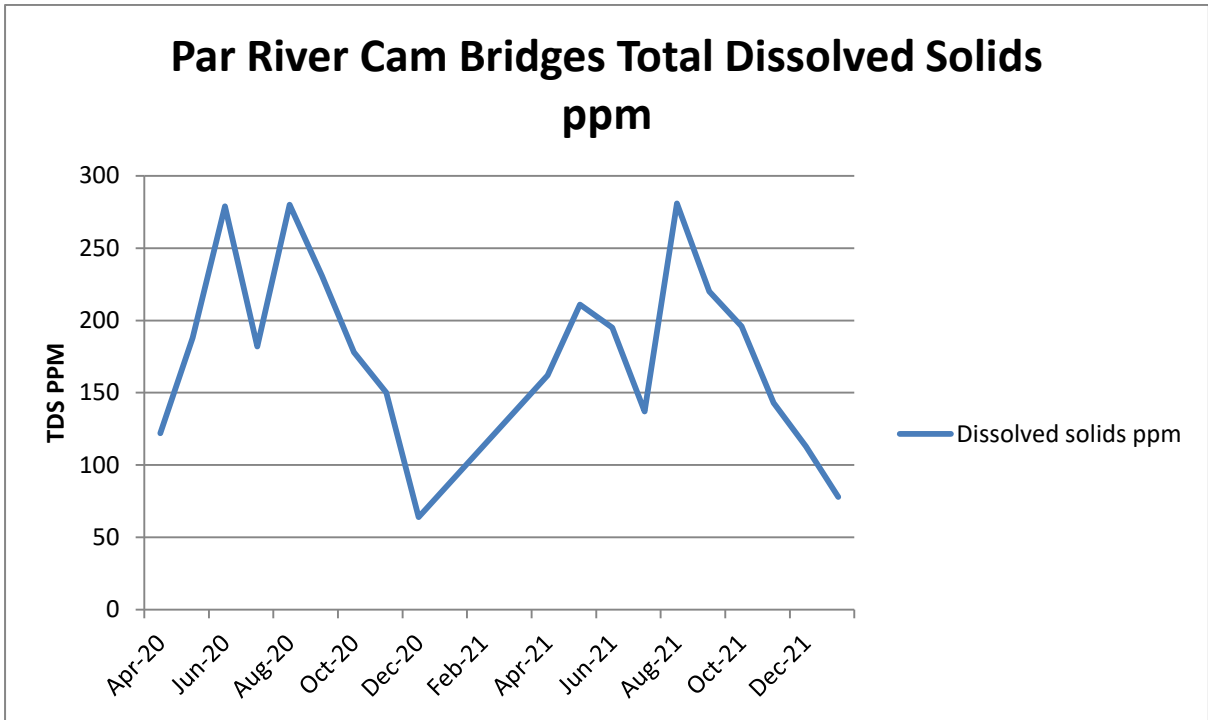
(a) Luxulyan sewage treatment works is usually measured from November 2021 at SX 04472 58114 (formerly at SX 0455 58114) but on this occasion the sample was taken at SX 0455 58114.



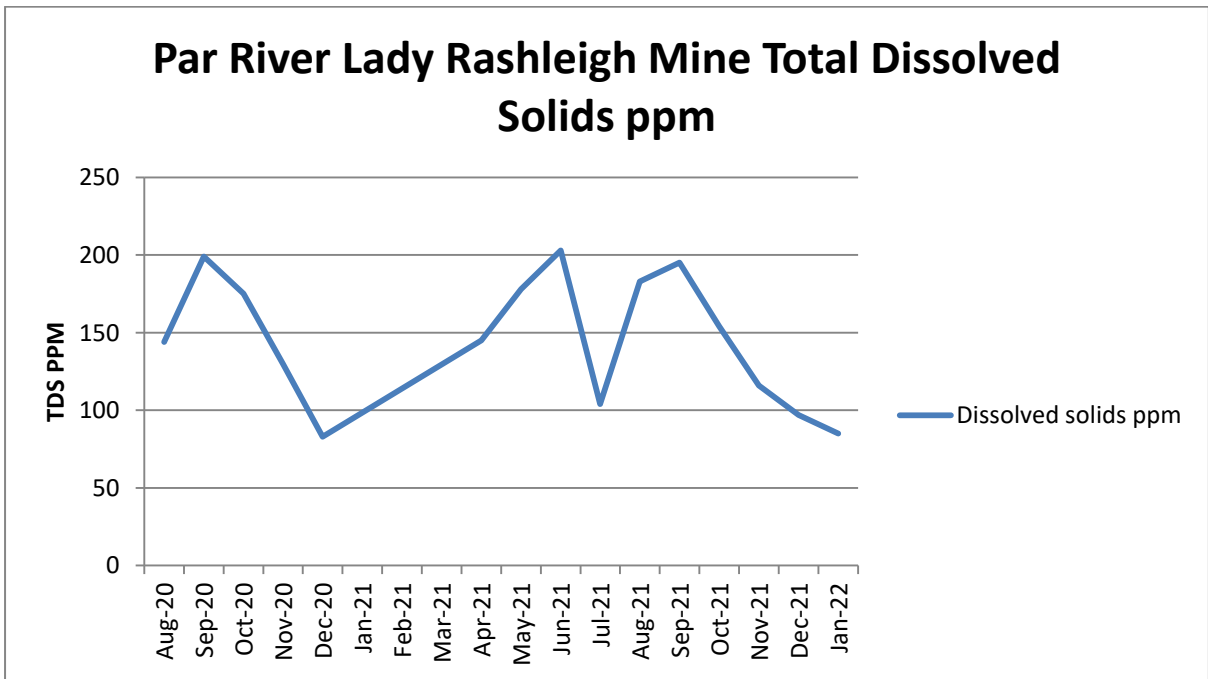
(a) Luxulyan SWW pumping station SX 05033 57849



(b) Cam Bridges SX 05292 57454



(d) Lady Rashleigh Mine SX 06451 56509

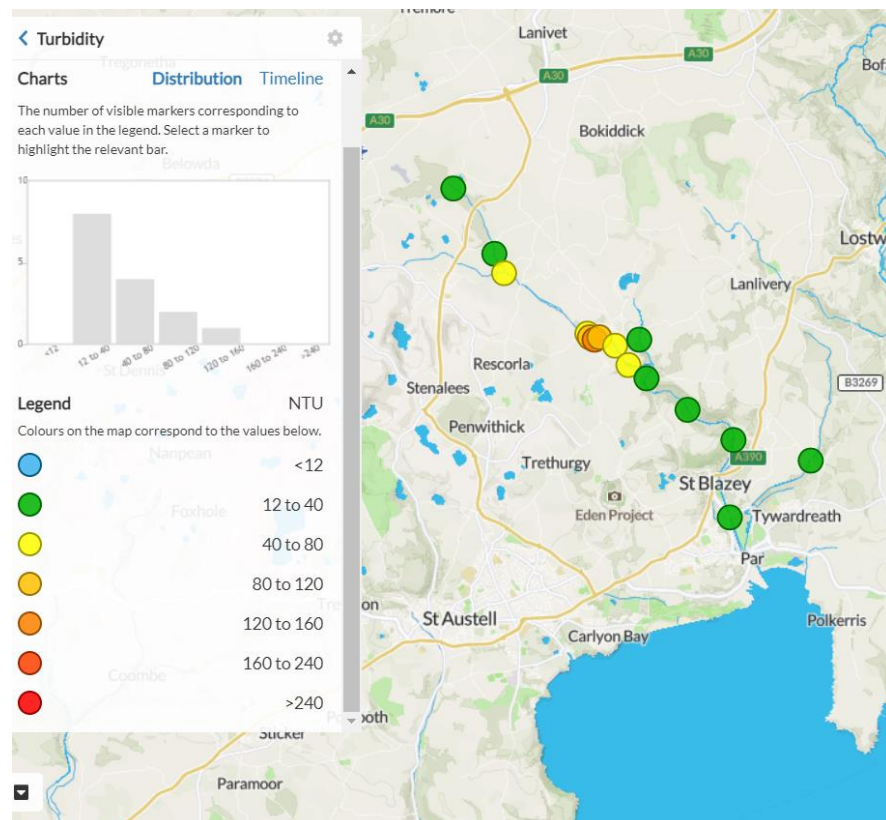


F. TURBIDITY

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.



As the table shows, the high turbidity scores were recorded on 8th January when the river was high and fast-flowing as a result of heavy rain. This might not account for all the higher turbidity scores recorded during the time our group has been active.

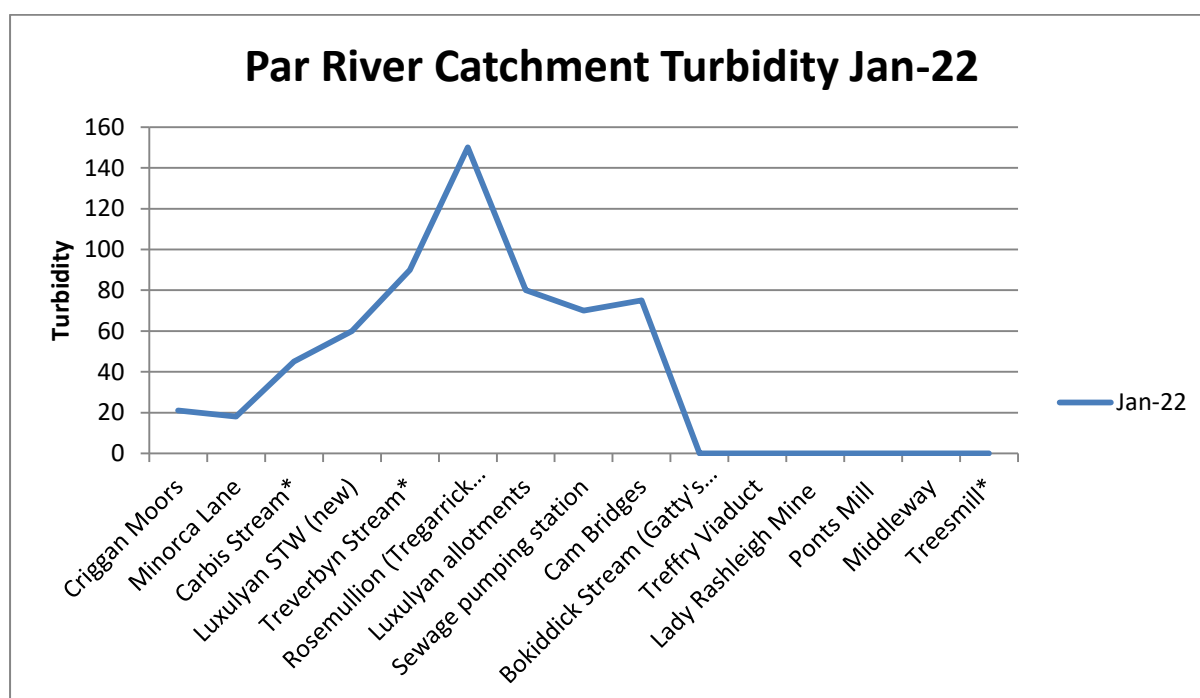
PAR RIVER/TRIBUTARY	LOCATION	Turbidity
Par (Bissa)	Criggan Moors, SX 01882 61133	21
Par	South of Minorca Lane, SX 02657 59788	18
Tributary	Carbis Stream SX 02834 59401	45
Par	Luxulyan sewage treatment works SX 04472 58114 (formerly SX 0455 58114)	60
Tributary	Treverbyn Stream, SX 04532 58033	90
Tributary	Tregarrick Stream, Rosemullion, SX 04623 57990	150
Par	Luxulyan allotments SX 04732 58045	80
Par	Luxulyan SWW pumping station SX 05033 57849	70
Par	Cam Bridges SX 05292 57454	75
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	0
Par	Treffry Viaduct SX 05650 57179	0
Par	Lady Rashleigh Mine SX 06451 56509	0
Par	Ponts Mill SX 07354 55875	0
Tributary	Tywardreath Marsh Stream (Treesmill) SX 08902 55414	0
Par	Middleway (Par Canal) SX 07238 54295	0

Surveys conducted on these dates, each of which is colour-coded:

8th January 2022

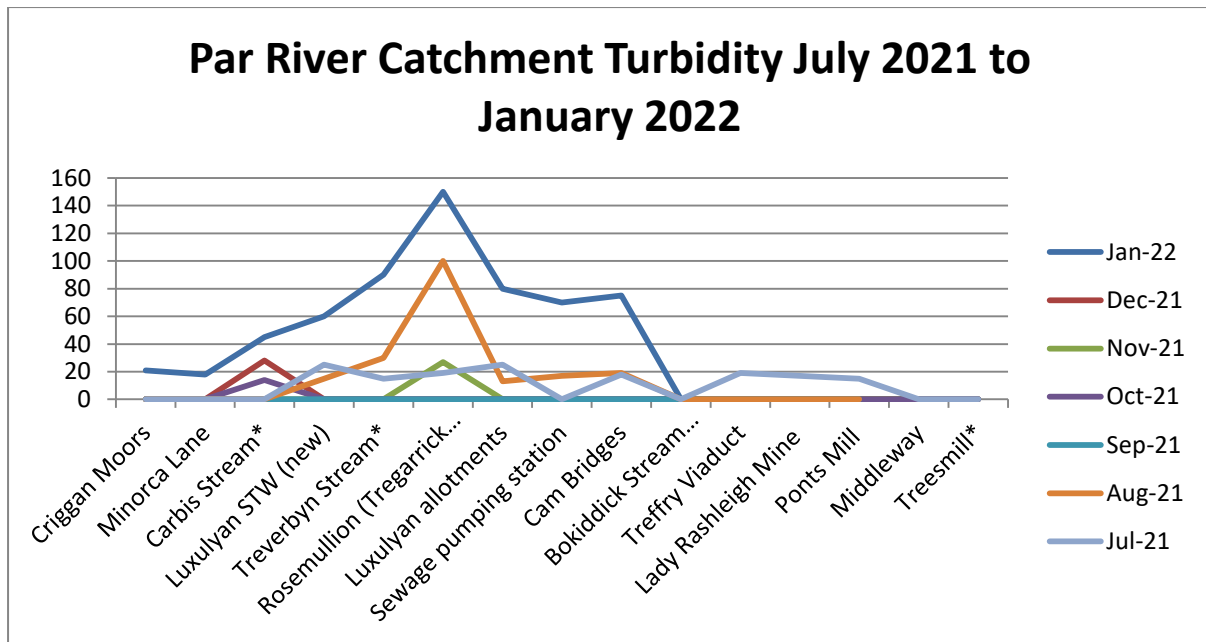
9th January 2022

10th January 2022



*indicates a tributary of the Par River.

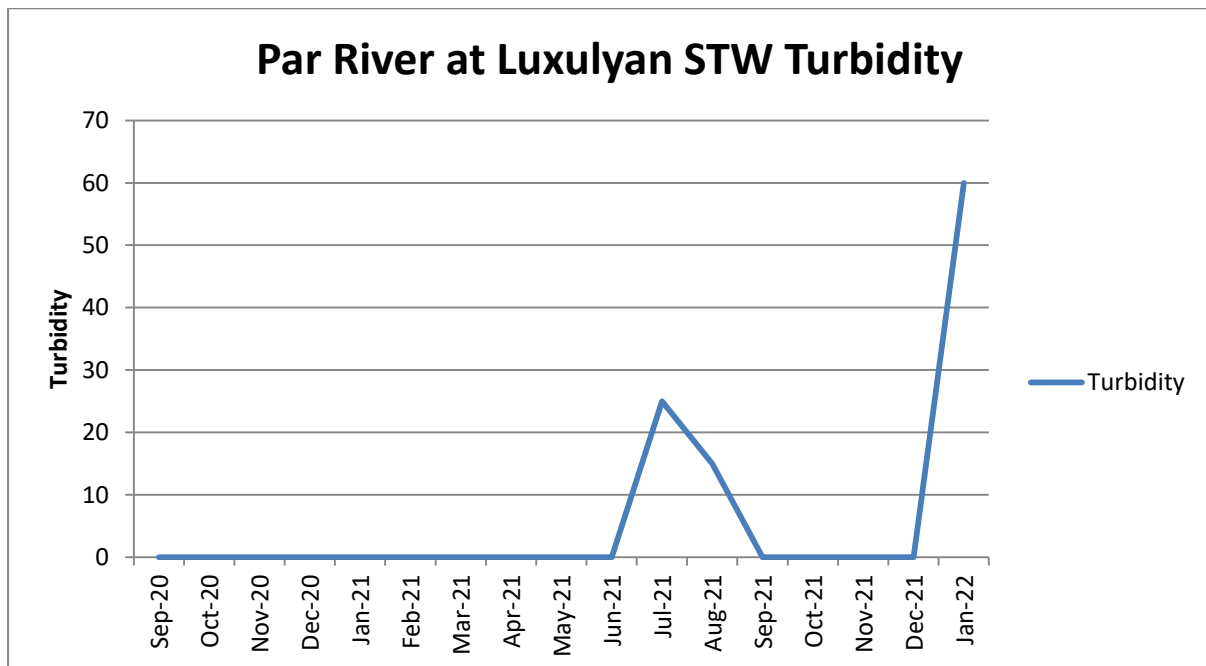
The following graph shows that the Tregarrick Stream (named because of its source at Tregarrick Farm) at Rosemullion often shows the highest levels of turbidity.



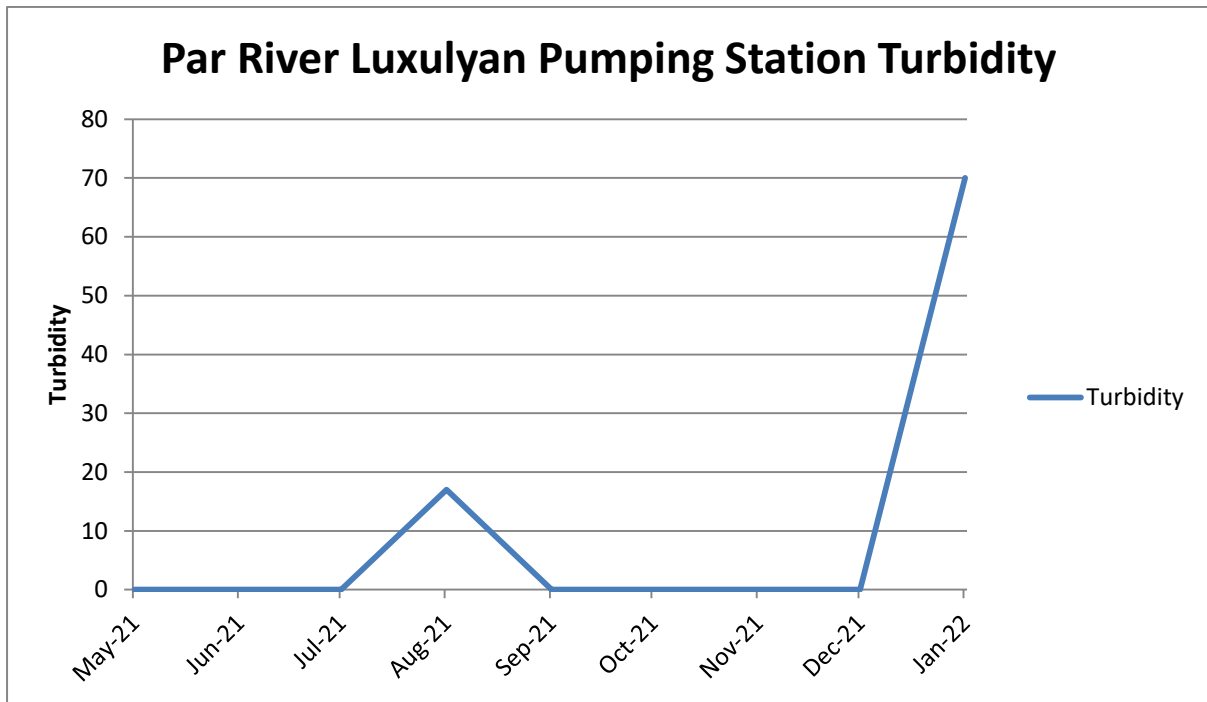
4. Historical data on turbidity at selected sites (no monitoring January to March 2021):

High turbidity at three of the four selected sites appears to be linked to recent heavy rainfall. At the STW, pumping station and Cam Bridges this round of monitoring followed heavy rainfall, as had been the case in July and August. Monitoring at downstream sites, such as Lady Rashleigh Mine, one day later allowed time for levels to return to normal levels.

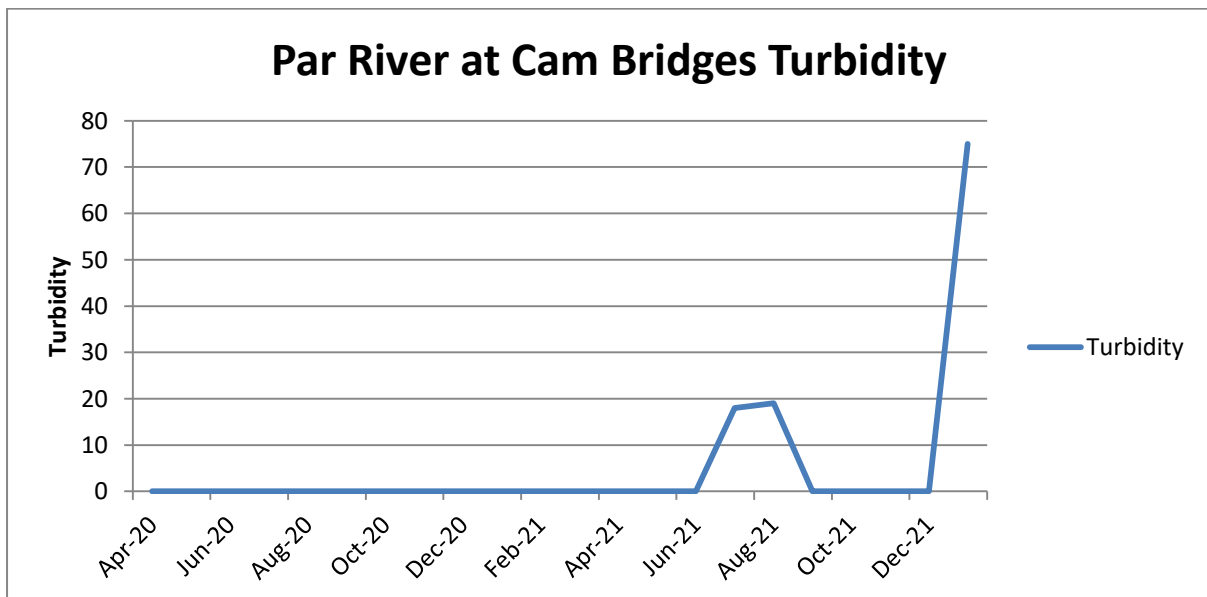
(a) Luxulyan sewage treatment works is usually measured from November 2021 at SX 04472 58114 (formerly at SX 0455 58114) but on this occasion the sample was taken at SX 0455 58114.



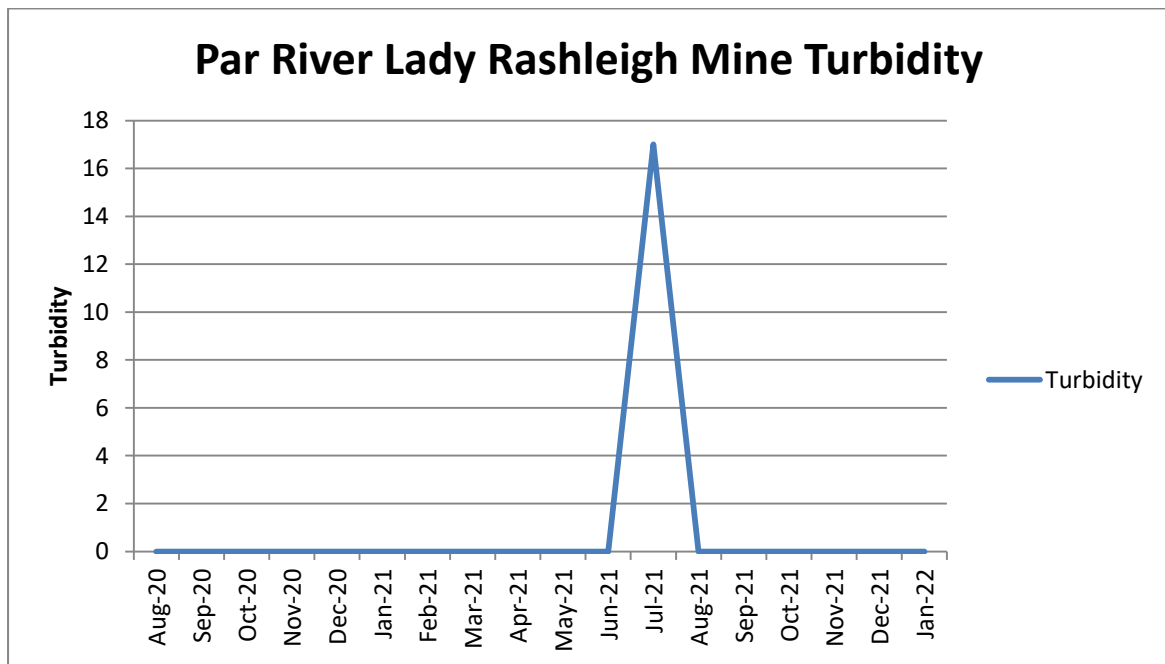
(b) Luxulyan SWW pumping station SX 05033 57849



(c) Cam Bridges SX 05292 57454



(d) Lady Rashleigh Mine SX 06451 56509



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:

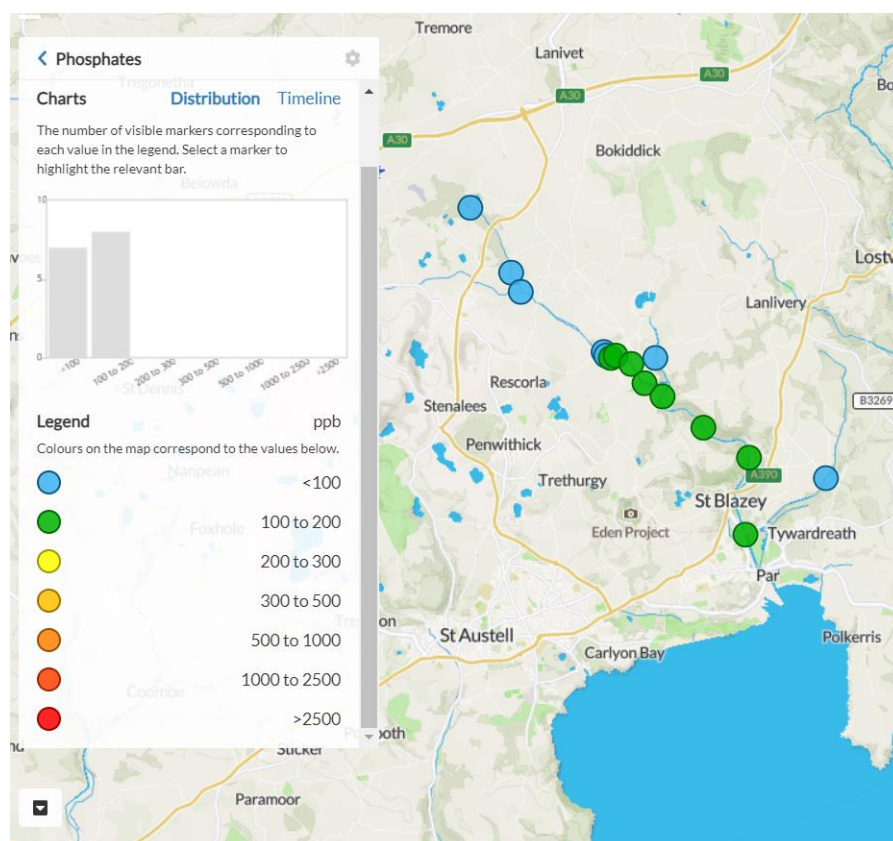
0 – 100 OK

200 – 300 HIGH

500 – 2500 – TOO HIGH

Phosphate levels were relatively low for the second month running. Levels at all sites monitored were OK according to the WRT guidance. Maximum scores of 2500 PPB have been recorded at some sites but these precede the date range in the historical graphs. They have been recorded on Cartographer.

2. Geographical comparison. Source: Cartographer.



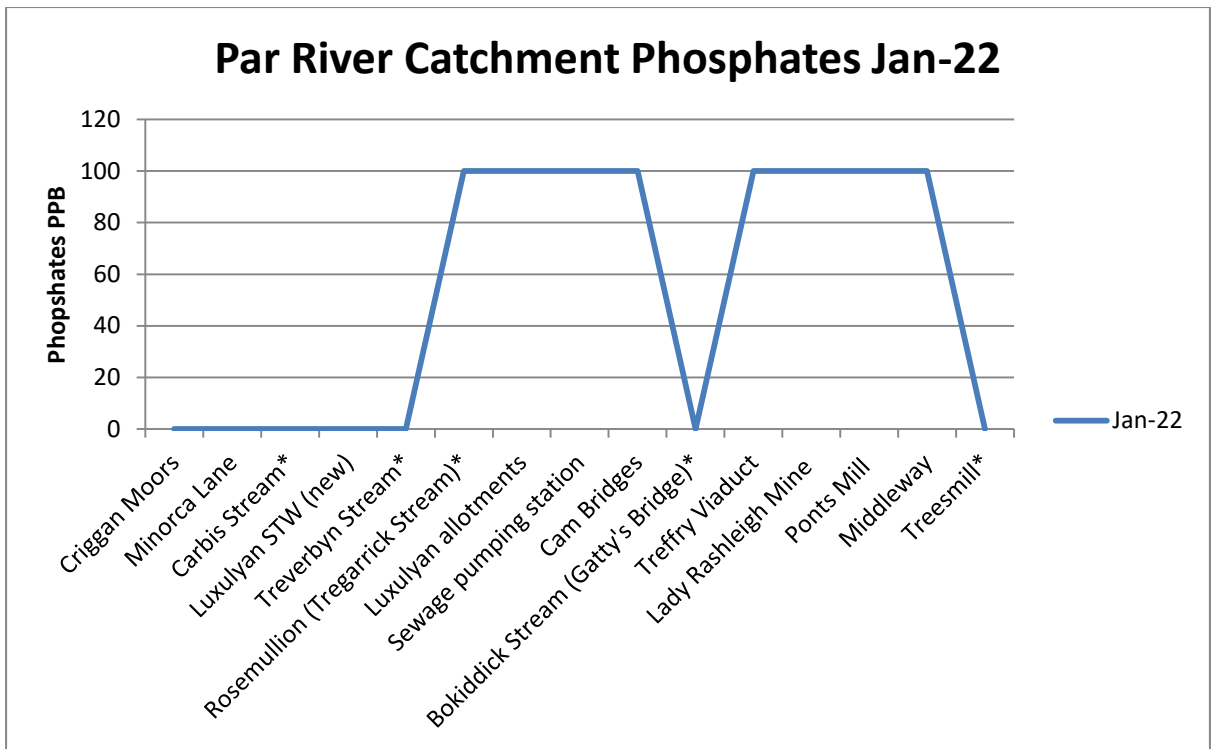
PAR RIVER/TRIBUTARY	LOCATION	Phosphates ppb
Par (Bissa)	Criggan Moors, SX 01882 61133	0
Par	South of Minorca Lane, SX 02657 59788	0
Tributary	Carbis Stream SX 02834 59401	0
Par	Luxulyan sewage treatment works SX 04472 58114 (formerly SX 0455 58114)	0
Tributary	Treverbyn Stream, SX 04532 58033	0
Tributary	Tregarrick Stream, Rosemullion, SX 04623 57990	100
Par	Luxulyan allotments SX 04732 58045	100
Par	Luxulyan SWW pumping station SX 05033 57849	100
Par	Cam Bridges SX 05292 57454	100
Tributary	Gatty's Bridge, Bokiddick Stream SX 05531 57953	0
Par	Treffry Viaduct SX 05650 57179	100
Par	Lady Rashleigh Mine SX 06451 56509	100
Par	Ponts Mill SX 07354 55875	100
Tributary	Tywardreath Marsh Stream (Treesmill) SX 08902 55414	100
Par	Middleway (Par Canal) SX 07238 54295	0

Surveys conducted on these dates, each of which is colour-coded:

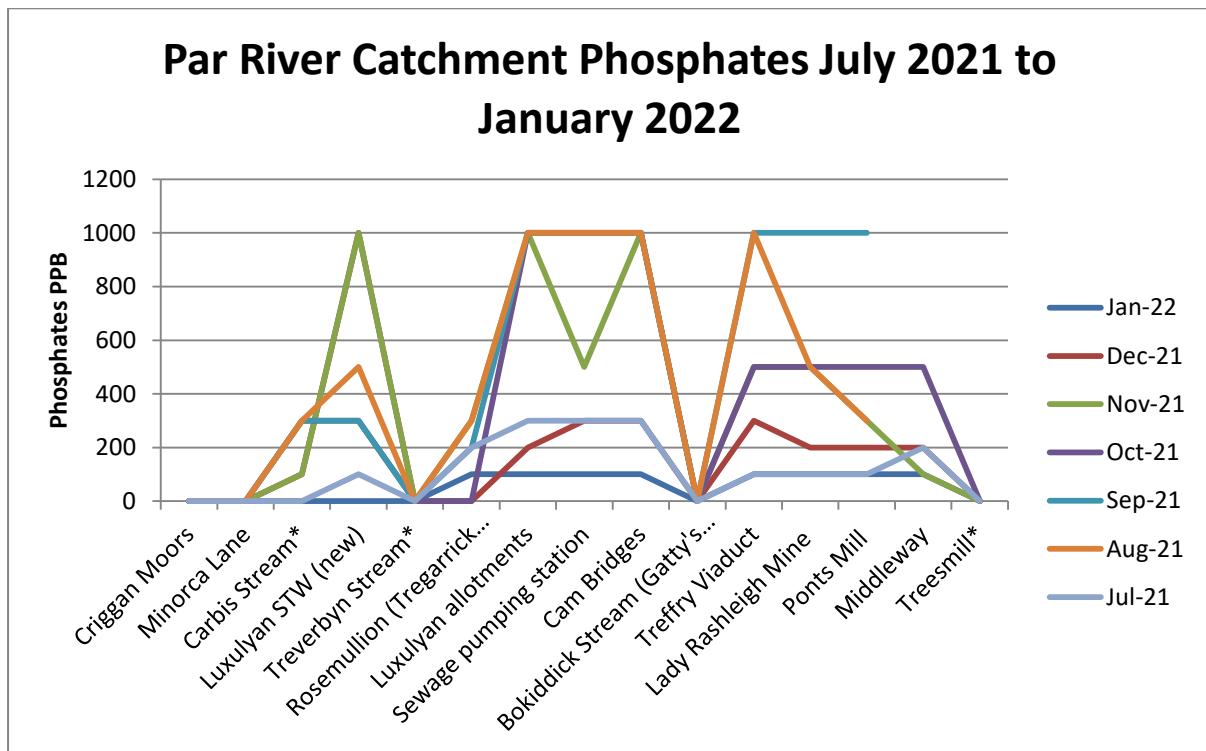
8th January 2022

9th January 2022

10th January 2022



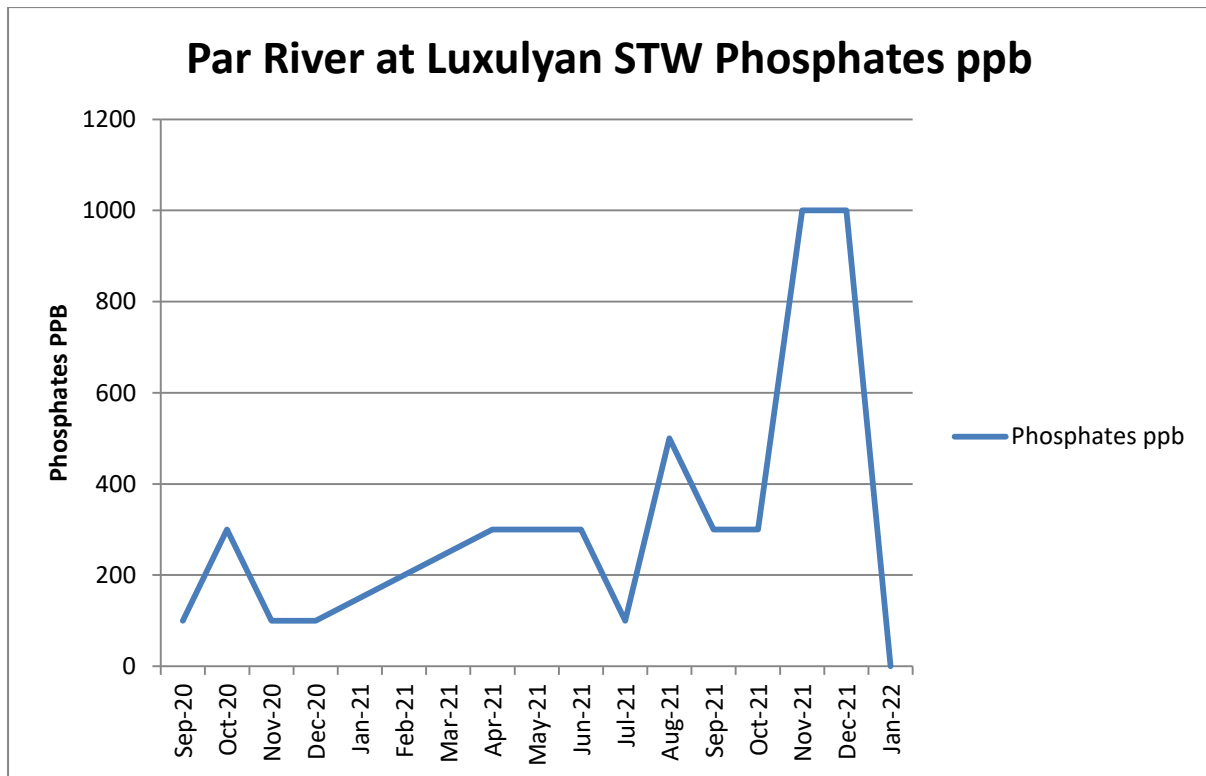
*indicates a tributary of the Par River.



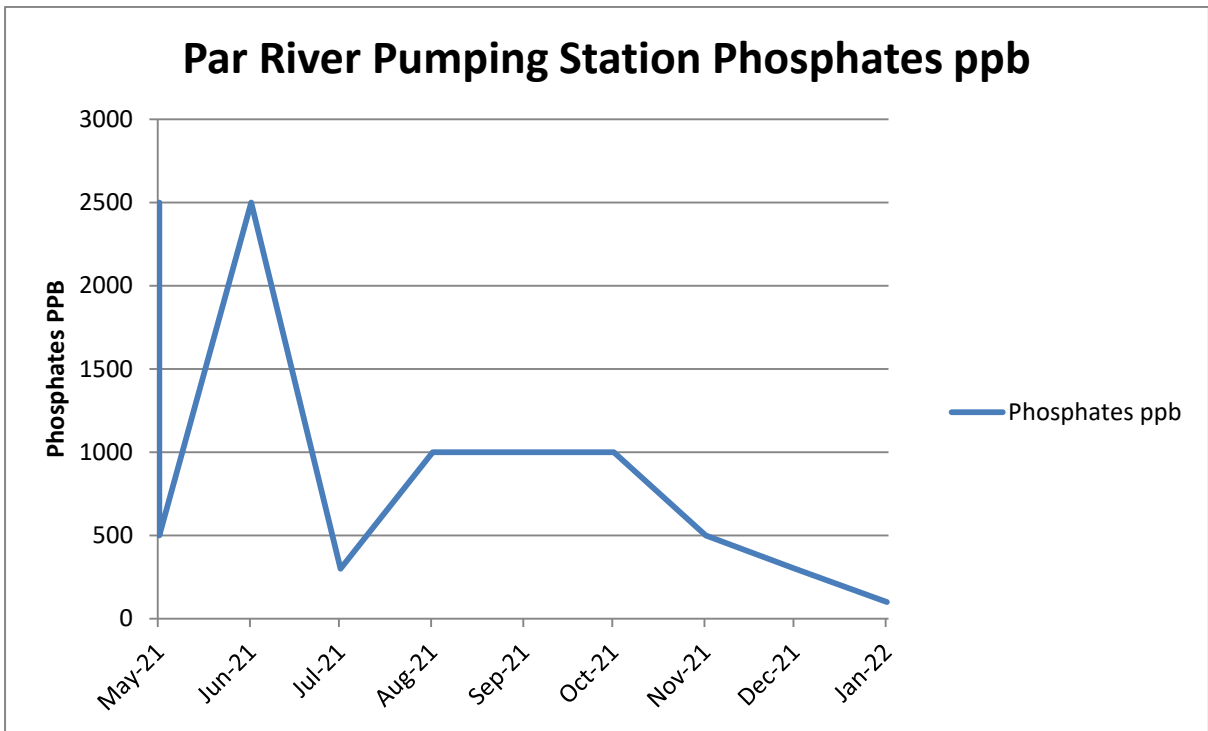
N.B. Readings of 2500 PPB have been recorded on dates preceding those shown in this graph.

5. **Historical data on phosphates at selected sites (no monitoring January to March 2021):**

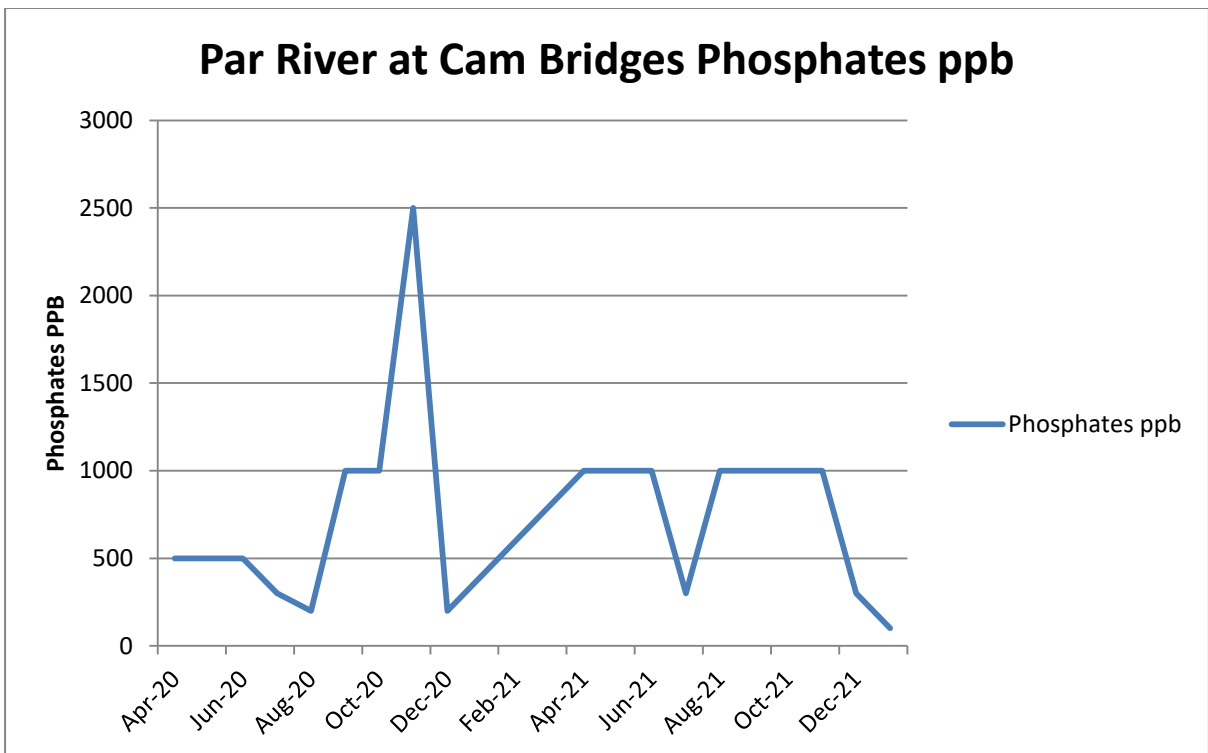
- (a) Luxulyan sewage treatment works is usually measured from November 2021 at SX 04472 58114 (formerly at SX 0455 58114) but on this occasion the sample was taken at SX 0455 58114. Measurements at the old monitoring spot, before November 2021, can be diluted by the proximity of 2 small outfalls (believed to be land drains).



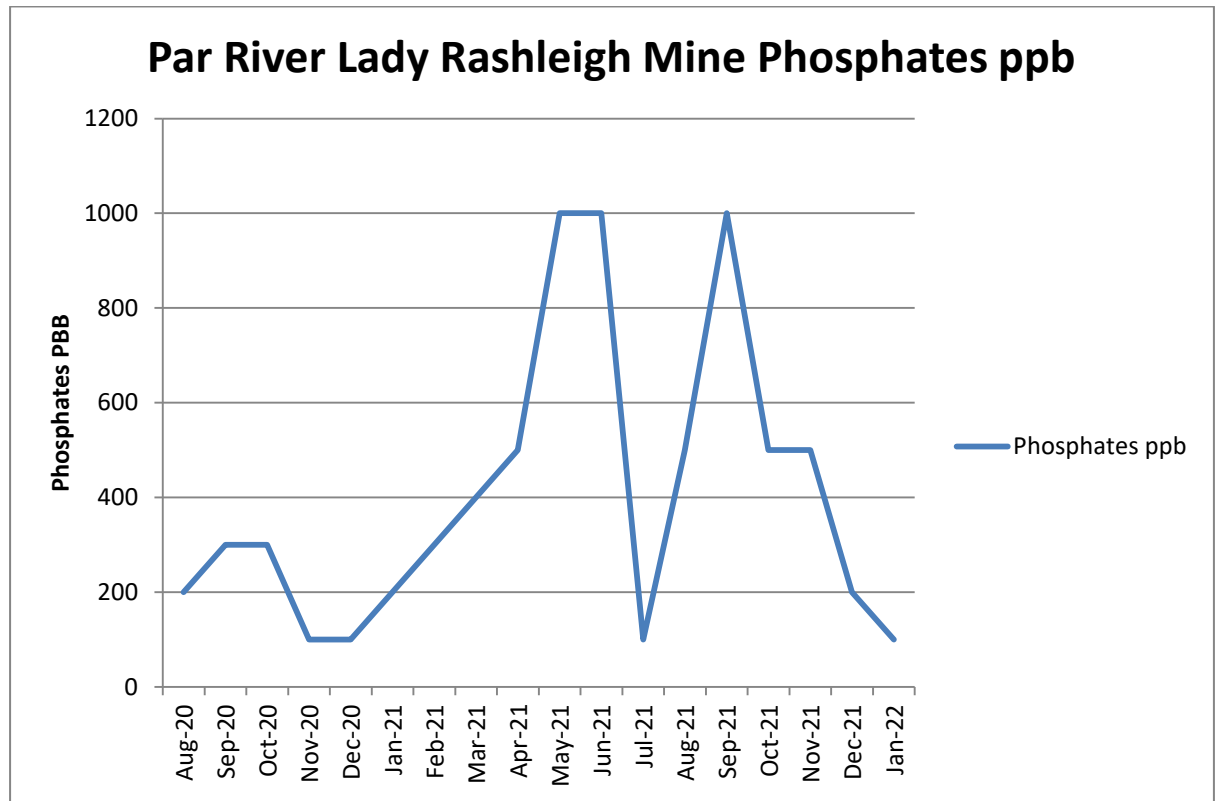
(b) Luxulyan SWW pumping station SX 05033 57849



(c) Cam Bridges SX 05292 57454



(d) Lady Rashleigh Mine SX 06451 56509

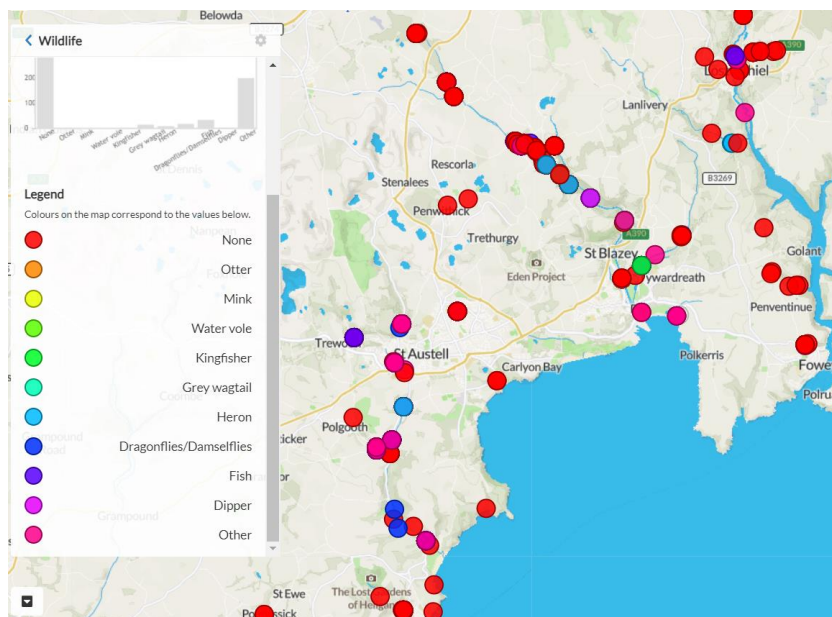


H. OTHER OBSERVATIONS

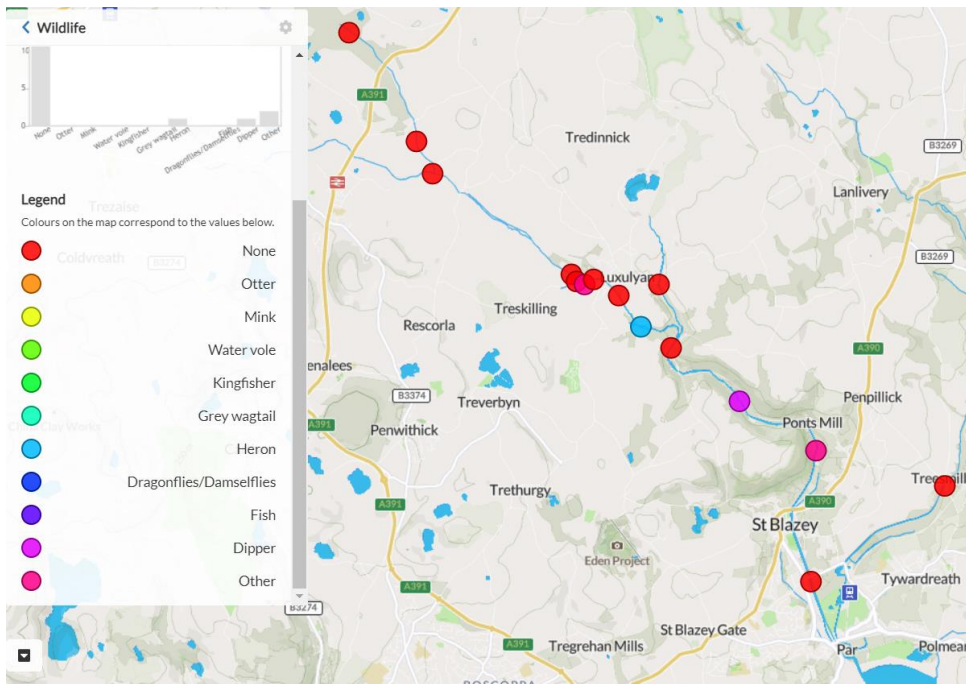
1. Wildlife

Source: Cartographer.

(a) Local comparison



(b) January 2022



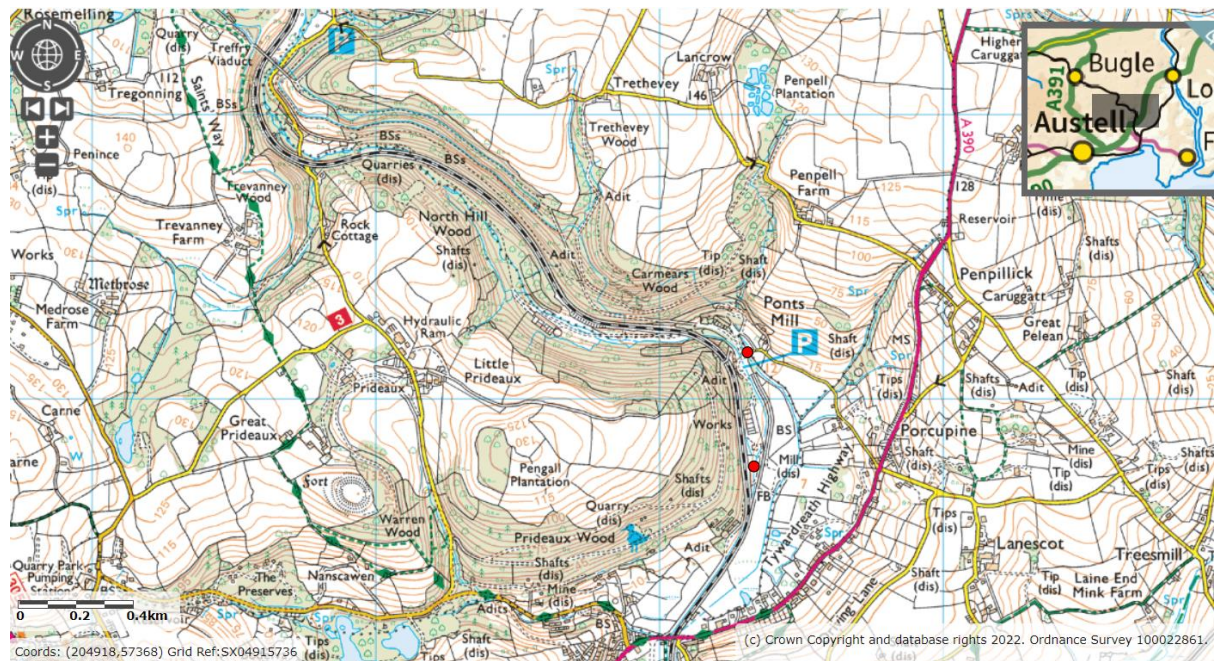
A heron was seen near Cam Bridges, and dippers in Luxulyan Valley.

2. Otter survey:

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

Red dots – definite evidence of otters. Recorded on ORKS database.

Grey dots – possible evidence. Not recorded on ORKS database



EVIDENCE	SEEN/ ORKS*	LOCATION	NOTES
Spraint - fresh	✓*	SX 0733 5577 On fallen tree trunk east bank of river about 100 metres downstream from Pontois Mill sluice gates and upstream of footbridge	Very large spraint.
Spraint – recent	✓*	SX 07312 56164 under canal bridge at Pontois Mill	Fish bones in spraint.
Spraint - old			
Anal jelly			
Sign heap			
Staining			
Tracks			
Path			
Slide			
Holt			
Hover			
Couch			
Live sighting			
Corpse			

3. Photographs

1. Downstream of Pontois Mill sluice looking downstream. Spraint found on this log.



2. Spraint on log.



A more detailed report on the monthly surveys and a table of cumulative results is available if required.

I. DISCUSSION

1. Phosphates did not exceed 100 PPB at any of our monitoring points. This may be a result of the dilution caused by heavy rainfall and high river levels. Environment Agency investigations have suggested that the source of high phosphate levels is the SWW sewage treatment works at Luxulyan and that there is currently no legal requirement to limit phosphate levels in any discharges into the river. Should high levels be recorded in future a case could be made to ask for limits.
2. Turbidity was high in various places, probably reflecting the conditions on 8th January when the river was high and flowing very fast.
3. The presence of what appears to be china clay in the Carbis Stream justifies investigation. It seems that Imerys has permits to discharge into other local rivers and this may be the case here.
4. The relatively high temperature at Middleway on the Par Canal is noticeable. This may be the result of the level and flow of the stream but it needs to be monitored.
5. It is hoped to report on riverflies next month. Thanks are due to Nick Taylor and Jeremy Roberts of the Three Bays Wildlife group for providing a refresher on riverfly monitoring.

Roger Smith, 21st January 2022

