# River Foss Water Quality Monitoring Report

River Foss, ~~Haxby~~near Sheriff Hutton. September 2017

June 2017 – March 2018

YorkshireDales Rivers Trust

# Introduction

In January 2017, the River Foss Society (RFS) was invited to the Dales to Vales Rivers Network (DVRN). The DVRN involves a wide range of statutory bodies, interest groups and charities, all of which have a shared passion for rivers and conservation. The RFS was identified as a key organisation to get involved in citizen monitoring, where data collection by volunteers would supplement Environment Agency (EA) data. The Yorkshire Dales Rivers Trust trained the RFS and provided water quality sampling kits. In June 2017, the RFS set up a Community Water Monitoring project with the aim to establish a baseline dataset for phosphate, nitrate and turbidity along the River Foss.

From June 2017 to March 2018 data were collected at six sampling locations on the River Foss ~~from~~ from Sheriff Hutton to Hungate Bridge (Table 1, Figure 1).

Table 1. River Foss sampling site names, reference numbers and grid references.

| Site Name | Number | NGR |
|---|---|---|
| Sheriff Hutton | 1 | SE 63149 64763 |
| Strensall | 2 | SE 62715 60604 |
| Haxby Lock | 3 | SE 61660 57897 |
| Huntington Church | 4 | SE 61617 56167 |
| Huntington Road | 5 | SE 61013 52828 |
| Hungate Bridge | 6 | SE 60906 51763 |

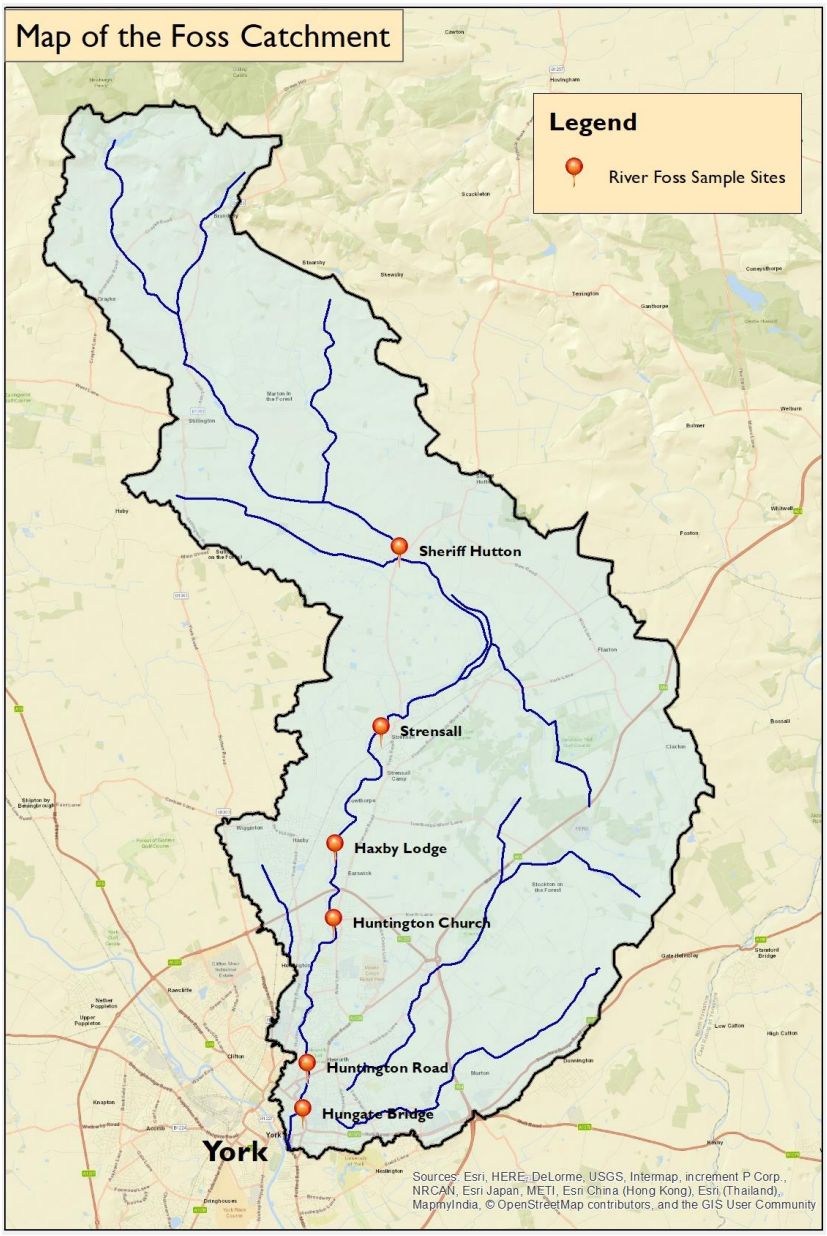
Nitrate, Phosphate and Turbidity were the three key elements which were analysed. High levels of nitrates and phosphates in water can lead to eutrophication. Nutrient rich conditions can result in excessive weed growth, harmful algal blooms, increased turbidity and oxygen depletion leading to fish kills, and an overall decline in biodiversity. Reasons for high levels of nitrates and phosphates in our rivers can be a result of human activity. By monitoring these key elements, the RFS, EA and YDRT can help advise and change human activities that could be impacting the River Foss. Phosphate were measured in milligrams per litre, results were compared to the EA set River Foss catchment specific Water Framework Directive (WFD) classifications (Table 2). One of the WFD aims is for all EU waterbodies to achieve a good status/potential (when heavily modified) by 2027, data collected indicate where areas are failing to meet good in the River Foss. Turbidity was measured in nephelometric turbidity units (NTU) and Nitrates were measured in milligrams per litre, no classifications are set for these two elements, but trends will be monitored.

Table 2. Water Framework Directive phosphate classifications for the River Foss catchment

| Phosphate (milligrams per litre) | Classification |
|---|---|
| 0 ≤ 0.05 | Excellent |
| 0.05 ≤ 0.09 | Good |
| 0.9 ≤ 0.2 | Moderate |
| 0.2 ≤ 1.09 | Poor |
| >1.09 | Bad |

Additional information was gathered which included; flow, water level, weather conditions, algal cover and temperature. These were not used for the main part of the analysis due to inconsistencies but helped with discussion points made.

**Commented [MG1]:** Should there be a table for Nitrate too?




Map 1. River Foss sampling sites

# Results

## Site Averages

Monthly sampling at each of the six sites revealed that Sheriff Hutton (1) had on average the lowest, nitrate (3.57 mg/l) and phosphate (0.036 mg/l) readings compared to the other five sites sampled on the River Foss (Figure 1). On average the highest nitrate readings occurred at Hungate Bridge (6) (7.66 mg/l) and the highest phosphate readings on average ~~were highest~~ at Strensall (2) (0.19mg/l) (Figure 1).

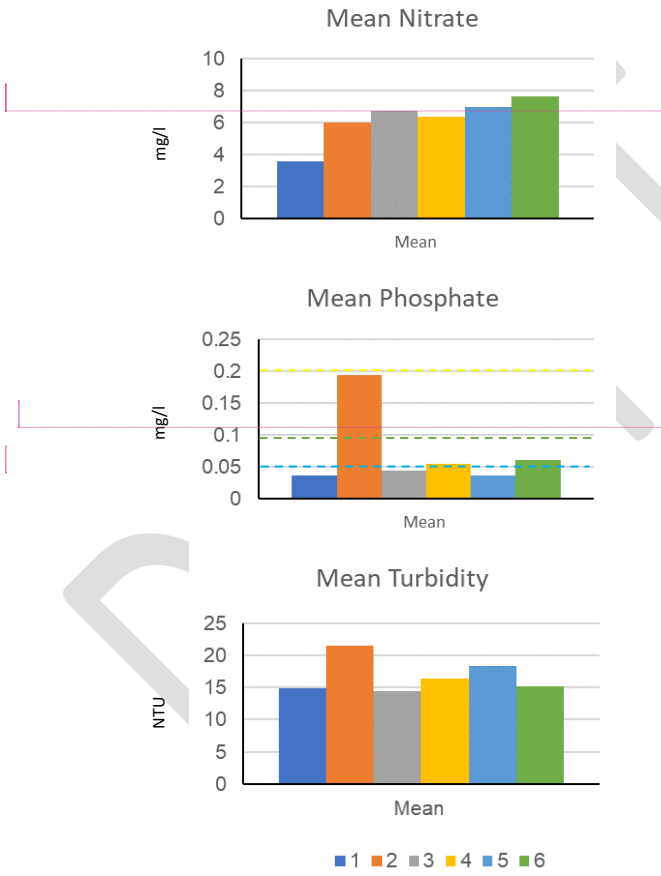



Figure 1. Mean Nitrate, Phosphate and turbidity results for each site (1-6) on the River Foss during sampling period, June 2017 to March 2018. Dashed lines indicates WFD classification thresholds (Table 2).

Turbidity between the six sites were comparable but on average Strensall (2) had the highest (21.5NTU) reading whilst Haxby ~~Lodge~~Lock ~~-~~(3) had the lowest (14.5NTU) (Figure 1).

Comparing the phosphate site averages to the WFD classifications, overall three of the six sites were classified as excellent (Sheriff Hutton (1), Haxby ~~Lodge~~Lock ~~-~~(3) and Huntington Road (5)), two were good (Huntington Church (4) and Hungate Bridge (6)) and one moderate (Strensall (2)).

**Commented [MG2]:** Are WFD limits available?

**Commented [MG3]:** Would abbreviated site names rather than 1-6 fit?

## Monthly Phosphate

Out of the 58 samples taken across the six sites 47 were classified as high. Phosphate readings spiked, and classification declined below good on 10 occasions at all six sites (Figure 2). In June 2017, spikes in phosphate were seen at four of the six sites. Strensall (2) and Hungate Bridge (6) had poor classification scores and Haxby ~~Lodge~~Lock ~~-~~(3) and Huntington Church were classified as moderate (Figure 2). Phosphate readings spiked on other occasions over the sampling period, for example at Strensall (2) in August and October 2017 where classifications were poor. Sheriff Hutton (1) in September 2017 and at Haxby ~~Lodge~~Lock ~~-~~(3), Huntington Church (4) and Huntington Road (5) in February 2018 (Figure 2), all of which were classified as moderate.

## Monthly Nitrate

Nitrate readings fluctuated at most sites throughout the sampling period (Figure 2). The highest reading ~~that could be~~ recorded was 10mg/l, ~~10mg/l readings were recorded~~ at all sites except Haxby Lock (3), readings at this site were more consistent during the sampling period than at others. The lowest nitrate reading was recorded at Sheriff Hutton (0.1mg/l) and samples taken at Hungate Bridge never dropped below 7mg/l, which was on average higher than any other site.

## Monthly Turbidity

Turbidity was overall consistent throughout the sampling period at all six sites, but on occasions turbidity increased (Figure 3). For example, on the 7$^{th}$ of January at all six sites there was an increase in turbidity due to recent flooding and heavy rain at the beginning of January. On all occasions an increase in turbidity coincided with periods of heavy rainfall or recent flooding events.

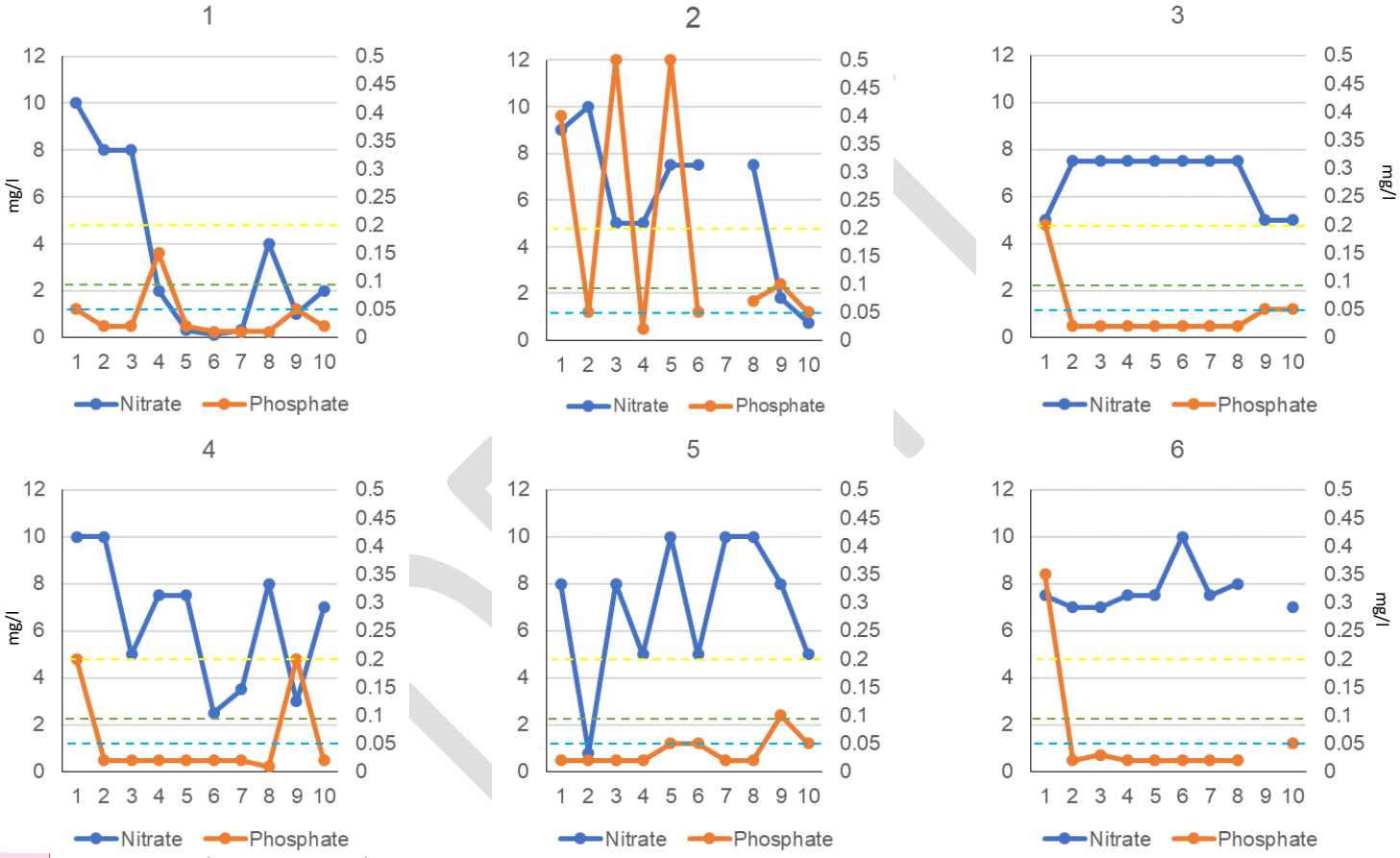



Figure 2. Phosphate (mg/l) and Nitrate (mg/l) results at each of the six sites over ten sampling occasions on the River Foss during sampling period, June 2017 to March 2018. Dashed lines ~~indicates~~indicate WFD classification thresholds (Table 2).

**Commented [MG4]:** Again, is it possible to replace the numbers with the site names, please?

**Commented [MG5]:** Just for phosphate?

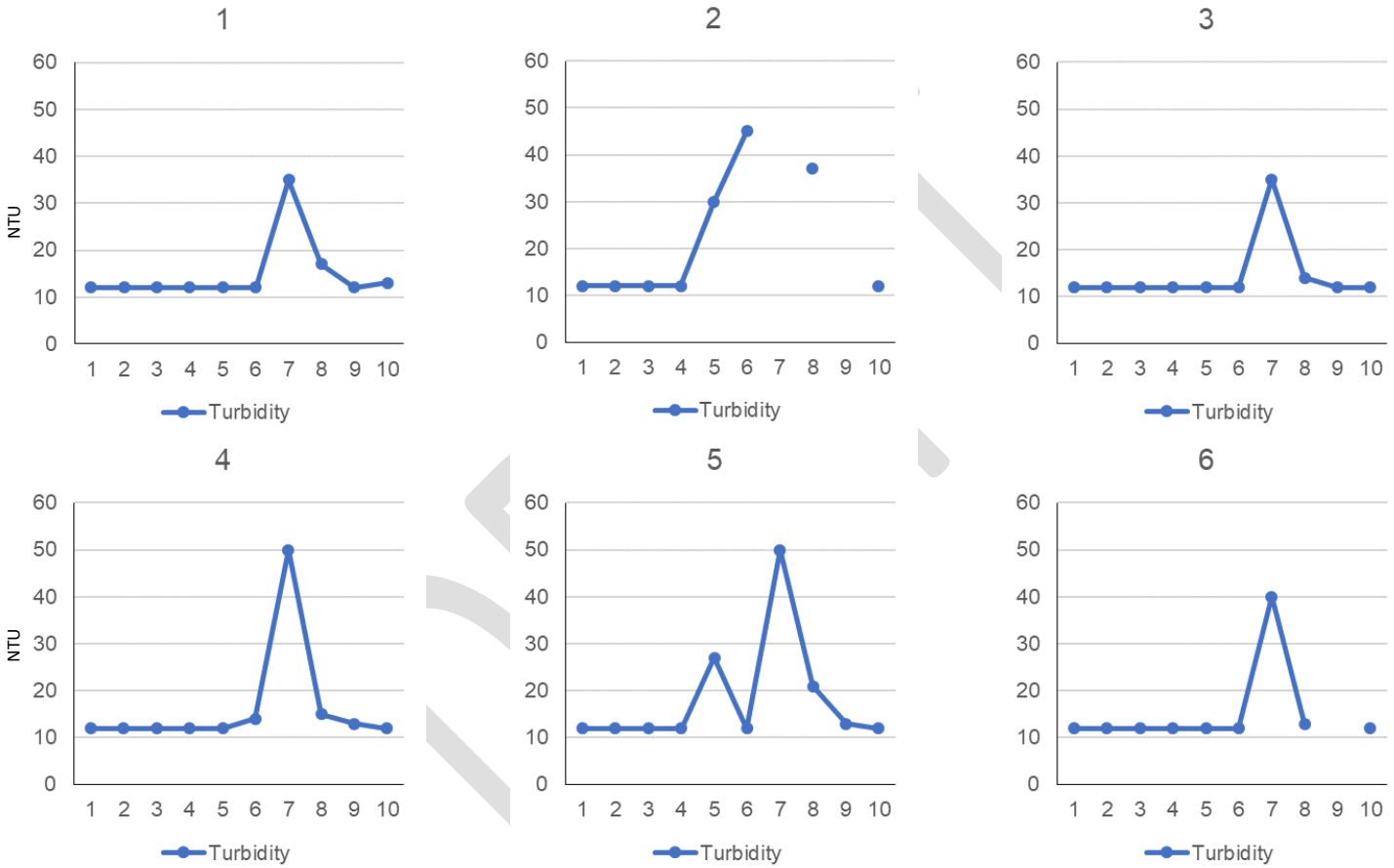



Figure 3. Turbidity (NTU) results at each of the six sites over ten sampling occasions on the River Foss during sampling period, June 2017 to March 2018

## Conclusions and Recommendations

Overall phosphate levels in the River Foss were very good. ~~Stresall~~Strensall appeared to be a site with ~~had~~ reoccurring increases in phosphate, these did not occur during rainfall events when phosphate readings might be likely to increase. There were comments when collecting data at Strensall about the smell of sewage. It is recommended that this site should be carefully monitored. Nitrate results at most sites were inconsistent and didn't just increase during periods of heavy rainfall which might be more likely to occur when runoff from surrounding land is expected. Turbidity appeared to only increase during periods of high rainfall or just after flood events which is inline with what would be expected. It is recommended that walkover surveys should be carried out to understand where there might be areas of diffuse or point source pollution. This will help in the future to identify key landowners and farmers that can work closely with the RFS and partners to help improve water quality in the Foss catchment.

As part of the data collection there was a mention of Himalayan balsam, it is advised that the RFS if not already doing so should carry out volunteer days to remove this non-native invasive plant species. This will help to encourage native plant species to establish on the riverbank and help to reduce issues caused by Himalayan balsam. Other opportunities for volunteer days might be to carry out litter picking events as some of the comments while sampling highlighted issues of litter.

Notes of wildlife along the river Foss were recorded such as a grey heron and a banded demoiselle, plus the presence of ~~a~~ macrophytes in and around the River Foss which are all positive signs of a healthy river.

**Commented [MG6]:** We are doing so. So far around 10 pulling session involving 20 or so volunteers. The walkover surveys (assuming that the training is given in time) should allow us to identify any surviving balsam.

**Commented [MG7]:** We have been doing 4 or 5 litter picks each year for some years now.