Yorkshire Water Drought Permit Application

Exceptional Shortage of Rainfall Evidence

September 2022

V1	August 2022	Submitted with NW pre application
V2	August 2022	Resubmitted with NW pre application
13-09-2022	September 2022	Updated with August data, and updated following NW Pre app comments. Submitted with NW application
V4	September 2022	For Ouse Application- Analyses redone for regional using EA YW region and incorporating comments from Ouse pre-app
V5	September 2022	Prepared for South pre application but not used-removed some of the analyses for NW and Ouse, and additional analyses for reservoirs in south and south west area.
V6	October 2022	As V 5 updated with September data. To be submitted for south and SW pre apps
YW Exceptional shortage of rain evidence_v7-09-2022_wharfe app	October 2022	For Wharfe application, updated from v6 for all analyses.

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Contents

1. Introduction

Yorkshire Water are applying for a number of drought permits and orders to enable us to deal with the serious risk of a deficiency of supplies that will exist if the dry weather continues throughout the autumn and winter of 2022/2023. The spring and summer of 2022 has been one of very low rainfall and high temperatures. This document outlines our analyses of rainfall data to date (and projections for the coming months) and demonstrates that the serious risk of deficiency of supplies is due to an exceptional shortage of rainfall.

The legal criteria that must be met in granting a drought order or permit include:

'If the Secretary of State / Agency is satisfied that, by reason of an exceptional shortage of rain, a serious deficiency of supplies of water in any area exists or is threatened.....'

There is no set definition or methodology to determine that an "exceptional shortage of rainfall" has occurred, because each drought and situation is unique.

In this document we demonstrate an exceptional shortage of rainfall by analysis of monthly rainfall and other metrics.
We have included:

- Plots of 2022 rainfall in relation to long term average
- Calculation of Cunnane Plotting position for long time series
- MORECS Soil Moisture Deficit analysis
- Standard Precipitation Indices

This document summarises the analyses carried out for the region and for catchments, and is a supplementary document to accompany the supporting information for our drought permit applications. Each application refers to the information in this document, and highlights some of the relevant analyses. Each application also shows relevant river flows and reservoir stocks relating to that application.

2. 2022 Weather Summary

2022 started dry, with below average rainfall from November 2021 until January 2022. February 2022 was extremely wet, with more than double the LTA, but all months have been below average since March. There have been periods of extremely hot weather, with heatwaves in July and early August, and the first ever red weather warnings for extreme heat in July. It has been the driest July in England since 1935 (Met Office, 2022), with virtually no rainfall in the south east of the country. In Yorkshire, there has been far less rainfall than usual, and this, combined with the high temperatures has meant that river flows and reservoir inflows have been far lower than usual.

The heatwave conditions resulted in exceptionally high demand for water. July rainfall was lower than average in Yorkshire, but much of the rainfall for the month fell in the last 10 days

of the month. The combination of hot dry periods with occasional rainfall has meant that much of the rainfall was soaked up by the dry ground.

3. Rainfall data

We have used the HADUK river catchment rainfall data provided to us monthly by the Environment Agency. In addition, we have used monthly catchment rainfall data for several of our reservoir group catchments throughout the region. The ones relevant to the south and south West area applications are listed in

Wharfe	TPD_NE_H11	Monthly EA updates of HADUK data
Ure	TPD_NE_H08	Monthly EA updates of HADUK data
SwaleNE	TPD_NE_H07	Monthly EA updates of HADUK data
Rye	TPD_NE_H13	Monthly EA updates of HADUK data
Ouse	TPD_NE_H10	Monthly EA updates of HADUK data
Nidd	TPD_NE_H09	Monthly EA updates of HADUK data
Don	TPD_NE_H17	Monthly EA updates of HADUK data
DerwentNE	TPD_NE_H14	Monthly EA updates of HADUK data
Dales NSTribs	TPD_NE_H12	Monthly EA updates of HADUK data
Hull and Humber	TPD_NE_H18	Monthly EA updates of HADUK data
Calder	TPD_NE_H16	Monthly EA updates of HADUK data
Aire	TPD_NE_H15	Monthly EA updates of HADUK data
Yorkshire regional	Yorkshire regional	EA data request-HADUK
Nidd group	North West catchment	EA data request-HADUK
Leeming/Leeshaw reservoirs	North West catchment	EA data request-HADUK
Ponden and Lower Laithe reservoirs	North West catchment	EA data request-HADUK

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Grimwith Reservoir	North West catchment	EA data request-HADUK
Walshaw Dean reservoirs	South West catchment	EA data request-HADUK
Brownhill/Digley	South West catchment	EA data request-HADUK
Ryburn Slithero Bridge	South West catchment	EA data request-HADUK
Don Valley Group	South catchment	EA data request-HADUK
Loxley Group	South catchment	EA data request-HADUK
Rivelin Redmires	South catchment	EA data request-HADUK
Little Don Valley group	South catchment	EA data request-HADUK
Washburn Valley reservoirs	North catchment	EA data request-HADUK

Table 1 . These data have been provided from the HADUK/EA by EA NE regional hydrology team. The use of the HADUK rainfall data allows analysis of long time series since it starts in 1891.

Figure 1 shows the Yorkshire River catchments and all of our reservoir catchments on a map, with the reservoir catchments we have analysed rainfall data for in this report labelled. It is clear how small the reservoir catchments are in proportion to even the smaller river catchments.

Catchment rainfall	Code/description	Source
Don	TPD_NE_H17	Monthly EA updates of HADUK data
Calder	TPD_NE_H16	Monthly EA updates of HADUK data
Yorkshire regional	Yorkshire regional	EA data request-HADUK
Walshaw Dean reservoirs	South West catchment	EA data request-HADUK
Little Don Valley group	South catchment	EA data request-HADUK
Brownhill/Digley	South West catchment	EA data request-HADUK
Don Valley Group	South catchment	EA data request-HADUK
Loxley Group	South catchment	EA data request-HADUK
Rivelin Redmires	South catchment	EA data request-HADUK
Ryburn Slithero Bridge	South West catchment	EA data request-HADUK

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Wharfe	TPD_NE_H11	Monthly EA updates of HADUK data
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Don	TPD_NE_H17	Monthly EA updates of HADUK data
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Calder	TPD_NE_H16	Monthly EA updates of HADUK data
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Yorkshire regional	Yorkshire regional	EA data request-HADUK
Nidd group	North West catchment	EA data request-HADUK
Leeming/Leeshaw reservoirs	North West catchment	EA data request-HADUK
Ponden and Lower Laithe reservoirs	North West catchment	EA data request-HADUK
Grimwith Reservoir	North West catchment	EA data request-HADUK
Walshaw Dean reservoirs	South West catchment	EA data request-HADUK
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Ryburn Slithero Bridge	South West catchment	EA data request-HADUK
Don Valley Group	South catchment	EA data request-HADUK
Loxley Group	South catchment	EA data request-HADUK
Rivelin Redmires	South catchment	EA data request-HADUK
Little Don Valley group	South catchment	EA data request-HADUK
Washburn Valley reservoirs	North catchment	EA data request-HADUK

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Table 1: Rainfall Catchments

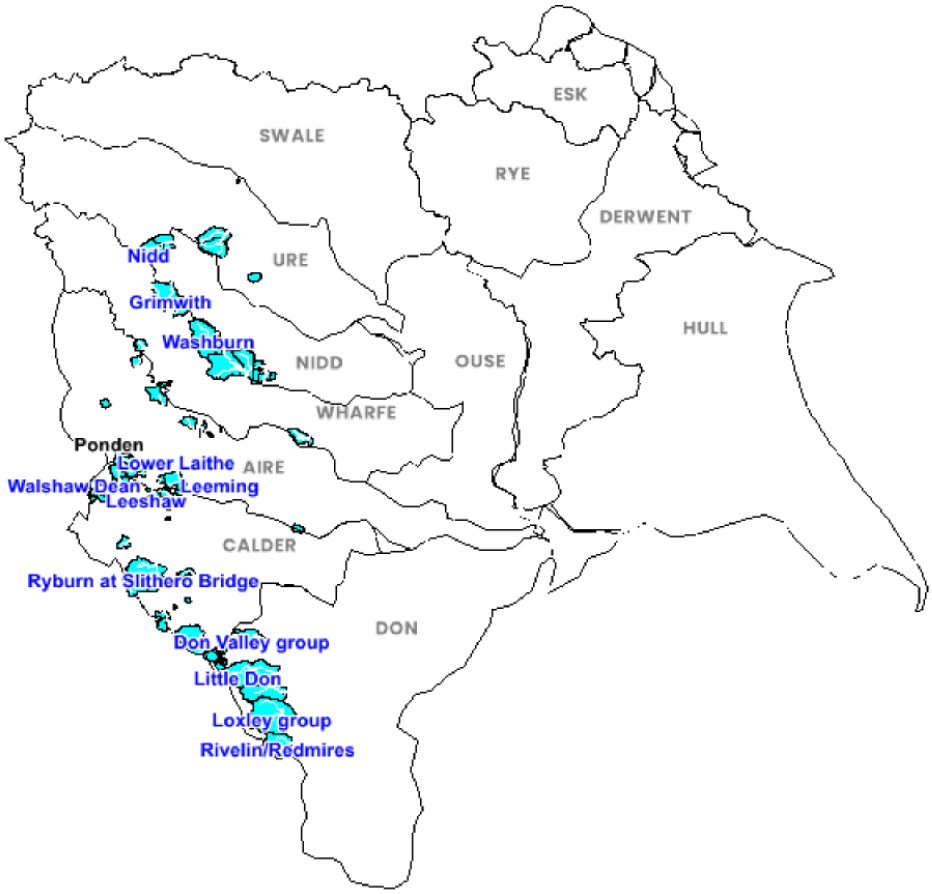

Figure 1: River and reservoir catchments

4. Rainfall and climate data analyses

The following analyses are included in our rainfall and climate analyses;

- Standardised Precipitation Index (SPI) calculations
- Rainfall ranking
- Rainfall probability bands
- Rainfall percentage of Long Term Average
- Reservoir Stocks
- Soil Moisture Deficit maps over time
- SPI maps from CEH Water Resources Portal
- River flow maps and graphs from CEH Water Resources Portal

5. Rainfall as percentage of Long Term Average (LTA)

Figure 2 shows the monthly rainfall values as percentage of the 1961-1990 long term average (LTA) for regional Yorkshire rainfall series from October 2021. In this graph red bars show rainfall below the LTA, and blue bars show monthly rainfall above the LTA.

It is clear that there has been a substantial rainfall deficit since rainfall has been below LTA in all but 3 months since October, with September being only just above LTA for the regional series. A dry autumn 2021 meant that reservoirs were below the normal control line until the very wet February, but rainfall has been below average since then. In both June and July, much of the rainfall occurred in the last 10 days of the month, with dry conditions followed by a short period of rainfall, much of which soaked into dry ground.

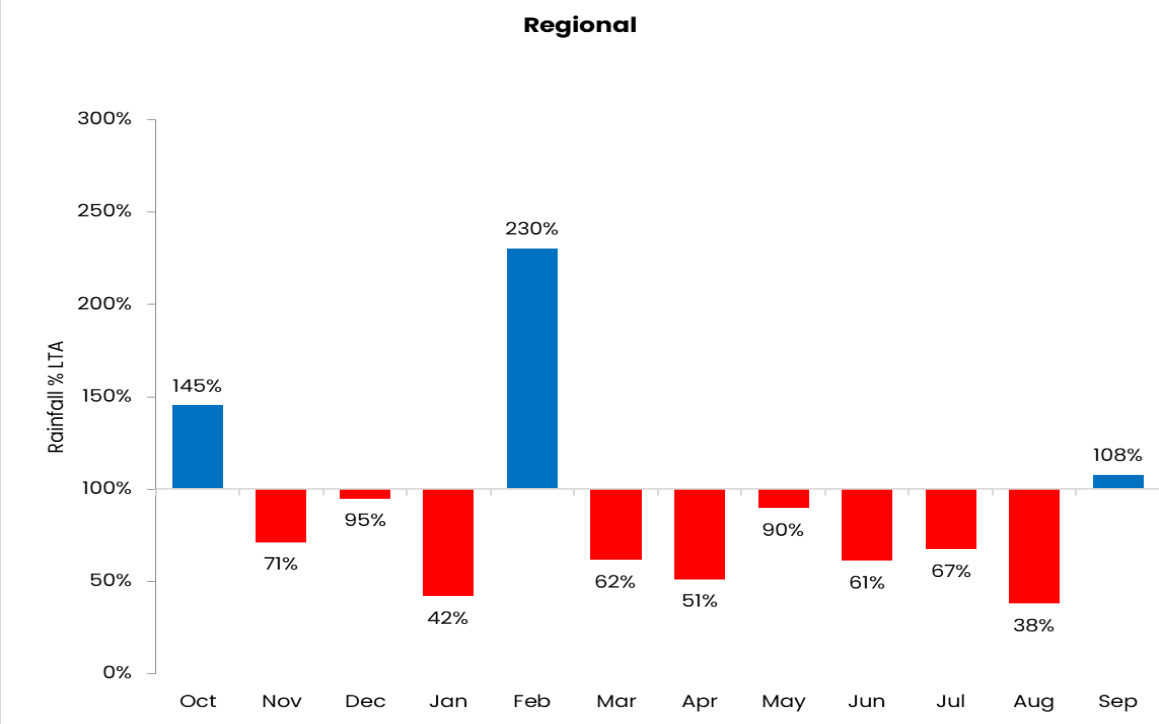

Figure 2: 2021-22 Regional rainfall as percentage of long term average (1961-1990 LTA)

Graphs for all of the river and reservoir catchments listed in

Wharfe	TPD_NE_H11	Monthly EA updates of HADUK data
Ure	TPD_NE_H08	Monthly EA updates of HADUK data
SwaleNE	TPD_NE_H07	Monthly EA updates of HADUK data
Rye	TPD_NE_H13	Monthly EA updates of HADUK data
Ouse	TPD_NE_H10	Monthly EA updates of HADUK data

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Nidd	TPD_NE_H09	Monthly EA updates of HADUK data
Don	TPD_NE_H17	Monthly EA updates of HADUK data
DerwentNE	TPD_NE_H14	Monthly EA updates of HADUK data
Dales NSTribs	TPD_NE_H12	Monthly EA updates of HADUK data
Hull and Humber	TPD_NE_H18	Monthly EA updates of HADUK data
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Rivelin Redmires	South catchment	EA data request-HADUK
Little Don Valley group	South catchment	EA data request-HADUK
Washburn Valley reservoirs	North catchment	EA data request-HADUK

Table 1 are shown in Appendix 1. These all show a dry November-January period, wet February, and dry period from March onwards. The graphs in Appendix 1 show only October and February have had higher than average rainfall since October 2021. It is worth noting that our reservoirs are located in very wet areas, and although the actual rainfall has been similar in some of the larger catchments and some of the small reservoir catchments, the proportion of what we would expect in those areas is low in comparison to what the systems are used to. The regional data is HADUK data supplied by the Environment Agency for the Yorkshire region. We have shown this for illustrative purposes in the main part of this document, but show data for the selected river and reservoir catchments in appendix 1. September has been just above average regionally, although for the river and reservoir catchments shown in appendix 1, rainfall is close to the LTA in September-just below in some areas and just above in others.

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Appendix 1 also contains a table showing the March-August and March-September rainfall as percentage of the LTA for each catchment.

6. Ranking of rainfall

Table 2 shows the rank of rainfall for the Yorkshire region in the 131 or 132 year period of record, for periods of up to 12 months ending from September 2021 to August 2022. (131 years for data to 2021, 132 years for data to 2022). Each cell is shaded to indicate how the 2022 rainfall is classified according to the Cunnane plotting position (See Appendix 2). Tables for the other rainfall catchments listed in

Wharfe	TPD_NE_H11	Monthly EA updates of HADUK data
Ure	TPD_NE_H08	Monthly EA updates of HADUK data
SwaleNE	TPD_NE_H07	Monthly EA updates of HADUK data
Rye	TPD_NE_H13	Monthly EA updates of HADUK data
Ouse	TPD_NE_H10	Monthly EA updates of HADUK data
Nidd	TPD_NE_H09	Monthly EA updates of HADUK data
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Ryburn Slithero Bridge	South West catchment	EA data request-HADUK
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Rivelin Redmires	South catchment	EA data request-HADUK
Little Don Valley group	South catchment	EA data request-HADUK
Washburn Valley reservoirs	North catchment	EA data request-HADUK

Table 1 are shown in Appendix 2a.
Table 2 shows that the 4 months to July are the 5th ranked April- July in the Yorkshire region since 1891, and the 5 and 6 months until August are the 4th and 3rd ranked respectively. These, and the other periods shaded red are classified as "exceptionally low" rainfall according to the Cunnane plotting position.

Appendix 2b shows tables of the driest ranked event for each of the rainfall catchments, and Appendix 2c shows the last year that was drier than 2022 for each month ending and duration.

Appendix 2a shows that 2022 ranks in the top 10 of the period of record for some of the larger river catchments, but for some of the small reservoir catchments in the south and west of the region, it is higher ranked. The 6 months ending in August have exceptionally low rainfall for all of the catchments, and is the driest in the period of record for the Walshaw Dean, Brownhill Digley and Little Don Valley catchments, and 2nd driest for Calder river catchments and the Don Valley Group reservoir catchments. This illustrates just how extreme the weather of 2022 has been in some of our Pennine catchments where our supply reservoirs are located. Using the Cunnane plotting position, the driest in the 132 year record has a return period of 220 years, and the second driest has a return period of 82 years, although to more accurately calculate the return period an extreme value analysis (EVA) distribution would need to be fitted.

September rainfall has been close to average, at 108% regionally, but the 6 and 7 month periods ending in September are still ranked in the top 6, and so in the exceptionally low category.

	Rank of 2022 rainfall in period since 1891											
	duration											
end month	1	2	3	4	5	6	7	8	9	10	11	12
10	94	74	51	74	47	87	60	60	72	97	106	95
11	27	51	51	36	49	33	69	42	44	54	84	94
12	57	32	54	44	32	47	32	64	41	40	49	78
1	9	22	13	25	21	14	24	13	44	25	27	37

2	127	90	80	63	71	61	49	62	43	75	56	54
3	41	116	72	68	49	59	58	45	57	37	70	49
4	27	20	91	52	56	36	45	45	33	45	33	55
5	64	25	16	87	47	48	33	39	44	34	43	27
6	35	29	14	12	66	30	36	25	33	33	20	35
7	26	14	14	5	8	41	17	19	12	22	19	17
8	10	9	5	6	4	3	19	6	11	6	9	9
9	84	29	18	10	9	5	6	23	12	15	10	12

Key

Exceptionally low	Notably low	Below normal	Normal	Above normal	Notably high	Exceptionally high

Table 2: Yorkshire Regional rainfall ranking of 2022 rainfall (from 1891-2022)

Appendix 2b shows that for many ending months and durations, 1995 was the driest, but for a few locations and durations 2022 is now the driest.

Appendix 2c shows that for many durations ending in August, 2022 is the driest since 1995/1996 for the regional rainfall series, and for a few durations ending in August for the Walshaw Dean reservoir and Calder river catchments.

7. Soil Moisture Deficit (SMD)

Rainfall is just one of the many indicators of drought, although it is the primary one. We have used the *Met Office Rainfall and Evaporation Calculation System (MORECS)* to show Soil Moisture Deficit (SMD) throughout the region. Ground conditions were fully saturated in all of the region in February after the high rainfall, but low rainfall and high temperatures led to a relatively early increase in SMD, with values showing very dry conditions of over 100mm (shaded dark orange in the maps below) for one area at the start of June and over 110mm in almost all areas by the start of July. It has been extremely dry earlier in the year compared to other years. The maps below show the SMD from May 2022.

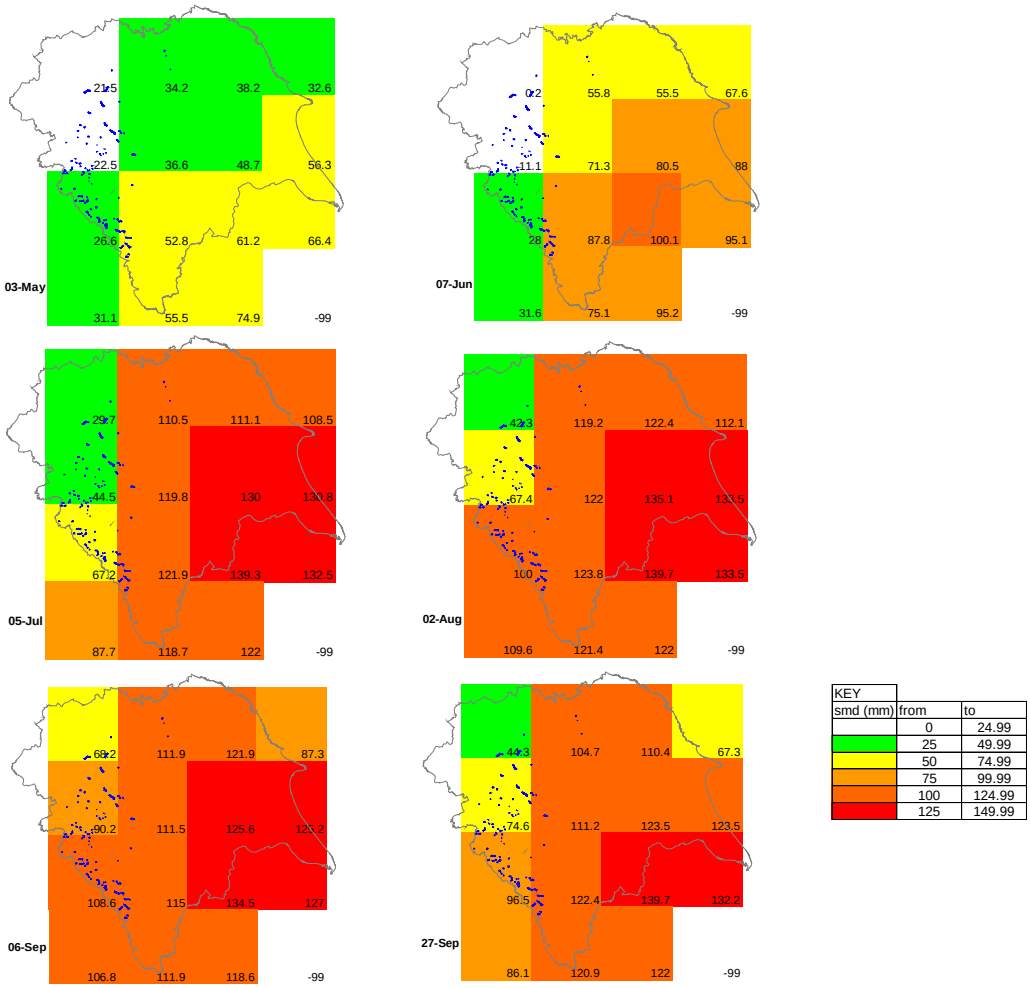

Figure 3: Soil Moisture Deficit for Yorkshire 2022

8. Standardised Precipitation Index (SPI)

The Standardised Precipitation Index (SPI) values can be interpreted as the number of standard deviations by which the observed anomaly deviates from the long-term mean. The SPI can be calculated for differing periods using monthly input data. We have calculated the SPI for all the monthly rainfall data listed in

Ure	TPD_NE_H08	Monthly EA updates of HADUK data
SwaleNE	TPD_NE_H07	Monthly EA updates of HADUK data
Rye	TPD_NE_H13	Monthly EA updates of HADUK data
Ouse	TPD_NE_H10	Monthly EA updates of HADUK data
Nidd	TPD_NE_H09	Monthly EA updates of HADUK data
Don	TPD_NE_H17	Monthly EA updates of HADUK data
DerwentNE	TPD_NE_H14	Monthly EA updates of HADUK data
Dales NSTribs	TPD_NE_H12	Monthly EA updates of HADUK data
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Aire	TPD_NE_H15	Monthly EA updates of HADUK data
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Grimwith Reservoir	North West catchment	EA data request-HADUK
Walshaw Dean reservoirs	South West catchment	EA data request-HADUK
Brownhill/Digley	South West catchment	EA data request-HADUK
Ryburn Slithero Bridge	South West catchment	EA data request-HADUK
Don Valley Group	South catchment	EA data request-HADUK
Loxley Group	South catchment	EA data request-HADUK
Rivelin Redmires	South catchment	EA data request-HADUK
Little Don Valley group	South catchment	EA data request-HADUK
Washburn Valley reservoirs	North catchment	EA data request-HADUK

Table 1 for a 1 month, 3 month, and 6 month duration, and these are shown in Appendix 3. We have followed the methodology described in report *Environment Agency Standardised Precipitation Index (SPI) Tool*. We have not used the Environment Agency Tool, as the spreadsheet macros do not work on our computers, but we have used the methodology described and our results are the same as those provided by the Agency.

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Catchment	1 month SPI	3 month SPI	6 month SPI
Wharfe	-0.62	-1.78	-2.01
Ure	-0.54	-1.46	-1.80
SwaleNE	-0.06	-1.24	-1.69
Rye	-0.17	-1.60	-2.04
Ouse	-0.24	-1.91	-2.08
Nidd	-0.46	-1.67	-1.86
Don	-0.30	-1.43	-1.89
DerwentNE	-0.44	-1.96	-2.31
Dales NSTribs	-0.47	-1.74	-2.22
Hull and Humber	-0.33	-1.86	-2.25
Calder	-0.94	-2.07	-2.43
Aire	-0.73	-2.04	-2.31
Yorkshire regional	0.37	-1.18	-1.78
Nidd group	0.47	-0.61	-0.98
Washburn group	0.33	-1.15	-1.62
Walshaw group	0.03	-1.50	-2.07
Leeshaw/Leeming	0.07	-1.37	-1.80
Ponden/Lower Laithe	0.04	-1.46	-1.92
Grimwith	0.31	-0.83	-1.14
Brownhill_Digley_group	0.07	-1.22	-1.79
Don_Valley_group	0.12	-1.17	-1.80
Little_Don_Valley_group	0.15	-1.19	-1.94
Loxley_group	0.28	-0.95	-1.67
Rivelin_Redmires	0.24	-0.83	-1.47
Ryburn_us_slitheroe_bridge	-0.01	-1.16	-1.74
Key			
Extremely dry			Severely dry	Moderate dry

Table 3 shows the SPI values calculated for August for our rainfall catchments. The 3 month SPI is severely dry for most catchments(7 from 12), and extremely dry for the Aire and

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Calder catchments. The 6 month SPI (April-September) is extremely dry for 8 out of the 12 catchments, and for the regional Yorkshire rainfall series is severely dry, along with the 4 other catchments.

Catchment	1 month SPI	3 month SPI	6 month SPI
Wharfe	-0.62	-1.78	-2.01
Ure	-0.54	-1.46	-1.80
SwaleNE	-0.06	-1.24	-1.69
Rye	-0.17	-1.60	-2.04
Ouse	-0.24	-1.91	-2.08
Nidd	-0.46	-1.67	-1.86
Don	-0.30	-1.43	-1.89
DerwentNE	-0.44	-1.96	-2.31
Dales NSTribs	-0.47	-1.74	-2.22
Hull and Humber	-0.33	-1.86	-2.25
Calder	-0.94	-2.07	-2.43
Aire	-0.73	-2.04	-2.31
Yorkshire regional	0.37	-1.18	-1.78
Nidd group	0.47	-0.61	-0.98
Washburn group	0.33	-1.15	-1.62
Walshaw group	0.03	-1.50	-2.07
Leeshaw/Leeming	0.07	-1.37	-1.80
Ponden/Lower Laithe	0.04	-1.46	-1.92
Grimwith	0.31	-0.83	-1.14
Brownhill_Digley_group	0.07	-1.22	-1.79
Don_Valley_group	0.12	-1.17	-1.80
Little_Don_Valley_group	0.15	-1.19	-1.94
Loxley_group	0.28	-0.95	-1.67
Rivelin_Redmires	0.24	-0.83	-1.47
Ryburn_us_slitheroe_bridge	-0.01	-1.16	-1.74
Key			

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Extremely dry	Severely dry	Moderate dry

Table 3: September SPI values for Yorkshire catchments

Appendix 3 shows maps of the SPI from the Centre For Ecology and Hydrology Water Resources Portal for August and September for the 1, 3 and 6 month durations. The catchment for the River Wharfe is outlined. The CEH SPI calculates SPI in the same way as the EA recommended method, but currently has a slightly different rainfall dataset, and uses a different method to fit the Gamma distribution, so the calculated values may differ slightly to those shown below, but the maps provide a good visual indication of the SPI.

9. River Flows

The graphs below taken from our weekly Water situation report show river flows in 2022 compared to recent years and 1995 and 1996- our worst drought years. These show that river flows have been low in 2022, and for some rivers they have been at low levels relatively early in the year, even when compared to some of our worst drought years such as 1995.

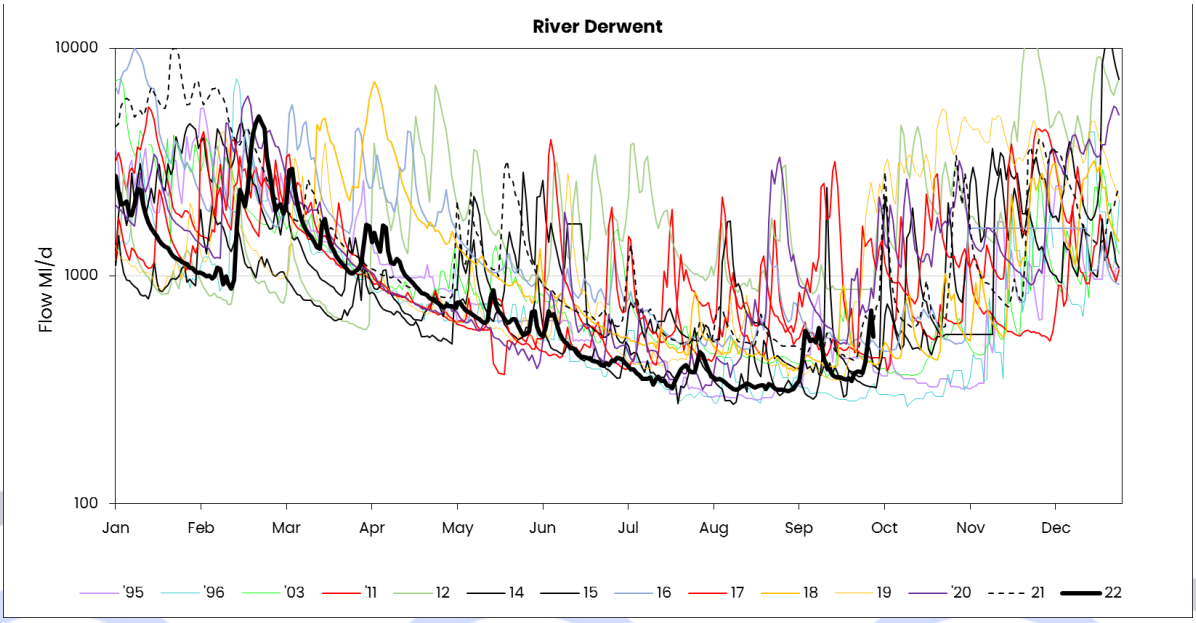

Figure 4:River Derwent flows

Flows in the River Derwent during June and July have been as low as they were in 1995 and 1996.

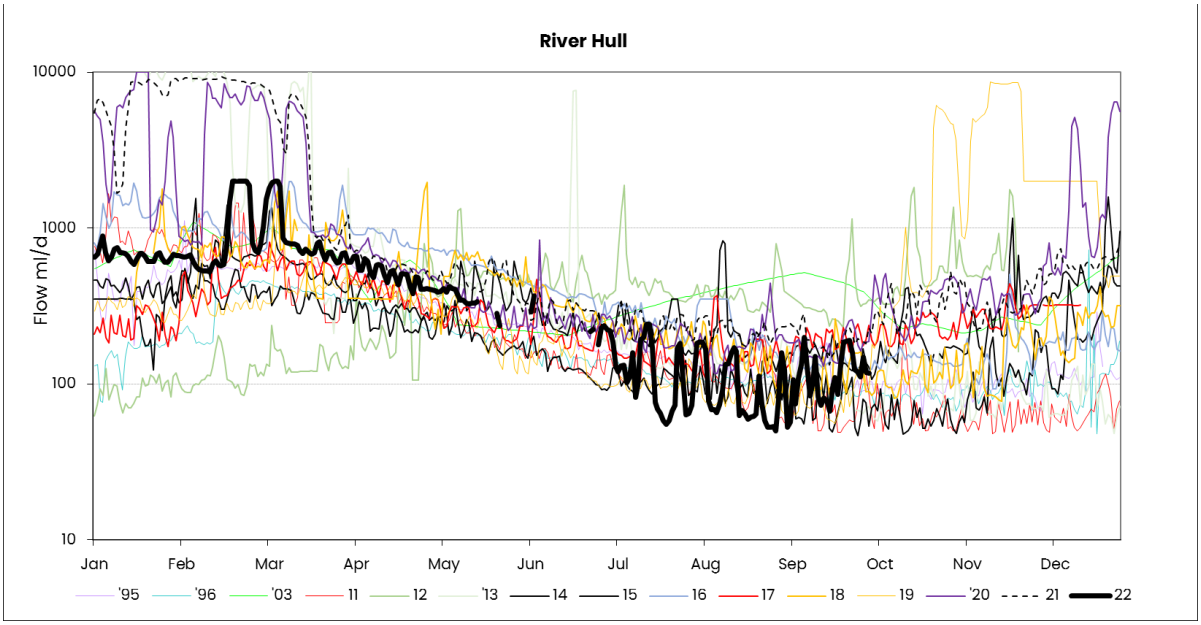

Figure 5:River Hull flows

Flows in the River Hull have had very low periods in July and August 2022.

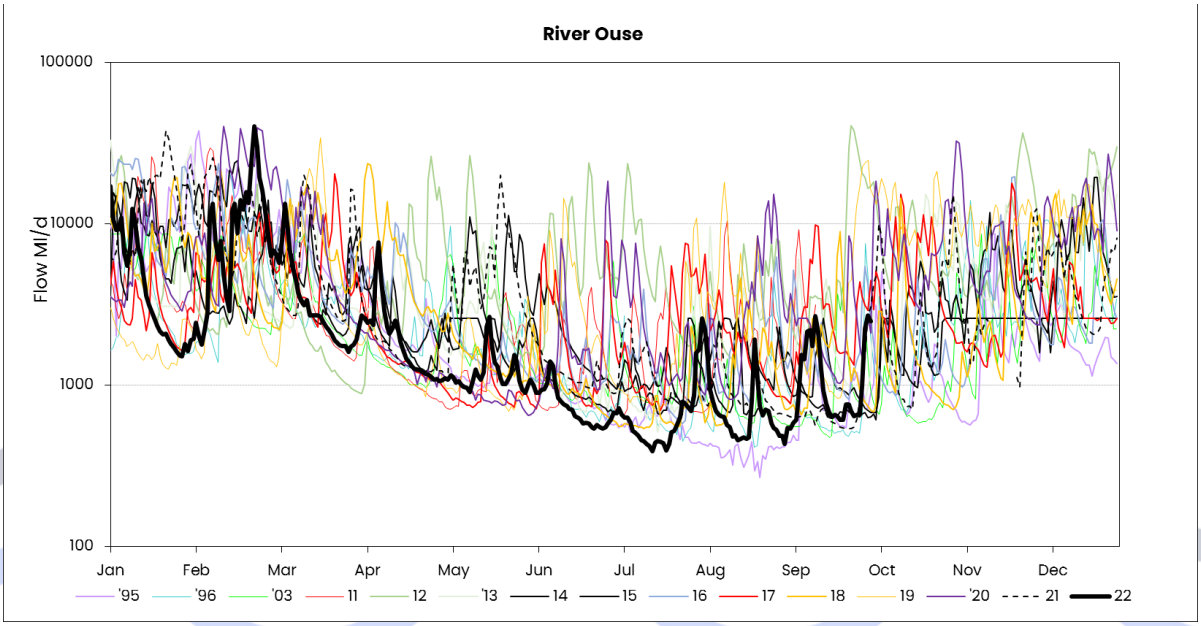

Figure 6:River Ouse flows

Flows in the River Ouse were lower in periods of June and July 2022 than they were in 1995 and 1996.

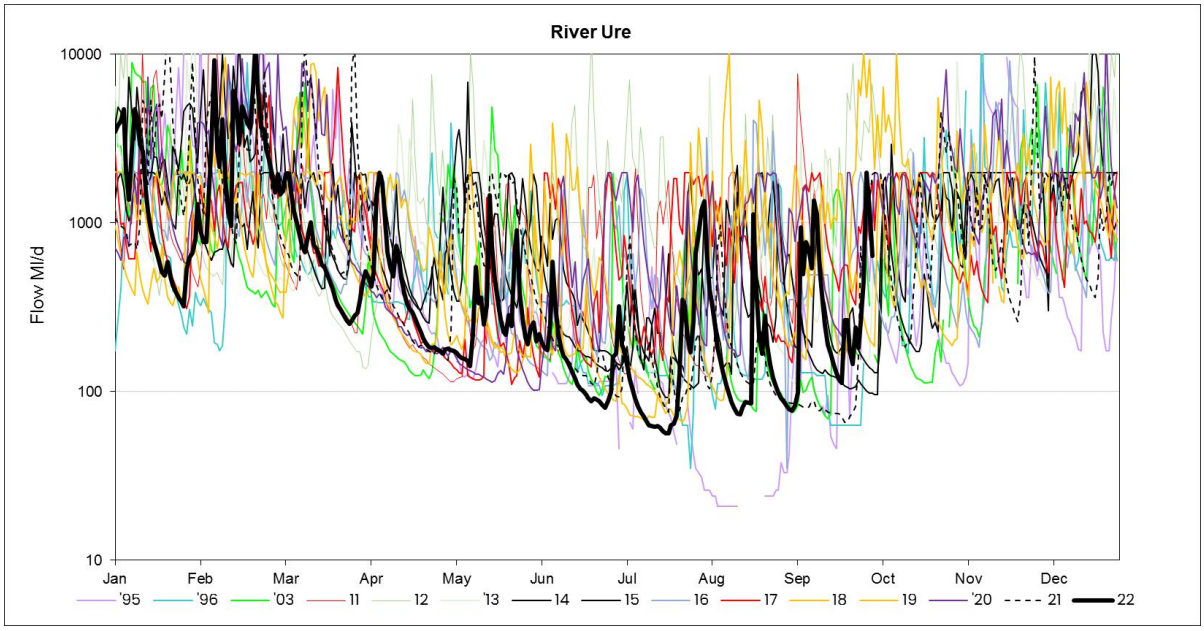

Figure 7:River Ure flows

Flows in the River Ure were lower in periods of June and July 2022 than they were in 1995 and 1996.

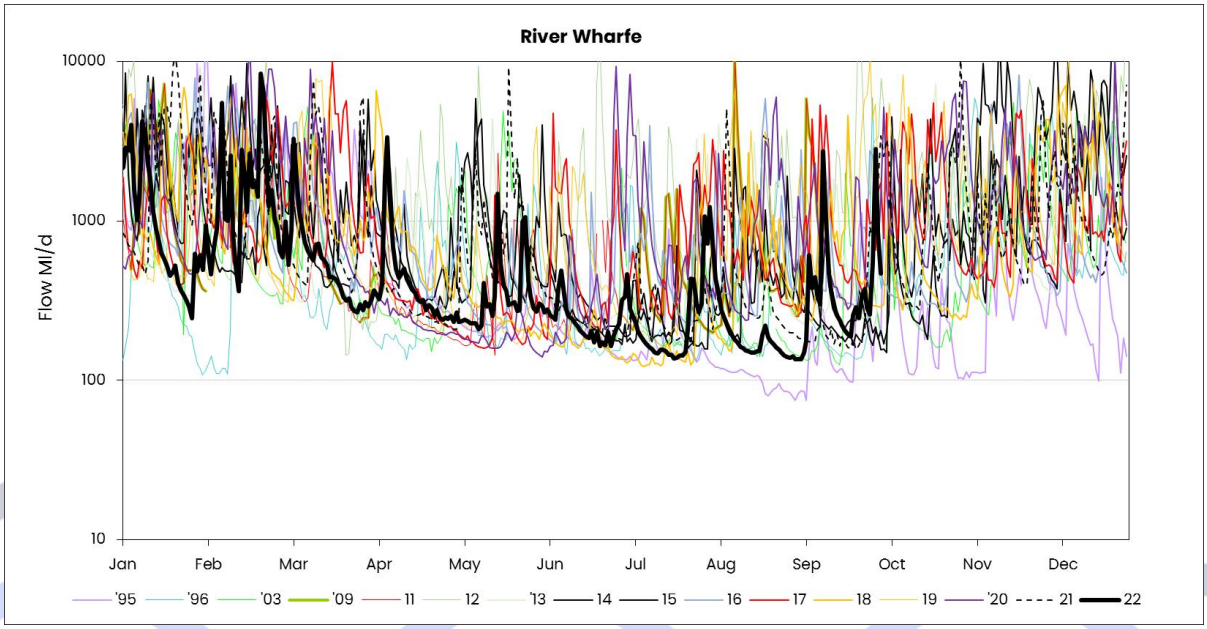

Figure 8:River Wharfe flows

The graphs below taken from the CEH Water Resources portal show river flows and the accompanying rainfall for the River Ouse. It shows that for both June and July 2022, although the monthly rainfall is only a little below average, the river flows have been very low for periods of time and then recovered when rainfall has occurred late in the month. Intermittent rainfall and high SMD have meant that more of the rainfall than usual is soaked up by the dry ground. It can be seen that at times in July river flows were "exceptionally low" (see Appendix 4 for a description of the regime bandings shown below), but the rainfall at the end of the month brought flows into the "above normal" range, meaning that average

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monthly flows were in the normal range. River Flows in August and September have responded to intermittent rainfall, and been in bands normal, to exceptionally low.

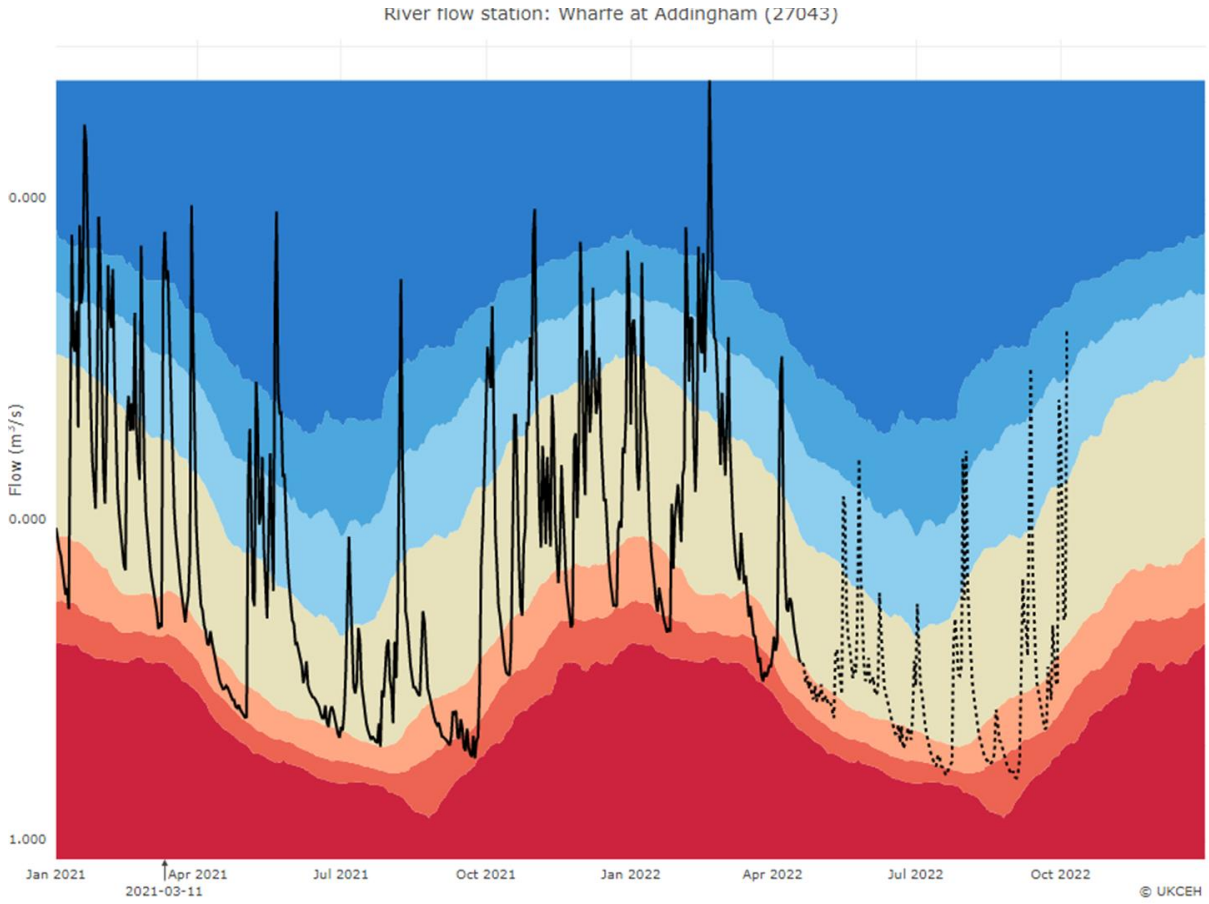

Figure 9: CEH River flows and banding:River Wharfe

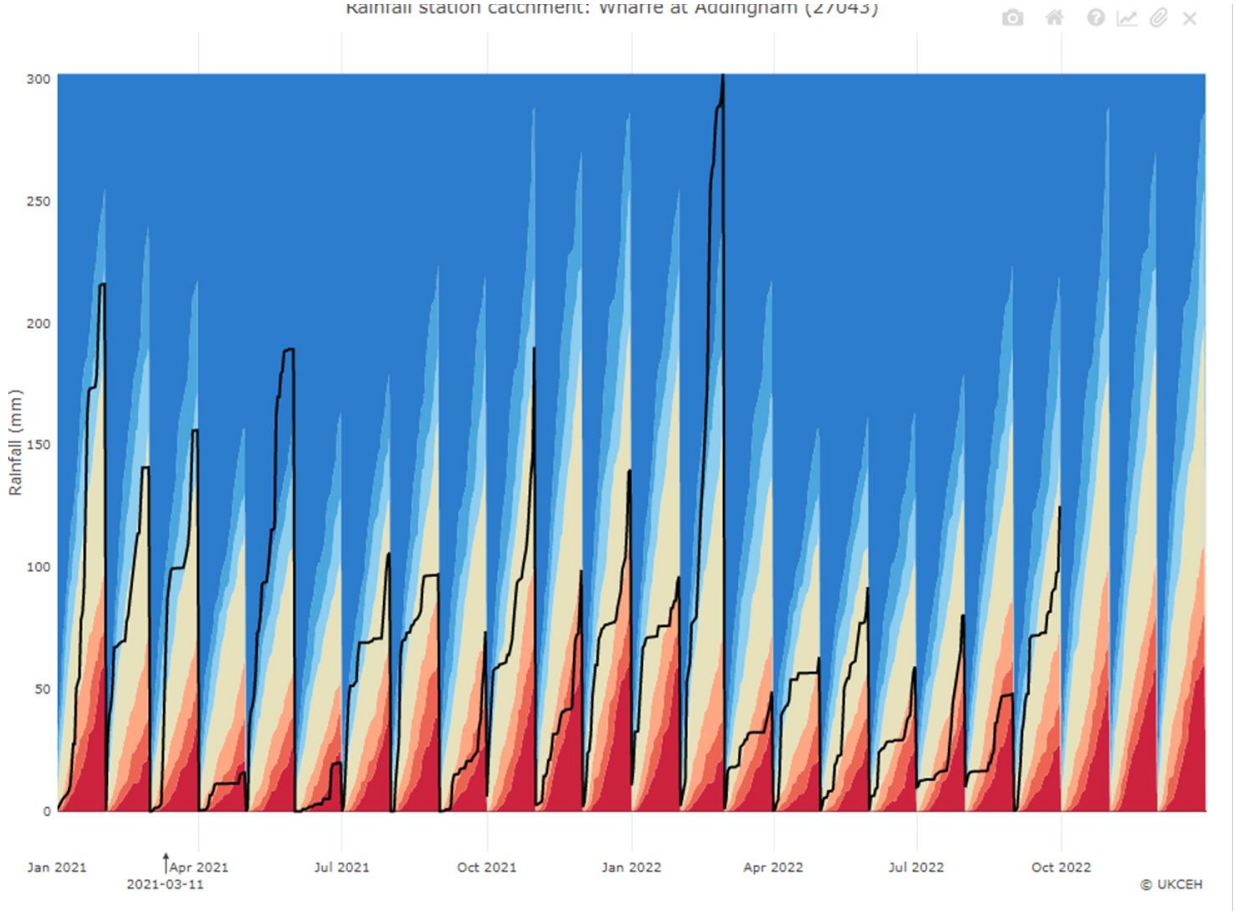

Figure 10: CEH Rainfall station catchment rainfall:River Wharfe

10. Reservoir stocks

The graphs below show the stocks of our regional reservoir group and our 5 major reservoir groups, East, North, North West, South and south West for the last 12 years and selected other dry years- 2003, 1995 and 1996. They all show 2022 stocks falling earlier and more steeply than in most recent years. In 2020 stocks fell earlier, but then recovered. Since mid June stocks have been lower than at the same time of year in previous years, other than the 1995 drought. This further illustrates how dry 2022 has been in comparison to other years. Area reservoir stocks and group and individual reservoir stocks are shown in the supporting information documents for each set of drought permit applications.

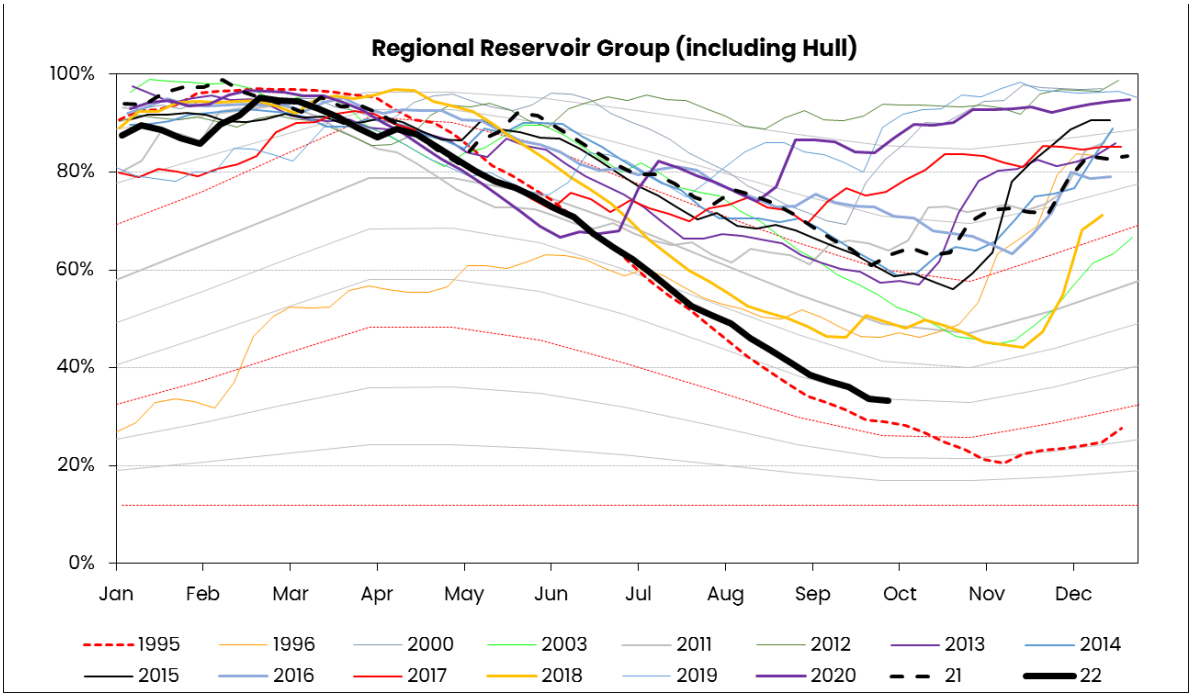

Figure 11: Regional reservoir stocks

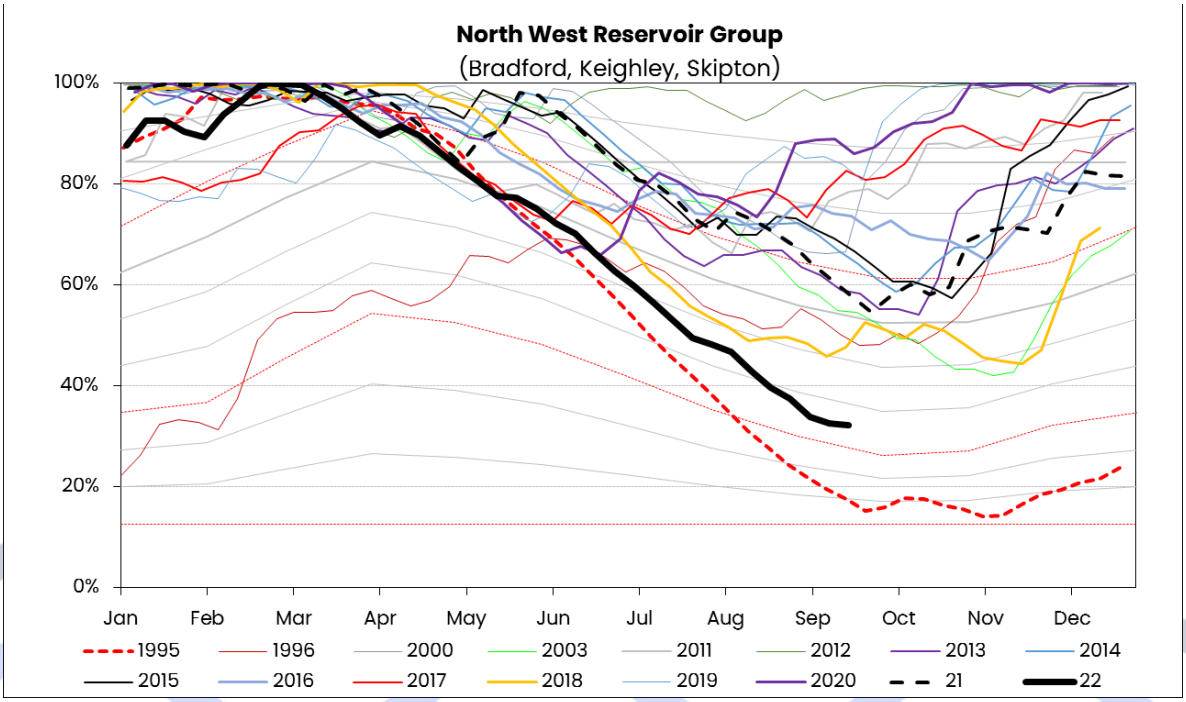

Figure 12: North West group reservoir stocks

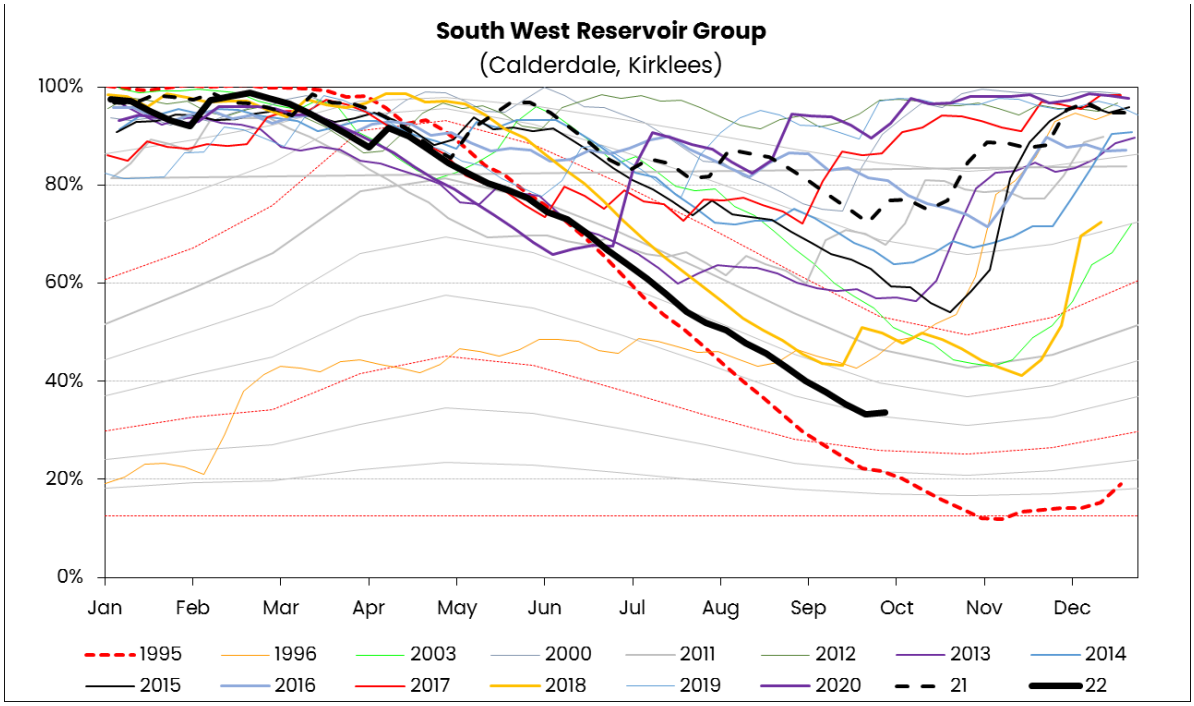

Figure 13: South West group reservoir stocks

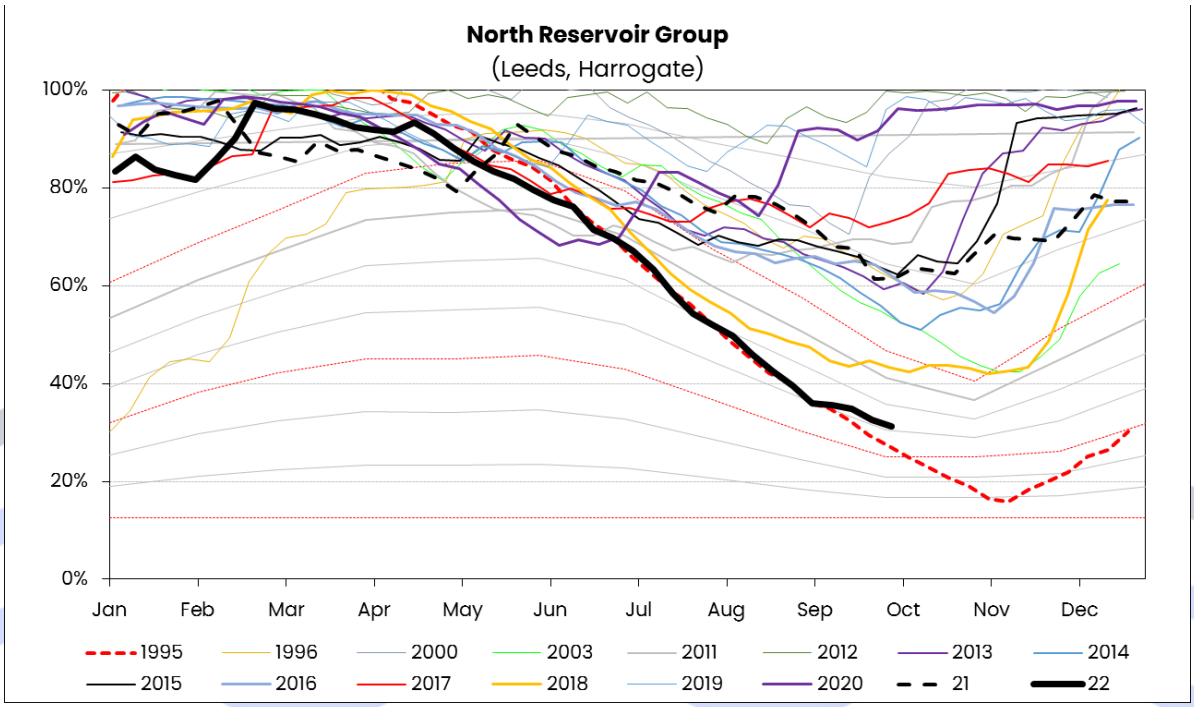

Figure 14: North group reservoir stocks

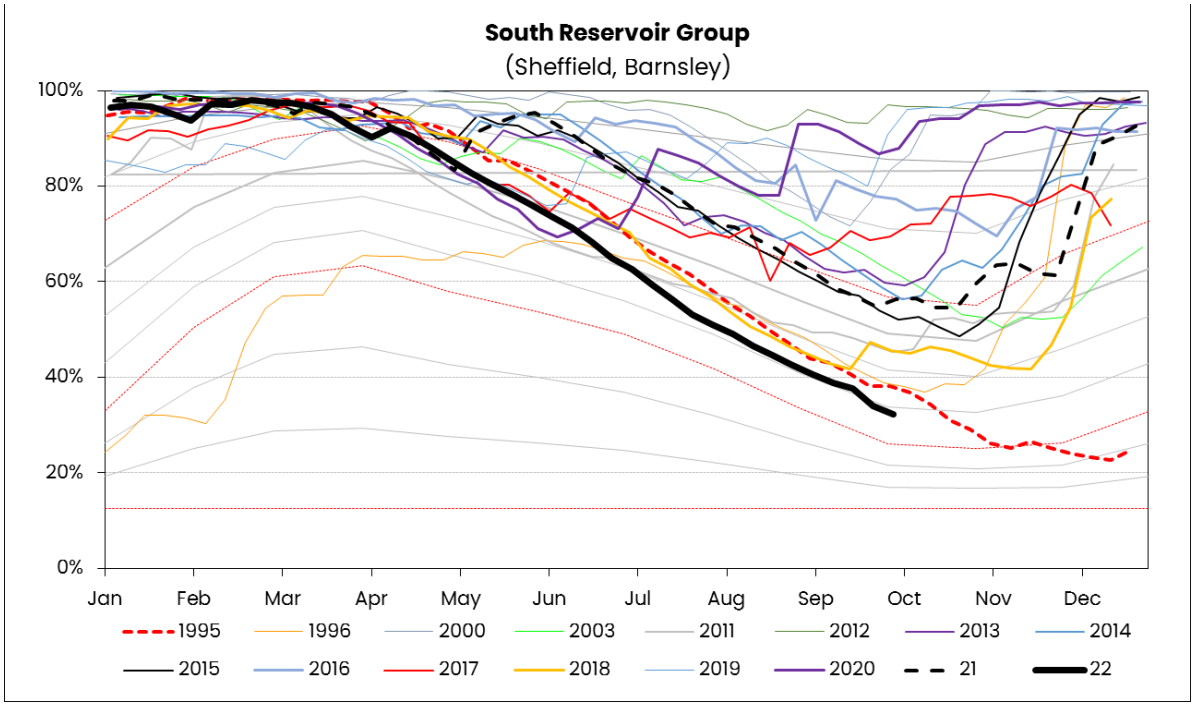

Figure 15: South group reservoir stocks

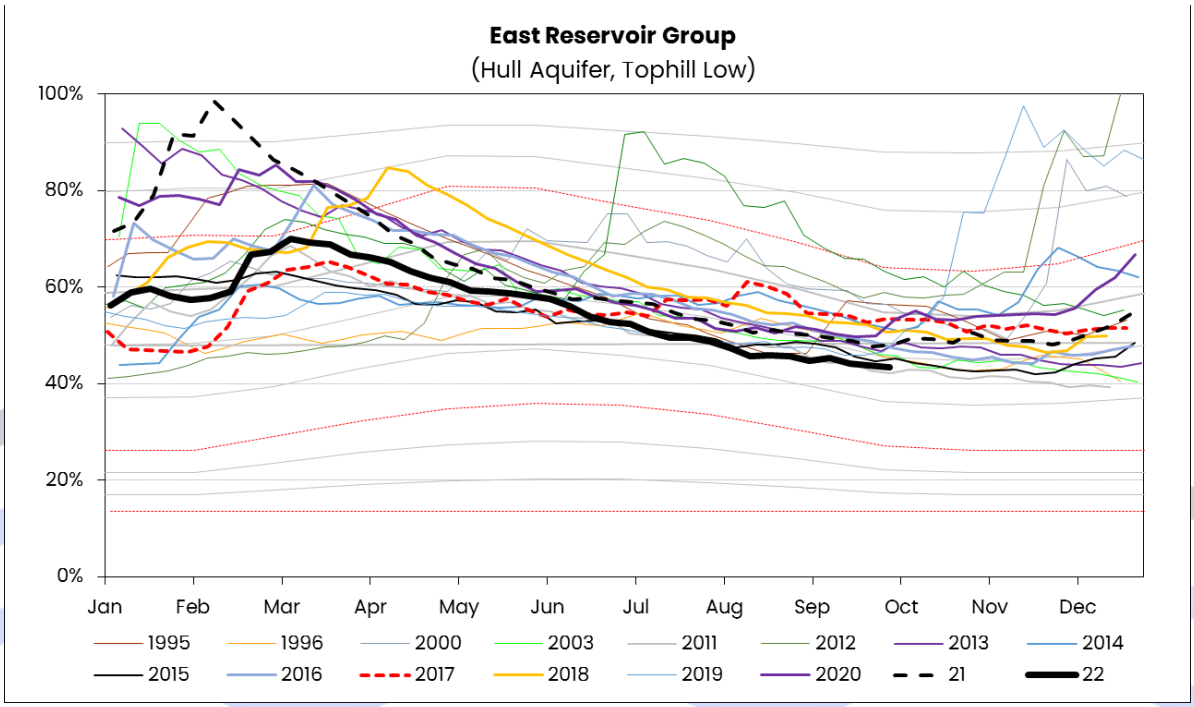

Figure 16: East reservoir stocks

11. Weather Forecast

The Met Office long range weather forecast (30 September) is for cloud and occasionally heavy rain in the northwest with a shift towards drier and more settled weather by mid October.

There is no clear signal for an end to the dry weather we have been experiencing, and so we are making preparations on the assumption that the dry weather will continue. If we have a repeat of 1995 autumn and winter rainfall, rainfall totals from the start of March 2022 would be among the lowest in our 132 year record.

12. Conclusions

The spring and summer of 2022 has been exceptionally hot and dry.

For several of our catchments, the 6 month period to August has been among the driest since records began in 1891, although the July figures disguise just how dry most of July was, with the majority of the rainfall in July occurring in the last week of the month. The SPI and ranking analyses indicate conditions are extremely or exceptionally dry in several catchments.

The low rainfall in the summer was accompanied by periods of extremely hot weather, and this combination of hot dry weather resulted in very high SMD values throughout the region, as well as extremely high demands.

River flows have been low due to the low rainfall, and high SMD, meaning that when there has been intermittent rainfall, it has not resulted in significant runoff to rivers.

Whilst the rainfall is not the lowest we've had in most catchments, the period March-August is the driest on the period of record for the Walshaw Dean and Little Don Valley reservoir catchments, and the 2nd driest in the 132 year record for the Calder and Aire river catchments, and the Leeming/Leeshaw and Ponden reservoir catchments. For all the catchments we have analysed the March-August period is in the top 6 driest years and classified as exceptionally low. It is the combination of low rainfall and high temperatures (so high evaporation) that has reduced the inflows into our rivers and reservoirs. Our Pennine reservoirs are situated in wet uplands, and when the inflows are below normal for long periods of time, our crucial resources are at risk even when the rainfall totals we have seen have been far higher than the south of England. The record breaking high temperatures have also led to very high demands, which have accelerated the rate of reservoir drawdown.

Our analyses have been based on rainfall until the end of August, and we believe this demonstrates that the current deficiency in supplies is a direct result of the exceptional shortage of rainfall.

Our analyses show that if we had a repeat of inflows from most years from the current date (September 2022), reservoir stocks would recover, but if we had a repeat of some of the drier years in our historic record, reservoir stocks would fall to very low levels, and fail to refill in winter. Our analyses also show that the temporal pattern of rainfall we have had in 2022 has been similar to that in 1995 (We have had 66% of LTA March-July in 2022 compared to 61% for the same period in 1995). When August values are included we have had 61% March-August (51% in 1995), so although the situation is not as bad as in 1995, it is still

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extremely dry. We therefore think it prudent to plan for an autumn and winter like the one that followed the hot dry summer of 1995, as both have been a result of similar prevailing meteorological conditions.

13. References

CEH Water Resources Portal- **https://eip.ceh.ac.uk/hydrology/water-resources/**

Environment Agency, Environment Agency Standardised Precipitation Index (SPI) Tool, version 2.0.

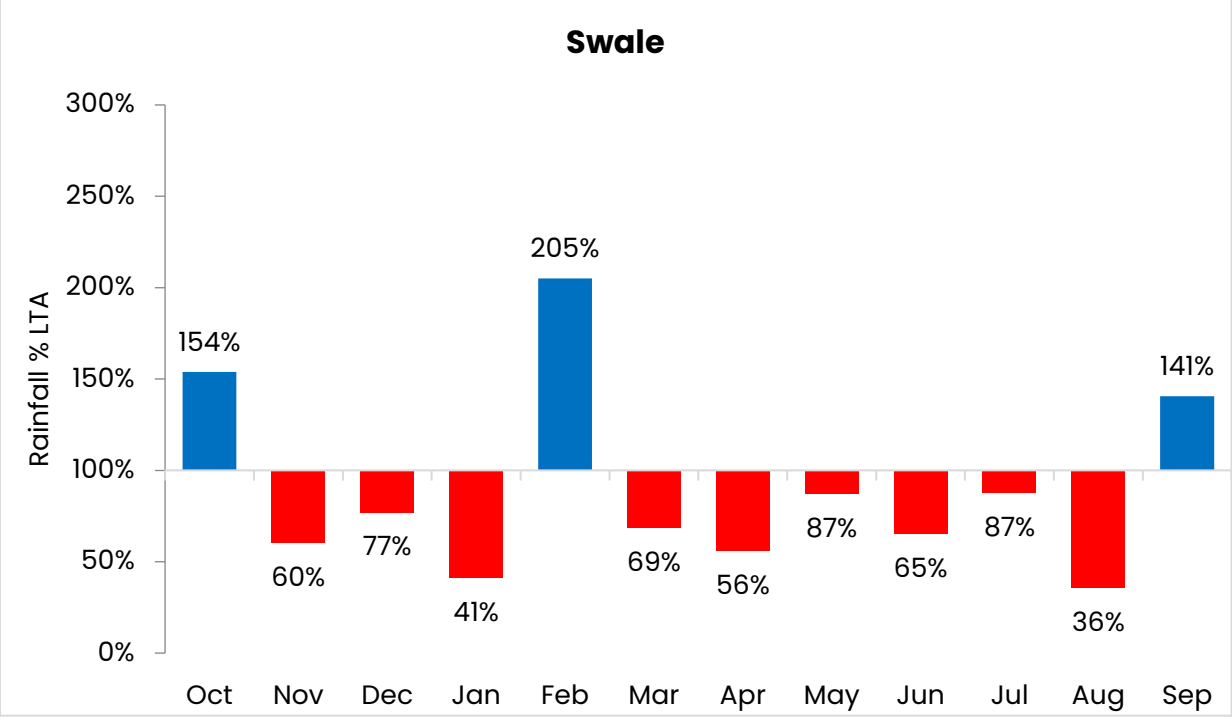
Met Office/CEH and Environment Agency– HADUK Datasets

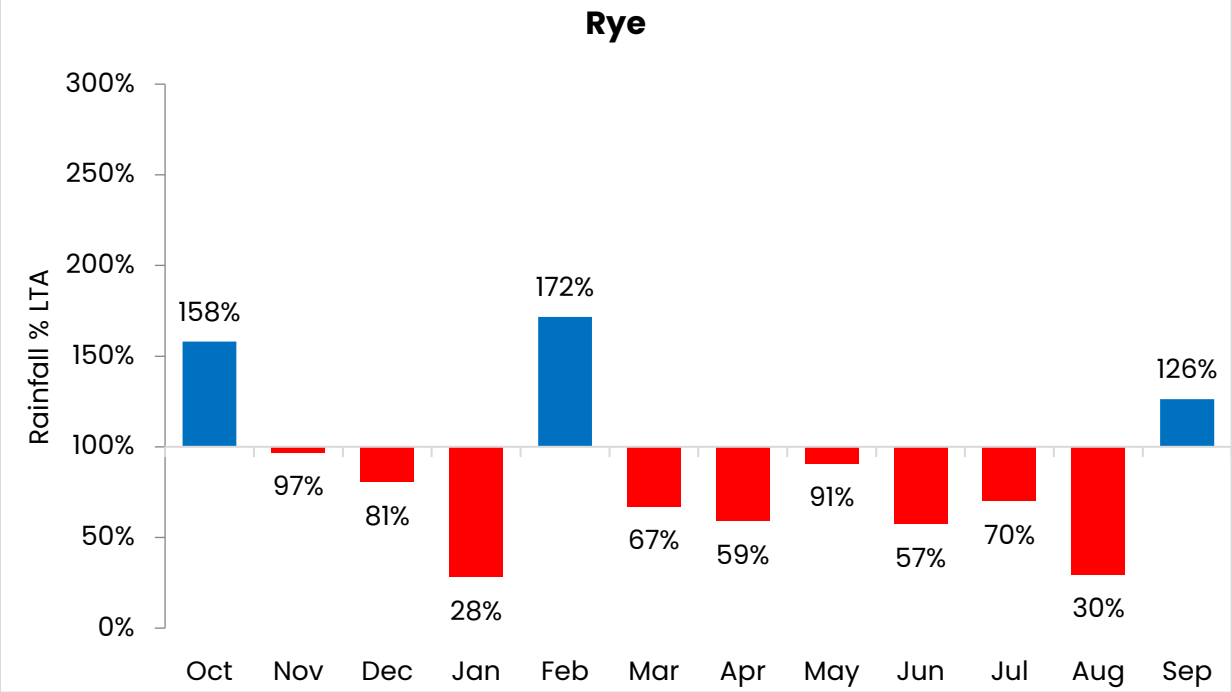
MET OFFICE 2022, https://www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2022/driest-july-in-england-since-1935

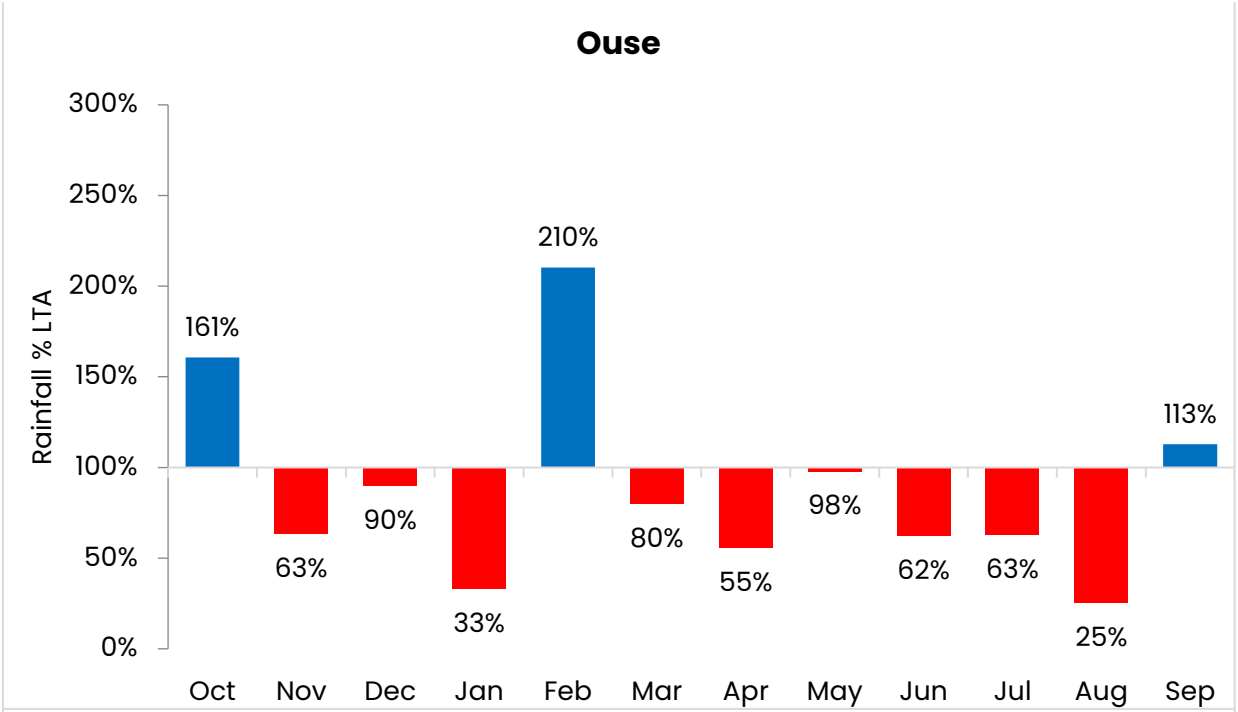
Met Office Rainfall and Evaporation Calculation System. This is a generic name for Met Office services involving the routine calculation of soil moisture and evaporation for Great Britain and uses a grid 40 x 40km squares.

Appendices

Appendix 1: Rainfall in comparison to LTA






Ouse
Rainfall % LTA
300%
250%
200%
150%
100%
50%
0%
161%
63%
90%
33%
210%
80%
55%
98%
62%
63%
25%
113%
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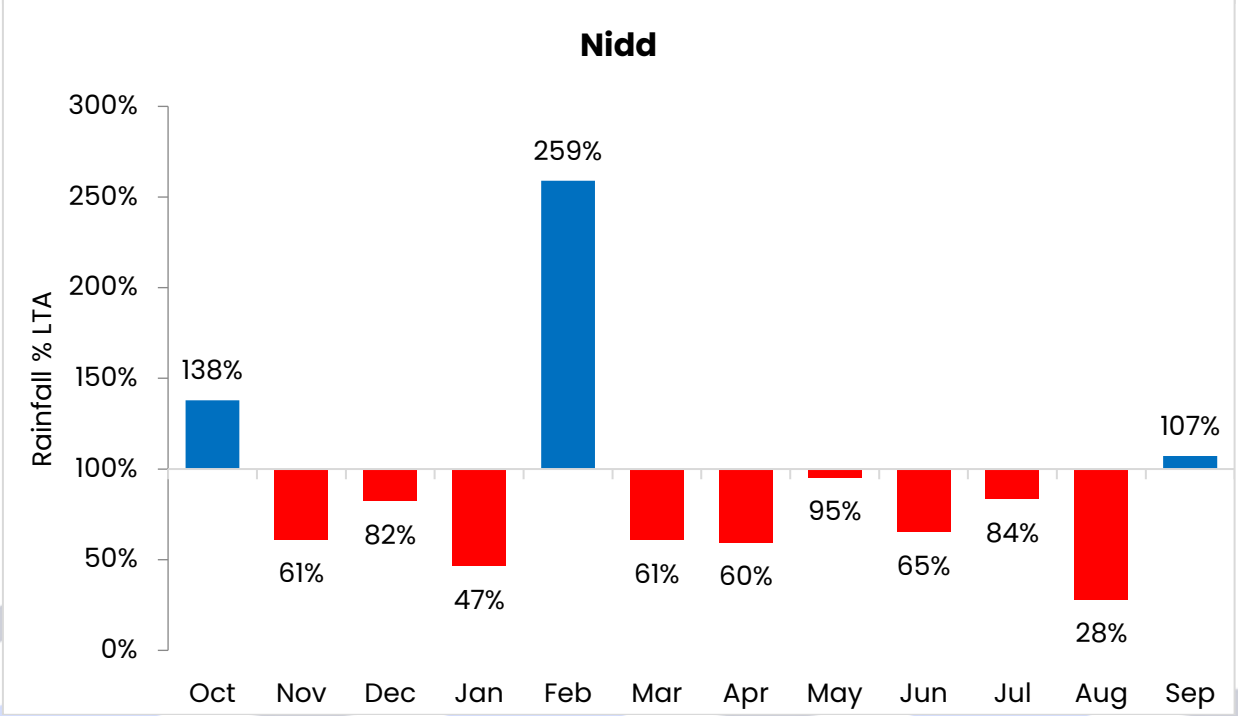
Nidd
Rainfall % LTA
300%
250%
200%
150%
100%
50%
0%
138%
61%
82%
47%
259%
61%
60%
95%
65%
84%
28%
107%
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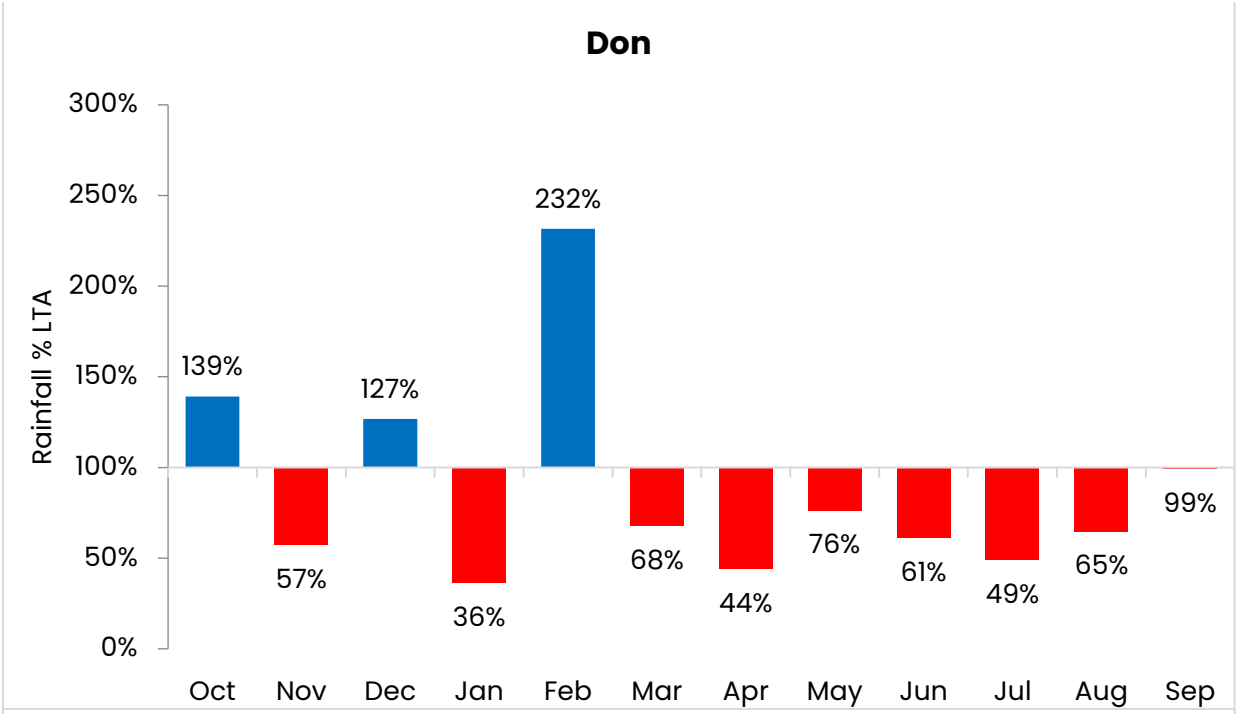
Don
Rainfall % LTA
300%
250%
200%
150%
100%
50%
0%
139%
57%
127%
36%
232%
68%
44%
76%
61%
49%
65%
99%
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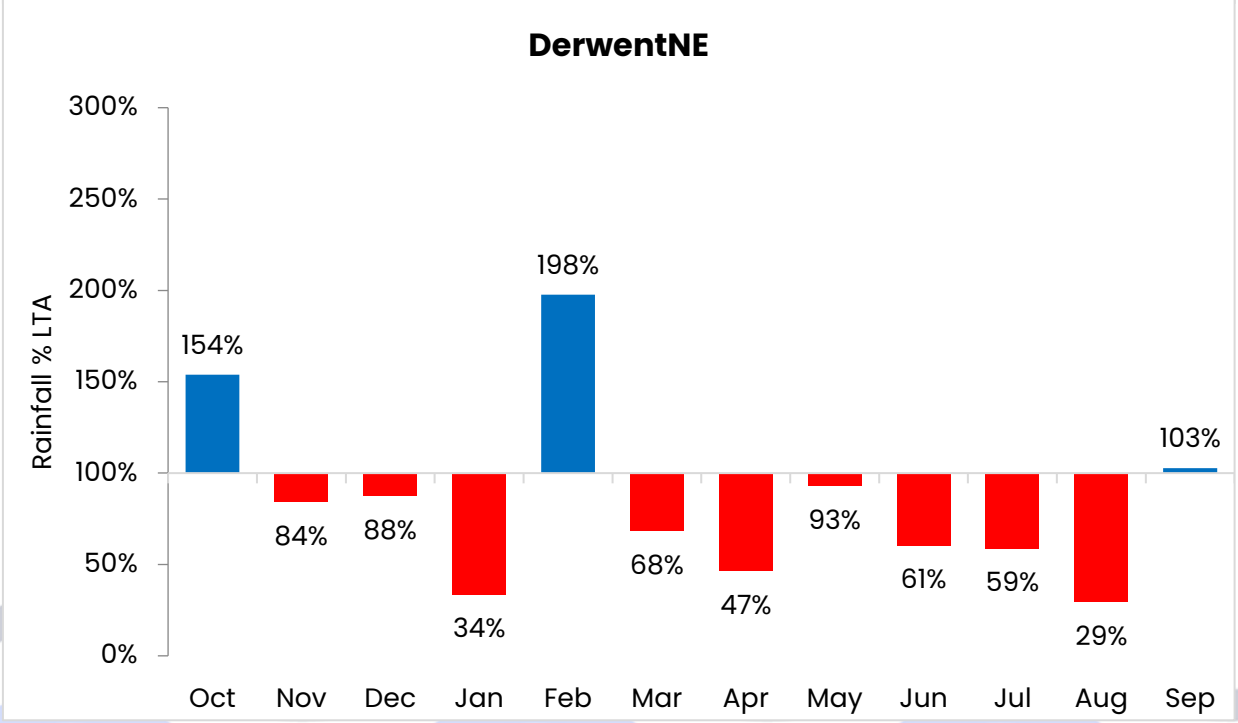
DerwentNE
Rainfall % LTA
300%
250%
200%
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100%
50%
0%
154%
84%
88%
34%
198%
68%
47%
93%
61%
59%
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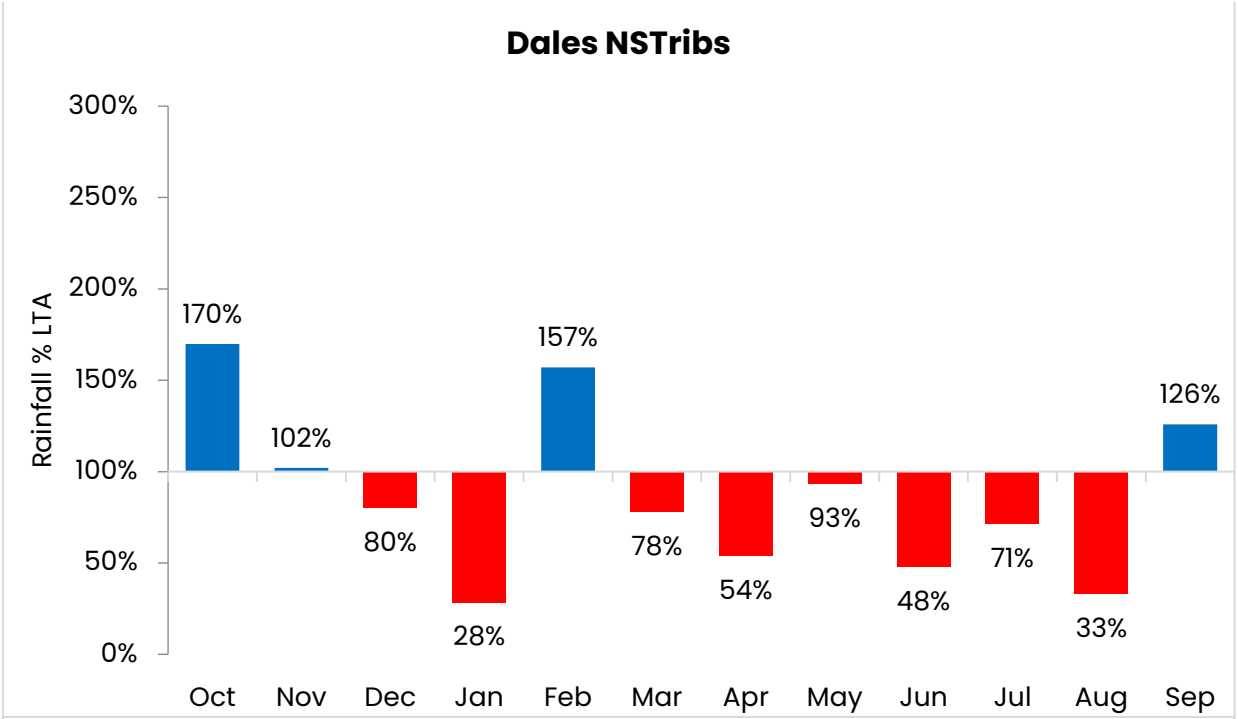
Dales NSTribs
Rainfall % LTA
300%
250%
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150%
100%
50%
0%
170%
102%
80%
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157%
78%
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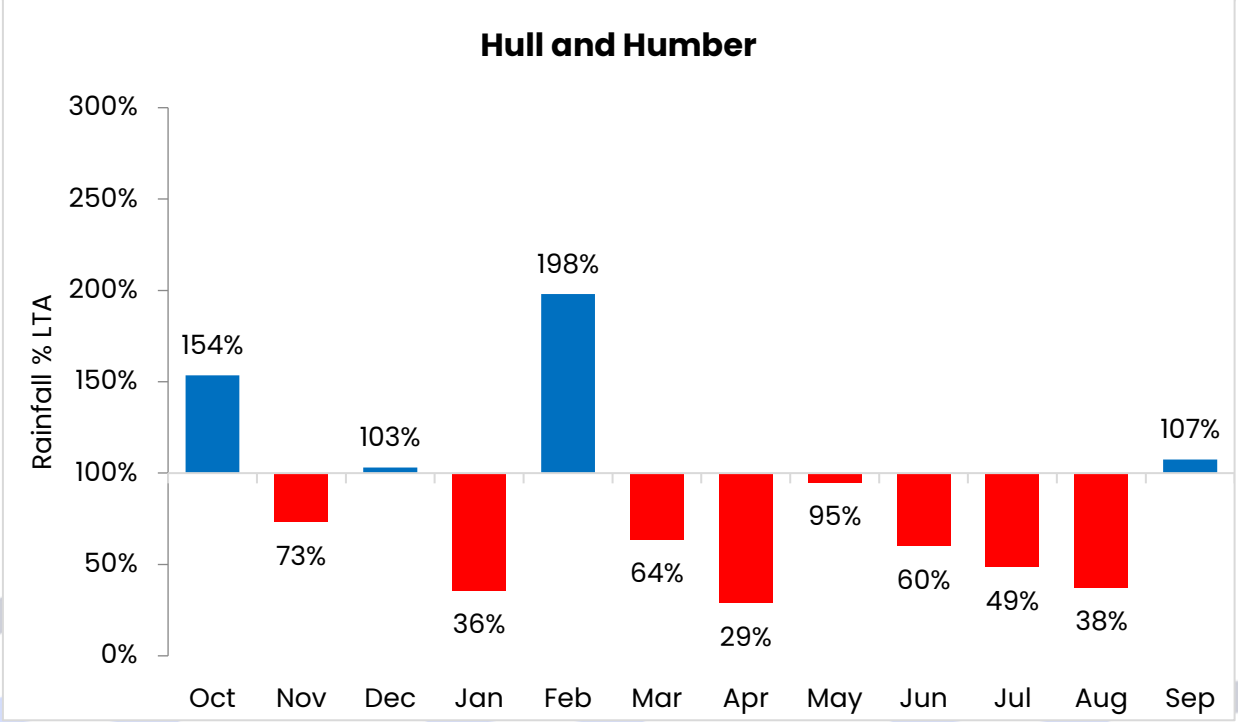
Hull and Humber
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100%
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154%
73%
103%
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198%
64%
29%
95%
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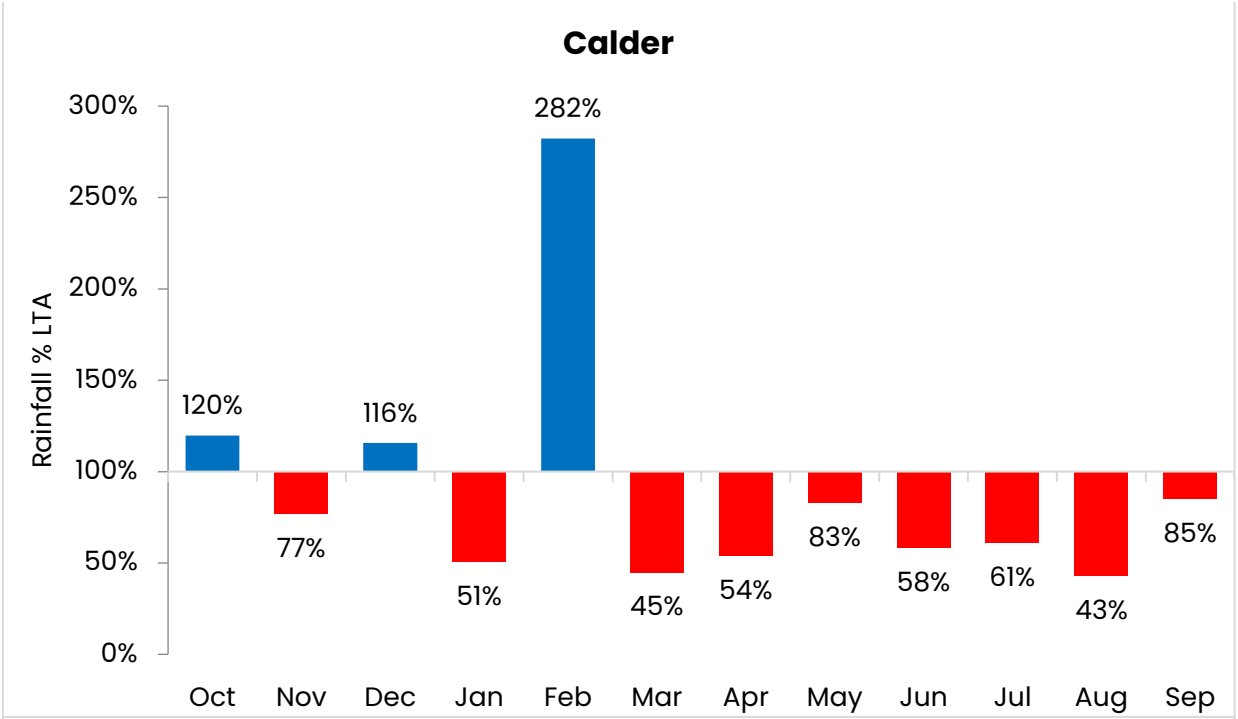
Calder
Rainfall % LTA
300%
250%
200%
150%
100%
50%
0%
120%
77%
116%
51%
282%
45%
54%
83%
58%
61%
43%
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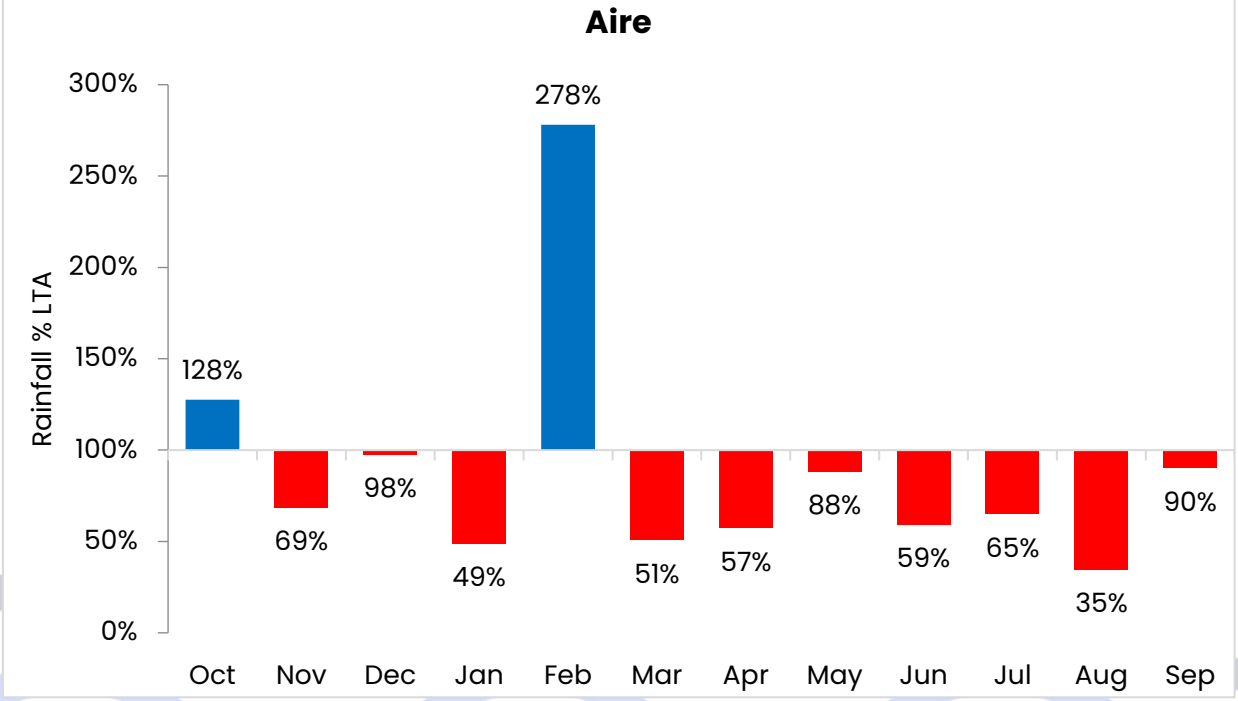
Aire
Rainfall % LTA
300%
250%
200%
150%
100%
50%
0%
128%
69%
98%
49%
278%
51%
57%
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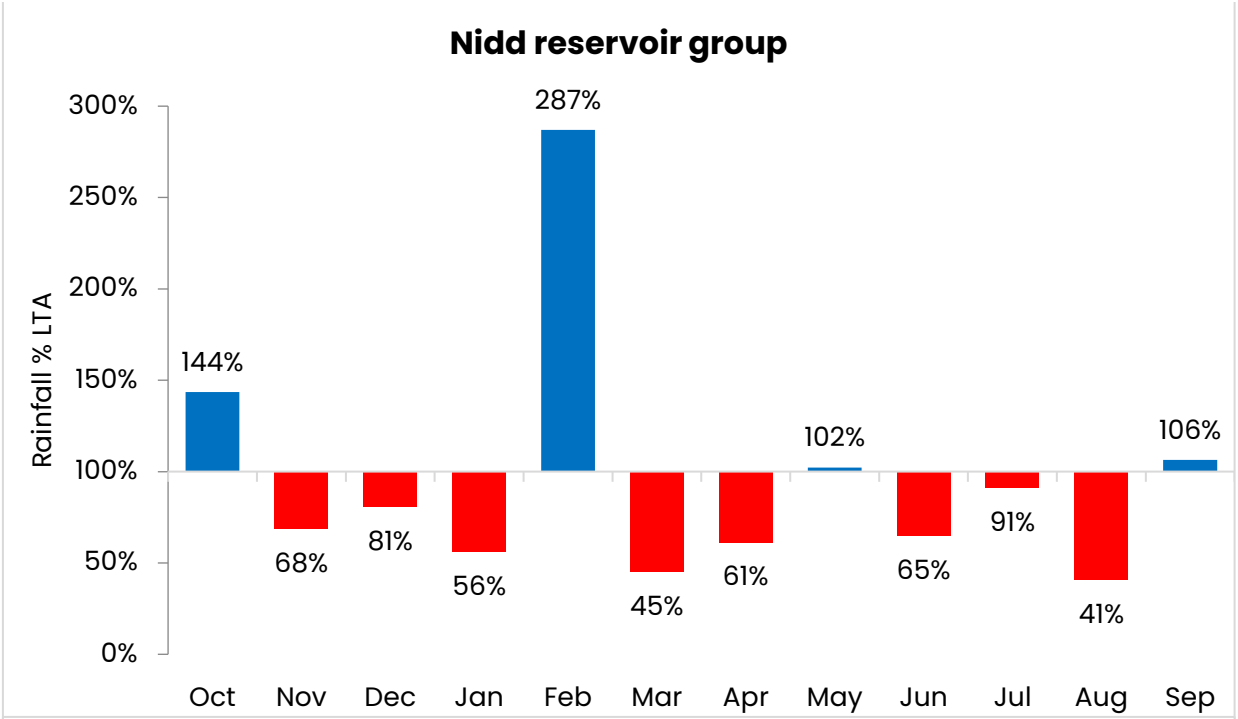
Nidd reservoir group
Rainfall % LTA
300%
250%
200%
150%
100%
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81%
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287%
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102%
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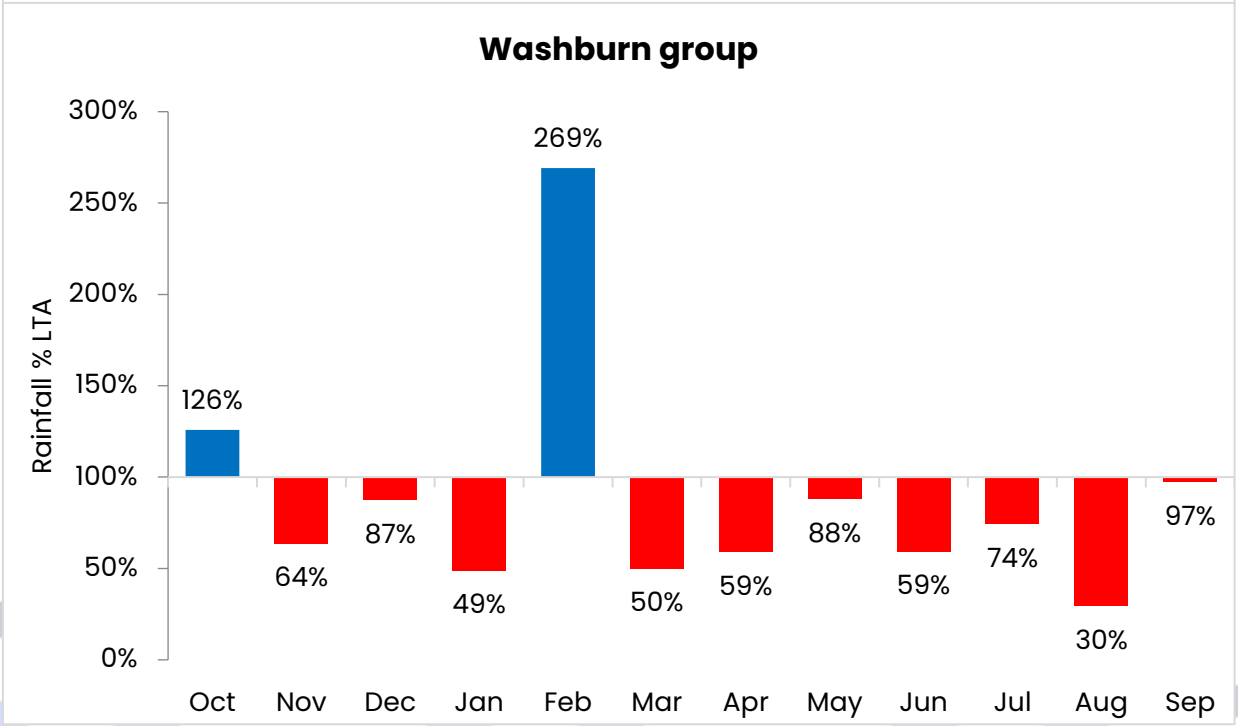
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Rainfall % LTA
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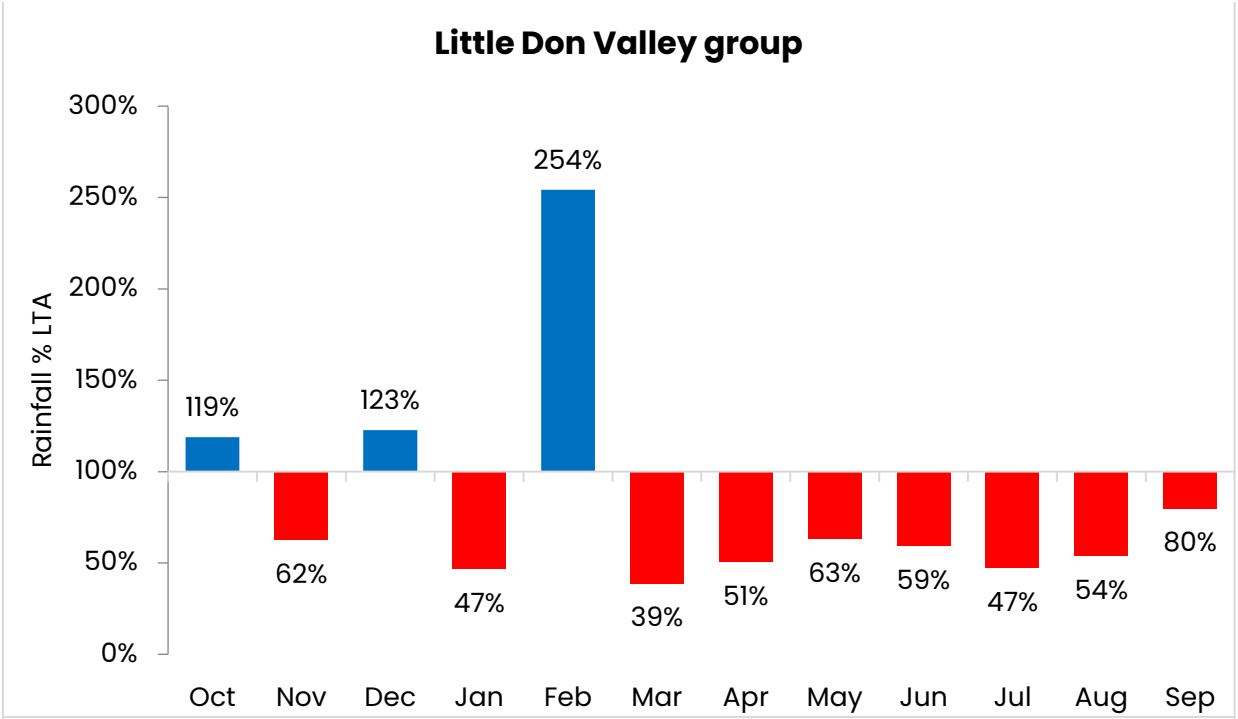
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Rainfall % LTA
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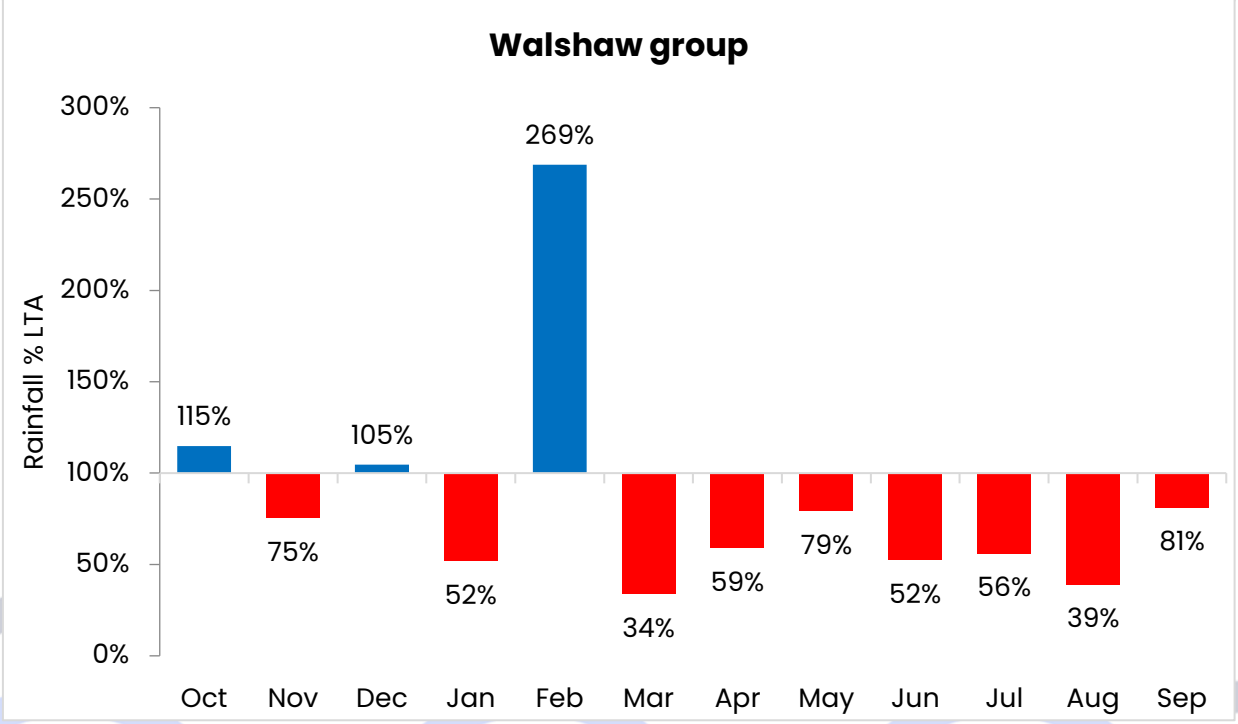
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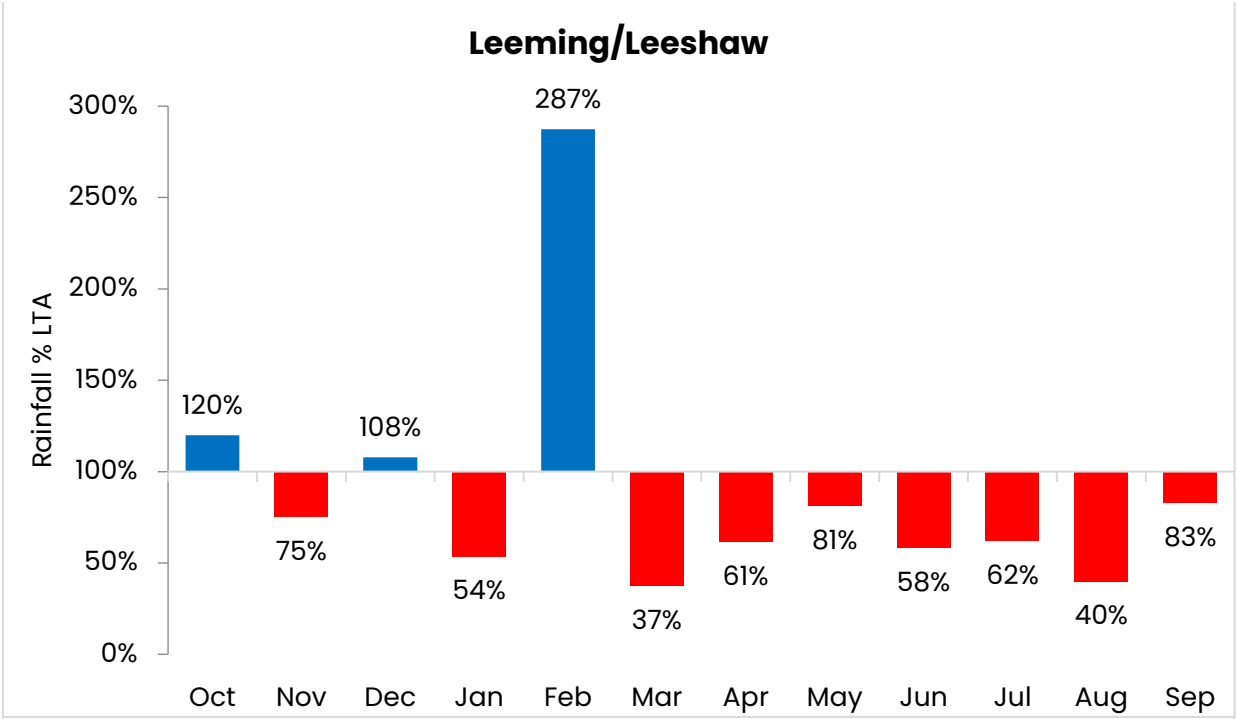
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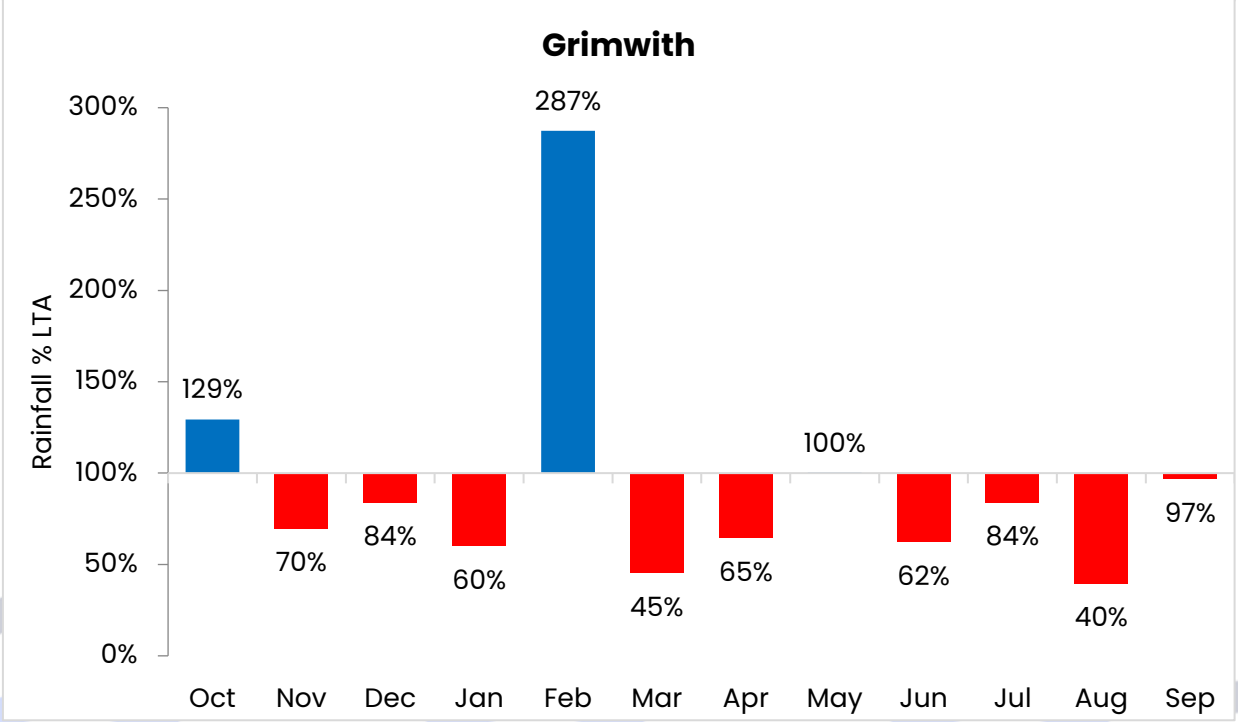
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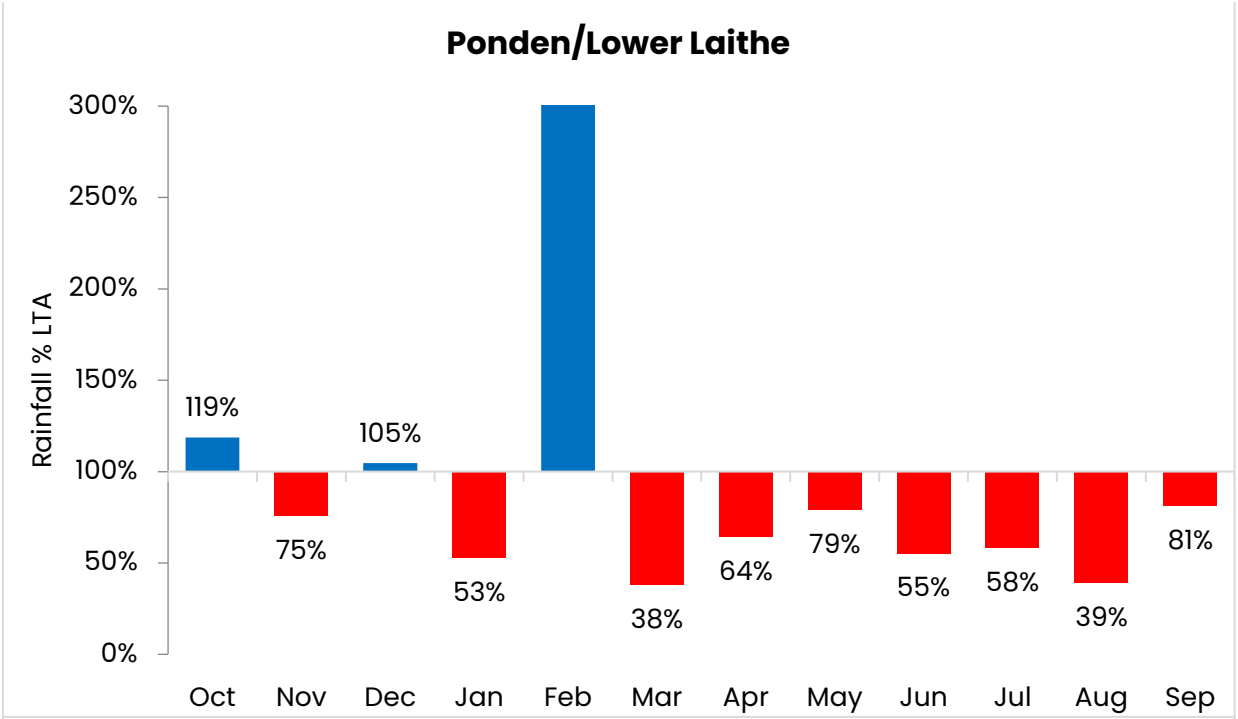
Ponden/Lower Laithe
Rainfall % LTA
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230%
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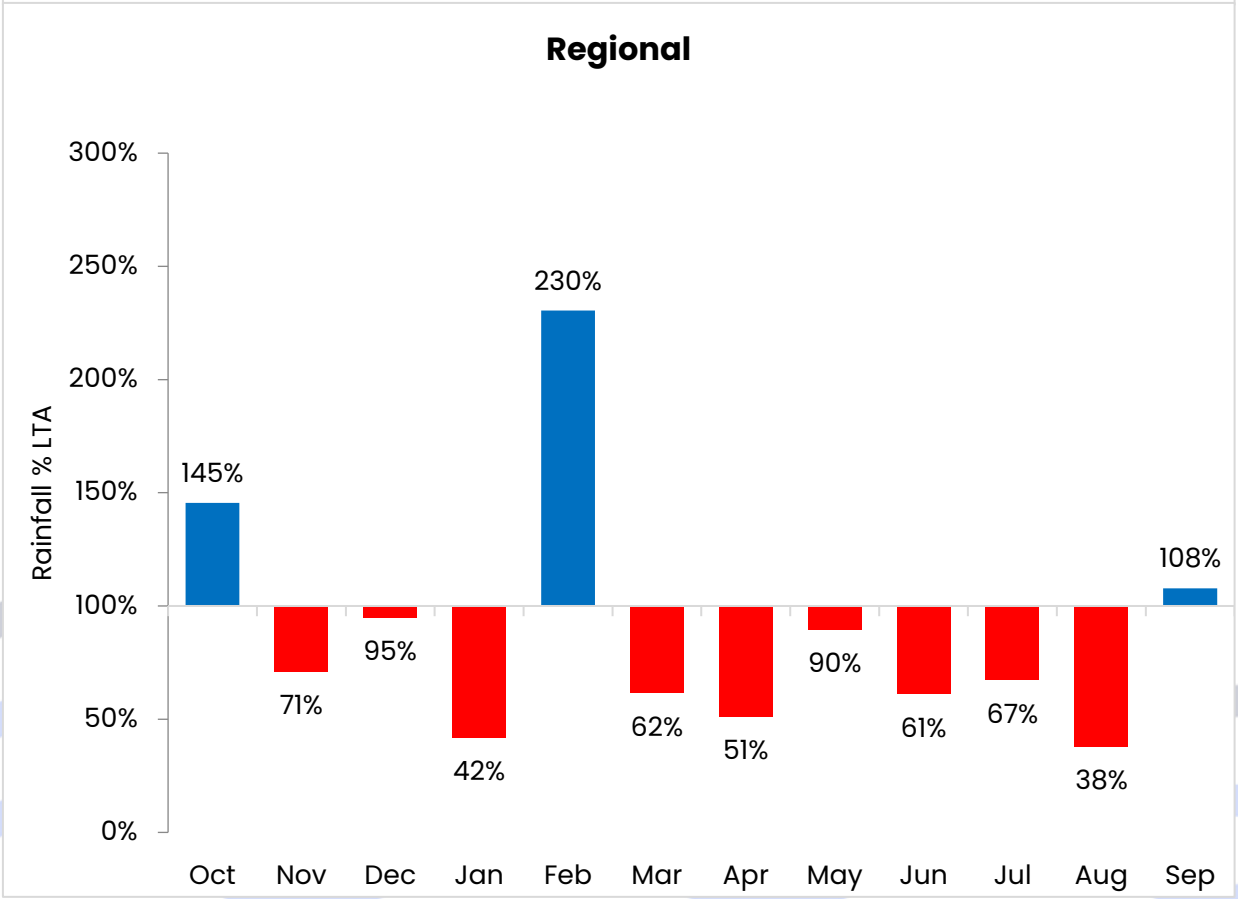
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0%
145%
71%
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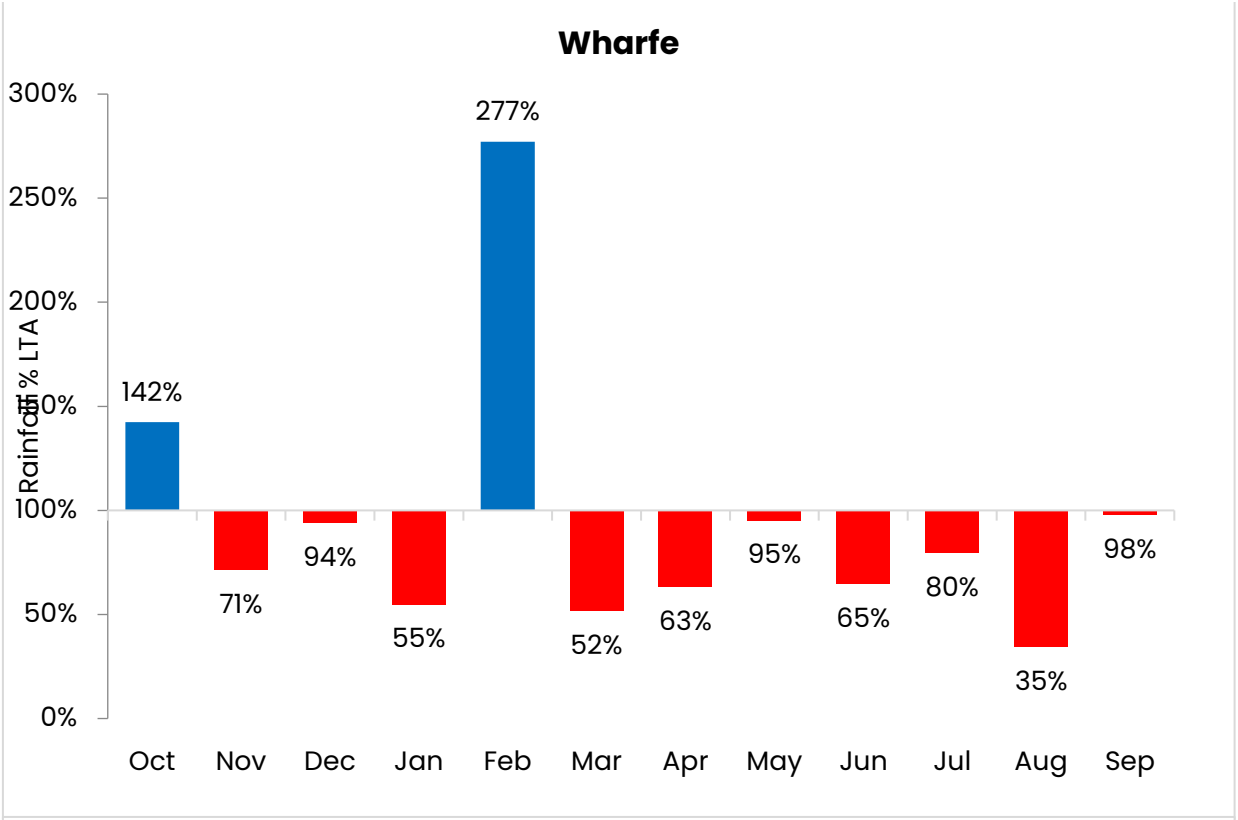
Wharfe
300%
250%
200%
150%
100%
50%
0%
Rainfall % LTA
142%
71%
94%
55%
277%
52%
63%
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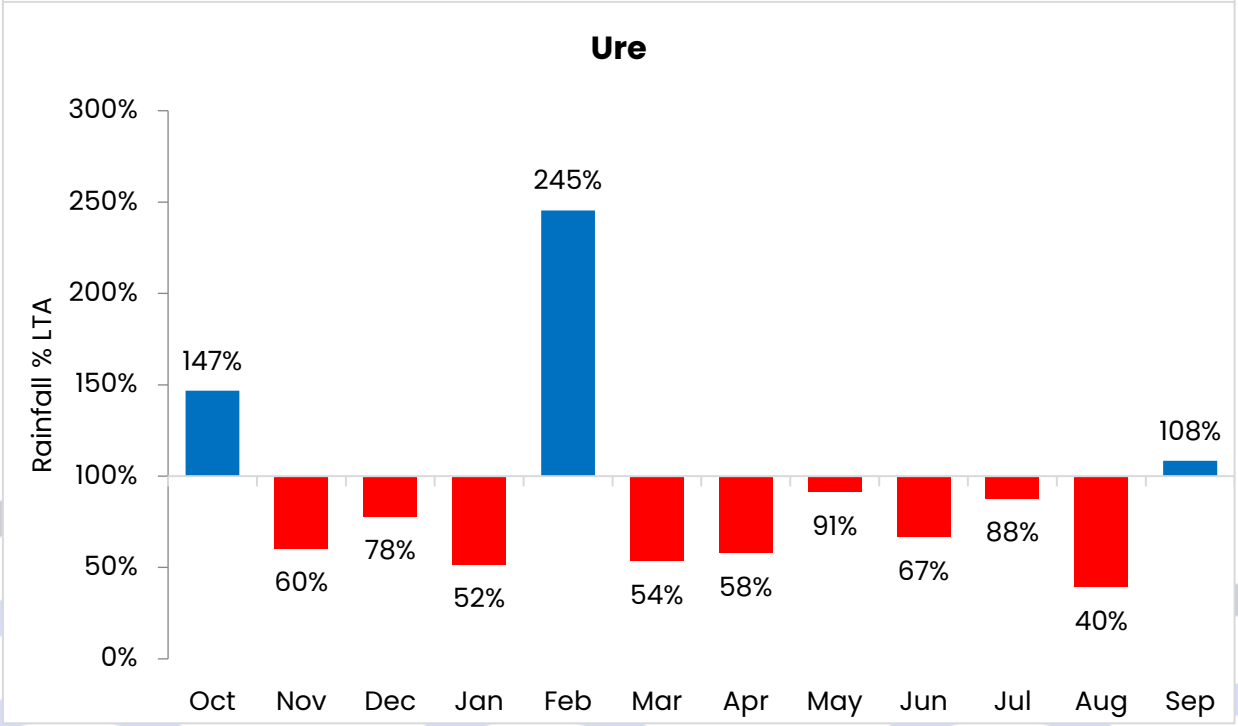
Ure
300%
250%
200%
150%
100%
50%
0%
Rainfall % LTA
147%
60%
78%
52%
245%
54%
58%
91%
67%
88%
40%
108%
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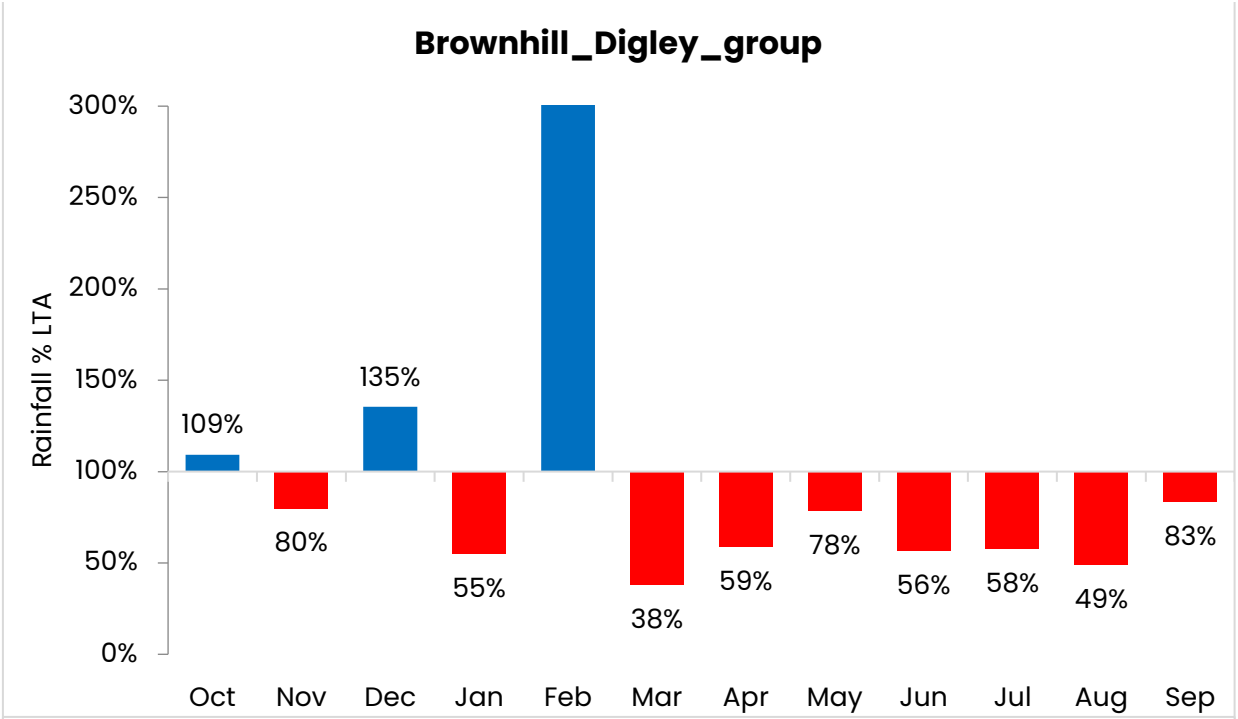
Brownhill_Digley_group
Rainfall % LTA
300%
250%
200%
150%
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50%
0%
109%
80%
135%
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254%
38%
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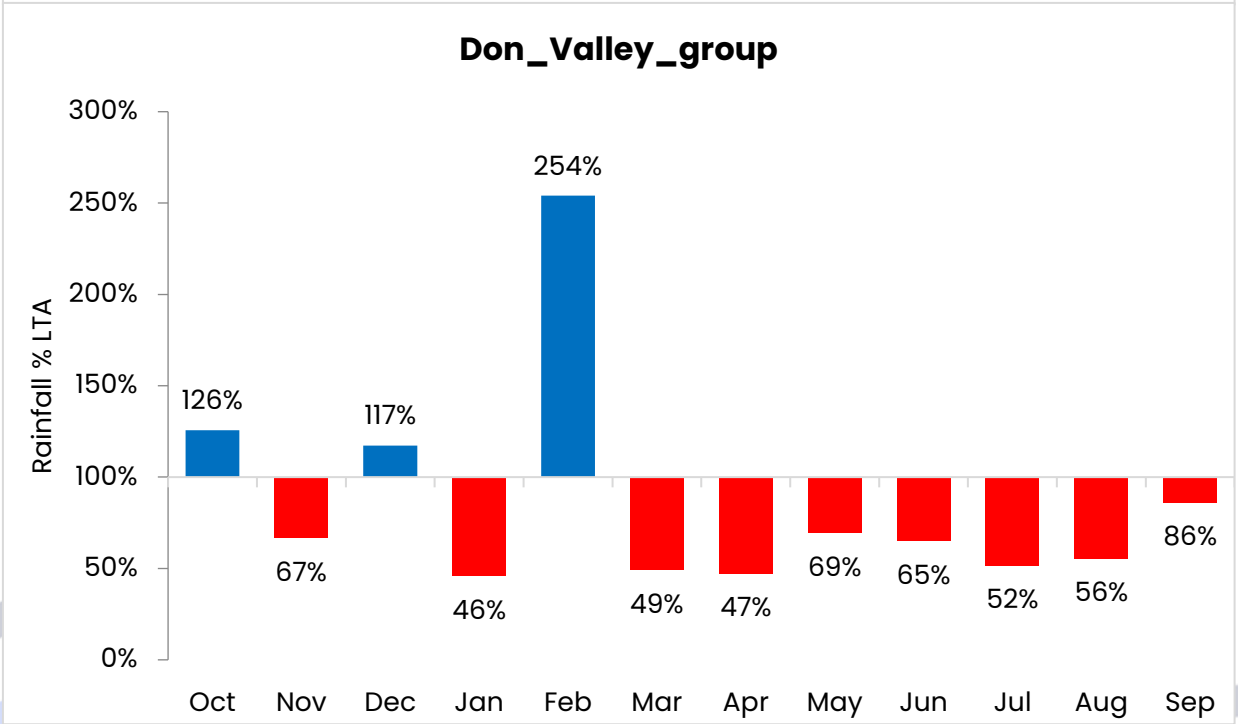
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Rainfall % LTA
300%
250%
200%
150%
100%
50%
0%
126%
67%
117%
46%
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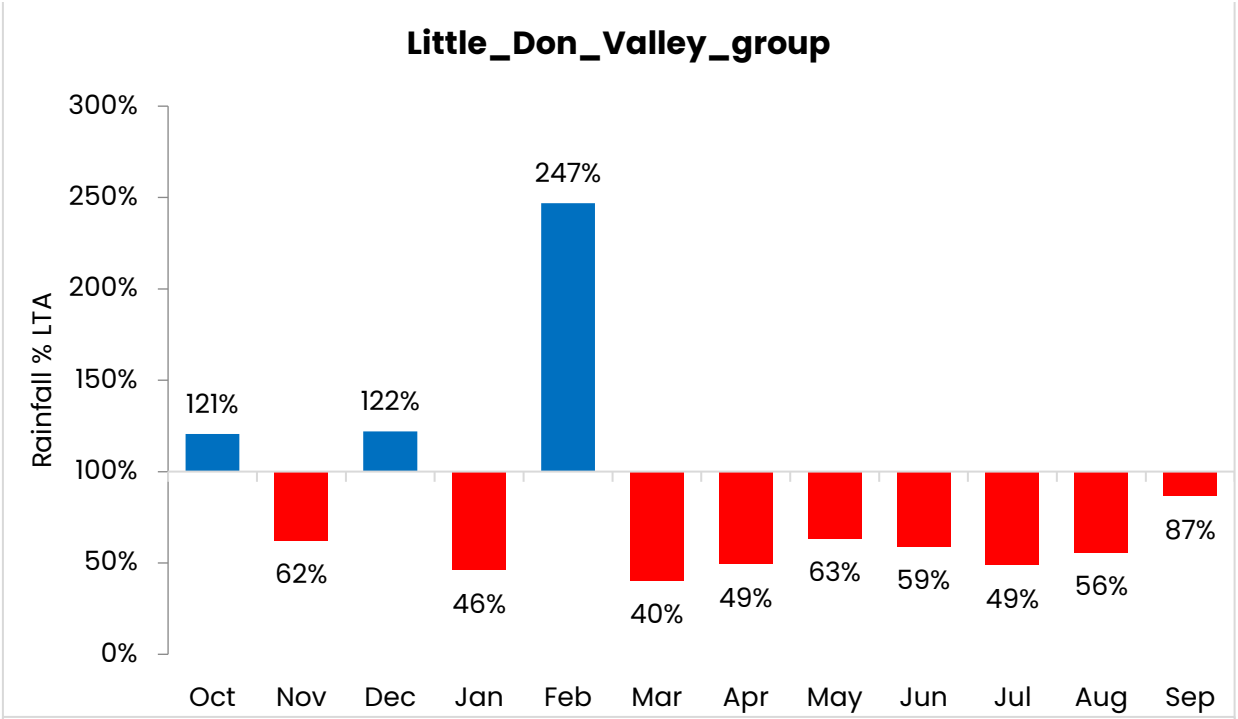
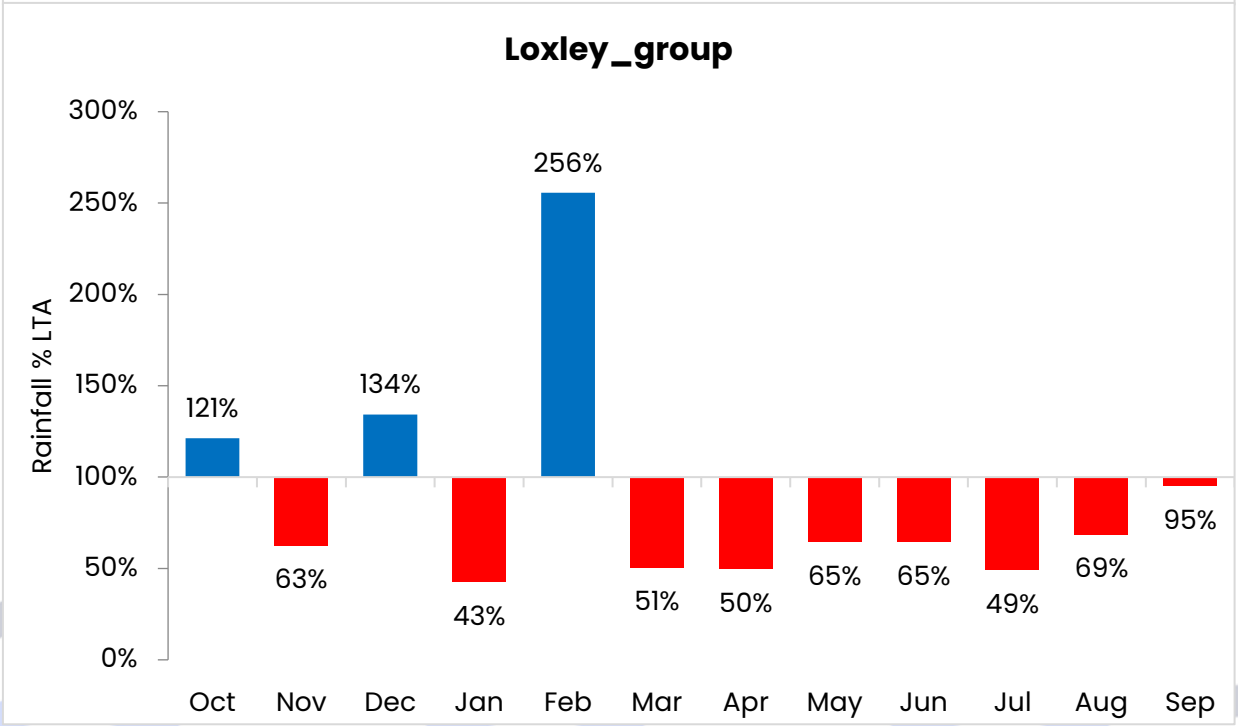
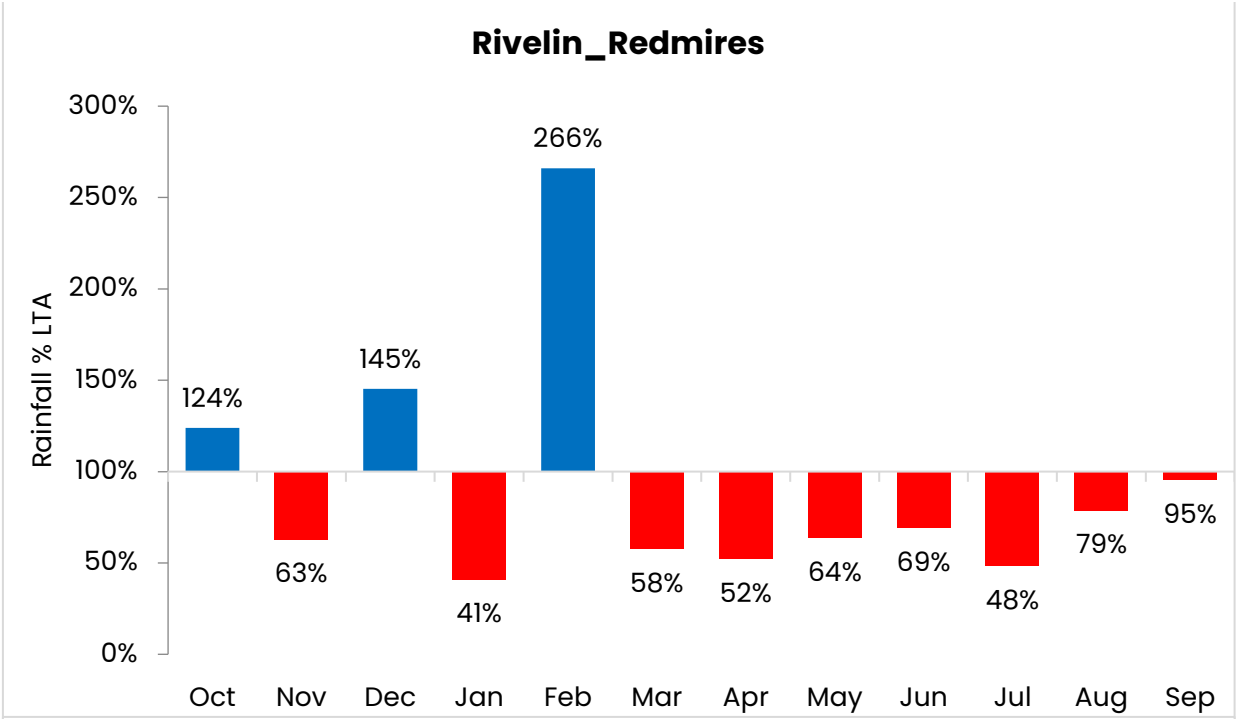
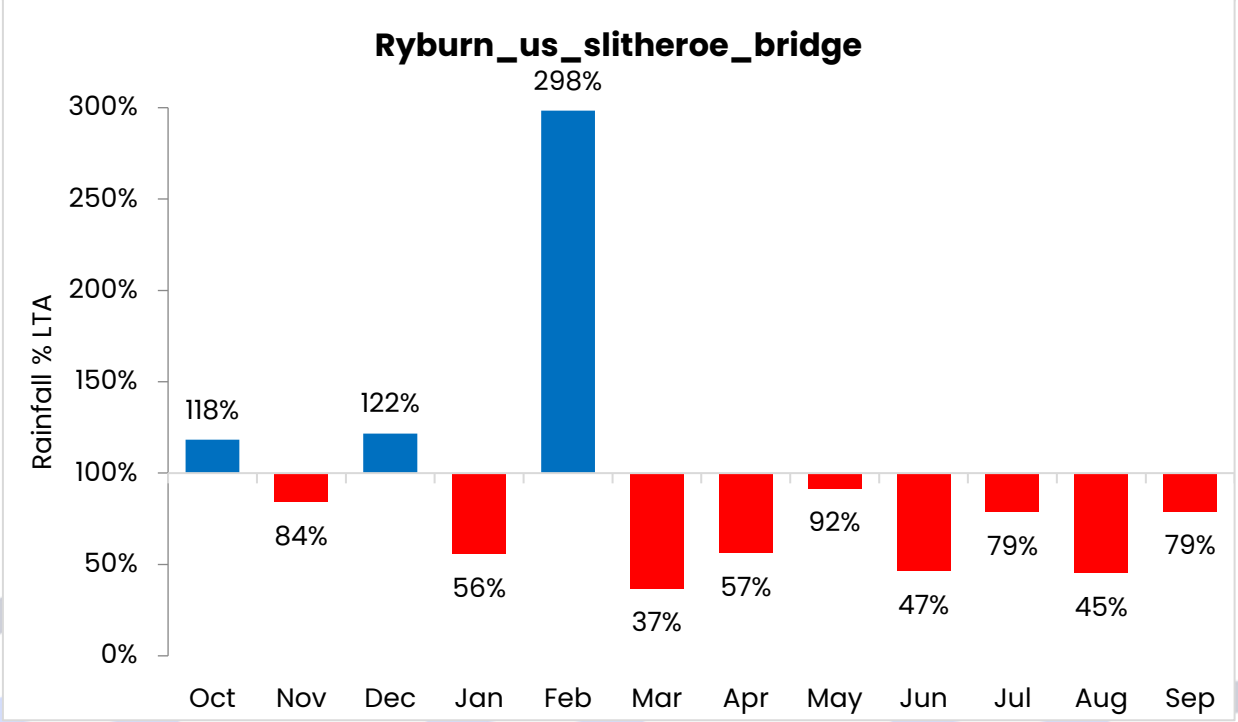

Little_Don_Valley_group
Rainfall % LTA
300%
250%
200%
150%
100%
50%
0%
121%
62%
122%
46%
247%
40%
49%
63%
59%
49%
56%
87%
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep


Loxley_group
Rainfall % LTA
300%
250%
200%
150%
100%
50%
0%
121%
63%
134%
43%
256%
51%
50%
65%
65%
49%
69%
95%
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep


Rivelin_Redmires
Rainfall % LTA
300%
250%
200%
150%
100%
50%
0%
124%
63%
145%
41%
266%
58%
52%
64%
69%
48%
79%
95%
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep


Ryburn_us_slitheroe_bridge
Rainfall % LTA
300%
250%
200%
150%
100%
50%
0%
118%
84%
122%
56%
298%
37%
57%
92%
47%
79%
45%
79%
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep

	Cumulative rainfall as % of LTA	
Catchment	**March-August**	**March-September**
Wharfe	63%	69%
Ure	64%	71%
Swale	65%	77%
Rye	61%	71%
Ouse	62%	70%
Nidd	64%	71%
Don	61%	66%
DerwentNE	59%	65%
Dales NSTribs	62%	72%
Hull and Humber	55%	63%
Calder	56%	61%
Aire	58%	63%
Regional	61%	68%
Nidd reservoir group	65%	71%
Washburn group	58%	65%
Walshaw group	52%	57%
Leeming/Leeshaw	55%	60%
Grimwith	63%	69%
Ponden/Lower Laithe	54%	59%
Brownhill_Digley_group	55%	60%
Don_Valley_group	56%	61%
Little_Don_Valley_group	52%	58%
Loxley_group	58%	63%
Rivelin_Redmires	62%	67%
Ryburn_us_slitheroe_bridge	58%	61%

Appendix 2a: Ranking of Rainfall Results

The following tables show the rank of the rainfall from October 2021 until September 2022 for the 131 (October-December 2021) or 132 (2022) years of data, for periods of 1 to 12 months duration.

In the tables below values have been shaded according to their category as calculated using Cunnane's plotting position, which calculates the probability of one of the ranked values being lower than expected.

The equation below shows the formula for the Cunnane plotting position, and the table shows the thresholds for the different categories.

$$Cunnane\ plotting\ position = \frac{Rank - 0.4}{n + 0.2}$$

Category	Probability of value being surpassed by lower value P(X)	Probability of occurrence
Exceptionally high	>0.95	0.05 (5%)
Notably high	0.87 – 0.95	0.08 (8%)
Above normal	0.721 – 0.869	0.15 (15%)
Normal	0.28 – 0.72	0.44 (44%)
Below normal	0.131 – 0.279	0.15 (15%)
Notably low	0.05 – 0.13	0.08 (8%)
Exceptionally low	<0.05	0.05 (5%)

	Rank of 2022 rainfall in period since 1891												
		duration											
	end month	1	2	3	4	5	6	7	8	9	10	11	12
Wharfe	**10**	106	82	58	79	56	94	73	72	86	106	110	109
	11	39	68	57	44	66	41	82	60	69	77	97	101
	12	60	42	64	51	37	57	39	79	58	63	72	92
	1	21	30	15	35	28	22	37	22	60	37	45	55
	2	129	115	98	88	103	89	83	86	74	101	80	86
	3	29	124	98	87	73	82	79	63	74	63	90	71
	4	35	19	114	81	74	63	70	61	53	67	52	86
	5	70	42	23	105	79	77	61	68	65	53	68	57
	6	41	35	23	15	91	70	65	48	61	55	47	62
	7	36	23	26	14	7	85	54	54	41	54	49	43
	8	9	12	7	9	4	4	42	28	28	17	35	29
	9	34	7	6	5	7	3	3	30	18	21	12	22
Ure	**10**	102	75	44	49	35	67	44	55	75	97	99	100
	11	26	63	44	24	32	20	55	27	40	58	78	86
	12	44	21	48	34	21	23	14	41	24	30	46	70
	1	19	20	8	21	13	9	12	7	26	12	16	31
	2	127	102	84	58	76	62	42	46	29	58	42	52
	3	31	116	78	63	48	58	48	32	38	24	47	33
	4	31	17	102	64	53	34	50	39	26	30	19	41
	5	61	37	20	98	59	52	32	44	41	28	31	21
	6	46	36	21	15	79	50	43	25	39	31	25	25
	7	42	34	32	12	9	75	36	36	18	36	29	20
	8	12	13	10	13	5	5	39	23	19	11	20	15
	9	38	9	9	8	10	5	5	31	16	16	10	14
SwaleNE	**10**	104	73	37	49	36	67	47	45	70	99	107	104
	11	23	63	45	23	32	19	55	28	30	50	86	99
	12	37	12	47	31	18	24	16	42	27	25	39	73
	1	12	13	4	21	12	6	11	6	26	13	15	23
	2	117	76	60	40	55	48	23	29	17	47	32	35
	3	46	106	63	52	26	47	40	22	32	17	45	32
	4	32	29	87	49	37	19	35	31	15	22	15	37
	5	63	35	25	82	43	34	22	35	30	17	23	14
	6	38	35	18	19	62	28	23	15	30	20	15	18
	7	46	32	28	15	9	49	26	22	10	21	13	11
	8	9	12	8	9	6	6	22	10	8	5	7	8
	9	60	17	17	13	12	9	7	23	12	10	6	11
Rye	**10**	101	80	59	77	52	89	67	59	60	109	113	102
	11	54	86	75	55	72	51	83	68	54	55	101	111
	12	40	38	64	55	43	58	44	72	53	44	44	93
	1	5	6	10	29	32	18	31	15	49	30	21	27
	2	111	43	39	38	55	45	33	50	35	66	48	39
	3	48	94	35	34	28	47	43	31	48	36	60	47
	4	33	31	71	25	23	24	39	36	27	34	27	53
	5	70	43	31	68	26	23	21	39	32	30	38	27
	6	33	31	18	16	42	11	14	18	27	26	18	24
	7	32	17	21	9	11	27	10	9	9	19	20	15
	8	7	7	5	5	5	3	10	2	3	5	11	11
	9	63	10	11	3	6	3	5	11	6	5	5	10

		Rank of 2022 rainfall in period since 1891											
		duration											
	end month	1	2	3	4	5	6	7	8	9	10	11	12
	10	106	94	71	73	60	90	68	55	65	114	122	114
	11	66	99	88	69	69	63	84	68	56	62	114	122
	12	46	47	76	66	55	65	52	74	57	47	54	108
	1	4	10	17	43	44	28	38	28	50	35	27	38
	2	105	42	37	42	61	55	43	50	38	60	49	40
	3	57	95	38	36	38	55	51	40	47	40	56	49
	4	35	41	70	25	27	27	43	40	34	41	33	51
	5	72	43	43	66	30	29	31	43	40	34	36	35
	6	22	27	16	16	41	13	16	20	29	25	22	30
	7	35	16	17	10	13	27	12	10	12	23	20	18
	8	7	10	3	6	4	4	11	4	5	6	13	16
Dales NSTribs	9	42	6	10	1	5	2	3	10	4	5	4	11
	10	100	98	75	82	68	95	73	59	74	100	110	90
	11	34	62	81	59	68	54	86	67	49	61	87	103
	12	80	52	66	81	60	72	58	84	58	51	59	88
	1	8	32	21	36	46	34	49	39	61	44	35	43
	2	122	65	71	53	65	76	64	76	62	82	60	56
	3	45	100	55	64	51	59	74	61	67	62	75	60
	4	15	16	61	25	44	28	43	49	40	51	39	61
	5	75	26	19	67	30	43	31	40	48	40	52	41
	6	35	42	15	12	44	21	29	25	28	39	29	39
	7	15	11	18	4	7	25	9	14	12	16	25	21
	8	13	7	4	8	4	3	10	5	8	8	10	16
Hull and Humber	9	58	10	6	3	6	3	4	8	5	7	6	9
	10	86	73	54	86	64	93	72	79	93	106	108	103
	11	55	60	55	46	74	52	82	63	66	80	101	100
	12	84	65	70	70	55	80	57	87	70	77	83	98
	1	18	42	32	42	44	35	58	37	70	51	63	65
	2	129	112	104	100	104	96	82	101	87	104	91	92
	3	20	124	93	91	82	86	82	76	89	76	97	80
	4	30	9	109	76	80	73	74	68	62	80	62	91
	5	58	26	11	99	70	78	64	66	67	60	75	62
	6	33	26	15	6	84	57	63	55	57	59	50	70
	7	21	12	10	5	4	63	32	52	42	50	45	42
	8	10	6	5	5	3	2	33	18	26	21	32	33
Calder	9	23	7	3	3	4	2	1	21	12	19	16	18
	10	95	72	52	78	59	93	72	71	83	102	107	102
	11	40	56	50	41	64	40	80	56	60	67	94	98
	12	62	41	59	46	36	64	39	80	61	56	68	87
	1	15	32	18	30	26	19	34	21	59	38	39	54
	2	129	109	98	88	97	86	77	87	72	102	83	82
	3	30	125	94	89	76	81	72	60	78	60	92	74
	4	33	18	111	79	75	62	65	58	49	63	51	84
	5	67	34	18	104	73	74	56	60	55	49	67	52
	6	34	29	19	13	88	59	61	45	52	48	42	60
	7	26	14	13	6	6	67	38	43	32	39	36	33
	8	10	8	4	5	4	2	32	20	21	14	19	16
Aire	9	31	4	4	3	4	2	1	21	12	20	11	14

	Rank of 2022 rainfall in period since 1891												
		duration											
	end month	1	2	3	4	5	6	7	8	9	10	11	12
	10	94	74	51	74	47	87	60	60	72	97	106	95
	11	27	51	51	36	49	33	69	42	44	54	84	94
	12	57	32	54	44	32	47	32	64	41	40	49	78
	1	9	22	13	25	21	14	24	13	44	25	27	37
	2	127	90	80	63	71	61	49	62	43	75	56	54
	3	41	116	72	68	49	59	58	45	57	37	70	49
	4	27	20	91	52	56	36	45	45	33	45	33	55
	5	64	25	16	87	47	48	33	39	44	34	43	27
	6	35	29	14	12	66	30	36	25	33	33	20	35
	7	26	14	14	5	8	41	17	19	12	22	19	17
	8	10	9	5	6	4	3	19	6	11	6	9	9
orkshire regional	**9**	84	29	18	10	9	5	6	23	12	15	10	12
	10	103	81	53	63	39	76	47	63	89	105	111	112
	11	47	74	57	39	45	25	59	29	55	70	96	104
	12	47	32	59	45	32	37	22	48	31	43	60	83
	1	23	26	18	29	23	18	18	12	34	21	28	46
	2	128	115	100	85	102	84	72	74	57	85	61	79
	3	24	124	106	82	67	79	70	54	59	43	72	49
	4	35	14	114	82	69	56	70	55	48	51	37	64
	5	75	48	23	108	84	71	56	68	57	50	54	39
	6	45	44	26	17	102	75	59	48	61	56	45	46
	7	51	40	37	21	10	96	70	57	42	63	52	38
	8	11	18	12	21	14	5	67	41	35	24	43	32
Nidd reservoirs	**9**	89	38	39	30	28	22	13	76	50	42	33	46
	10	93	61	46	74	56	90	64	62	74	96	105	104
	11	33	51	32	31	52	37	73	47	49	56	82	89
	12	54	29	41	28	23	45	29	61	42	45	52	76
	1	16	25	14	18	16	15	25	18	39	27	26	36
	2	129	112	95	80	85	74	61	79	64	93	69	70
	3	32	124	92	82	64	68	60	50	65	53	81	56
	4	36	20	111	76	74	54	58	49	44	58	40	71
	5	66	33	18	105	76	69	47	50	48	44	56	42
	6	34	32	21	12	88	60	57	38	44	41	37	46
	7	36	19	21	9	8	74	45	46	28	33	29	25
	8	8	8	6	7	3	3	39	23	20	14	17	14
Washburn	**9**	81	26	17	11	15	11	6	43	28	26	17	20
	10	82	59	39	67	42	72	50	57	62	87	87	89
	11	49	65	41	32	55	37	63	42	47	52	81	79
	12	76	55	69	46	35	56	37	64	44	46	56	77
	1	18	38	29	35	25	19	32	20	42	27	31	39
	2	129	112	102	93	98	77	72	83	64	87	72	78
	3	10	122	80	80	69	76	62	50	65	49	76	56
	4	33	9	101	64	70	58	59	51	44	59	40	63
	5	53	26	10	93	59	64	54	56	46	42	57	37
	6	30	23	16	4	72	41	55	41	47	40	35	45
	7	16	10	9	6	1	48	24	35	26	36	27	19
	8	6	6	3	3	2	1	23	12	19	13	14	13
Walshaw Dean	**9**	61	20	9	6	6	3	1	25	11	20	13	16

	Rank of 2022 rainfall in period since 1891												
		duration											
	end month	1	2	3	4	5	6	7	8	9	10	11	12
	10	87	61	42	75	51	84	62	73	82	100	101	97
	11	49	62	46	34	64	40	70	51	56	69	91	92
	12	76	52	64	48	36	64	44	73	54	61	73	86
	1	20	44	29	38	28	22	41	23	54	37	41	53
	2	129	119	107	96	103	89	83	95	82	98	87	91
	3	14	125	94	91	82	86	73	62	82	66	89	75
	4	38	12	117	84	81	75	73	63	53	71	58	82
	5	59	33	12	106	78	81	66	71	57	52	70	59
	6	32	27	19	7	93	66	71	55	63	50	43	62
	7	24	12	11	6	3	76	43	59	48	52	41	33
	8	8	9	4	4	4	2	42	23	30	26	35	26
eshaw/Leeming	9	65	20	13	6	9	5	3	40	27	35	28	30
	10	96	70	48	63	39	85	57	68	81	101	101	106
	11	40	61	44	39	47	30	68	42	56	66	92	96
	12	48	34	55	37	29	40	24	57	38	52	62	83
	1	27	30	16	30	22	16	25	13	41	29	34	48
	2	129	115	102	89	97	81	73	78	63	89	71	79
	3	24	125	103	85	74	78	62	52	64	47	77	61
	4	39	19	113	89	74	65	71	55	50	56	44	69
	5	72	49	25	111	89	78	64	65	53	48	60	44
	6	41	45	27	20	97	79	63	55	58	52	45	50
	7	47	33	37	19	10	96	64	61	47	57	47	43
	8	12	14	11	17	10	6	60	32	35	27	36	28
Grimwith	9	80	32	31	21	22	22	11	63	41	42	32	38
	10	86	58	43	69	44	79	59	66	76	97	101	97
	11	54	63	43	34	59	36	70	50	53	63	89	90
	12	73	55	67	49	36	59	36	72	50	55	67	86
	1	20	42	27	33	24	18	35	20	47	32	37	44
	2	129	121	105	100	103	92	86	92	79	97	86	86
	3	13	126	98	89	79	84	74	64	78	59	86	72
	4	40	12	116	84	78	74	75	58	51	72	53	80
	5	56	35	13	107	77	80	66	71	58	53	71	48
	6	30	22	20	4	94	66	68	54	59	49	45	58
	7	20	9	8	6	1	75	43	53	39	49	40	32
	8	8	8	4	3	3	2	39	20	30	24	32	21
nden/ Lower Laithe	9	64	20	11	6	5	3	2	34	24	32	24	27
	10	74	70	53	84	60	86	66	80	81	105	103	98
	11	61	56	57	49	73	48	76	56	70	77	99	98
	12	102	78	81	80	65	82	62	90	69	80	80	102
	1	19	63	48	56	56	46	61	44	69	49	66	68
	2	129	118	120	115	110	106	100	108	95	108	96	105
	3	15	126	98	107	98	97	92	83	95	83	99	84
	4	34	8	115	85	92	87	89	84	75	85	77	94
	5	54	29	9	105	75	89	78	86	80	69	82	74
	6	30	22	14	6	92	60	81	72	74	71	61	75
	7	21	10	5	5	2	75	51	69	59	59	57	55
	8	12	7	6	4	4	1	44	28	54	48	48	43
rownhill Digley	9	65	27	14	10	6	4	2	47	28	45	44	43

		Rank of 2022 rainfall in period since 1891											
		duration											
	end month	1	2	3	4	5	6	7	8	9	10	11	12
	10	90	79	52	83	59	92	72	76	80	107	108	97
	11	45	56	55	40	61	40	76	55	59	69	93	97
	12	87	62	62	67	56	69	50	85	63	71	72	95
	1	15	45	27	38	42	33	45	31	63	48	52	56
	2	128	104	100	86	92	89	75	87	77	95	78	85
	3	26	121	87	88	74	78	82	68	80	65	92	73
	4	22	10	102	69	74	62	65	67	53	66	54	81
	5	35	15	8	89	64	70	51	54	57	53	63	51
	6	41	25	11	6	78	48	58	44	49	54	44	56
	7	17	12	7	4	3	60	27	42	33	36	40	30
	8	21	7	8	7	4	2	37	20	29	23	30	31
on Valley Group	**9**	71	29	16	13	9	5	4	37	20	30	23	28
	10	84	71	47	74	46	86	59	69	69	102	104	94
	11	36	47	46	28	50	31	67	40	51	54	90	93
	12	96	62	66	62	47	66	44	77	55	64	63	96
LDV supply and comp	**1**	14	47	29	39	37	23	41	24	54	39	45	45
	2	128	104	104	90	94	87	74	85	73	91	73	85
	3	18	118	83	89	74	77	76	63	71	56	81	63
	4	26	7	98	65	74	62	58	60	49	60	47	74
	5	33	14	6	85	53	65	51	54	54	43	55	42
	6	33	13	6	5	69	35	55	40	41	43	34	45
	7	10	9	4	3	1	39	18	36	26	29	29	20
	8	25	8	6	3	3	1	26	16	23	16	23	25
	9	72	33	16	13	7	3	3	27	18	29	18	24
	10	83	69	43	63	38	82	46	61	66	92	100	87
	11	34	45	43	24	43	25	62	29	43	49	84	86
	12	103	68	71	65	47	63	45	76	51	57	60	89
	1	11	52	29	37	35	24	36	19	56	32	38	44
Loxley Group	**2**	128	106	109	96	98	89	77	90	73	92	75	83
	3	29	124	86	96	82	89	81	66	77	59	83	60
	4	25	13	105	69	82	67	68	69	52	65	49	75
	5	35	16	12	91	55	73	60	60	61	52	59	45
	6	41	18	8	8	82	47	63	54	52	51	43	50
	7	10	12	5	4	3	53	25	49	36	40	37	30
	8	32	13	10	7	4	3	37	20	39	29	34	34
	9	77	48	24	23	17	10	6	44	22	39	32	31

YorkshireWater

		Rank of 2022 rainfall in period since 1891											
		duration											
	end month	1	2	3	4	5	6	7	8	9	10	11	12
Rivelin Redmires	**10**	82	70	42	62	41	79	50	60	67	90	99	92
	11	35	46	44	25	43	25	62	31	44	50	80	87
	12	111	78	77	68	49	67	46	79	56	62	64	90
	1	10	59	36	43	46	25	39	22	63	35	43	47
	2	128	112	116	102	101	101	86	92	78	98	80	87
	3	37	126	91	106	89	96	90	75	83	67	88	73
	4	28	20	113	76	91	78	85	81	69	74	59	82
	5	35	20	16	97	68	83	67	74	71	58	68	52
	6	49	22	10	10	88	54	74	59	63	64	50	61
	7	14	17	7	8	8	61	33	57	44	43	47	37
	8	45	19	14	11	7	6	48	23	51	38	37	41
	9	76	52	22	28	18	12	11	51	33	47	37	39
Ryburn Slithero Bridge	**10**	84	74	61	88	60	85	63	80	87	107	100	96
	11	63	70	62	60	81	60	81	62	73	82	99	98
	12	96	75	84	79	71	87	66	87	70	77	83	102
	1	20	53	50	59	55	51	67	46	72	56	68	71
	2	129	120	115	105	107	104	96	109	89	105	96	98
	3	13	125	96	95	91	95	87	83	93	81	96	83
	4	33	7	110	83	83	77	82	77	72	83	74	92
	5	65	34	14	105	78	90	75	79	77	71	79	71
	6	22	21	14	4	84	56	73	62	69	65	60	70
	7	38	13	13	7	2	75	46	65	56	65	56	56
	8	9	13	6	8	4	3	35	23	38	35	42	39
	9	60	21	17	9	7	4	4	37	25	43	35	35

Appendix 2b: Driest period on record

		driest												
		duration												
	end month	1	2	3	4	5	6	7	8	9	10	11	12	
Wharfe	10	1972	1972	1972	1972	1995	1995	1995	1995	1959	1929	1929	1959	
	11	1945	1956	1915	1937	1995	1995	1995	1995	1995	1921	1955	1964	
	12	1933	1945	1995	1904	1995	1995	1995	1995	1995	1995	1995	1975	
	1	1997	1964	1893	1963	1905	1996	1996	1996	1996	1996	1996	1996	
	2	1921	1963	1964	1934	1963	1963	1934	1996	1996	1996	1996	1996	
	3	1944	1993	1929	1929	1953	1963	1949	1996	1996	1996	1996	1996	
	4	1980	1938	1929	1929	1929	1893	1996	1938	1938	1996	1996	1996	
	5	1970	2020	1929	1929	1929	1929	1953	1963	1905	1996	1996	1996	
	6	1925	1940	2010	1929	1929	1929	1929	1929	1996	1929	1996	1996	
	7	1984	1925	1921	1984	1984	1921	1929	1929	1929	1996	1905	1996	
	8	1995	1995	1995	1995	1995	1995	1984	1929	1929	1976	1976	1976	
	9	1959	1959	1959	1959	1959	1995	1995	1959	1929	1929	1959	1959	
Ure	10	1969	1915	1972	1972	1995	1959	1995	1915	1959	1929	1929	1959	
	11	1945	1922	1915	1915	1955	1995	1995	1995	1915	1921	1964	1964	
	12	1933	1945	1975	1904	1995	1995	1995	1995	1995	1995	1975	1975	
	1	1997	1964	1893	1963	1905	1905	1996	1996	1996	1996	1996	1976	
	2	1921	1964	1964	1963	1963	1905	1934	1905	1905	1996	1996	1996	
	3	1929	1929	1929	1929	1953	1963	1905	1973	1996	1996	1996	1996	
	4	1980	1938	1929	1929	1929	1929	1976	1929	1996	1996	1996	1996	
	5	1989	2020	1929	1929	1929	1929	1929	1963	1905	1996	1996	1996	
	6	1925	1940	1921	1929	1929	1929	1929	1929	1996	1905	1996	1996	
	7	1911	1925	1905	1984	1984	1921	1929	1929	1929	1905	1905	1905	
	8	1995	1995	1995	1995	1995	1995	1929	1929	1929	1976	1976	1976	
	9	1910	1959	1959	1959	1959	1995	1990	1959	1929	1929	1959	1959	
SwaleNE	10	1947	1972	1972	1972	1959	1959	1995	1959	1959	1959	1959	1959	
	11	1945	1964	1964	1964	1955	1964	1989	1995	1990	1921	1964	1964	
	12	1905	1945	1975	1971	1947	1947	1995	1989	1995	1995	1921	1964	
	1	1997	1964	1893	1905	1905	1973	1905	1905	1996	1996	1996	1976	
	2	1921	1896	1964	1909	1905	1905	1973	1973	1905	1992	1996	1996	
	3	1929	1929	1929	1929	1953	1973	1973	1973	1973	1973	1996	1996	
	4	1912	1938	1938	1929	1929	1893	1976	1973	1973	1973	1996	1976	
	5	1989	2020	2020	1929	1929	1929	1929	1905	1905	1973	1973	1905	
	6	1925	1940	1915	1915	1921	1929	1929	1929	1949	1905	1973	1973	
	7	1911	2006	1905	1984	1984	1921	1929	1929	1929	1905	1905	1905	
	8	1947	1995	1995	1995	1995	1995	1959	1959	1929	1976	1976	1976	
	9	1910	1959	1959	1959	1959	1959	1959	1959	1959	1929	1959	1959	
Rye	10	1962	1964	1959	1972	1959	1959	1964	1996	1959	1959	1964	1959	
	11	1964	1964	1964	1964	1964	1964	1964	1964	1964	1964	1964	1964	
	12	1905	2004	1964	1964	1964	1964	1964	1964	1964	1964	1964	1964	
	1	1997	1989	1989	1909	1965	1973	1965	1965	1965	1965	1992	1965	
	2	1985	1896	1989	1949	1949	1949	1973	1973	1965	1965	1965	1992	
	3	1953	1943	1973	1973	2012	1973	1973	1973	1973	1973	1965	1965	
	4	1912	2011	1938	1997	2011	1949	1949	1949	1973	1973	1914	1965	
	5	1992	2020	2020	1929	1896	1896	1989	1949	1949	1973	1973	1914	
	6	1925	1960	1960	1960	1921	1949	1929	1949	1949	1949	1973	1973	
	7	1935	1976	1921	1984	1921	1921	1921	1989	1921	1949	1949	1921	
	8	1947	1976	1976	1995	1995	1976	1976	1976	1976	1976	1976	1976	
	9	1898	1959	1959	1959	1959	1991	1959	1959	1959	1989	1989	1949	

YorkshireWater

		driest												
		duration												
	end month	1	2	3	4	5	6	7	8	9	10	11	12	
	10	1972	1972	1959	1959	1959	1959	1991	1959	1959	1959	1959	1959	
	11	1909	1978	1964	1947	1964	1964	1991	1991	1990	1959	1959	1964	
	12	1905	2004	1964	1964	1964	1964	1991	1991	1991	1991	1991	1991	
	1	1997	1989	2005	1909	1905	1992	1992	1992	1992	1992	1992	1992	
	2	1985	1896	1964	1909	1909	1965	1965	1992	1992	1992	1992	1992	
	3	1929	1993	1973	1973	1949	1973	1973	1973	1973	1973	1992	1992	
	4	2011	1938	1938	1997	2015	1893	1973	1973	1973	1973	1914	1992	
	5	2020	2020	2020	1929	1896	1929	1893	1957	1905	1973	1973	1914	
	6	1925	1960	1960	1960	1929	1929	1929	1921	1949	1949	1921	1992	
	7	1935	1976	1921	1995	1921	1921	1921	1921	1921	1921	1921	1921	
	8	1995	1995	1976	1995	1995	1995	1976	1976	1976	1976	1976	1976	
Ouse	**9**	1959	1959	1959	1959	1959	1991	1959	1959	1959	1929	1959	1959	
	10	1969	1972	1972	1972	1995	1959	1995	1995	1959	1929	1929	1929	
	11	1945	1922	1915	1937	1955	1995	1995	1995	1995	1921	1955	1964	
	12	1933	1945	1975	1904	1937	1995	1995	1995	1995	1995	1975	1975	
	1	1997	1964	1893	1963	1905	1996	1996	1996	1996	1996	1996	1996	
	2	1921	1896	1934	1934	1963	1905	1934	1934	1934	1996	1996	1996	
	3	1944	1929	1929	1929	1953	1949	1949	1973	1973	1996	1996	1996	
	4	1938	1938	1938	1929	1929	1929	1976	1938	1938	1938	1996	1996	
	5	1970	2020	1990	1929	1929	1929	1929	1963	1905	1938	1914	1996	
	6	1925	1970	1995	1929	1929	1929	1929	1929	1949	1929	1973	1996	
	7	1911	1925	1995	1995	1995	1921	1929	1929	1929	1905	1905	1905	
	8	1995	1995	1995	1995	1995	1995	1929	1929	1929	1929	1976	1976	
Nidd	**9**	1959	1959	1959	1959	1959	1995	1929	1959	1929	1929	1929	1959	
	10	1978	1904	1947	1947	1995	1959	1995	1995	1959	1959	1929	1959	
	11	1945	1978	1964	2003	1955	1995	1995	1995	2011	1921	2011	2011	
	12	1933	1945	1904	1904	1975	1995	1995	1995	1995	1995	1975	1975	
	1	1997	1964	1989	1905	1905	1909	1996	1996	1996	1996	1996	1996	
	2	1959	1964	1964	1934	1905	1905	1909	1992	1905	1996	1996	1996	
	3	1929	1929	1929	1929	2005	1963	1905	1976	1996	1996	1996	1996	
	4	1938	2011	1938	1929	1929	1893	1976	1976	1976	1976	1976	1976	
	5	2020	2020	2020	1929	1929	1929	1893	1905	1905	1921	1996	1996	
	6	1925	1970	1921	2011	1921	1929	1929	1893	1921	1921	1921	1996	
	7	1911	1921	1921	1921	1921	1921	1929	1929	1921	1921	1921	1921	
	8	1995	1995	1976	1995	1995	1976	1976	1929	1929	1976	1976	1976	
Don	**9**	1959	1959	1959	1959	1959	1990	1990	1959	1929	1929	1959	1959	
	10	1962	1972	1959	1972	1959	1959	1991	1991	1959	1959	1989	1989	
	11	1958	1978	1964	1947	1964	1964	1964	1964	1991	1964	1989	1989	
	12	1905	2004	1964	1964	1947	1964	1964	1964	1964	1991	1964	1964	
	1	1997	1989	1989	1905	1905	1973	1973	1914	1992	1992	1992	1992	
	2	1985	1896	1989	1949	1949	1949	1973	1973	1914	1992	1992	1992	
	3	1929	1943	1973	1973	1949	1949	1973	1973	1973	1973	1973	1973	
	4	2011	2011	1938	1997	2015	1949	1949	1949	1973	1973	1914	1973	
	5	1991	2020	2011	1929	1896	1896	1989	1949	1905	1973	1973	1914	
	6	1925	1970	1960	1960	1921	1921	1929	1949	1949	1949	1921	1973	
	7	1935	1976	1921	1984	1921	1921	1921	1929	1921	1921	1921	1921	
	8	1995	1976	1976	1995	1995	1976	1976	1976	1976	1989	1976	1976	
DerwentNE	**9**	1959	1959	1913	1913	1959	1991	1991	1959	1959	1989	1989	1949	

YorkshireWater

		driest												
		duration												
	end month	1	2	3	4	5	6	7	8	9	10	11	12	
	10	1969	1904	1947	1972	1996	1959	1964	1996	1959	1964	1989	1949	
	11	1920	1964	1964	1964	1964	1964	1964	1964	1964	1964	1964	1964	
	12	1905	1932	1964	1964	1947	1964	1964	1964	1964	1964	1964	1964	
	1	1905	1989	1949	1949	1949	1973	1973	1965	1965	1965	1992	1965	
	2	1985	1949	1989	1949	1949	1949	1973	1973	1905	1965	1992	2012	
	3	1938	1943	1973	1973	2012	1949	2012	1973	1973	1973	1973	1973	
	4	1912	1938	1938	1997	2015	1949	1949	1949	1973	1973	1914	1914	
	5	1992	2020	2020	1929	1896	1989	1949	1949	1949	1973	1973	1914	
	6	1976	1970	1960	1960	1921	1949	1949	1949	1949	1949	1949	1949	
	7	1935	1976	1905	2010	1976	1921	1905	1905	1949	1949	1949	1905	
	8	1995	1976	1976	1995	1995	1976	1976	1976	1976	1949	1976	1949	
Dales NSTribs	9	1898	1959	1991	2022	1959	1991	1991	1959	1949	1989	1949	1949	
	10	1962	1977	1947	1947	1959	1959	1959	1959	1959	1959	1929	1959	
	11	1958	1978	1964	1947	1947	1947	1947	1947	1991	1959	1959	1989	
	12	1905	2004	1964	1964	1947	1947	1913	1991	1991	1991	1921	1964	
	1	1997	1989	1989	1905	1905	1973	1992	1914	1992	1992	1992	1992	
	2	1985	1896	1989	1949	1905	1905	1973	1992	1914	1992	1992	1992	
	3	1929	1943	1973	1973	1949	1949	1973	1973	1973	1973	1973	1992	
	4	2011	2011	1938	1997	1929	1949	1949	1949	1973	1973	1914	1914	
	5	1991	2020	2020	1929	1929	1929	1949	1949	1949	1973	1973	1914	
	6	1925	1960	1960	1960	1929	1929	1929	1949	1949	1949	1921	1992	
	7	1935	1976	1935	2010	1929	1921	1921	1929	1921	1921	1921	1921	
	8	1995	1976	1976	1995	1995	1976	1976	1976	1976	1976	1976	1976	
Hull and Humber	9	1959	1959	1959	1913	1959	1959	1959	1959	1959	1929	1959	1959	
	10	1972	1904	1947	1947	1995	1995	1995	1995	1959	1929	1929	1959	
	11	1945	1962	1915	2003	1995	1995	1995	1995	1995	1921	1955	1893	
	12	1933	1933	1995	1904	1995	1995	1995	1995	1995	1995	1995	1975	
	1	1997	1893	1893	1996	1905	1996	1996	1996	1996	1996	1996	1996	
	2	1959	1963	1934	1934	1963	1905	1934	1996	1996	1996	1996	1996	
	3	1931	1993	1929	1929	1934	1963	1949	1996	1996	1996	1996	1996	
	4	1980	2011	1929	1929	1929	1893	1996	1938	1996	1996	1996	1996	
	5	2020	2020	2020	1929	1929	1929	1893	1996	1905	1996	1996	1996	
	6	1925	1940	2010	1929	1929	1929	1929	1893	1996	1905	1996	1996	
	7	1982	1925	2018	1921	1984	1921	1929	1929	1934	1996	1905	1996	
	8	1947	1995	1995	1995	1995	1995	1929	1929	1929	1934	1996	1996	
Calder	9	1910	1959	1959	1959	1959	1995	2022	1959	1929	1929	1959	1996	
	10	1978	1904	1947	1995	1995	1995	1995	1995	1959	1929	1929	1959	
	11	1945	1962	1915	1995	1995	1995	1995	1995	1995	1921	1955	1964	
	12	1933	1945	1995	1904	1995	1995	1995	1995	1995	1995	1995	1955	
	1	1997	1893	1893	1963	1905	1996	1996	1996	1996	1996	1996	1996	
	2	1921	1963	1934	1934	1963	1905	1934	1996	1996	1996	1996	1996	
	3	1944	1993	1929	1929	1953	1963	1905	1996	1996	1996	1996	1996	
	4	1980	2011	1929	1929	1929	1893	1996	1938	1996	1996	1996	1996	
	5	2020	2020	2020	1929	1929	1929	1893	1963	1905	1996	1996	1996	
	6	1925	2018	2010	1929	1929	1929	1929	1893	1996	1905	1996	1996	
	7	1911	1925	2018	1984	1984	1921	1929	1929	1996	1996	1905	1996	
Aire	8	1995	1995	1995	1995	1995	1995	1929	1929	1929	1976	1976	1976	
	9	1959	1959	1959	1995	1959	1995	2022	1959	1929	1929	1959	1959	

	end month	1	2	3	4	5	6	7	8	9	10	11	12
	10	1978	1972	1947	1947	1995	1959	1995	1995	1959	1959	1929	1959
	11	1945	1922	1964	1964	1955	1995	1995	1995	1995	1921	1964	1964
	12	1905	1945	1962	1904	1947	1947	1995	1995	1995	1995	1921	1964
	1	1997	1964	1893	1905	1905	1973	1996	1996	1996	1996	1996	1996
	2	1921	1896	1964	1909	1963	1905	1973	1973	1905	1996	1996	1996
	3	1929	1929	1929	1929	1949	1949	1949	1973	1973	1996	1996	1996
	4	1938	1938	1938	1929	1929	1893	1976	1905	1973	1973	1996	1996
	5	1970	2020	2020	1929	1929	1929	1893	1905	1905	1973	1973	1996
	6	1925	1940	2010	1929	1921	1929	1929	1929	1949	1949	1921	1996
	7	1935	1976	1921	1984	1921	1921	1929	1929	1921	1905	1905	1921
	8	1995	1995	1976	1995	1995	1995	1976	1929	1929	1976	1976	1976
orkshire regional	**9**	1959	1959	1959	1959	1959	1959	1959	1959	1929	1929	1959	1959
	10	1969	1915	1972	1947	1995	1995	1995	1995	1921	1929	1929	1929
	11	1945	1922	1915	1915	1937	1995	1995	1995	1915	1921	1955	1964
	12	1933	1945	1975	1904	1995	1995	1995	1995	1995	1995	1995	1933
	1	1997	1964	1893	1963	1905	1996	1996	1996	1996	1996	1996	1996
	2	1921	1929	1964	1934	1963	1963	1934	1934	1934	1996	1996	1996
	3	1944	1929	1929	1929	1953	1996	1934	1934	1996	1996	1996	1996
	4	1938	1938	1929	1929	1929	1929	1996	1929	1996	1996	1996	1996
	5	1970	1980	1929	1929	1929	1929	1929	1996	1929	1996	1996	1996
	6	1925	1970	1921	1929	1921	1929	1929	1929	1996	1929	1996	1996
	7	1911	1925	1905	1984	1984	1929	1929	1929	1929	1996	1905	1996
	8	1947	1995	1995	1995	1995	1995	1929	1929	1929	1929	1976	1929
Nidd reservoirs	**9**	1910	1959	1959	1959	1959	1995	1929	1959	1929	1929	1929	1959
	10	1969	1972	1972	1913	1995	1995	1995	1995	1959	1929	1929	1929
	11	1945	1956	1915	1937	1995	1995	1995	1995	1995	1921	1955	1929
	12	1933	1945	1975	1971	1995	1995	1995	1995	1995	1995	1995	1975
	1	1997	1964	1893	1996	1905	1996	1996	1996	1996	1996	1996	1996
	2	1921	1896	1934	1934	1909	1905	1934	1914	1996	1996	1996	1996
	3	1944	1993	1929	1929	1953	1949	1949	1934	1996	1996	1996	1996
	4	1938	1938	1938	1929	1929	1929	1976	1938	1938	1996	1996	1996
	5	1970	2020	2020	1929	1929	1929	1929	1957	1929	1938	1914	1996
	6	1925	1940	2010	1929	1929	1929	1929	1929	1949	1929	1996	1996
	7	1984	1925	1995	1995	1984	1921	1929	1929	1929	1949	1949	1996
	8	1995	1995	1995	1995	1995	1995	1929	1929	1929	1929	1976	1976
Washburn	**9**	1959	1959	1959	1913	1959	1995	1929	1959	1929	1929	1929	1959
	10	1947	1915	1947	1995	1995	1995	1995	1995	1959	1959	1929	1959
	11	1945	1962	1915	1995	1995	1995	1995	1995	1995	1921	1955	1955
	12	1933	1945	1995	1937	1995	1995	1995	1995	1995	1995	1995	1955
	1	1997	1996	1996	1996	1996	1996	1996	1996	1996	1996	1996	1996
	2	1932	1963	1934	1934	1963	1905	1996	1996	1996	1996	1996	1996
	3	1931	1993	1929	1929	1934	1996	1996	1996	1996	1996	1996	1996
	4	1980	2011	1929	1929	1929	1893	1996	1938	1996	1996	1996	1996
	5	2020	1980	2020	1929	1929	1929	1893	1996	1996	1996	1996	1996
	6	1925	2018	2010	2010	1929	1929	1929	1996	1996	1996	1996	1996
	7	1911	1925	2018	1995	2022	1929	1929	1929	1996	1996	1996	1996
	8	1947	1995	1995	1995	1995	2022	1976	1929	1929	1959	1996	1996
Walshaw Dean	**9**	1959	1959	1959	1995	1995	1995	2022	1959	1929	1929	1959	1996

		driest											
		duration											
	end month	1	2	3	4	5	6	7	8	9	10	11	12
	10	1922	1904	1947	1947	1995	1995	1995	1995	1921	1929	1929	1959
	11	1945	1962	1915	1995	1995	1995	1995	1995	1995	1921	1955	1893
	12	1933	1945	1995	1904	1995	1995	1995	1995	1995	1995	1995	1955
	1	1997	1893	1893	1996	1905	1996	1996	1996	1996	1996	1996	1996
	2	1934	1896	1934	1934	1963	1905	1996	1996	1996	1996	1996	1996
	3	1944	1993	1929	1929	1934	1996	1905	1996	1996	1996	1996	1996
	4	1980	2011	1929	1929	1929	1893	1996	1996	1996	1996	1996	1996
	5	2020	2020	2011	1929	1929	1929	1893	1996	1905	1996	1996	1996
	6	1925	1940	2010	1929	1929	1929	1929	1893	1996	1905	1996	1996
	7	1982	1925	1921	1995	1984	1921	1929	1929	1996	1996	1905	1996
	8	1995	1995	1995	1995	1995	1995	1929	1929	1929	1893	1996	1905
eshaw/Leeming	9	1959	1959	1959	1995	1995	1995	1995	1959	1929	1929	1959	1996
	10	1922	1904	1947	1947	1995	1995	1995	1995	1921	1929	1929	1959
	11	1945	1962	1915	1995	1995	1995	1995	1995	1995	1921	1955	1893
	12	1933	1945	1995	1904	1995	1995	1995	1995	1995	1995	1995	1955
	1	1997	1964	1893	1963	1905	1934	1996	1996	1996	1996	1996	1934
	2	1921	1929	1964	1934	1963	1963	1934	1934	1934	1934	1934	1934
	3	1944	1929	1929	1929	1953	1963	1934	1934	1934	1934	1934	1934
	4	1938	1938	1929	1929	1929	1929	1963	1929	1934	1934	1996	1996
	5	1970	2020	1938	1929	1929	1929	1929	1963	1929	1934	1938	1996
	6	1925	1970	2010	1929	1929	1929	1929	1929	1929	1929	1934	1996
	7	1984	1925	1941	1995	1929	1929	1929	1929	1929	1905	1929	1934
	8	1947	1995	1995	1995	1995	1995	1929	1929	1929	1929	1976	1929
Grimwith	9	1959	1959	1959	1959	1959	1995	1959	1959	1929	1929	1929	1959
	10	1947	1904	1947	1995	1995	1995	1995	1995	1959	1955	1929	1959
	11	1945	1962	1915	1995	1995	1995	1995	1995	1995	1995	1955	1955
	12	1933	1945	1995	1995	1995	1995	1995	1995	1995	1995	1995	1955
	1	1997	1893	1893	1996	1996	1996	1996	1996	1996	1996	1996	1996
	2	1959	1963	1934	1934	1963	1905	1996	1996	1996	1996	1996	1996
	3	1931	1993	1929	1929	1934	1996	1996	1996	1996	1996	1996	1996
	4	1980	2011	1929	1929	1929	1893	1996	1938	1996	1996	1996	1996
	5	1970	1980	1893	1929	1929	1929	1893	1996	1905	1996	1996	1996
	6	1925	2018	2010	2010	1929	1929	1929	1893	1996	1905	1996	1996
	7	1911	1925	1995	1995	2022	1929	1929	1929	1996	1996	1905	1996
	8	1947	1995	1995	1995	1995	1995	1929	1929	1929	1959	1996	1996
nden/ Lower Laithe	9	1959	1959	1959	1995	1995	1995	1995	1959	1929	1929	1959	1996
	10	1972	1972	2003	1947	1995	1995	1995	1995	1959	1901	1893	1959
	11	1945	1995	1915	2003	1995	1995	1995	1995	1995	1921	1901	1893
	12	1933	1933	1995	1995	1995	1995	1995	1995	1995	1995	1995	1901
	1	1997	1893	1996	1996	1996	1996	1996	1996	1996	1996	1996	1996
	2	1934	1963	1964	1934	1963	1963	1996	1996	1996	1996	1996	1996
	3	1931	1993	1929	1929	1934	1996	1996	1996	1996	1996	1996	1996
	4	1980	2011	1929	1929	1929	1893	1996	1996	1996	1996	1996	1996
	5	2020	2020	1893	1929	1929	1929	1893	1996	1996	1996	1996	1996
	6	1925	1940	2010	1893	1929	1929	1929	1893	1996	1996	1996	1996
	7	1982	1925	2018	1921	1984	1921	1929	1929	1996	1996	1996	1996
	8	1947	1995	1995	1995	1995	2022	1959	1929	1929	1893	1996	1996
rownhill Digley	9	1959	1959	1959	1959	1959	1995	1959	1959	1901	1929	1959	1996

YorkshireWater

		driest												
		duration												
	end month	1	2	3	4	5	6	7	8	9	10	11	12	
	10	1972	2003	2003	1947	1947	1959	1995	2011	1959	1959	1929	1959	
	11	1945	1975	2003	2003	1955	1995	1995	1995	2011	1921	2003	2011	
	12	1933	1933	1975	1904	2003	2003	1995	1995	1995	1995	1975	2003	
	1	1997	1964	1893	1996	1905	1996	1996	1996	1996	1996	1996	1996	
	2	1985	1929	1964	1934	1963	1905	1934	1934	1996	1996	1996	1934	
	3	1931	1993	1929	1929	1934	1949	1949	1934	1996	1996	1996	1996	
	4	2007	2011	1929	1929	1929	2009	1996	1949	1996	1996	1996	1996	
	5	2020	2020	2020	1929	1929	1929	1893	1996	1905	1996	1996	1996	
	6	1925	1940	1957	2011	1929	1929	1929	1934	1996	1949	1996	1996	
	7	1982	1925	1921	1921	2011	1921	1929	1929	1996	1996	1996	1996	
	8	1947	1955	1976	2018	1995	2011	1976	1929	1929	1934	1996	1976	
on Valley Group	**9**	1959	1959	1955	1959	1959	2011	2011	1959	1929	1929	1959	1996	
	10	1947	1904	1947	1947	1947	1959	1995	1959	1959	1959	1929	1959	
	11	1945	1995	1904	2003	1955	1995	1995	1995	2011	1921	2003	2011	
	12	1933	1933	1995	1904	2003	1995	1995	1995	1995	1995	1975	2003	
LDV supply and comp	**1**	1997	1964	1893	1996	1905	1996	1996	1996	1996	1996	1996	1996	
	2	1985	1929	1964	1934	1963	1905	1934	1934	1996	1934	1934	1934	
	3	1931	1993	1929	1929	1934	1949	1949	1934	1996	1996	1996	1996	
	4	2007	2011	1929	1929	1929	1893	1996	1949	1996	1996	1996	1996	
	5	2020	2020	2011	1929	1929	1929	1934	1996	1905	1996	1996	1996	
	6	1925	1970	2010	2011	1929	1929	1929	1934	1996	1949	1996	1996	
	7	1982	1921	1921	1921	2022	1921	1929	1929	1996	1996	1949	1996	
	8	1995	1976	1976	2018	1995	2022	1976	1929	1929	1959	1996	1949	
	9	1959	1959	1955	1959	1959	1959	2011	1959	1929	1929	1959	1959	
	10	1972	1947	1947	1947	1947	1959	1995	2011	1959	1959	1929	1959	
	11	1945	1995	1904	2003	1955	1995	1995	1995	2011	1921	2003	2011	
	12	1933	1933	1995	1904	1995	1995	1995	1995	1995	1995	1975	1975	
	1	1997	1964	1989	1996	1905	1996	1996	1996	1996	1996	1996	1996	
Loxley Group	**2**	1985	1929	1964	1934	1905	1905	1934	1934	1905	1934	1934	1934	
	3	1931	1993	1929	1929	1934	1949	1949	1996	1996	1996	1996	1996	
	4	2007	2011	1929	1929	1929	1893	1996	1954	1996	1996	1996	1996	
	5	2020	2020	2011	1929	1929	1929	1934	1996	1905	1996	1996	1996	
	6	1925	1921	1957	2011	1929	1929	1929	1934	1996	1949	1996	1996	
	7	1911	1921	1921	1921	2011	1921	1929	1929	1921	1996	1921	1996	
	8	1995	1976	1976	2018	1995	2011	1976	1929	1929	1959	1996	1976	
	9	1959	1959	1959	1959	1959	1959	2011	1959	1929	1929	1959	1959	

YorkshireWater

		driest												
		duration												
	end month	1	2	3	4	5	6	7	8	9	10	11	12	
Rivelin Redmires	**10**	1947	1904	1947	1947	1959	1959	1995	2011	1959	1959	1929	1959	
	11	1945	1908	1904	2003	1955	1995	1995	1995	2011	1921	1959	2011	
	12	1933	1933	1904	1904	1995	1995	1995	1995	1995	1995	1975	1975	
	1	1997	1964	1989	1905	1905	1996	1996	1996	1996	1996	1996	1996	
	2	1959	1964	1964	1934	1905	1905	1934	1934	1905	1996	1996	1996	
	3	1931	1929	1929	1929	1934	1905	1905	1996	1996	1996	1996	1996	
	4	1957	2011	1929	1929	1929	1893	1996	1905	1996	1996	1996	1996	
	5	2020	2020	2011	1929	1929	1929	1934	1905	1905	1996	1996	1996	
	6	1925	1921	1957	2011	1921	1929	1929	1934	1996	1921	1921	1996	
	7	1911	1921	1921	1921	2011	1921	1929	1929	1921	1921	1921	1921	
	8	1976	1976	1976	2018	1995	2011	1976	1929	1929	1934	1996	1976	
	9	1959	1959	1959	1959	1959	1959	2011	1959	1959	1929	1959	1959	
Ryburn Slithero Bridge	**10**	1972	1915	2003	1947	1995	1995	1995	1995	1901	1901	1929	1959	
	11	1945	1962	1915	2003	1995	1995	1995	1995	1995	1921	1901	1893	
	12	1933	1933	1995	1904	1995	1995	1995	1995	1995	1995	1995	1893	
	1	1997	1893	1996	1996	1996	1996	1996	1996	1996	1996	1996	1996	
	2	1934	1963	1934	1934	1963	1905	1996	1996	1996	1996	1996	1996	
	3	1931	1993	1929	1929	1934	1963	1996	1996	1996	1996	1996	1996	
	4	1980	2011	1929	1929	1929	1893	1996	1996	1996	1996	1996	1996	
	5	2020	1980	1893	1929	1929	1929	1893	1996	1905	1996	1996	1996	
	6	1925	1940	2010	1893	1929	1929	1929	1893	1996	1905	1996	1996	
	7	1911	1925	2018	1984	1984	1921	1929	1929	1893	1996	1905	1996	
	8	1947	1955	1976	1995	1995	1984	1984	1929	1929	1893	1996	1996	
	9	1910	1959	1959	1959	1959	1995	1901	1959	1929	1929	1959	1959	

Appendix 2c: Last Year drier than 2021/22 for durations 1-12 months

The table below shows the last year drier than 2021/22. Cells are highlighted if the last year drier than this year was before 1996. Cells are blank and highlighted if this year is the driest on record.

YorkshireWater

		driest SINCE (OR LAST YEAR DRIER THAN...)											
		duration											
	end month	1	2	3	4	5	6	7	8	9	10	11	12
Wharfe	10	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	11	2011	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	12	2017	2017	2018	2016	2016	2018	2018	2018	2018	2018	2018	2018
	1	2019	2017	2006	2019	2019	2019	2019	2019	2019	2019	2019	2019
	2	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2012	2021	2019	2019	2018	2019	2019	2019	2019	2019	2019	2019
	4	2021	2011	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2019	2019	2019	2019	2019	2019	2019	2019	2019
	6	2021	2018	2018	2011	2021	2019	2018	2018	2019	2017	2017	2019
	7	2006	2018	2018	2018	1995	2018	2018	2018	2018	2018	2017	2017
	8	2003	1995	1995	2018	1995	1995	2018	2013	2011	2005	2018	2010
	9	2015	1989	1991	1995	1995	1995	1995	2018	2013	2010	1996	1996
Ure	10	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	11	2004	2018	2018	2007	2018	2003	2018	2018	2018	2018	2018	2018
	12	2017	2017	2017	2016	2007	2016	2003	2018	2016	2016	2018	2018
	1	2019	2017	1996	2019	2017	2017	2017	1997	2019	2019	2017	2019
	2	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2012	2021	2019	2018	2017	2019	2019	2017	2019	2017	2019	2019
	4	2021	2011	2021	2019	2019	2017	2019	2019	2017	2019	2017	2019
	5	2020	2020	2020	2019	2019	2019	2017	2019	2019	2017	2019	2017
	6	2021	2018	2010	2010	2018	2017	2017	2009	2017	2017	2017	2017
	7	2014	2021	2018	1995	1995	2018	2013	2011	2005	2017	2017	2004
	8	2003	1995	1995	2001	1995	1995	2013	2010	2010	1996	2017	1996
	9	2021	1991	1991	1995	1995	1995	1995	2013	2010	2010	1996	1996
SwaleNE	10	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2019	2019
	11	2011	2018	2018	2007	2018	2018	2018	2018	2018	2018	2018	2018
	12	2017	2004	2018	2016	2007	2016	1995	2018	2018	2010	2018	2018
	1	2019	2017	1953	2019	2017	1996	2019	1997	2019	2019	2019	2019
	2	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2012	2021	2019	2019	2012	2019	2019	2019	2019	2019	2019	2019
	4	2021	2021	2021	2019	2019	2009	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2019	2019	2019	2017	2019	2019	2019	2019	2019
	6	2021	2018	2010	2011	2018	2013	2011	1996	2017	2015	1996	2015
	7	2016	2018	2018	2010	1996	2015	2010	2011	1996	1996	1996	1996
	8	1995	1995	1995	2018	1995	1995	2010	1976	1976	1976	1996	1976
	9	2021	2021	1991	1995	2018	1995	1995	2003	1996	1996	1989	1996
Rye	10	2020	2018	2018	2018	2018	2018	2018	2018	2018	2020	2020	2020
	11	2020	2020	2020	2018	2018	2018	2020	2020	2020	2018	2020	2020
	12	2017	2013	2018	2018	2018	2018	2018	2018	2018	2018	2018	2020
	1	1997	1992	2012	2017	2017	2019	2019	2019	2019	2019	2012	2019
	2	2021	2019	2015	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2021	2021	2015	2015	2015	2019	2017	2019	2019	2019	2019	2019
	4	2021	2021	2021	2019	2017	2015	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2020	2020	2020	2011	2019	2019	2019	2019	2019
	6	2021	2018	2011	2011	2015	2011	2015	1989	2015	2015	2015	2015
	7	2013	2006	2018	2010	2011	2011	1989	1989	1989	1996	2015	1996
	8	1995	1995	1995	1995	1995	1995	2003	1976	1989	1989	1996	1990
	9	2021	1991	1991	1959	1991	1991	1996	1996	1989	1989	1989	1996

YorkshireWater

		driest SINCE (OR LAST YEAR DRIER THAN...)											
		duration											
	end month	1	2	3	4	5	6	7	8	9	10	11	12
	10	2018	2020	2018	2020	2018	2020	2020	2020	2018	2020	2020	2020
	11	2020	2020	2020	2018	2020	2018	2020	2020	2020	2020	2020	2020
	12	2017	2017	2017	2017	2016	2018	2018	2020	2020	2020	2018	2020
	1	1997	2015	2005	2012	2017	2004	2019	2019	2019	2019	2012	2019
	2	2021	2019	2019	2018	2019	2019	2019	2019	2019	2019	2019	2019
	3	2021	2021	2019	2019	2015	2019	2017	2019	2019	2019	2019	2019
	4	2021	2021	2021	2019	2019	2015	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2020	2020	2020	2015	2019	2019	2019	2019	2019
	6	2021	2018	2020	2020	2019	2015	2015	2015	2015	2015	2015	2019
	7	2006	2018	2018	2010	2020	2015	2015	2015	2011	2015	2015	2011
	8	2003	1995	1995	2018	1995	1995	1996	1991	1989	1989	1996	1991
Ouse	9	2016	2003	1991	1959	1991	1991	1991	1996	1996	1989	1989	1996
	10	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	11	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	12	2017	2017	2017	2016	2016	2018	2018	2018	2018	2016	2018	2018
	1	2019	2017	2006	2017	2017	2017	2019	2019	2019	2019	2019	2019
	2	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2012	2021	2019	2019	2018	2019	2019	2019	2019	2019	2019	2019
	4	2021	2021	2021	2019	2019	2017	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2021	2019	2019	2017	2019	2019	2019	2019	2019
	6	2021	2018	2013	2011	2021	2017	2017	2017	2018	2017	2017	2019
	7	2006	2018	2018	2010	2011	2018	2017	2017	2011	2018	2017	2017
	8	1995	1995	1995	2018	1995	1995	2018	2013	2011	2005	1996	2005
Nidd	9	2015	1991	1991	1995	1995	1995	1995	2013	2013	2011	1996	1996
	10	2018	2020	2018	2018	2018	2018	2018	2020	2018	2020	2020	2018
	11	2020	2018	2020	2011	2018	2018	2020	2018	2020	2018	2020	2020
	12	2019	2017	2018	2020	2017	2018	2018	2018	2018	2020	2018	2018
	1	2006	2020	2006	2019	2017	2017	2019	2019	2019	2019	2012	2019
	2	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2020	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	4	2021	2021	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2020	2019	2020	2019	2019	2019	2019	2019	2019
	6	2021	2018	2011	2020	2017	2017	2017	2017	2017	2017	2017	2019
	7	1999	2018	2018	2011	2011	2015	2011	2017	2011	2017	2017	2011
	8	2021	2018	2018	2018	1995	2011	2011	2011	2011	2011	2011	2011
Don	9	2020	2011	2003	1995	1995	2011	2011	2011	2011	2011	2011	2011
	10	2020	2020	2018	2018	2018	2020	2020	2020	2018	2020	2020	2020
	11	2020	2020	2020	2018	2020	2018	2020	2020	2020	2018	2020	2020
	12	2017	2013	2017	2017	2018	2018	2018	2018	2018	2013	2018	2020
	1	1997	2015	2012	2017	2017	2017	2019	2019	2019	2019	2014	2019
	2	2021	2019	2019	2015	2019	2019	2019	2019	2019	2019	2019	2019
	3	2021	2021	2019	2017	2015	2017	2017	2019	2019	2019	2019	2019
	4	2021	2021	2021	2019	2017	2015	2017	2017	2019	2019	2019	2019
	5	2020	2020	2020	2020	2020	2020	2015	2017	2017	2019	2019	2019
	6	2021	2018	2011	2020	2015	2015	2015	2015	2015	2015	2015	2019
	7	2013	2018	2018	2010	2011	2013	1996	2011	1989	1996	2015	1996
	8	1995	1995	1995	2018	1995	1995	1995	1989	1989	1989	1996	1990
DerwentNE	9	2016	1991	1991	1959	1991	1991	1991	1996	1989	1989	1989	1996

YorkshireWater

		driest SINCE (OR LAST YEAR DRIER THAN...)											
		duration											
	end month	1	2	3	4	5	6	7	8	9	10	11	12
	10	2020	2018	2018	2018	2018	2018	2018	2018	2018	2020	2020	2020
	11	2020	2020	2020	2018	2018	2018	2018	2018	2018	2018	2020	2020
	12	2019	2014	2018	2018	2018	2018	2018	2018	2018	2018	2018	2020
	1	1997	2017	2012	2019	2019	2019	2019	2019	2019	2019	2019	2019
	2	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2021	2021	2017	2017	2017	2019	2019	2019	2019	2019	2019	2019
	4	2021	2021	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2020	2020	2020	2019	2019	2019	2019	2019	2019
	6	2018	2018	2011	2011	2015	2015	2015	2015	2015	2015	2015	2019
	7	2016	2018	2018	2010	2011	2015	2011	1989	1989	2015	2015	2015
	8	1995	1995	1995	2018	1995	1995	2003	1976	1989	1989	1996	2015
Dales NSTribs	9	2016	1991	1991		2018	1991	1996	2003	1989	1989	1989	1996
	10	2018	2020	2018	2018	2018	2018	2018	2018	2018	2020	2020	2018
	11	2020	2020	2020	2018	2018	2018	2020	2020	2020	2018	2020	2020
	12	2019	2013	2017	2017	2018	2018	2018	2018	2018	2013	2018	2018
	1	1997	2017	2012	2018	2017	2019	2019	2019	2019	2019	2014	2019
	2	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2021	2021	2019	2019	2015	2019	2019	2019	2019	2019	2019	2019
	4	2021	2021	2021	2019	2019	2015	2017	2017	2019	2019	2019	2019
	5	2020	2020	2020	2020	2020	2020	2015	2017	2017	2019	2019	2019
	6	2021	2018	2010	2011	2015	2011	2015	2011	2015	2015	1996	2019
	7	1999	2018	2018	2010	1996	2011	1996	2011	1989	1996	1996	1996
	8	2003	1995	1995	2018	1995	1995	1996	1976	1989	1989	1996	1996
ull and Humber	9	2016	2013	1991	1959	1991	1991	1991	1996	1959	1989	1989	1996
	10	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	11	2020	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	12	2019	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	1	2019	2017	2017	2019	2019	2019	2019	2019	2019	2019	2019	2019
	2	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2012	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	4	2021	2011	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2019	2019	2019	2019	2019	2019	2019	2019	2019
	6	2021	2018	2010	2011	2021	2019	2018	2018	2019	2019	2019	2019
	7	2006	2018	2018	2010	1984	2018	2013	2018	2018	2019	2017	2017
	8	2003	1995	2018	2018	1995	1995	2018	2013	2017	2011	2018	2017
Calder	9	2014	2003	1959	1995	1995	1995		2013	2013	2011	2009	2011
	10	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	11	2011	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	12	2017	2017	2018	2016	2018	2018	2018	2018	2018	2018	2018	2018
	1	2019	2017	2009	2019	2019	2019	2019	2019	2019	2019	2019	2019
	2	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2012	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	4	2021	2011	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2019	2019	2019	2019	2019	2019	2019	2019	2019
	6	2021	2018	2018	2011	2021	2019	2018	2018	2019	2019	2019	2019
	7	2006	2018	2018	2010	2011	2018	2013	2018	2018	2018	2017	2017
Aire	8	2003	1995	1995	2018	1995	1995	2018	2013	2011	2005	2018	2005
	9	2014	1989	1959	1995	1995	1995		2013	2013	2011	1996	1996

		driest SINCE (OR LAST YEAR DRIER THAN...)											
		duration											
	end month	1	2	3	4	5	6	7	8	9	10	11	12
	10	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	11	2011	2018	2016	2018	2018	2018	2018	2018	2018	2018	2018	2018
	12	2019	2017	2017	2016	2016	2018	2018	2018	2018	2018	2018	2018
	1	2019	2017	2006	2017	2017	2017	2019	2019	2019	2019	2019	2019
	2	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2012	2021	2019	2019	2017	2019	2019	2019	2019	2019	2019	2019
	4	2021	2021	2021	2019	2019	2017	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2019	2019	2019	2017	2019	2019	2019	2019	2019
	6	2021	2018	2010	2011	2018	2013	2011	2011	2017	2017	1996	2017
	7	2006	2018	2018	2010	2011	2013	2011	2011	1996	2011	1996	1996
	8	2003	1995	1995	2018	1995	1995	2010	1976	1996	1976	1996	1996
orkshire regional	**9**	2021	2009	2003	1995	2018	1995	1995	2013	1996	2011	1996	1996
	10	2020	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2019
	11	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	12	2017	2017	2018	2016	2016	2018	2018	2018	2018	2018	2018	2018
	1	2019	2017	2017	2019	2019	2019	2019	2019	2019	2019	2019	2019
	2	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2012	2021	2019	2019	2018	2019	2019	2019	2019	2019	2019	2019
	4	2021	2011	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2019	2019	2019	2019	2019	2019	2019	2019	2019
	6	2021	2018	2018	2010	2021	2019	2018	2018	2019	2019	2019	2019
	7	2006	2021	2018	2018	1995	2018	2018	2018	2018	2019	2018	2017
	8	1995	2003	1995	2018	2010	1995	2018	2018	2018	2018	2018	2017
Nidd reservoirs	**9**	2021	2021	2021	2021	2018	2018	1995	2021	2018	2018	2018	2018
	10	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	11	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	12	2017	2017	2017	2016	2007	2018	2018	2018	2018	2018	2018	2018
	1	2019	2017	2006	2019	2017	2017	2019	2019	2019	2019	2019	2019
	2	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2012	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	4	2021	2020	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2021	2019	2019	2019	2019	2019	2019	2019	2019
	6	2021	2018	2013	2011	2021	2019	2019	2018	2019	2019	2019	2019
	7	2006	2018	2018	2010	2011	2018	2019	2017	2011	2018	2017	2011
	8	1995	1995	1995	2018	1995	1995	2018	2013	2011	2005	2011	1996
Washburn	**9**	2021	2009	2003	1995	2018	1995	1995	2018	2013	2011	2009	2011
	10	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	11	2014	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	12	2019	2017	2018	2016	2018	2018	2018	2018	2018	2018	2018	2018
	1	2019	2017	2017	2019	2017	2019	2019	2019	2019	2019	2019	2019
	2	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2012	2021	2019	2019	2017	2019	2019	2019	2019	2019	2019	2019
	4	2021	2011	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2019	2019	2019	2019	2019	2019	2019	2019	2019
	6	2021	2018	2018	2010	2021	2018	2018	2018	2019	2017	2017	2019
	7	2006	2018	2018	2010		2018	2013	2018	2011	2017	2010	2010
	8	1995	1995	1995	2018	1995		2018	2013	2011	1996	2009	1996
Walshaw Dean	**9**	2021	2013	1995	1995	2018	1995		2018	2013	2013	2009	2009

YorkshireWater

		driest SINCE (OR LAST YEAR DRIER THAN...)											
		duration											
	end month	1	2	3	4	5	6	7	8	9	10	11	12
	10	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	11	2013	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	12	2019	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	1	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	2	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2012	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	4	2021	2011	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2021	2019	2019	2019	2019	2019	2019	2019	2019
	6	2021	2018	2013	2011	2021	2019	2019	2019	2019	2019	2019	2019
	7	2006	2018	2018	2010	1984	2018	2013	2018	2018	2019	2017	2017
	8	1995	1995	1995	2018	1995	1995	2018	2013	2018	2018	2017	2017
eshaw/Leeming	9	2021	2009	2003	1995	1995	1995	1995	2018	2013	2013	2011	2017
	10	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	11	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	12	2017	2017	2018	2016	2018	2018	2018	2018	2018	2018	2018	2018
	1	2019	2017	2006	2019	2019	2019	2019	2019	2019	2019	2019	2019
	2	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2012	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	4	2021	2011	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2021	2019	2019	2018	2019	2019	2019	2019	2019
	6	2021	2018	2018	2011	2021	2018	2018	2018	2019	2018	2017	2019
	7	2006	2018	2018	2018	1995	2018	2018	2018	2018	2018	2017	2017
	8	1995	1995	1995	2018	1995	1995	2018	2018	2018	2018	2018	1996
Grimwith	9	2021	2021	2003	2003	2018	1995	1995	2018	2018	2018	2018	2018
	10	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	11	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	12	2017	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	1	2019	2017	2017	2019	2019	2019	2019	2019	2019	2019	2019	2019
	2	2021	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2012	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	4	2021	2011	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2021	2019	2019	2019	2019	2019	2019	2019	2019
	6	2021	2018	2018	2010	2021	2019	2018	2018	2019	2019	2019	2019
	7	2006	2006	2018	2010		2018	2018	2018	2018	2019	2017	2017
	8	1995	1995	1995	2018	1995	1995	2018	2013	2018	2018	2018	2017
nden/ Lower Laithe	9	2021	2013	2003	1995	2018	1995	1995	2018	2013	2018	2018	2011
	10	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	11	2020	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	12	2020	2020	2018	2020	2018	2018	2018	2018	2018	2018	2018	2018
	1	2019	2020	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	2	2021	2019	2021	2021	2019	2021	2019	2019	2019	2019	2019	2019
	3	2012	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	4	2021	2011	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2021	2019	2019	2019	2019	2019	2019	2019	2019
	6	2021	2018	2010	2011	2021	2019	2019	2019	2019	2019	2019	2019
	7	2018	2018	2018	2010	1984	2018	2017	2018	2018	2019	2019	2019
	8	2007	1995	2018	2018	1995		2018	2013	2018	2018	2018	2017
rownhill Digley	9	2020	2015	2003	1995	2018	1995	1959	2018	2013	2017	2013	2017

YorkshireWater

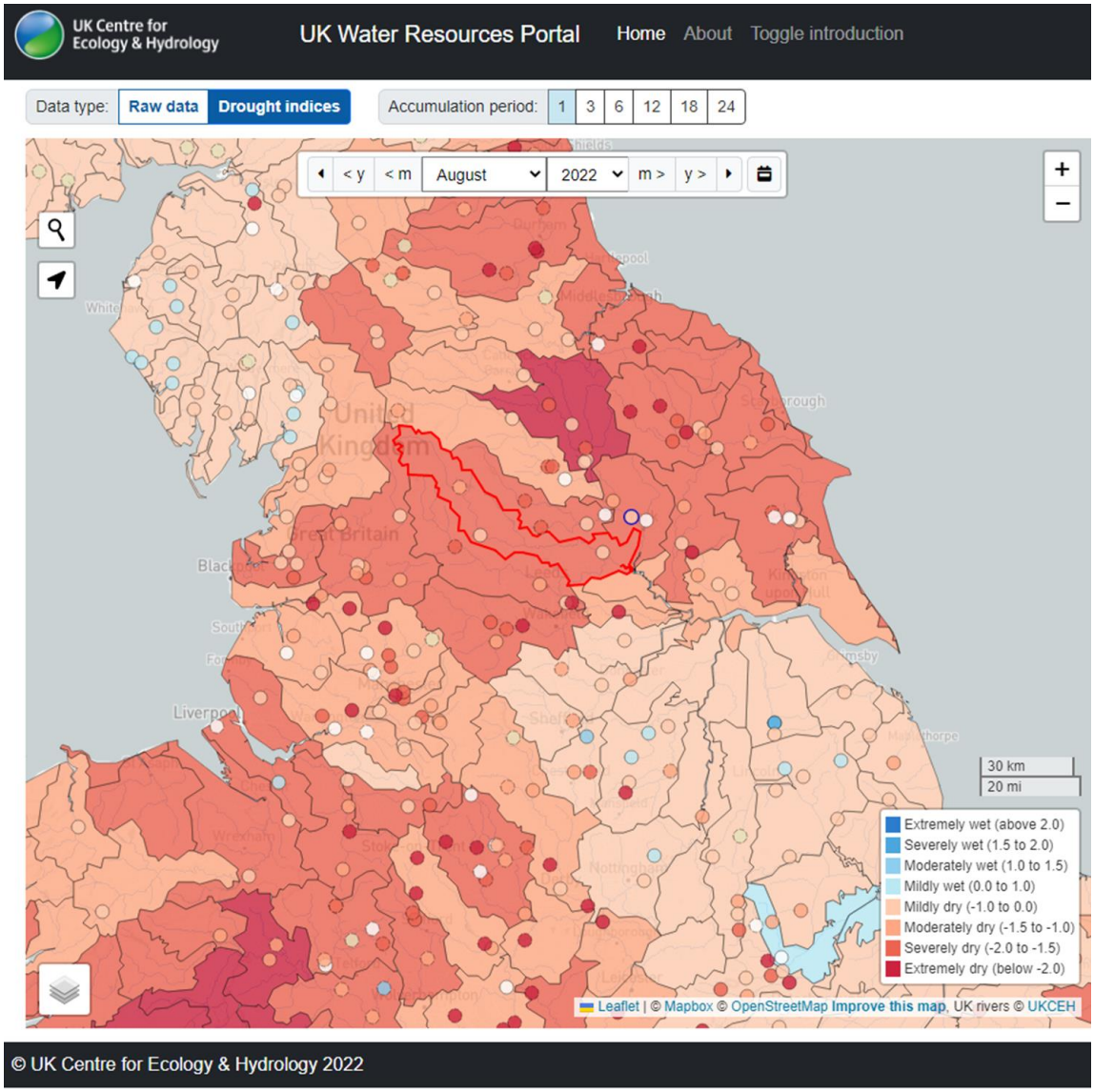
		driest SINCE (OR LAST YEAR DRIER THAN...)											
		duration											
	end month	1	2	3	4	5	6	7	8	9	10	11	12
	10	2018	2020	2018	2018	2018	2018	2018	2018	2018	2019	2019	2018
	11	2020	2020	2020	2018	2018	2018	2018	2018	2018	2018	2018	2018
	12	2019	2020	2018	2020	2018	2018	2018	2018	2018	2018	2018	2018
	1	2019	2020	2017	2019	2019	2019	2019	2019	2019	2019	2019	2019
	2	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2012	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	4	2021	2011	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2019	2019	2019	2019	2019	2019	2019	2019	2019
	6	2021	2018	2010	2011	2018	2017	2017	2017	2019	2017	2019	2019
	7	1999	2018	2018	1995	2011	2018	2017	2017	2017	2017	2017	2017
	8	2018	2018	2018	2018	1995	2011	2018	2017	2017	2017	2018	2017
on Valley Group	**9**	2020	2015	2003	1995	2018	1995	1959	2018	2013	2017	2013	2017
	10	2018	2020	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	11	2020	2018	2020	2011	2018	2018	2018	2018	2018	2018	2018	2018
	12	2020	2020	2018	2020	2018	2018	2018	2018	2018	2018	2018	2018
LDV supply and comp	**1**	2019	2020	2017	2019	2017	2019	2019	2019	2019	2019	2019	2019
	2	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2012	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	4	2021	2011	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2019	2019	2019	2019	2019	2019	2019	2019	2019
	6	2021	2018	2010	2011	2017	2017	2017	2017	2017	2017	2017	2019
	7	1984	2018	2018	1984		2011	2011	2017	2011	2017	2017	2011
	8	2018	2018	2018	2018	1995		2011	2011	2017	2011	2017	2017
	9	2021	2021	2003	2018	2018	1959	2011	2011	2011	2011	2011	2011
	10	2018	2020	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	11	2011	2018	2020	2011	2018	2018	2018	2018	2018	2018	2018	2018
	12	2020	2020	2018	2020	2018	2018	2018	2018	2018	2018	2018	2018
	1	2006	2020	2017	2019	2017	2019	2019	2019	2019	2019	2019	2019
Loxley Group	**2**	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2012	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	4	2021	2020	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2019	2019	2019	2019	2019	2019	2019	2019	2019
	6	2021	2018	2011	2011	2021	2013	2017	2017	2017	2017	2017	2019
	7	2018	2018	2018	2011	2011	2018	2011	2017	2011	2017	2017	2017
	8	2021	2018	2018	2018	1995	2011	2018	2011	2017	2011	2017	2017
	9	2021	2021	2015	2018	2018	2011	2011	2018	2013	2011	2011	2017

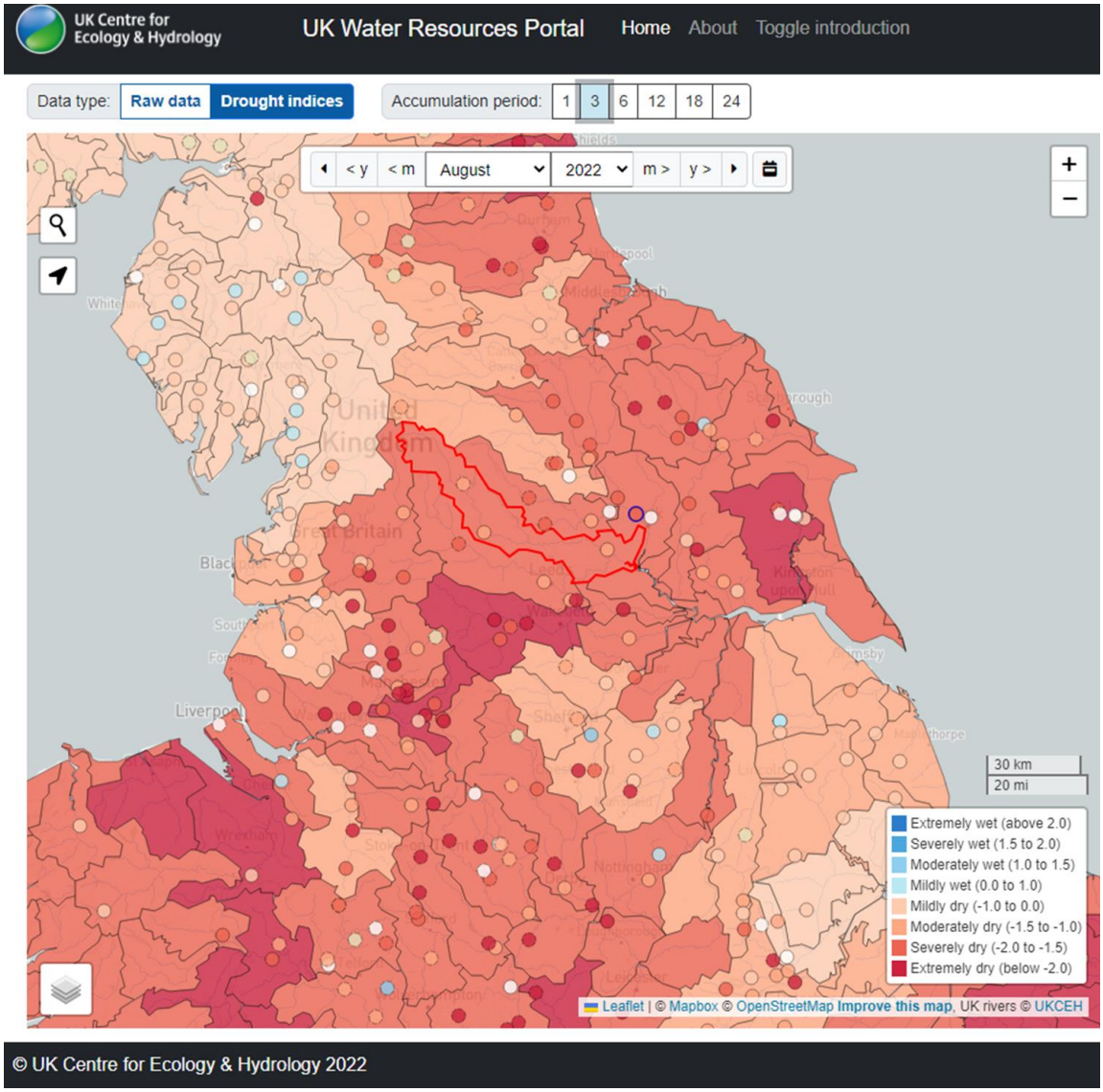
YorkshireWater

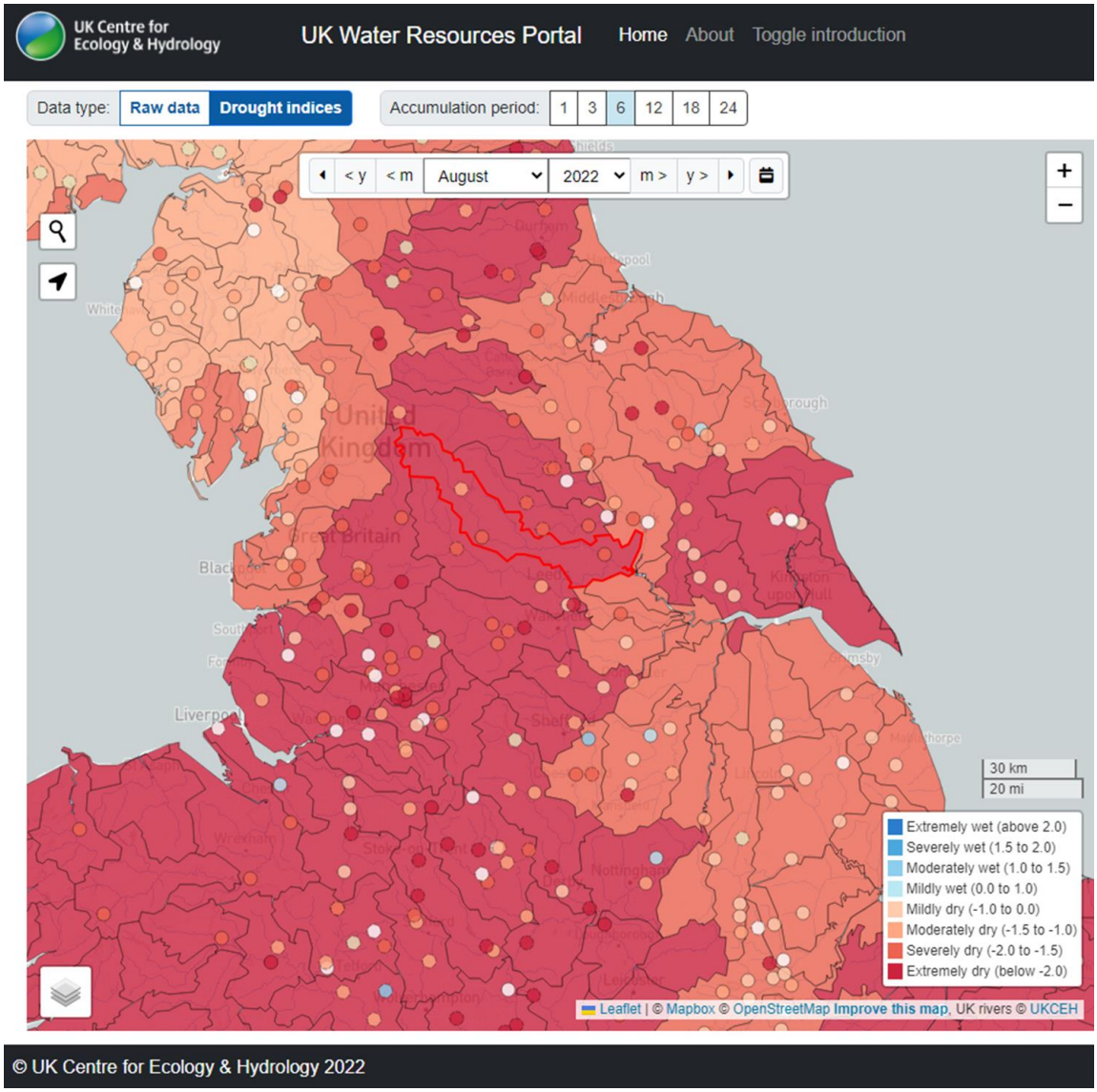
		driest SINCE (OR LAST YEAR DRIER THAN...)											
		duration											
	end month	1	2	3	4	5	6	7	8	9	10	11	12
Rivelin Redmires	**10**	2018	2020	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018
	11	2011	2018	2011	2011	2018	2018	2018	2018	2018	2018	2018	2018
	12	2020	2020	2018	2020	2018	2018	2018	2018	2018	2018	2018	2018
	1	2006	2020	2017	2019	2017	2017	2019	2019	2019	2019	2019	2019
	2	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	3	2012	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	4	2021	2013	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2019	2019	2019	2019	2019	2019	2019	2019	2019
	6	2021	2018	2011	2011	2021	2013	2017	2017	2019	2017	2017	2019
	7	2018	2018	2018	2011	2011	2018	2011	2017	2011	2017	2017	2017
	8	2021	2018	2018	2018	2011	2011	2018	2011	2017	2011	2017	2017
	9	2021	2021	2015	2018	2018	2011	2011	2018	2011	2011	2011	2011
Ryburn Slithero Bridge	**10**	2018	2020	2018	2018	2018	2018	2018	2020	2018	2018	2018	2018
	11	2020	2018	2020	2018	2018	2018	2018	2018	2020	2018	2018	2018
	12	2020	2020	2020	2020	2020	2020	2018	2020	2020	2020	2018	2018
	1	2006	2017	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	2	2021	2019	2021	2021	2019	2021	2019	2019	2019	2019	2019	2021
	3	2012	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
	4	2021	2011	2021	2019	2019	2019	2019	2019	2019	2019	2019	2019
	5	2020	2020	2020	2019	2019	2019	2019	2019	2019	2019	2019	2019
	6	2021	2018	2010	1984	2021	2013	2018	2018	2019	2019	2019	2019
	7	2018	2018	2018	2018	1984	2018	2018	2018	2018	2019	2017	2019
	8	2003	2003	2018	2018	1995	1995	2018	2013	2018	2018	2018	2017
	9	2021	2009	2003	1995	2018	1995	1995	2018	2013	2018	2009	2009

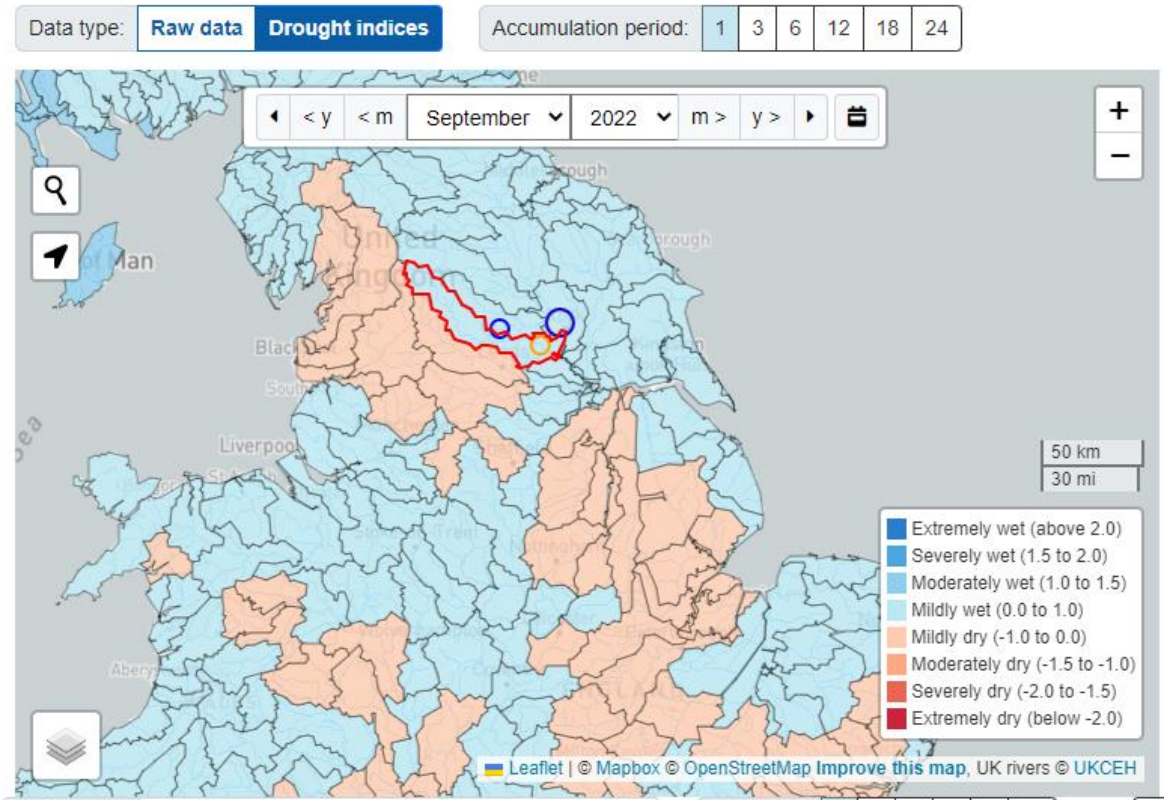
YorkshireWater

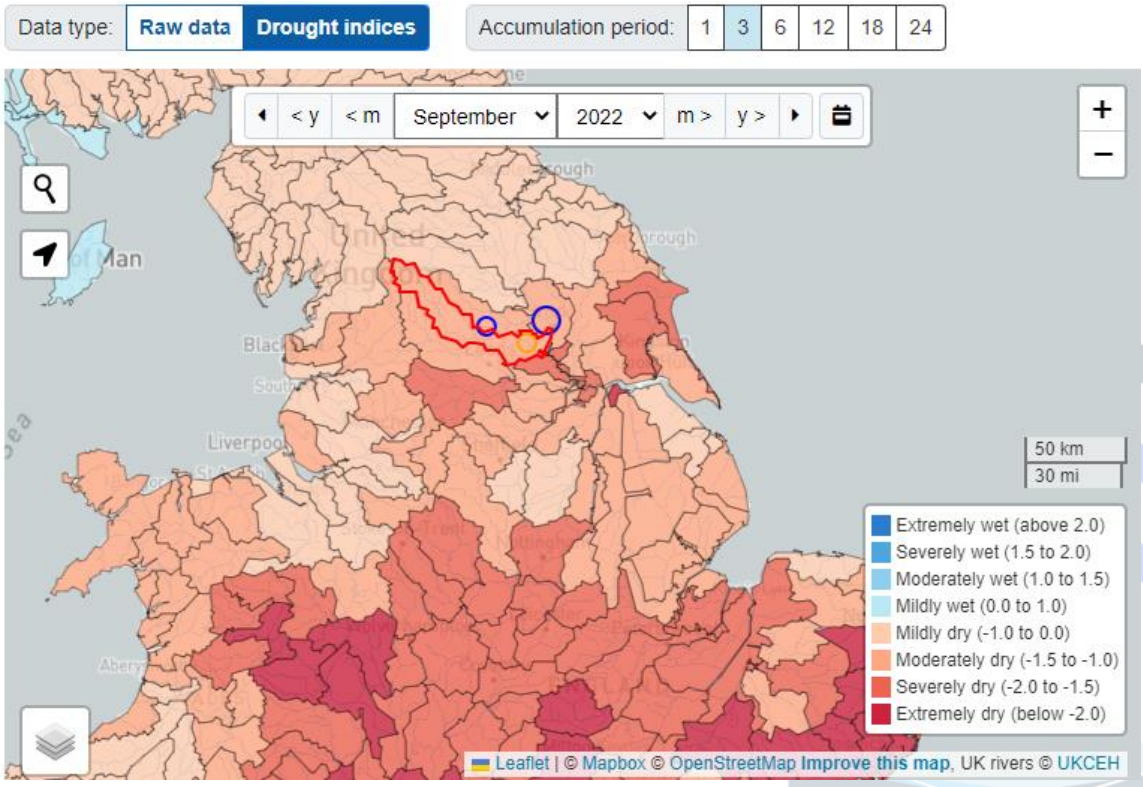
Appendix 3: SPI graphs and maps from CEH Water Resources portal



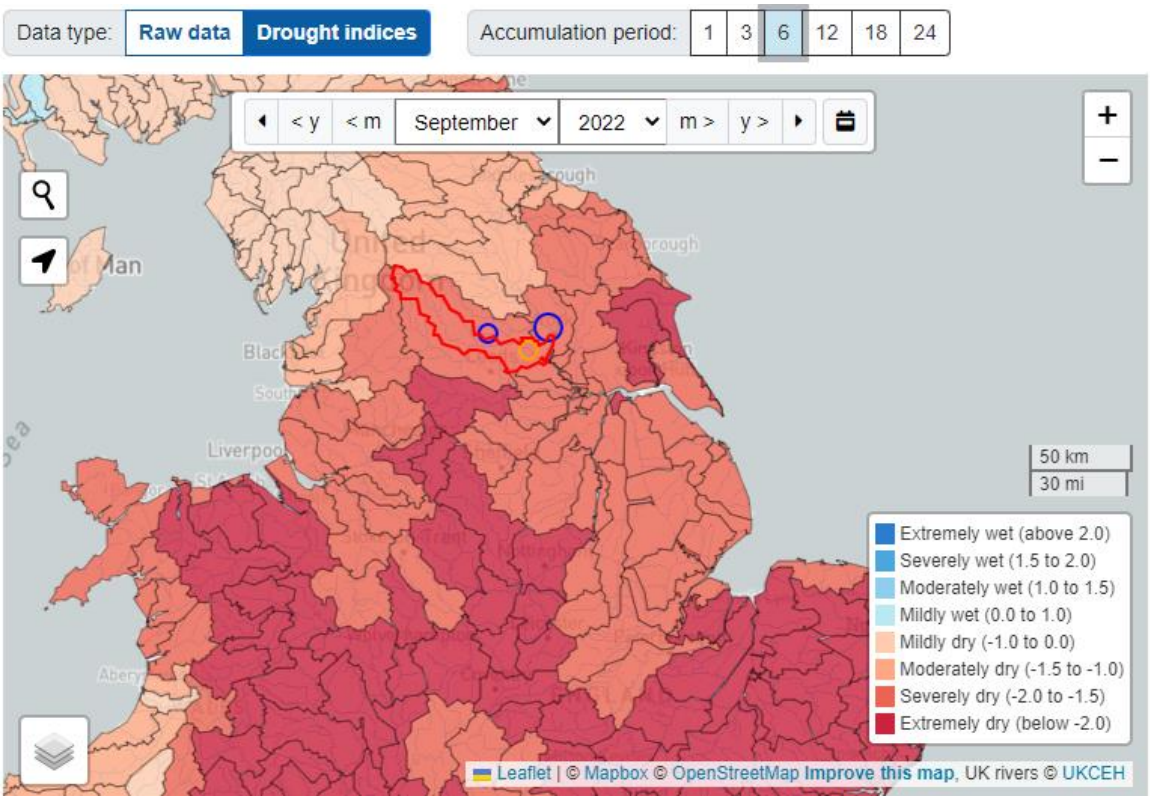

UK Centre for Ecology & Hydrology
UK Water Resources Portal
Home
About
Toggle introduction
Data type:
Raw data
Drought indices
Accumulation period:
1
3
6
12
18
24
< y
< m
August
2022
m >
y >
30 km
20 mi
Extremely wet (above 2.0)
Severely wet (1.5 to 2.0)
Moderately wet (1.0 to 1.5)
Mildly wet (0.0 to 1.0)
Mildly dry (-1.0 to 0.0)
Moderately dry (-1.5 to -1.0)
Severely dry (-2.0 to -1.5)
Extremely dry (below -2.0)
Leaflet | © Mapbox © OpenStreetMap Improve this map, UK rivers © UKCEH
© UK Centre for Ecology & Hydrology 2022

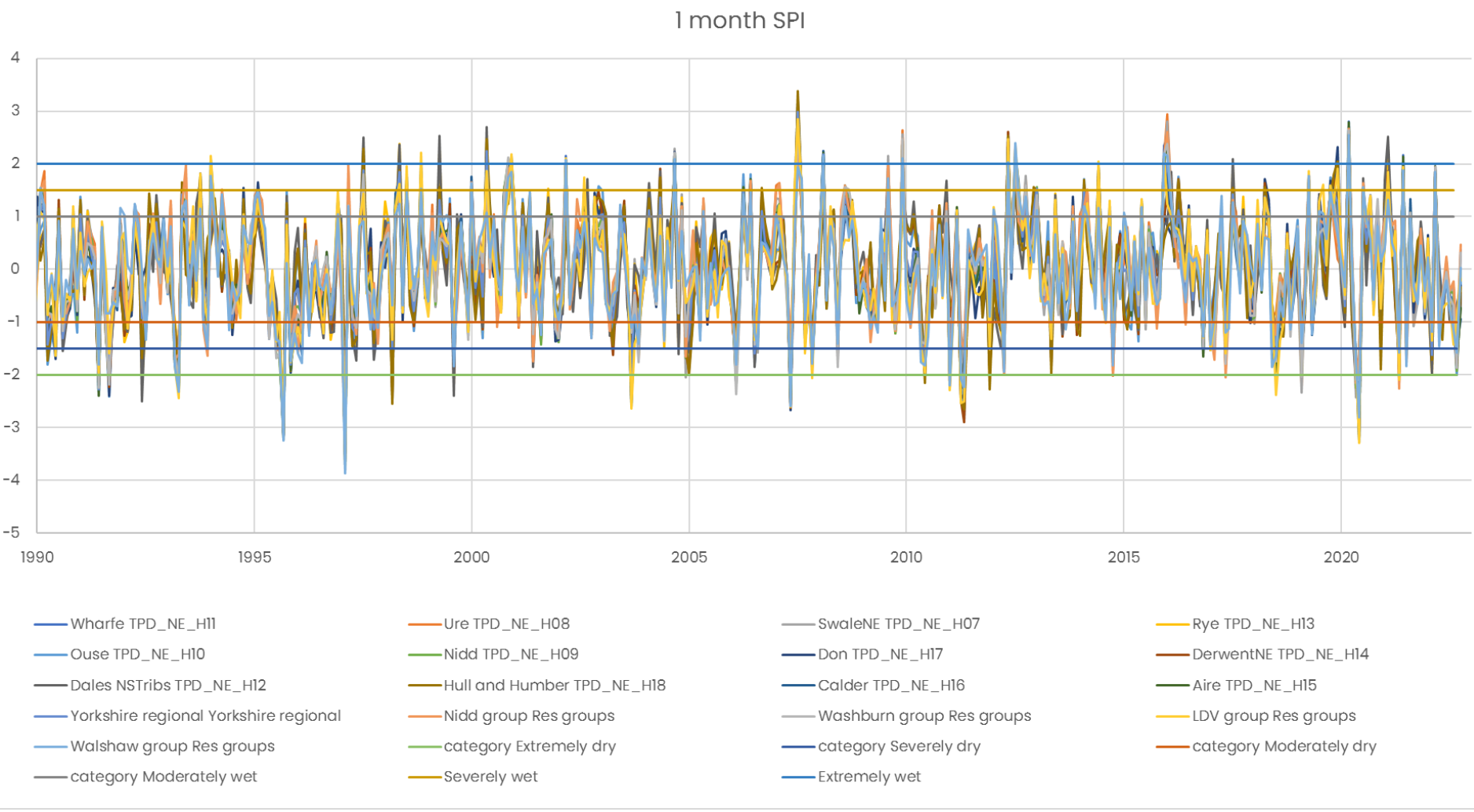

UK Centre for Ecology & Hydrology
UK Water Resources Portal
Home
About
Toggle introduction
Data type:
Raw data
Drought indices
Accumulation period:
1
3
6
12
18
24
< y
< m
August
2022
m >
y >
30 km
20 mi
Extremely wet (above 2.0)
Severely wet (1.5 to 2.0)
Moderately wet (1.0 to 1.5)
Mildly wet (0.0 to 1.0)
Mildly dry (-1.0 to 0.0)
Moderately dry (-1.5 to -1.0)
Severely dry (-2.0 to -1.5)
Extremely dry (below -2.0)
Leaflet | © Mapbox © OpenStreetMap Improve this map, UK rivers © UKCEH
© UK Centre for Ecology & Hydrology 2022

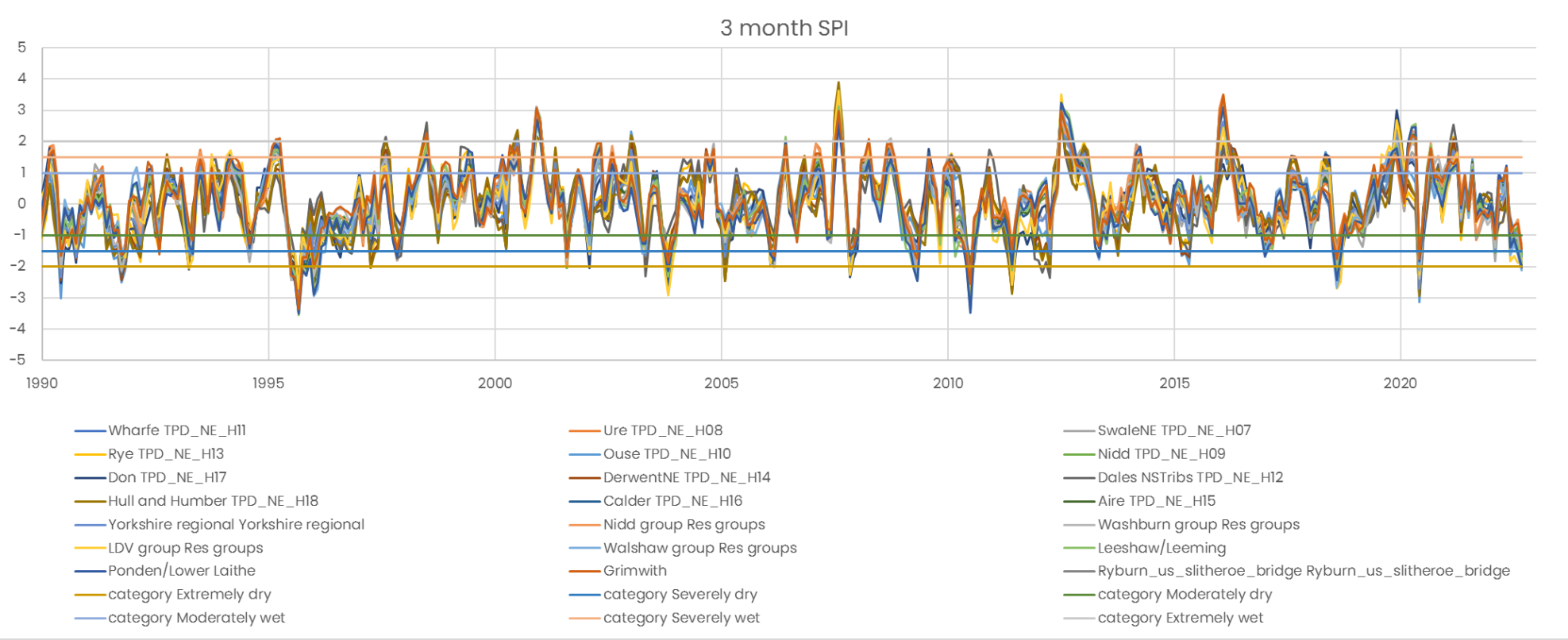


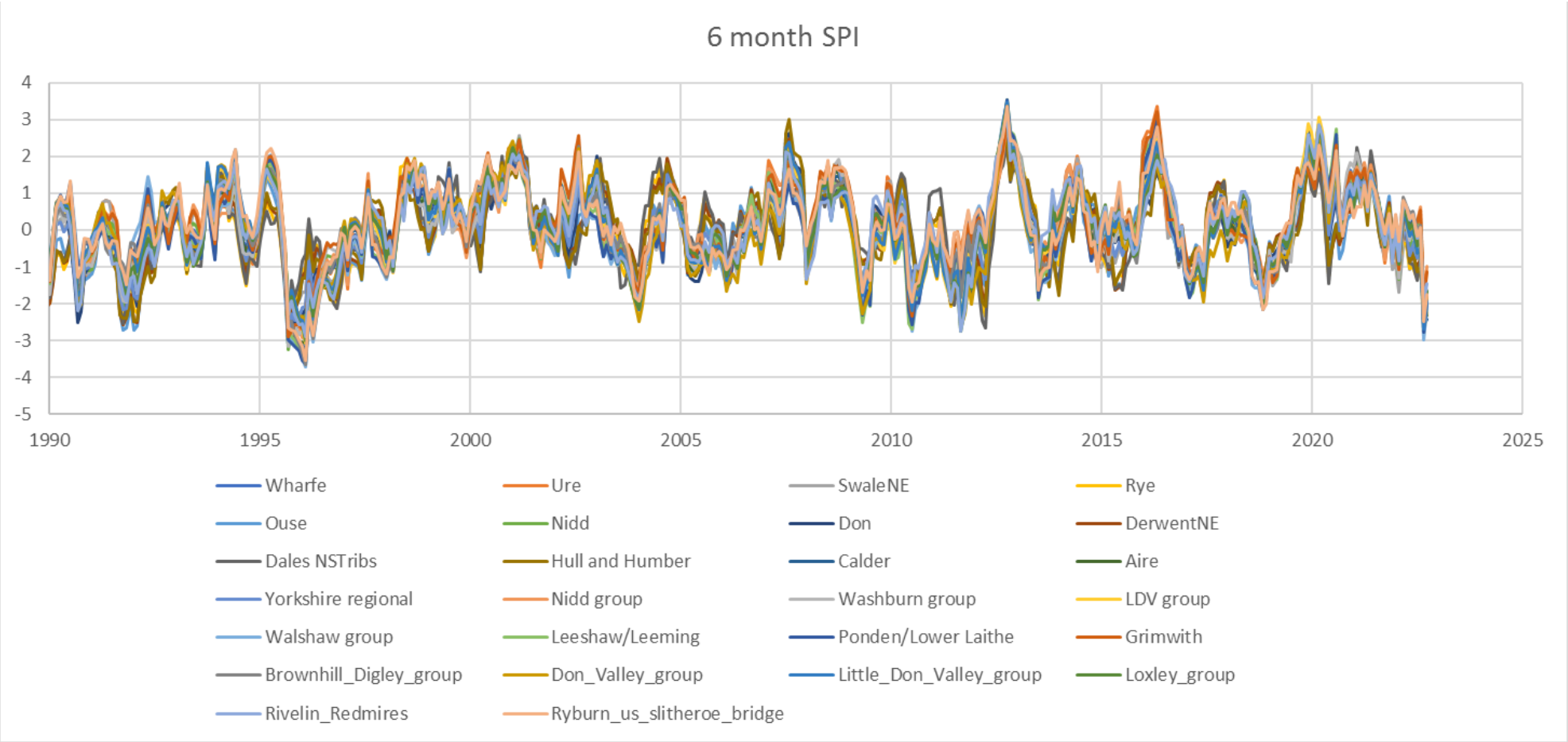


YorkshireWater


Data type:
Raw data
Drought indices
Accumulation period:
1
3
6
12
18
24
< y
< m
September
2022
m >
y >
50 km
30 mi
Extremely wet (above 2.0)
Severely wet (1.5 to 2.0)
Moderately wet (1.0 to 1.5)
Mildly wet (0.0 to 1.0)
Mildly dry (-1.0 to 0.0)
Moderately dry (-1.5 to -1.0)
Severely dry (-2.0 to -1.5)
Extremely dry (below -2.0)
Leaflet | © Mapbox © OpenStreetMap Improve this map, UK rivers © UKCEH


1 month SPI
4
3
2
1
0
-1
-2
-3
-4
-5
1990
1995
2000
2005
2010
2015
2020
Wharfe TPD_NE_H11
Ure TPD_NE_H08
SwaleNE TPD_NE_H07
Rye TPD_NE_H13
Ouse TPD_NE_H10
Nidd TPD_NE_H09
Don TPD_NE_H17
DerwentNE TPD_NE_H14
Dales NSTribs TPD_NE_H12
Hull and Humber TPD_NE_H18
Calder TPD_NE_H16
Aire TPD_NE_H15
Yorkshire regional Yorkshire regional
Nidd group Res groups
Washburn group Res groups
LDV group Res groups
Walshaw group Res groups
category Extremely dry
category Severely dry
category Moderately dry
category Moderately wet
Severely wet
Extremely wet

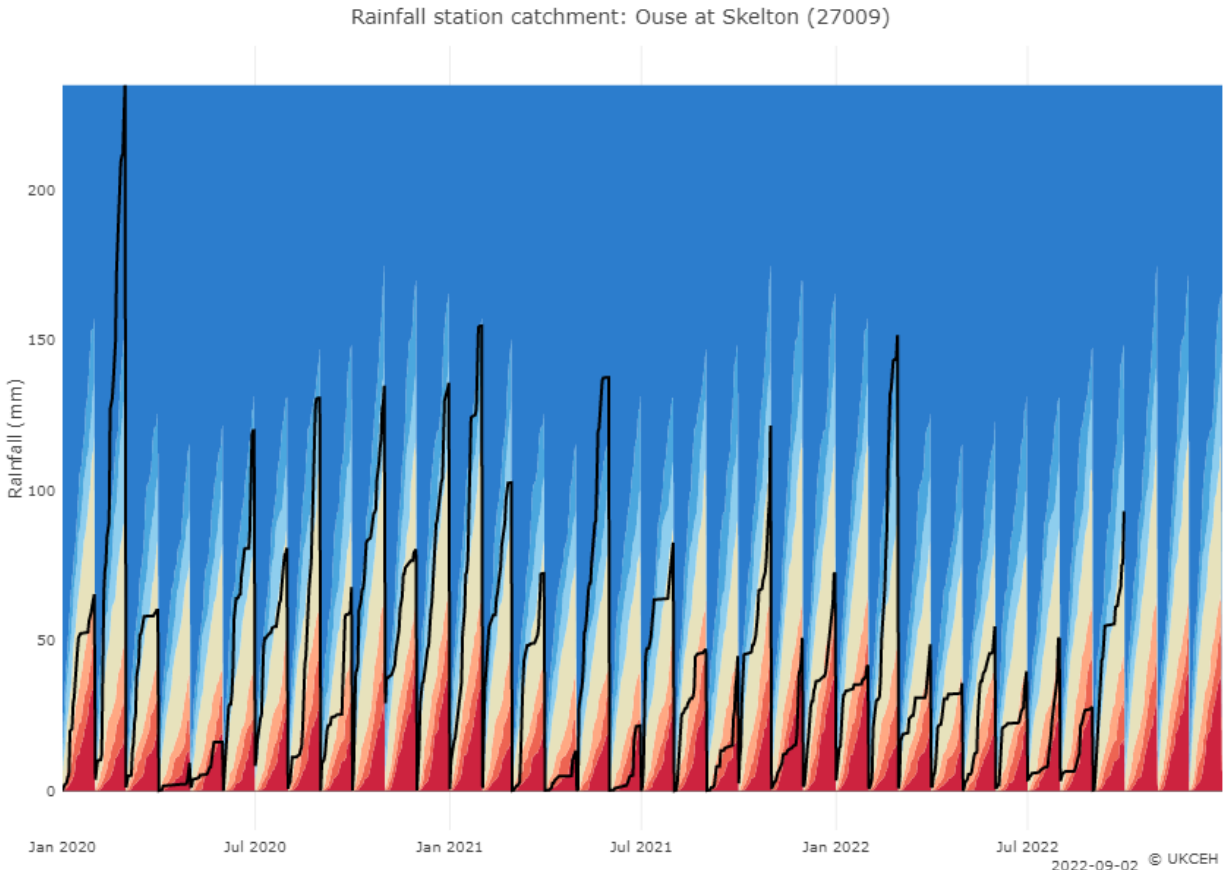

3 month SPI
5
4
3
2
1
0
-1
-2
-3
-4
-5
1990
1995
2000
2005
2010
2015
2020
Wharfe TPD_NE_H11
Ure TPD_NE_H08
SwaleNE TPD_NE_H07
Rye TPD_NE_H13
Ouse TPD_NE_H10
Nidd TPD_NE_H09
Don TPD_NE_H17
DerwentNE TPD_NE_H14
Dales NSTribs TPD_NE_H12
Hull and Humber TPD_NE_H18
Calder TPD_NE_H16
Aire TPD_NE_H15
Yorkshire regional Yorkshire regional
Nidd group Res groups
Washburn group Res groups
LDV group Res groups
Walshaw group Res groups
Leeshaw/Leeming
Ponden/Lower Laithe
Grimwith
Ryburn_us_slitheroe_bridge Ryburn_us_slitheroe_bridge
category Extremely dry
category Severely dry
category Moderately dry
category Moderately wet
category Severely wet
category Extremely wet

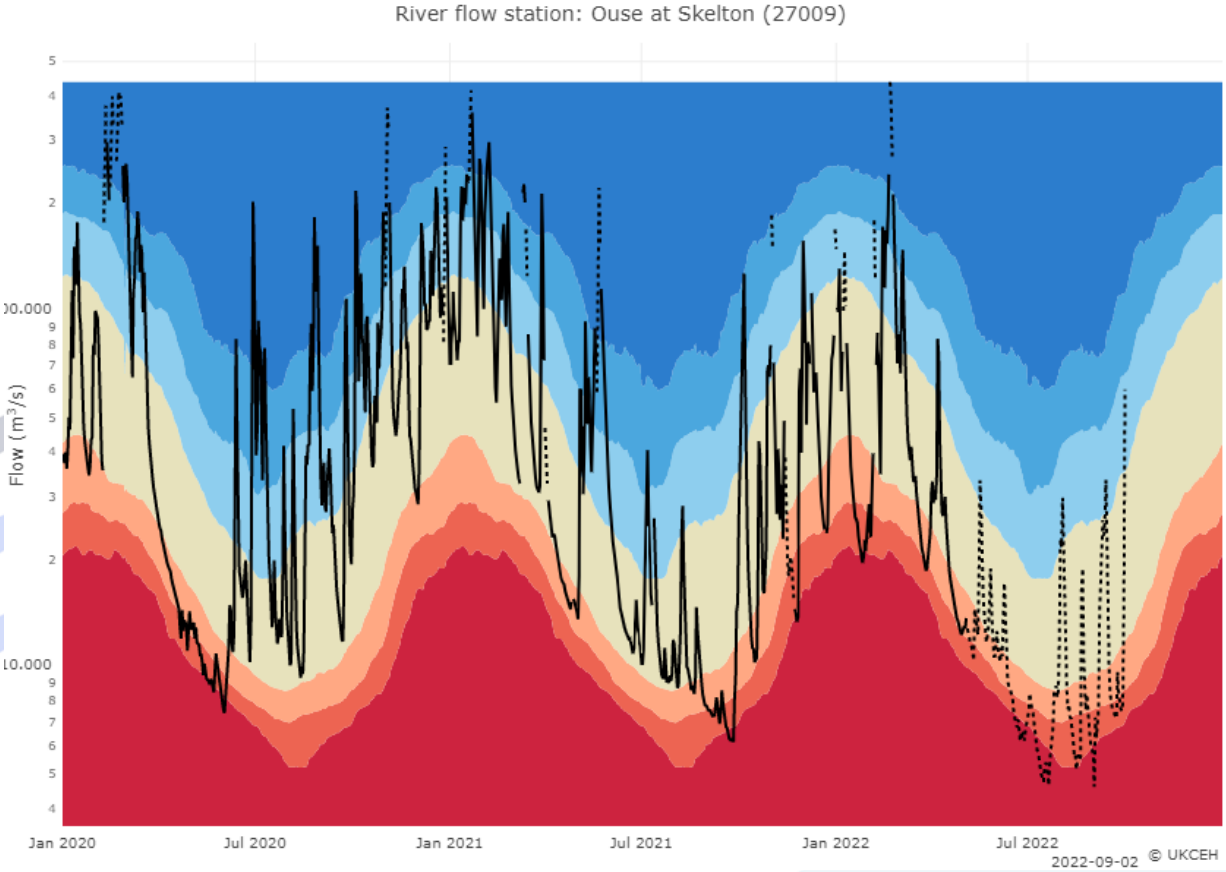

6 month SPI
4
3
2
1
0
-1
-2
-3
-4
-5
1990
1995
2000
2005
2010
2015
2020
2025
Wharfe
Ure
SwaleNE
Rye
Ouse
Nidd
Don
DerwentNE
Dales NSTribs
Hull and Humber
Calder
Aire
Yorkshire regional
Nidd group
Washburn group
LDV group
Walshaw group
Leeshaw/Leeming
Ponden/Lower Laithe
Grimwith
Brownhill_Digley_group
Don_Valley_group
Little_Don_Valley_group
Loxley_group
Rivelin_Redmires
Ryburn_us_slitheroe_bridge

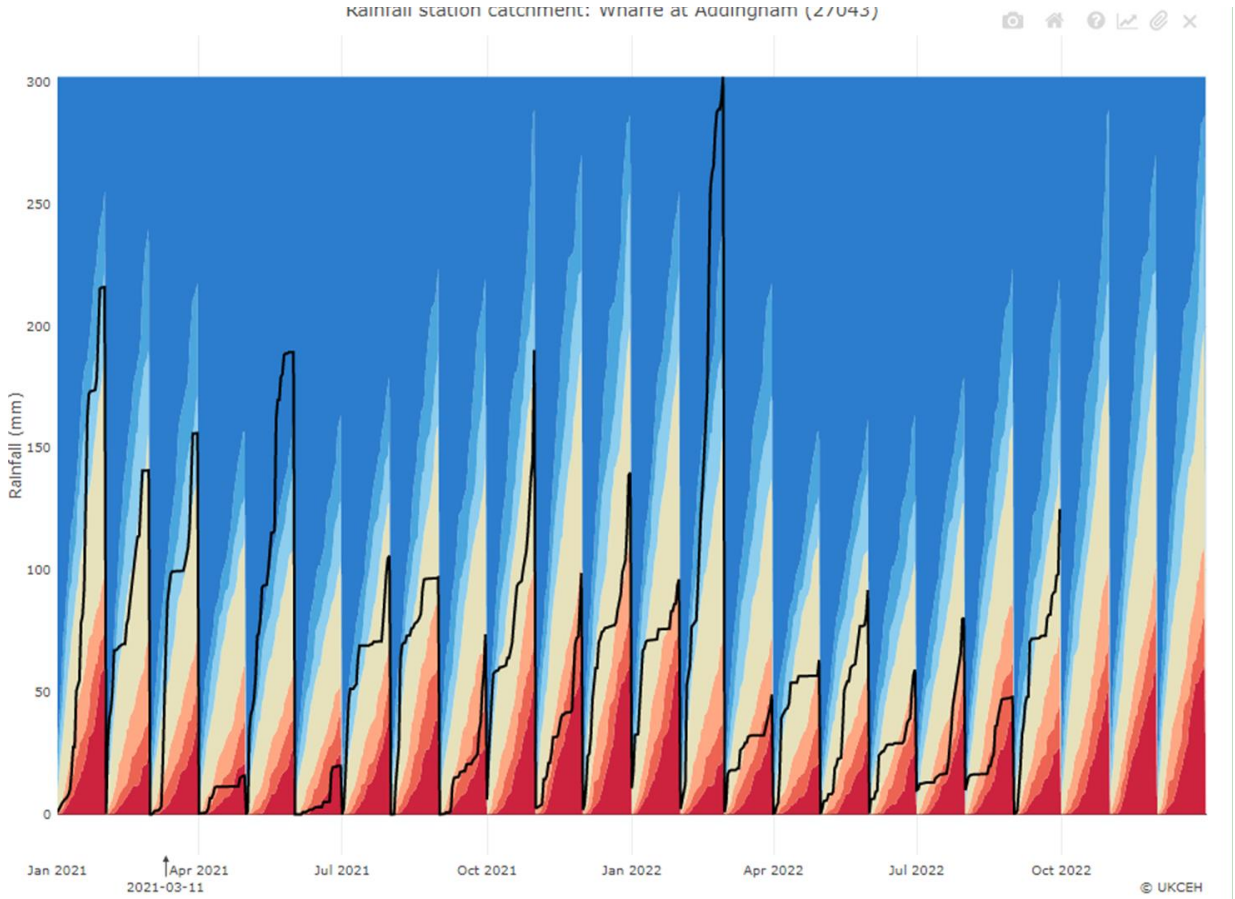
Appendix 4: River flow graphs from CEH Water Resources portal

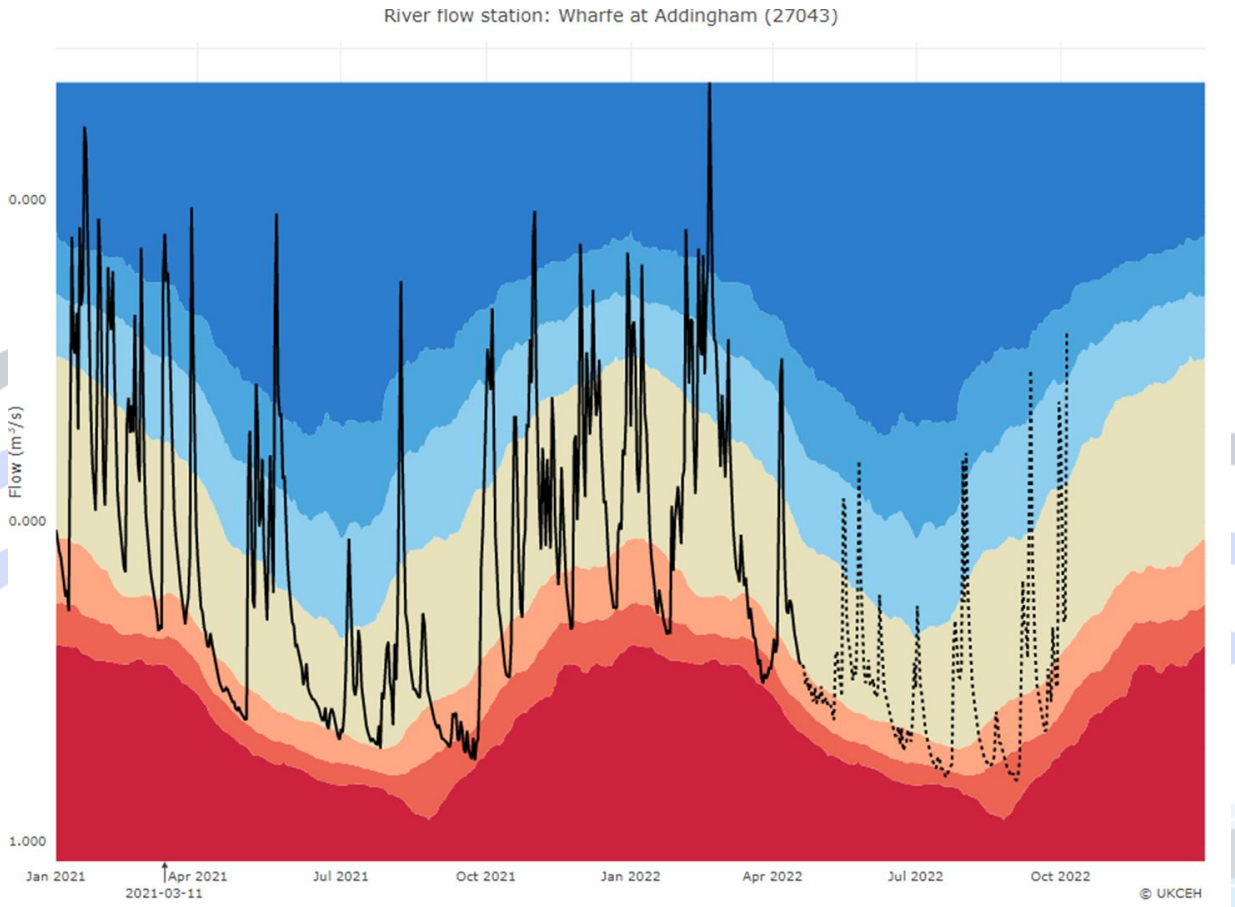
The River flow graph in this appendix are taken from the CEH Water resources portal, and are shown in river flow bandings as used by the Environment Agency. The associated rainfall graphs are only plotted until the end of July, as are not available on the CEH portal currently.

*The Water Resources daily river flow banding procedure follows that developed by the Environment Agency, in order to provide information and visualisations consistent with their Water Situation Reports (**https://www.gov.uk/government/collections/water-situation-reports-for-england**). Essentially, values for 7 flow bands are calculated for each day ("Exceptionally high", "Notably high", "Above normal", "Normal" through to "Exceptionally low") corresponding to thresholds of 5, 13, 28, 72, 87, and 95 percentiles (defining bands for 0-5, 5-13, 13-28. etc.). Values for a given day are calculated using all flows within a 30-day window around that day (15 days before and 14 days after). The values are pooled and the percentile values calculated for each day. All data is used from the beginning of the record up to a standard end date, which is updated on a regular basis (currently 31/12/2017). Only series with 20 years of data (up to this end date) are included. Note that the validated gauged daily flow data from the NRFA is used to provide the bands, whereas the time series data plotted against the bands is live data from EA / SEPA APIs, which may differ slightly from that in NRFA archives.*

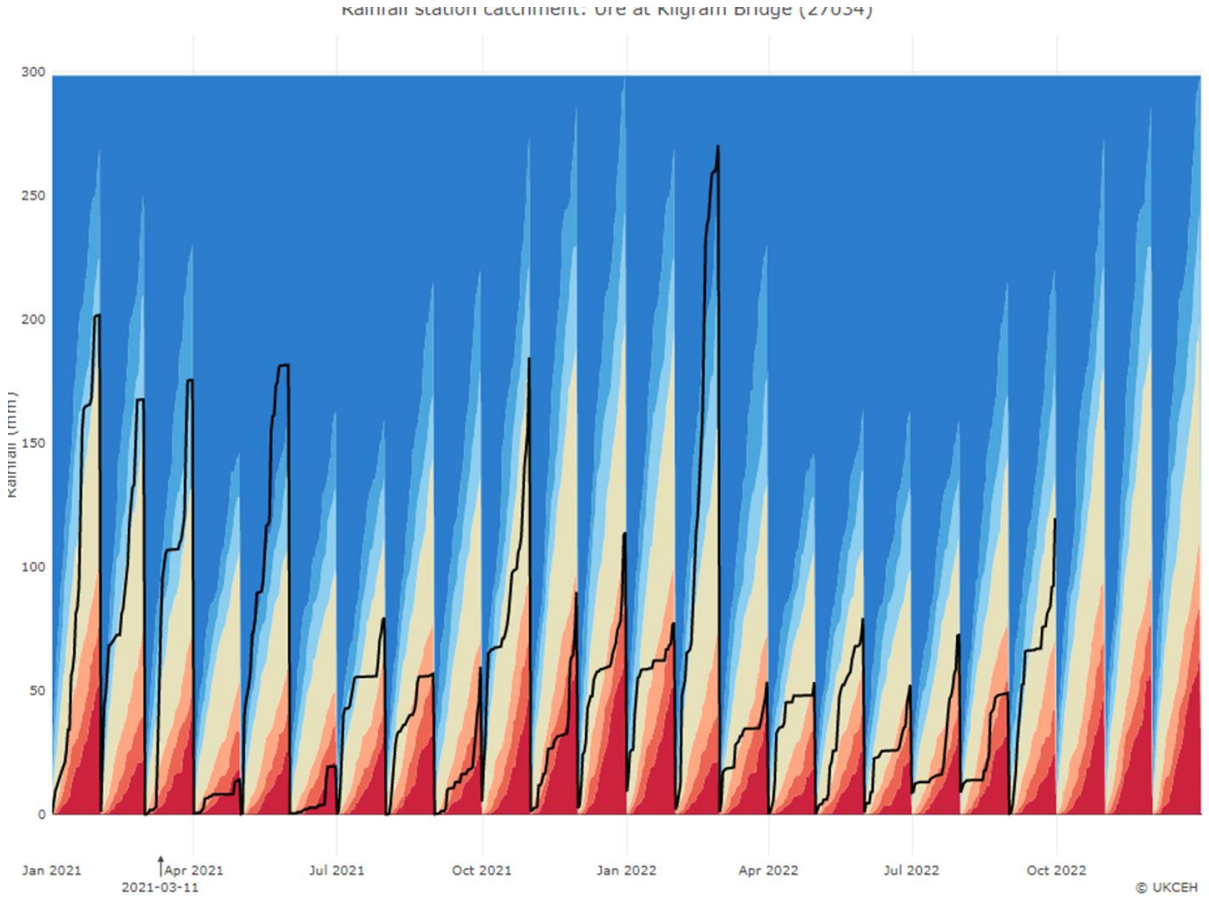

Rainfall station catchment: Ouse at Skelton (27009)
Rainfall (mm)
200
150
100
50
0
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
2022-09-02
© UKCEH

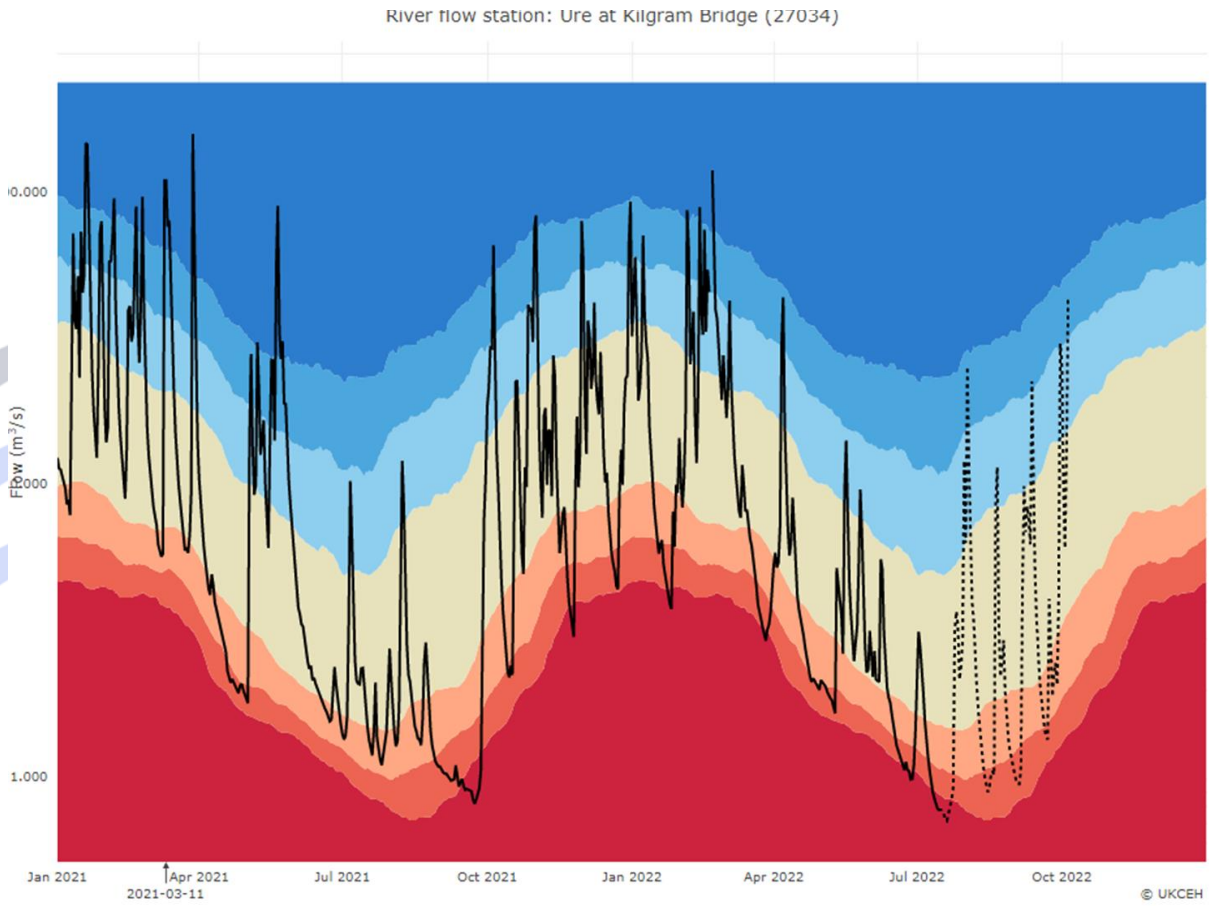

River flow station: Ouse at Skelton (27009)
Flow (m³/s)
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
2022-09-02
© UKCEH



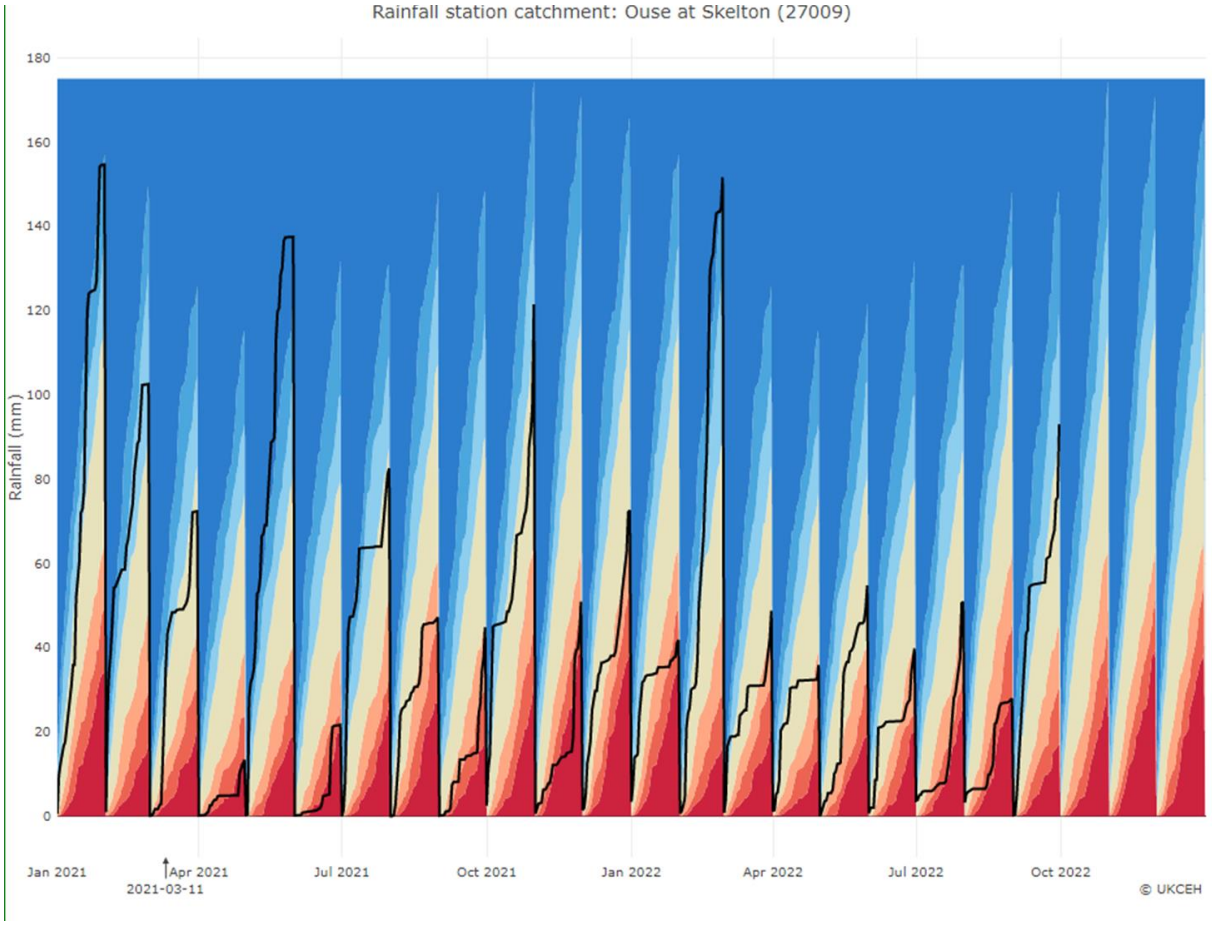


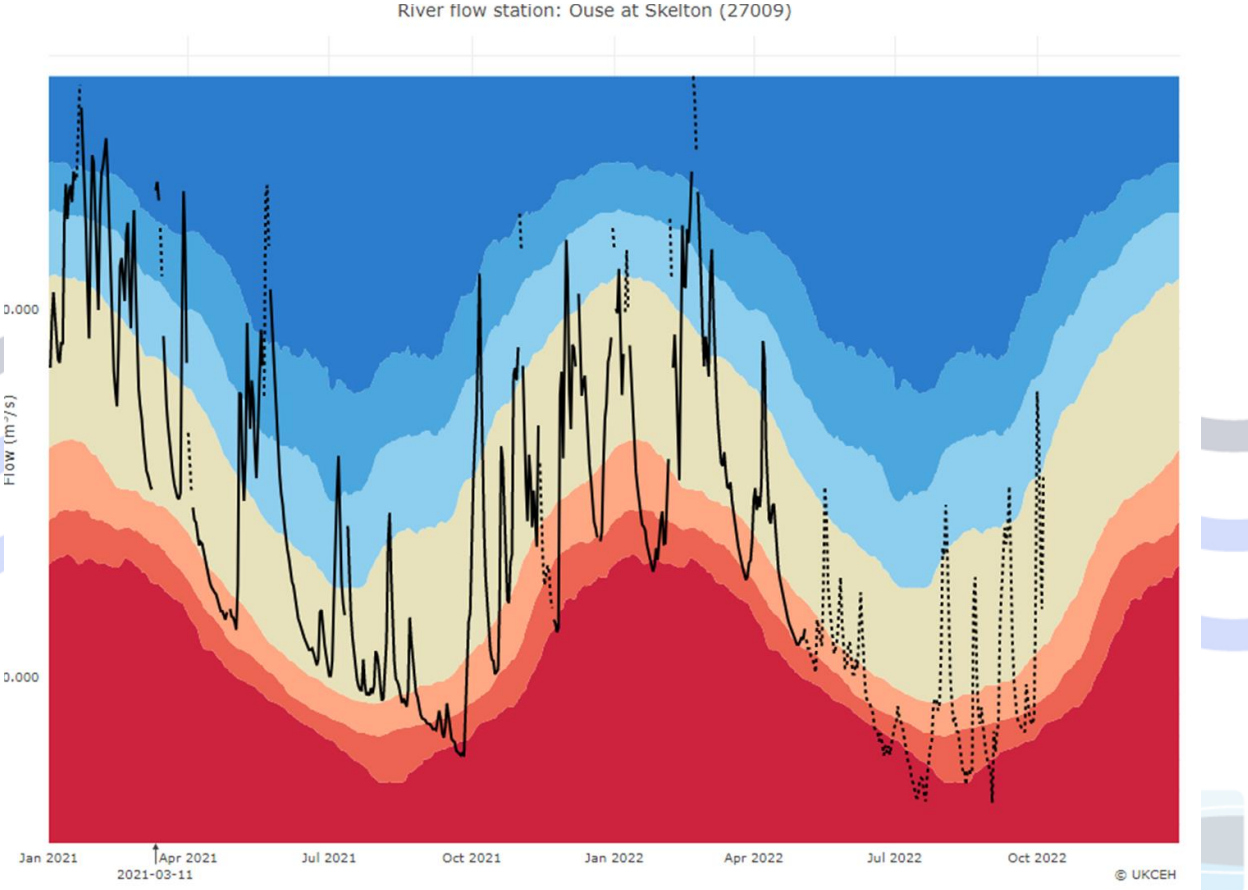
YorkshireWater





YorkshireWater





YorkshireWater