

Monthly water situation report: North-west England

1 Summary – October 2024

Table 1: North-west England summary of the current water situation.

1.1 Rainfall

October saw varied rainfall across north-west England, with over 75% of the month's rainfall occurring between 14 and 27 October. High rainfall totals were recorded at Ulpha and Ennerdale rain gauges, with both sites recording in excess of 70mm of rainfall on 27 October.

Following the rainfall during the latter half of October, rainfall for north-west England was classed as normal, at 101% of the long-term average (LTA). Cumbria and Lancashire was also classed as normal, at 106% of the LTA. Greater Manchester, Merseyside and Cheshire (GMC) observed 100% of the LTA, also classed as normal.

All hydrological areas in October were classed as normal, with the highest rainfall (in terms of the LTA) being the Cheshire Rivers Group hydrological area which received 119% of the LTA, and the lowest being the Derwent hydrological area which received 86% of the LTA. There were no clear spatial trends in rainfall for October.

During the 3-month cumulative rainfall period ending in October, coastal hydrological areas were wetter than predominantly inland hydrological areas – namely the Eden, the Ribble, and the Mersey and Irwell hydrological areas which were classed as normal. The Esk (Cumbria) and the Cheshire Rivers Group hydrological areas in particular were classed as notably high. The remaining hydrological areas were all classed as above normal.

The 6-month cumulative rainfall period ending in October, sees a similar trend with the Ribble, and the Mersey and Irwell hydrological areas still being classed as normal. Meanwhile, the Esk (Cumbria), the Kent, and the Cheshire Rivers Group hydrological areas were classed as notably high, reflecting the predominant path taken by low pressure systems over the last 6 months. The remaining hydrological areas were all classed as above normal.

The 12-month cumulative rainfall totals reflect how wet the previous year has been, with all hydrological areas in north-west England being classed as exceptionally high, despite the drier weather over the last few months.

The 12-month period ending in October was also the either the first, second, or third wettest since 1871 (153 years) for all hydrological areas, except for the Esk (Dumfries) hydrological area. Notably for:

- GMC, at 1245mm, breaking the 152-year-old record of 1203mm in 1872
- Esk (Cumbria) hydrological area, at 2423mm, breaking the previous record of 2315mm in 2016 by over 100mm
- Cheshire Rivers Group hydrological area, at 1135mm, breaking the 152-year-old record of 1090mm in 1872
- Kent hydrological area, at 2431mm, breaking the previous record of 2361mm in 2016

1.2 Soil moisture deficit and recharge

Rainfall recorded during the latter half of October resulted in a reduction in the spatial variability of soil moisture deficits (SMD) across north-west England at the start of November, SMD levels ranged from 0mm to 4mm. This is lower than expected for the time of year for the whole of north-west England, particularly for central Lancashire, Greater Manchester, Merseyside, and Cheshire.

1.3 River flows

Please note that monthly mean flows recorded at the River Bollin at Bollington Mill gauging station have not been included in this report due to data quality concerns.

The spatial distribution of September's rainfall continued to be reflected during October, with the highest mean river flows (in terms of percentage of the LTA) being recorded in western areas of central Lancashire and GMC. This was due to rainfall falling in catchments that were saturated during September, maintaining the river levels high in these catchments.

With the exception of the Mersey catchment at Ashton Weir which changed from normal to above normal, and the Derwent catchment at Seaton Mill which changed from normal to below normal, all sites remained at the same classification as they did in September. The latter was caused by the below average rainfall received in the Derwent hydrological area in both September and October.

River flows were highest (in terms of percentage of the LTA) in the Weaver catchment at Ashbrook (348% of the LTA, classed as exceptionally high), and lowest in the Derwent catchment at Seaton Mill (59% of the LTA, classed as below normal).

For the other 22 indicator sites reported this month:

- 17 sites were classed as normal
- 5 sites were classed as above normal

Heavy rainfall recorded across north-west England during the latter half of October resulted in some notable peaks in daily mean flow recorded during October.

Daily mean flows above Q1 (this is where mean flow has been exceeded only 1% of the time during the lifespan of the gauging station) were recorded on either the 16 or 17 October at:

- Caton gauging station on the River Lune
- Duddon Hall gauging station on the River Duddon
- Kirkby Stephen gauging station on the River Eden
- Hodder Place gauging station on the River Hodder
- Lunes Bridge gauging station on the River Lune
- Samlesbury gauging station on the River Ribble
- Sheepmount gauging station on the River Eden

Also on 27 October at:

- Cropple Howe gauging station on the River Esk

In addition, daily mean flows above Q0.1 (where mean flow has been exceeded only 0.1% of the time) were recorded on 16 either the or 17 October at:

- Croston gauging station on the River Yarrow
- Kirby gauging station on the River Alt
- St Michaels gauging station on the River Wyre
- Ashbrook gauging station on the River Weaver
- Causey Bridges gauging station on Sankey Brook

1.4 Groundwater levels

Groundwater levels across north-west England at the end of October were classed between normal and exceptionally high. Groundwater levels decreased at:

- Bruntwood Hall, from exceptionally high to above normal
- Primrose Hill, from above normal to normal
- Skirwith, from exceptionally high to notably high

All other groundwater indicator sites remained at the same classification at:

- Brown Bank Lay-By, classed as notably high
- Furness Abbey, classed as exceptionally high
- Great Musgrave, classed as normal
- Lea Lane, classed as normal,
- Priors Heyes, classed as exceptionally high
- Richmond Park, classed as exceptionally high
- Victoria Road, classed as normal

Please note, levels at Priors Heyes remain high compared to historic levels because the aquifer is recovering from the effects of historically high abstractions.

1.5 Reservoir storage

Total reservoir storage for north-west England increased from 75% from the end of September to 76% at the end of October. This is higher than the average of 75% at this time of the year, but lower than this time last year when total reservoir storage was 83%.

At the end of October, reservoir storage (in terms of percentage) was highest at Crummock Water, and Ennerdale Water, which were both at 100% full. This was followed by Lake Vyrnwy which was 87% full. Storage was lowest at Haweswater (68%) due to lower than average rainfall in the area in September (71% of the LTA) and October (96% of the LTA) recorded at Burnbanks rain gauge, and due to increased abstraction for public water supply.

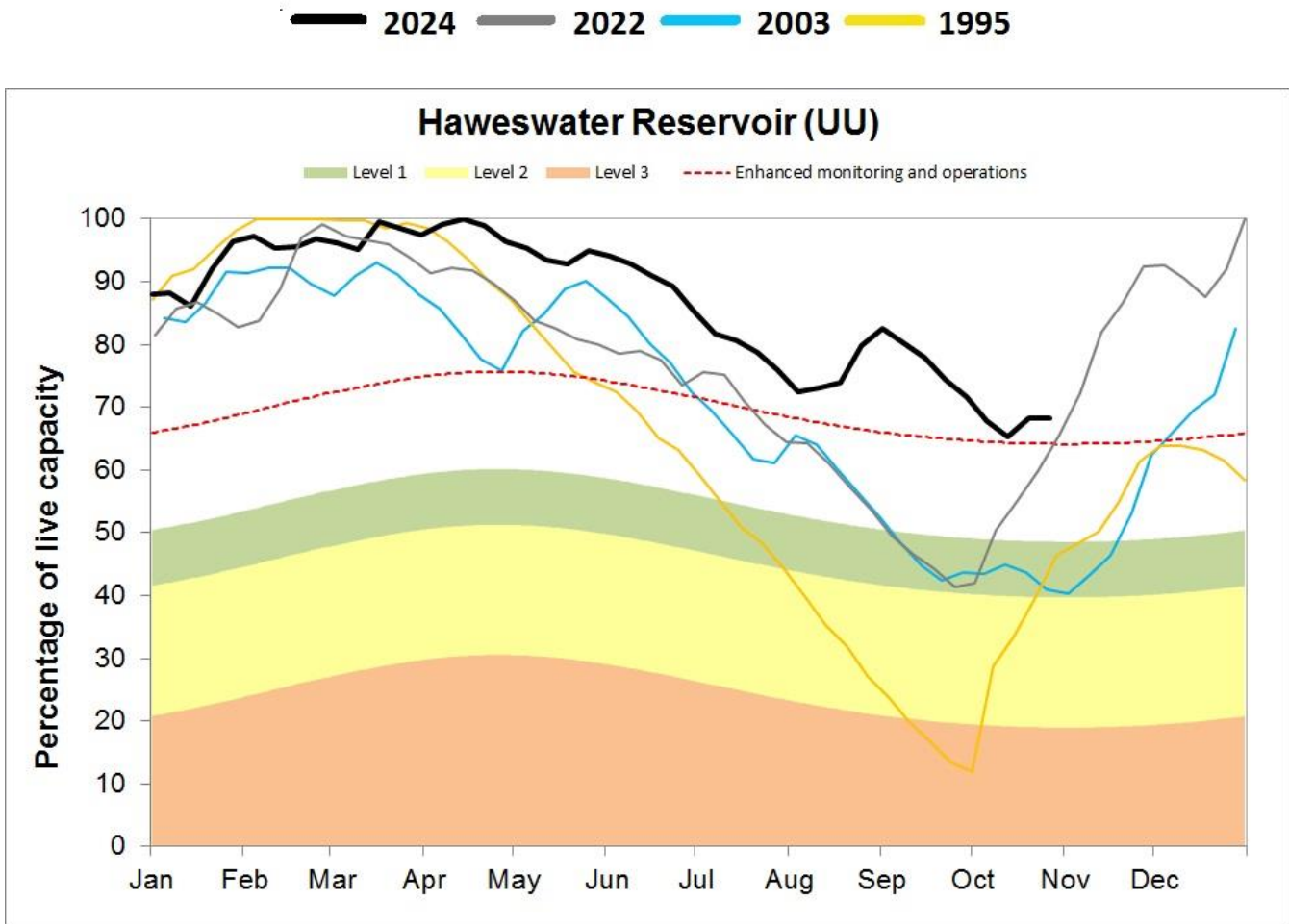
The combined storage at Haweswater and Thirlmere was at 71%. This is higher than the average of 68% at this time of year, but lower than this time last year when storage was 79%.

Reservoirs kept low for maintenance works include part of the:

- Longdendale system – Audenshaw No.1, and Torside
- Rivington system – Anglezarke, High Bullough, and Yarrow
- Worthington system – Arley, and Worthington
- Bolton supply system – Dingle
- Poaka Beck system – Harlock

- Piethorne Valley system – Norman Hill, Ogden (Milnrow), Kitcliffe, Piethorne, and Rooden
- Ogden (Barley) system – Ogden Lower, and Ogden Upper
- Barnacre Group system – Barnacre North
- Longridge system – Alston No.1, Alston No.2, and Spade Mill No.2
- Dee (Celyn and Brenig) system – Llyn Celyn
- Cowpe system – Cragg
- Dubbs system – Dubbs
- Belmont system – Belmont
- Worsthorne system – Swinden No 1.
- Watergrove system – Watergrove

Figure 1.5: Storage in Haweswater Reservoir, including the drought levels for the reservoir and storage for the current year (2024) and representative years: 1995, 2003 and 2022 (Source: United Utilities (UU)).



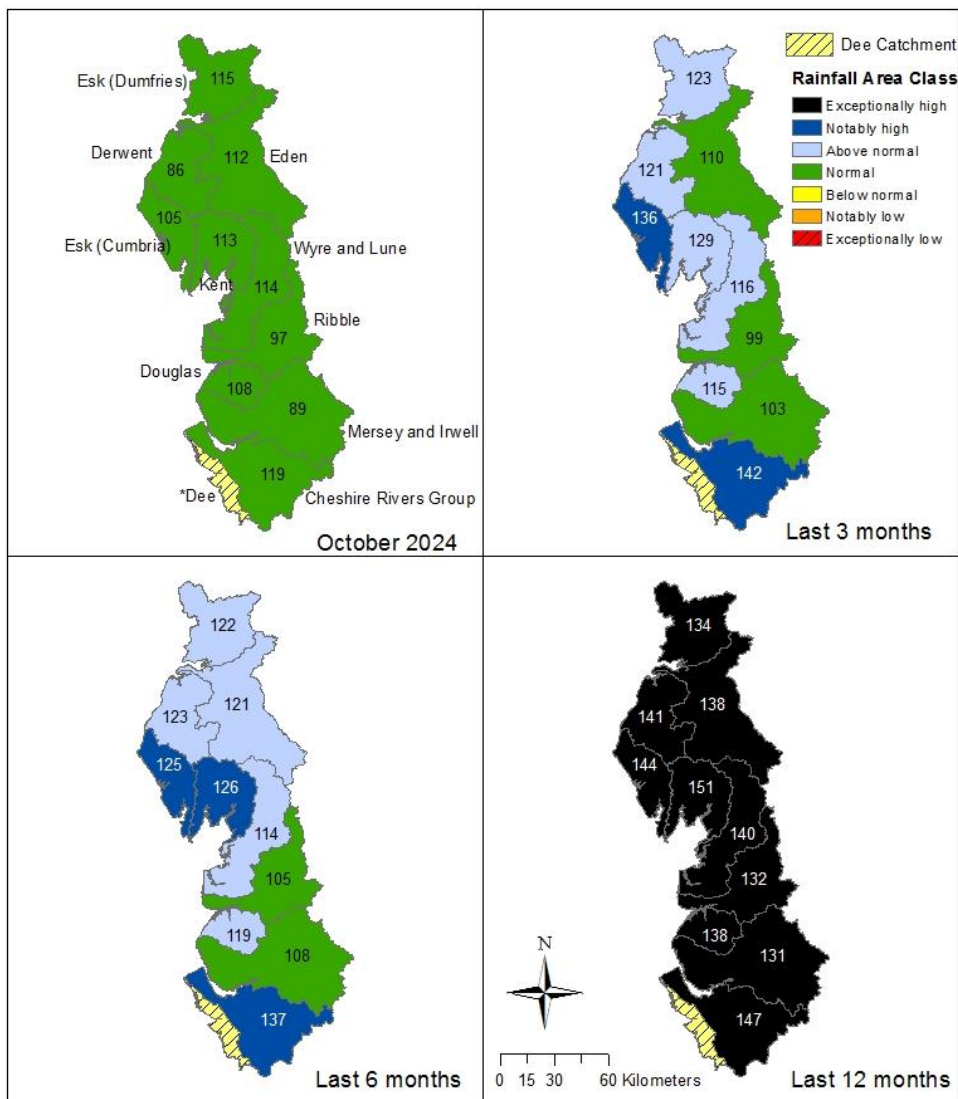
Author: Cumbria and Lancashire Hydrology Team, hydrology.CMBLNC@environment-agency.gov.uk

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2 Rainfall

2.1 Rainfall map

Figure 2.1: Total rainfall (as a percentage) for hydrological areas for the current month (up to 31 October 2024), the last 3 months, the last 6 months, and the last 12 months, classed relative to an analysis of respective historic totals. Table available in the appendices with detailed information.



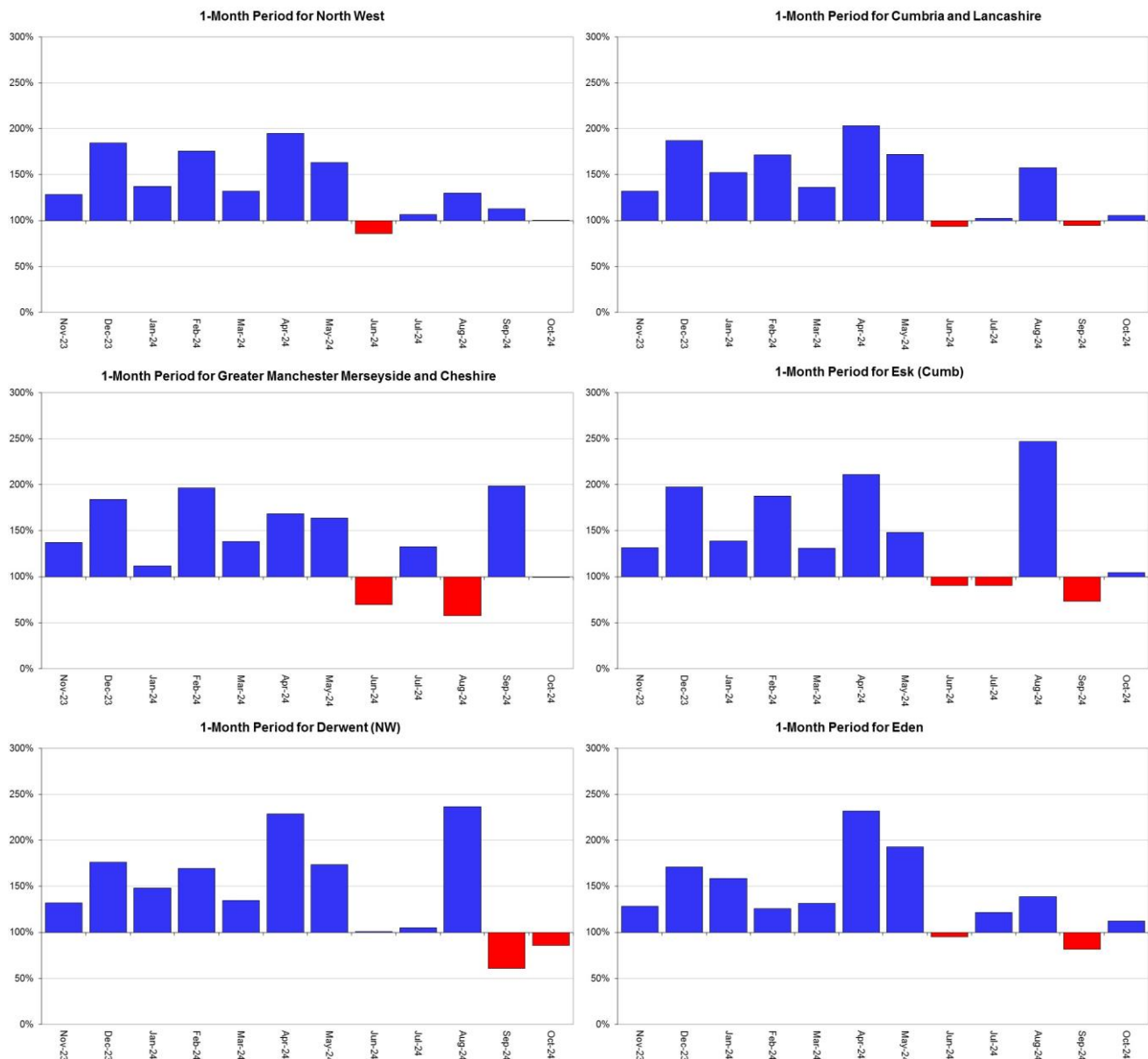
Rainfall data since 2023, extracted from Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. (Source: Environment Agency. Crown Copyright, 100024198, 2024). Rainfall data prior to 2023, extracted from Met Office HadUK 1km gridded rainfall dataset derived from registered rain gauges (Source: Met Office. Crown copyright, 2024).

2.2 Rainfall charts

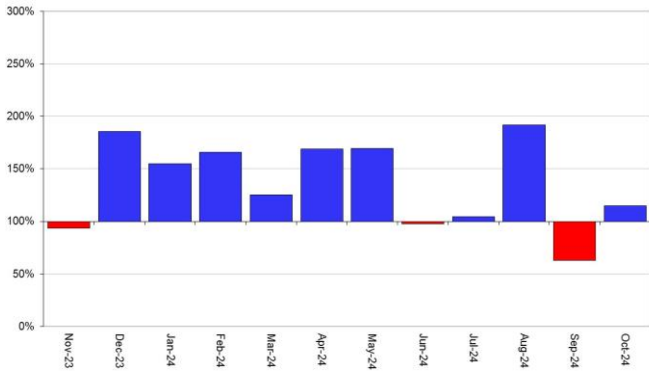
Figure 2.2: Monthly rainfall totals for the past 12 months expressed as a percentage of the 1961 to 1990 long term average for North-west England and its hydrological areas.

■ Above average rainfall

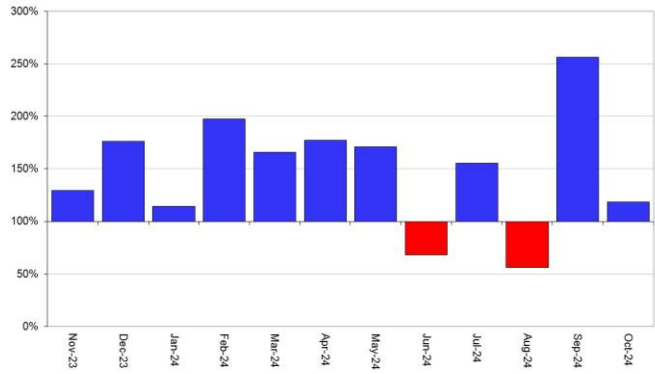
■ Below average rainfall



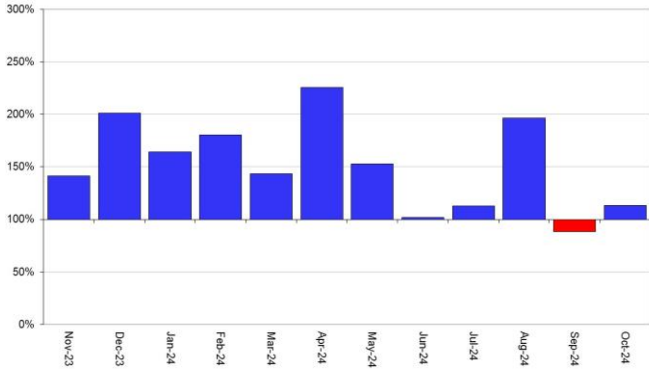
1-Month Period for Esk (Dumfries)



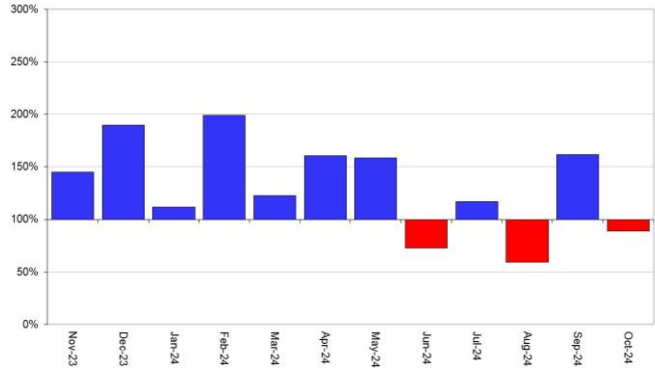
1-Month Period for Cheshire Rivers Group



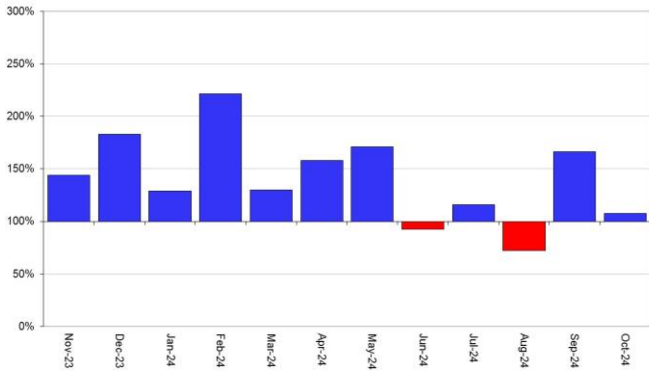
1-Month Period for Kent



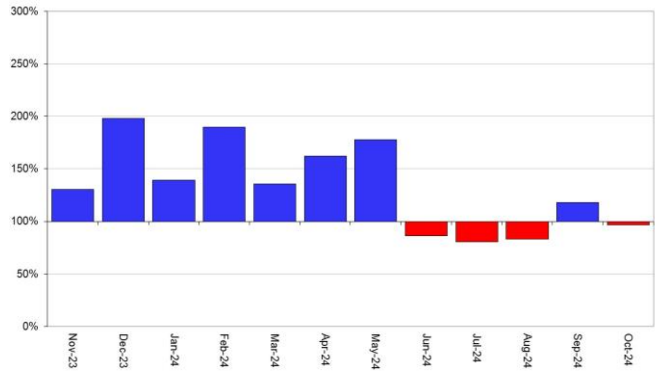
1-Month Period for Mersey and Irwell

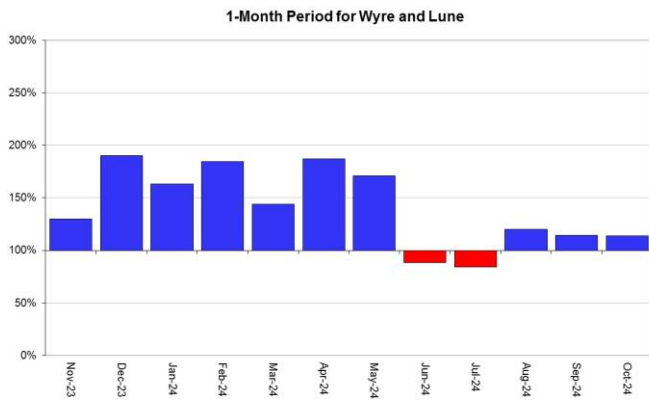


1-Month Period for Douglas



1-Month Period for Ribble



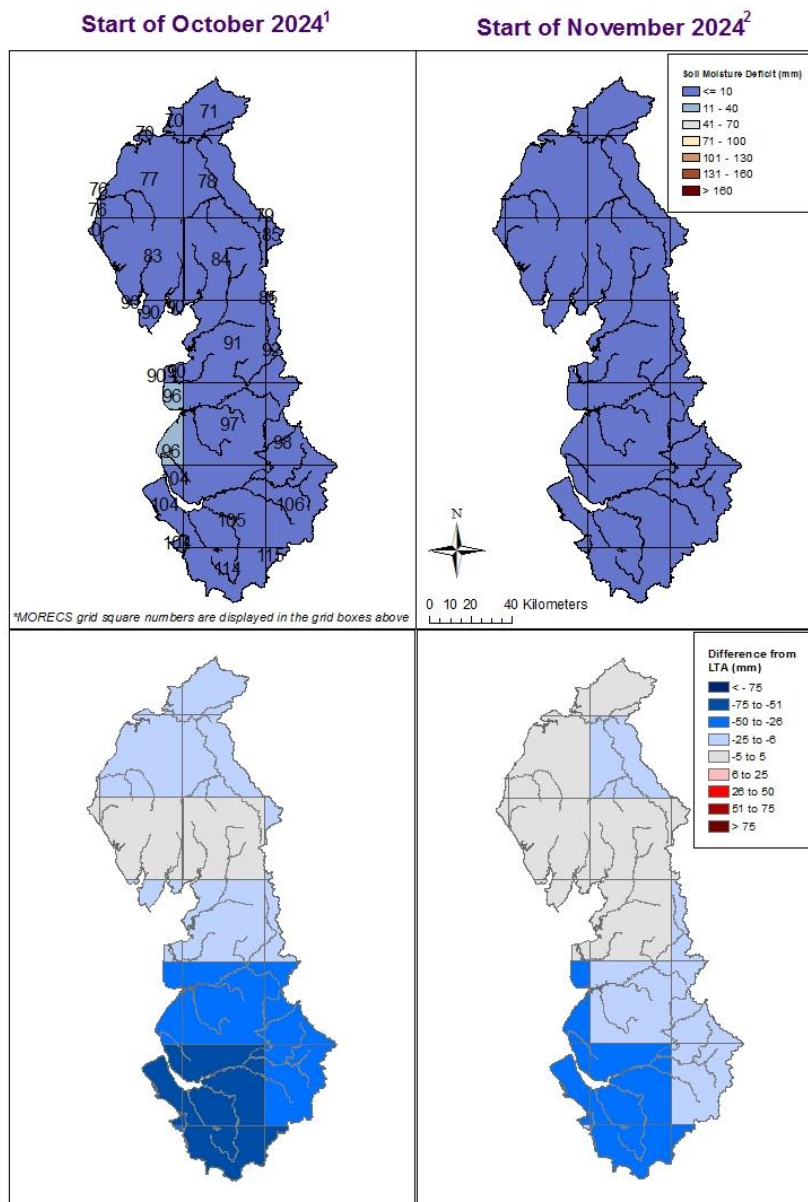


Rainfall data since 2023, extracted from Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. (Source: Environment Agency. Crown Copyright, 100024198, 2024). Rainfall data prior to 2023, extracted from Met Office HadUK 1km gridded rainfall dataset derived from registered rain gauges (Source: Met Office. Crown copyright, 2024).

3 Soil moisture deficit

3.1 Soil moisture deficit map

Figure 3.1: Soil moisture deficits for weeks ending 27 March 2024¹ (left panel) and 30 April 2024² (right panel). Top row shows actual soil moisture deficits (mm) and bottom row shows the difference (mm) of the actual from the 1961-90 long term average soil moisture deficits. MORECS data for real land use.

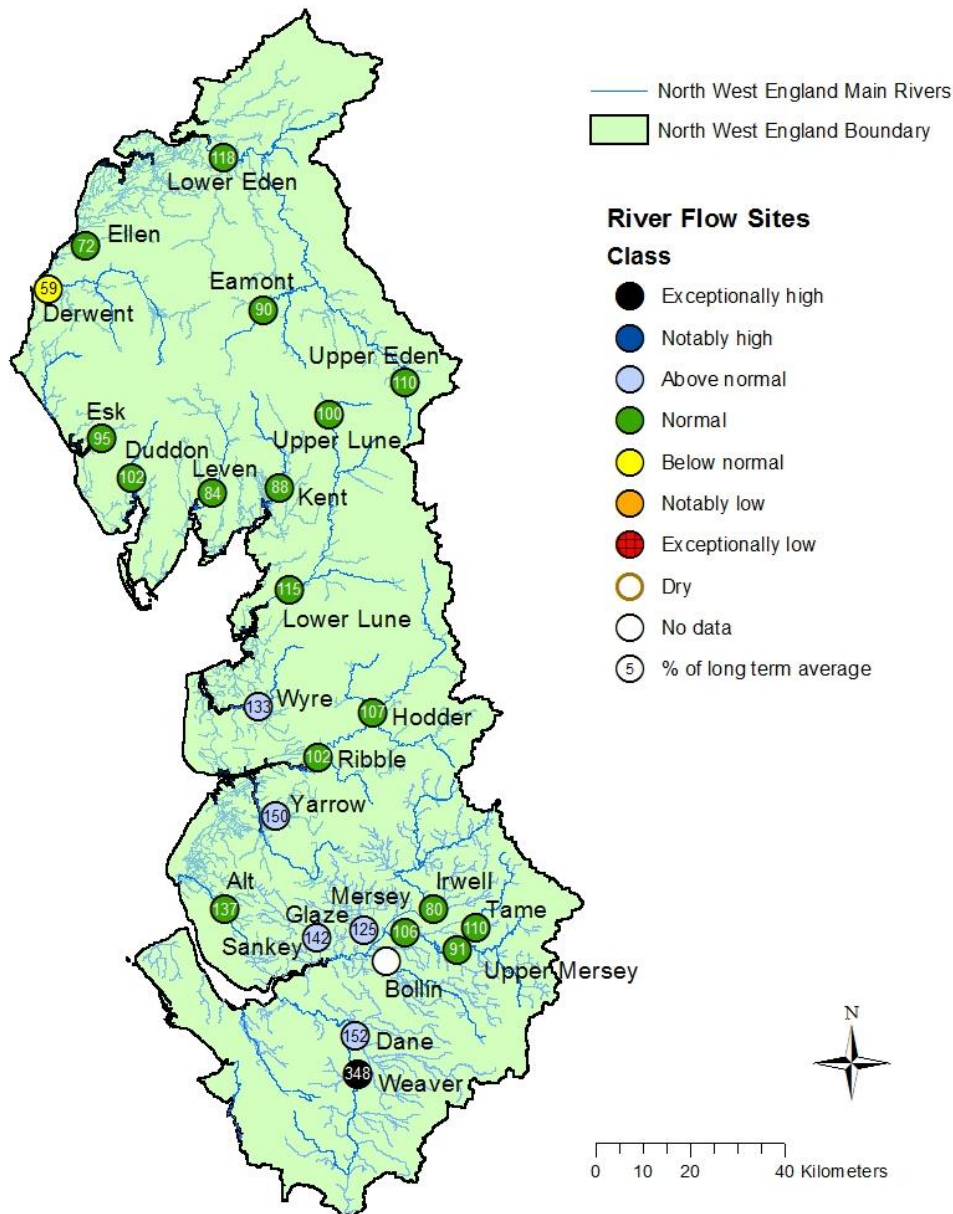


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4 River flows

4.1 River flows map

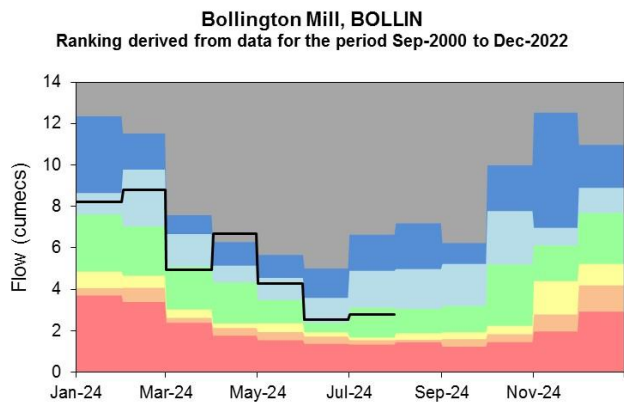
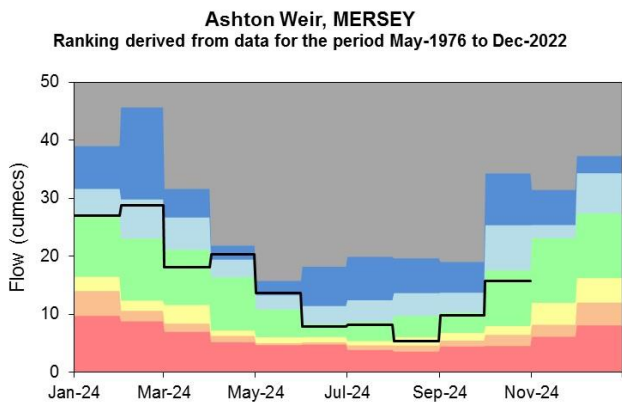
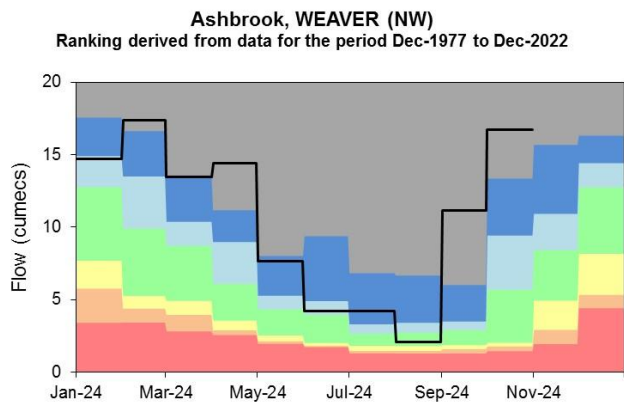
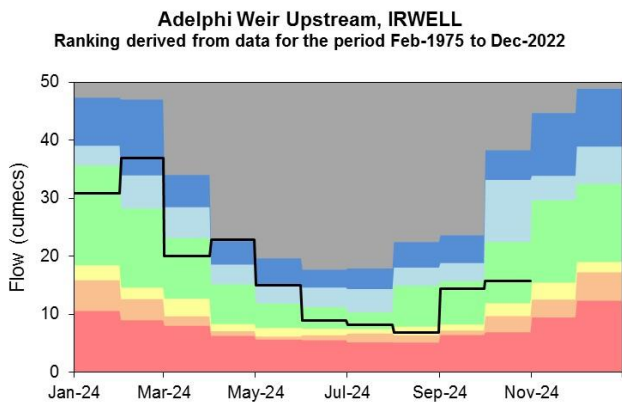
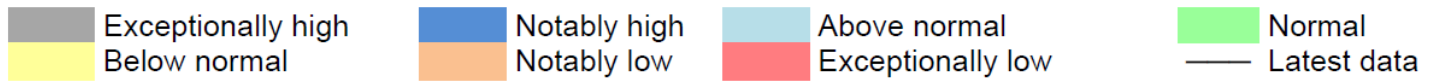
Figure 4.1: Monthly mean river flow for indicator sites for October 2024, expressed as a percentage of the respective long term average and classed relative to an analysis of historic October monthly means. Table available in the appendices with detailed information.



(Source: Environment Agency). Crown copyright. All rights reserved. Environment Agency, 100024198, 2024.

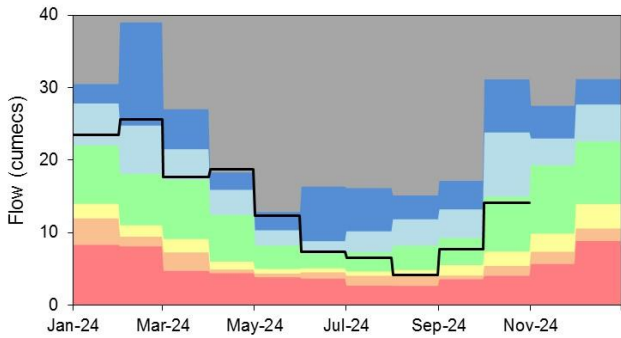
4.2 River flow charts

Figure 4.2: Monthly mean river flow for index sites over the past year, compared to an analysis of historic monthly mean flows.



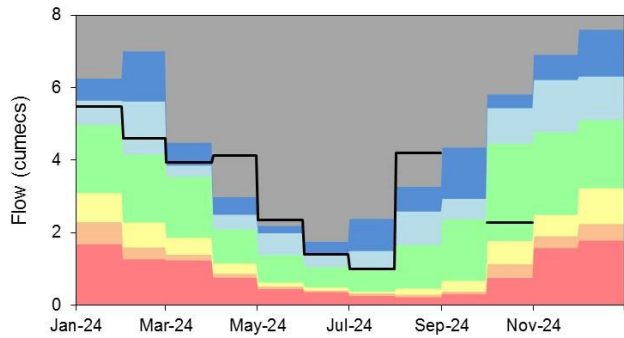
Brinksway, MERSEY

Ranking derived from data for the period Jan-1974 to Dec-2022



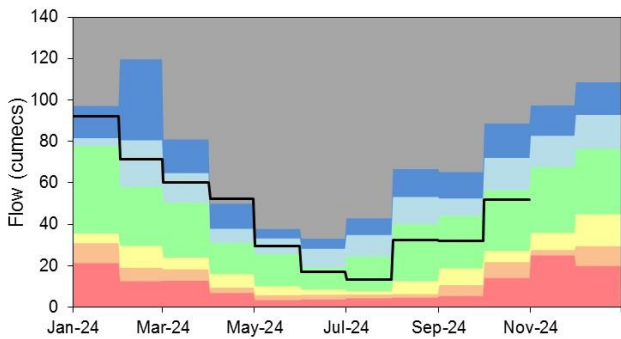
Bullgill, ELLEN

Ranking derived from data for the period Jan-1976 to Dec-2022



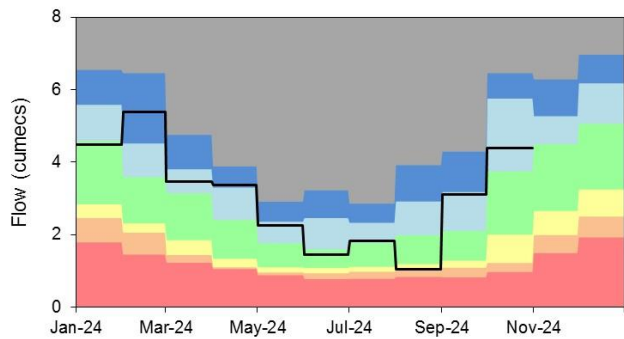
Caton, LUNE

Ranking derived from data for the period Jan-1959 to Dec-2022



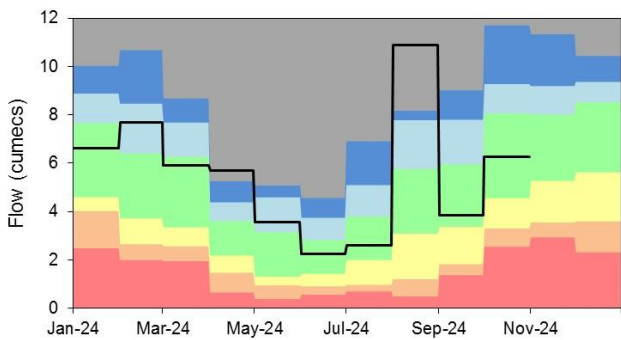
Causey Bridges, SANKEY

Ranking derived from data for the period Jan-1977 to Dec-2022



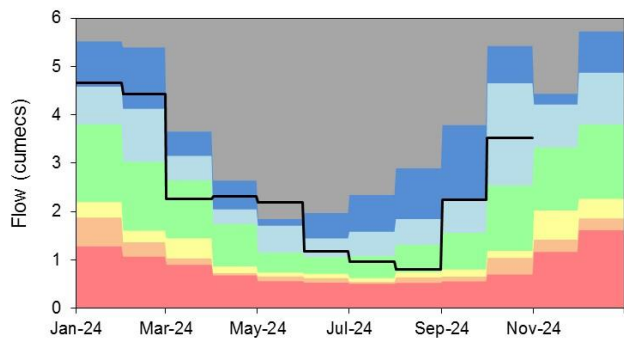
Crople How, ESK (NW)

Ranking derived from data for the period Jan-1976 to Dec-2022

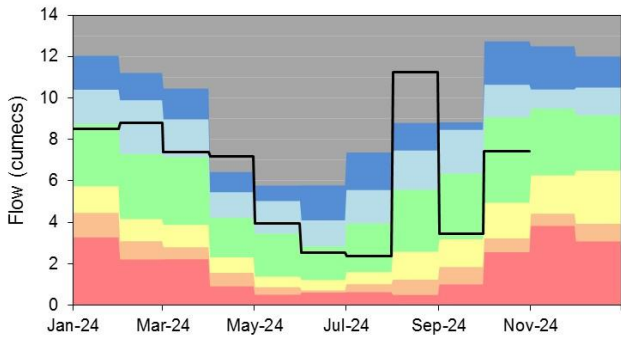


Croston, YARROW

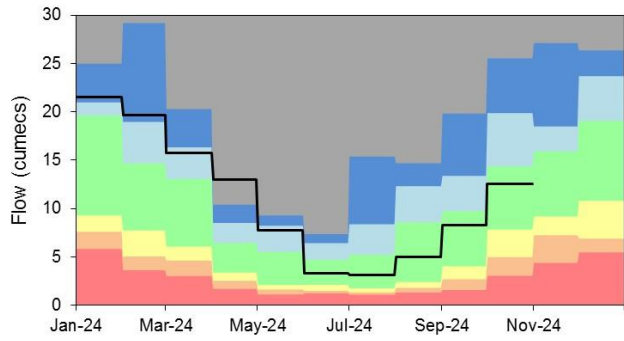
Ranking derived from data for the period Jan-1976 to Dec-2022



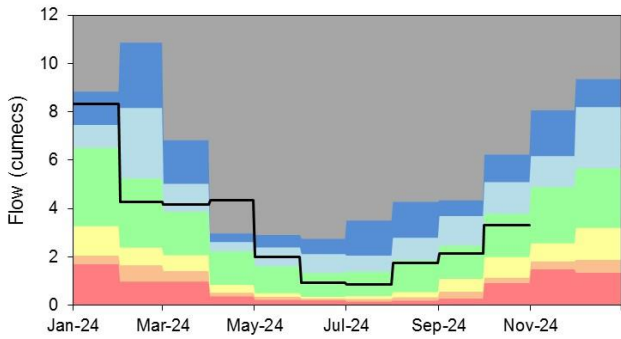
Duddon Hall, DUDDON
Ranking derived from data for the period Mar-1968 to Dec-2022



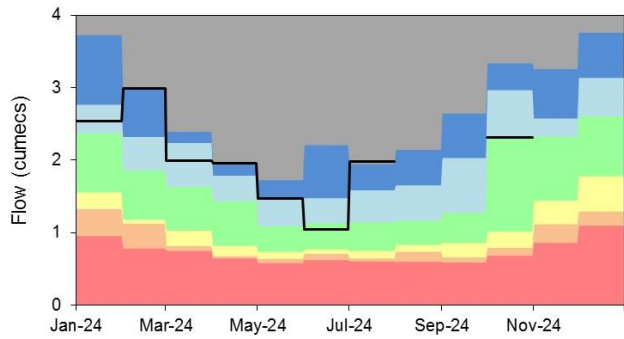
Hodder Place, HODDER
Ranking derived from data for the period Jan-1976 to Dec-2022



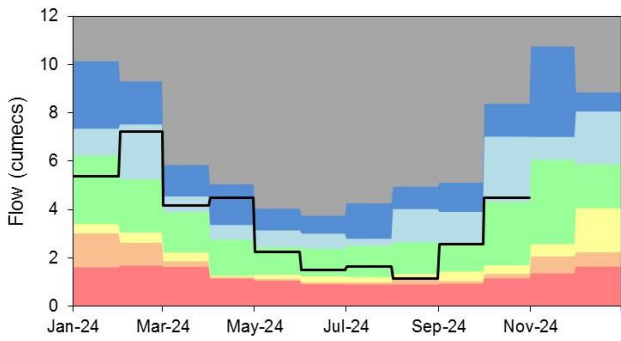
Kirkby Stephen, EDEN (NW)
Ranking derived from data for the period Oct-1971 to Dec-2022



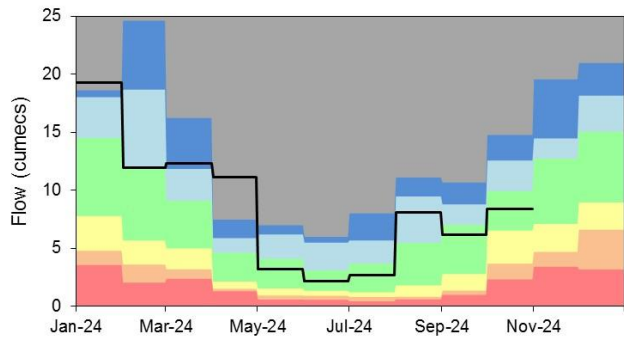
Kirkby, ALT
Ranking derived from data for the period Oct-1977 to Dec-2022



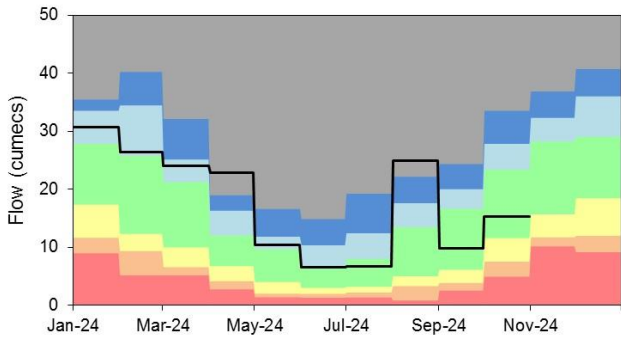
Little Woolden Hall Ultrasonic, GLAZE
Ranking derived from data for the period Jul-1995 to Dec-2022



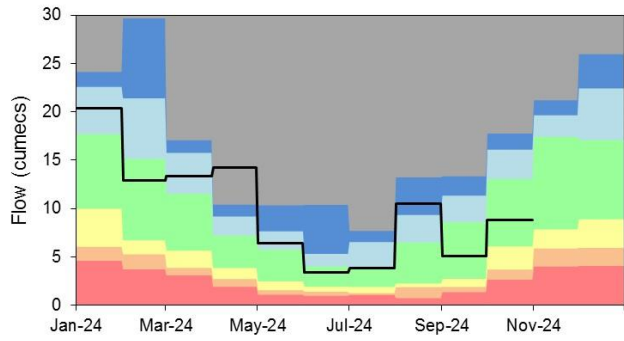
Lunes Bridge, LUNE
Ranking derived from data for the period Dec-1979 to Dec-2022



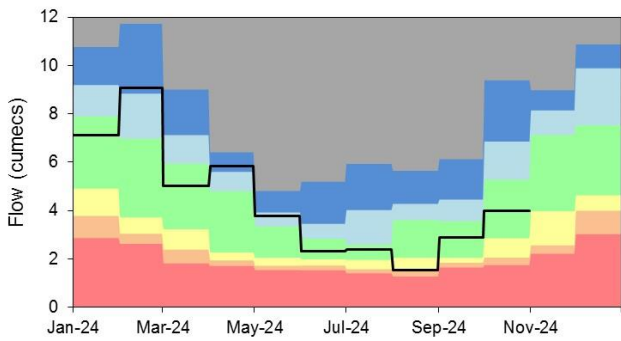
Newby Bridge FMS, LEVEN (NW)
Ranking derived from data for the period Jan-1972 to Dec-2022



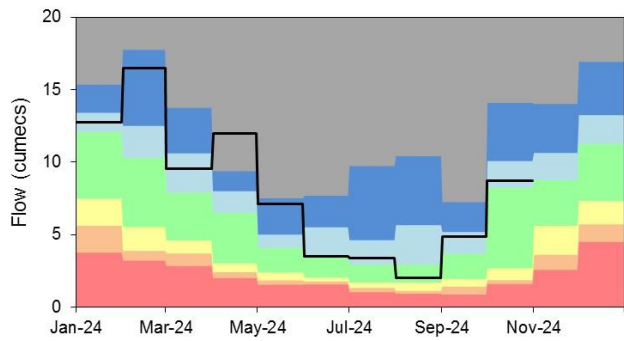
Pooley Bridge, EAMONT
Ranking derived from data for the period Jul-1970 to Dec-2022



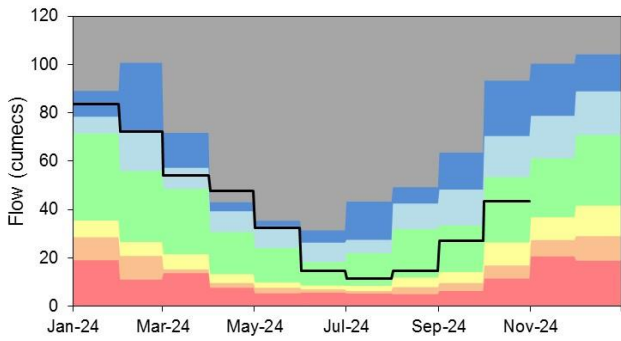
Portwood, TAME
Ranking derived from data for the period Jan-1976 to Dec-2022



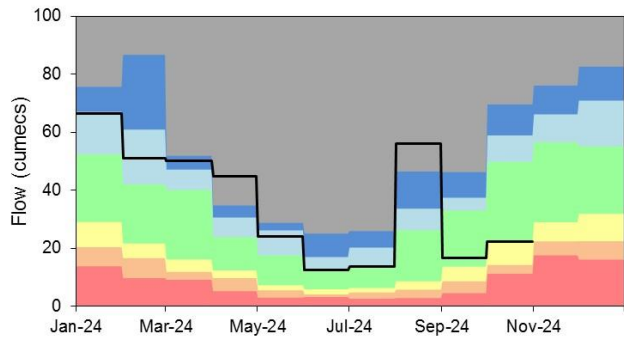
Rudheath, DANE
Ranking derived from data for the period Jan-1976 to Dec-2022



Samlesbury Pgs, RIBBLE (NW)
Ranking derived from data for the period May-1960 to Dec-2022

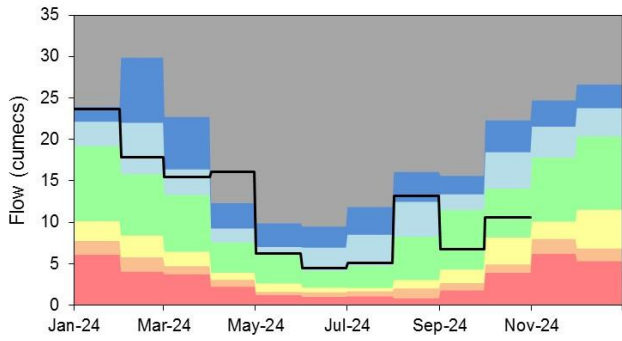


Seaton Mill, DERWENT (NW)
Ranking derived from data for the period Sep-1960 to Dec-2022



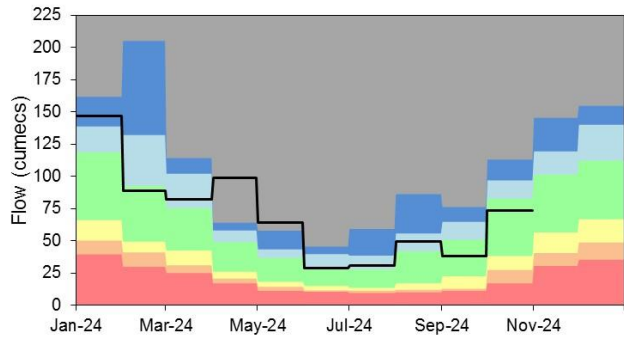
Sedgwick, KENT

Ranking derived from data for the period Nov-1968 to Dec-2022



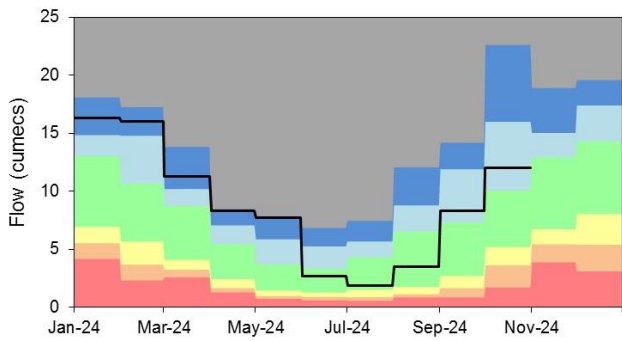
Sheepmount, EDEN (NW)

Ranking derived from data for the period Oct-1967 to Dec-2022



St Michaels FMS, WYRE

Ranking derived from data for the period Oct-1963 to Dec-2022

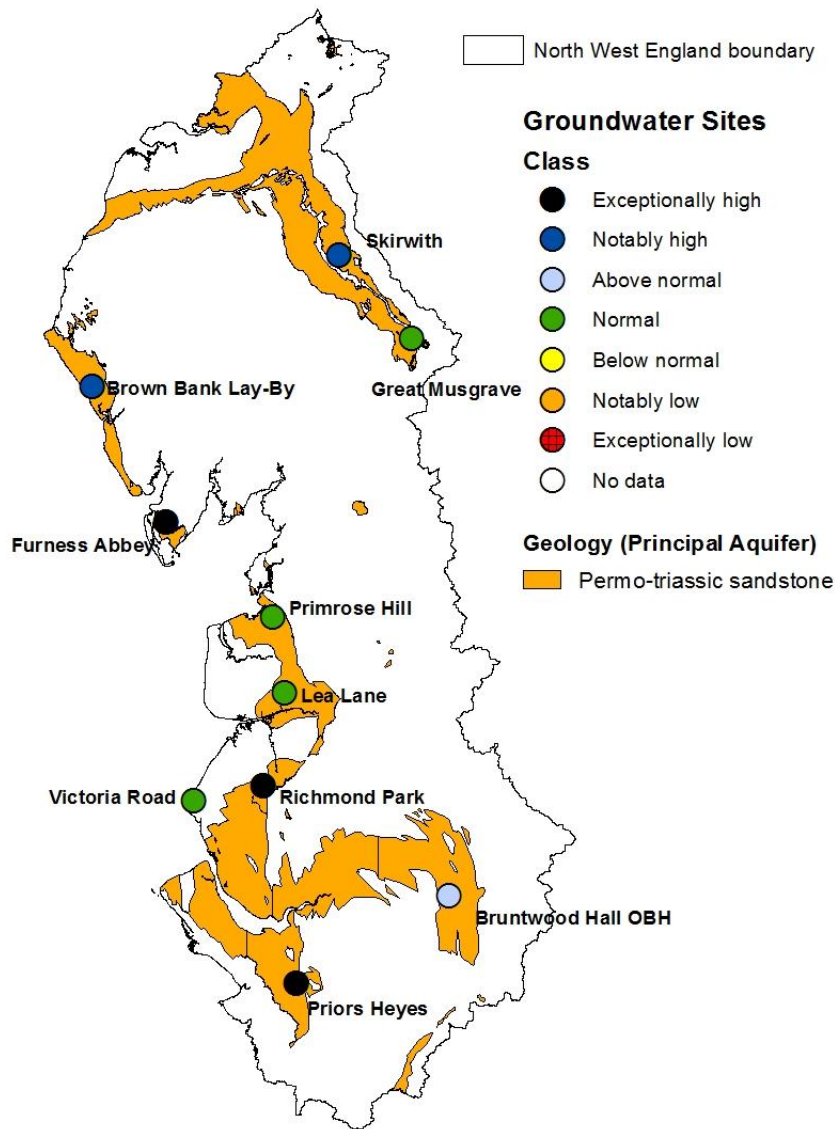


Source: Environment Agency.

5 Groundwater levels

5.1 Groundwater levels map

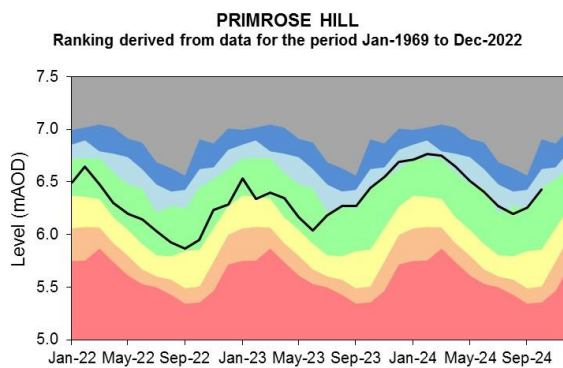
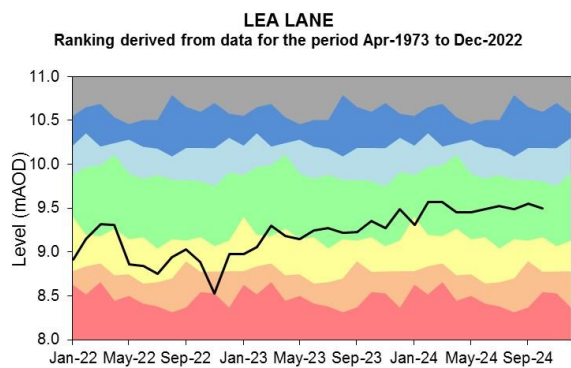
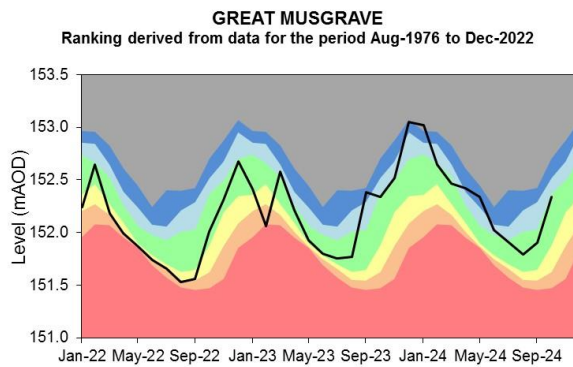
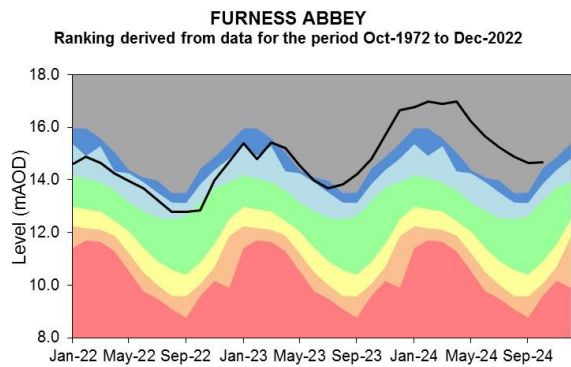
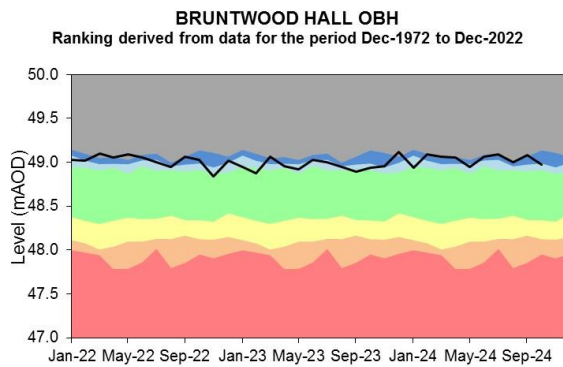
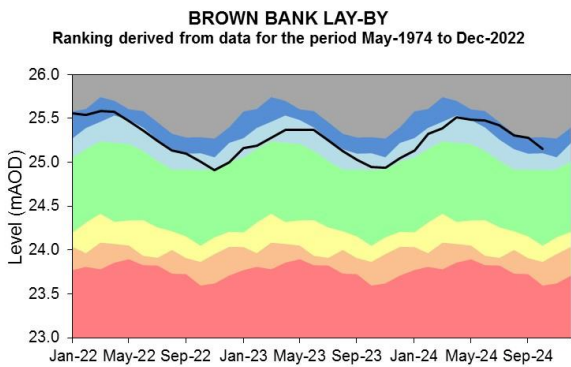
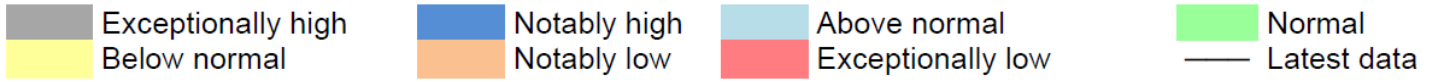
Figure 5.1: Groundwater levels for indicator sites at the end of October 2024, classed relative to an analysis of respective historic October levels. Table available in the appendices with detailed information. Please note Victoria Road Borehole sits within a superficial deposit as opposed to a bedrock aquifer. This is why the geology type is not marked on the map.



(Source: Environment Agency). Geological map reproduced with kind permission from UK Groundwater Forum, BGS copyright NERC. Crown copyright. All rights reserved. Environment Agency, 100024198, 2024.

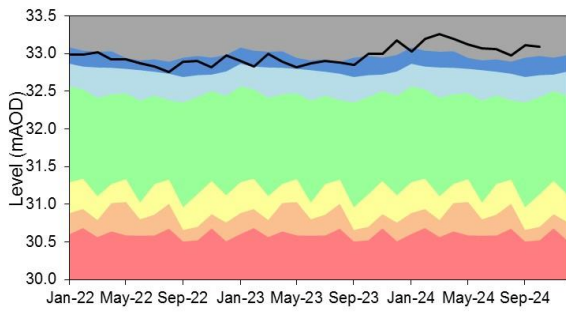
5.2 Groundwater level charts

Figure 5.2: End of month groundwater levels at index groundwater level sites for major aquifers. 34 months compared to an analysis of historic end of month levels and long term maximum and minimum levels.



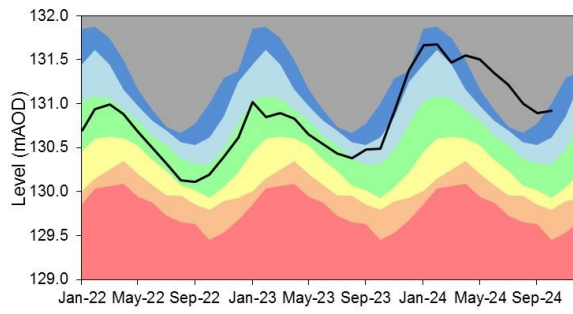
PRIORS HEYES

Ranking derived from data for the period Sep-1972 to Dec-2022



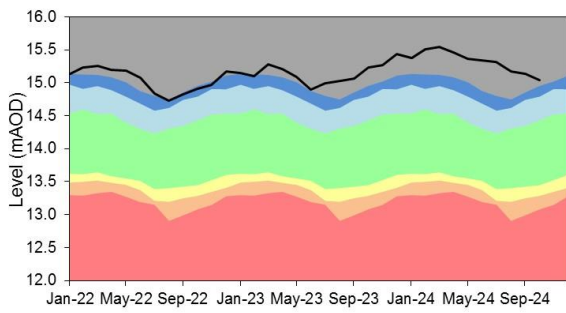
SKIRWITH

Ranking derived from data for the period Oct-1978 to Dec-2022



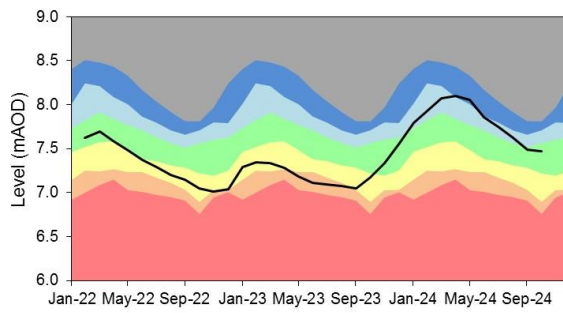
RICHMOND PARK

Ranking derived from data for the period Jun-1971 to Dec-2022



VICTORIA ROAD

Ranking derived from data for the period Jun-1999 to Dec-2022



Source: Environment Agency, 2024.

6 Reservoir storage

Figure 6.1: The location of reservoirs that comprise the supply districts across North-west England and selected individual reservoirs.

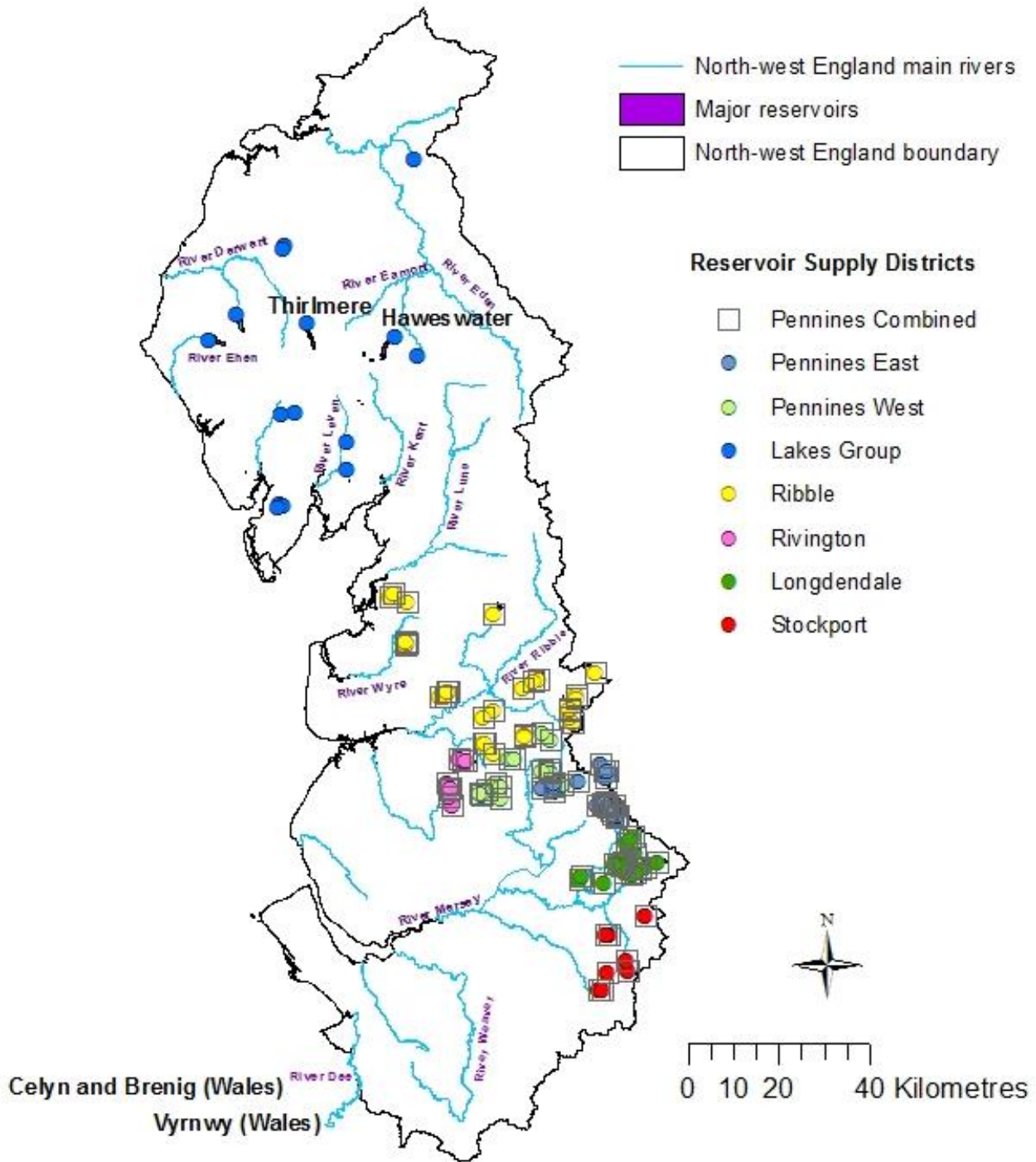
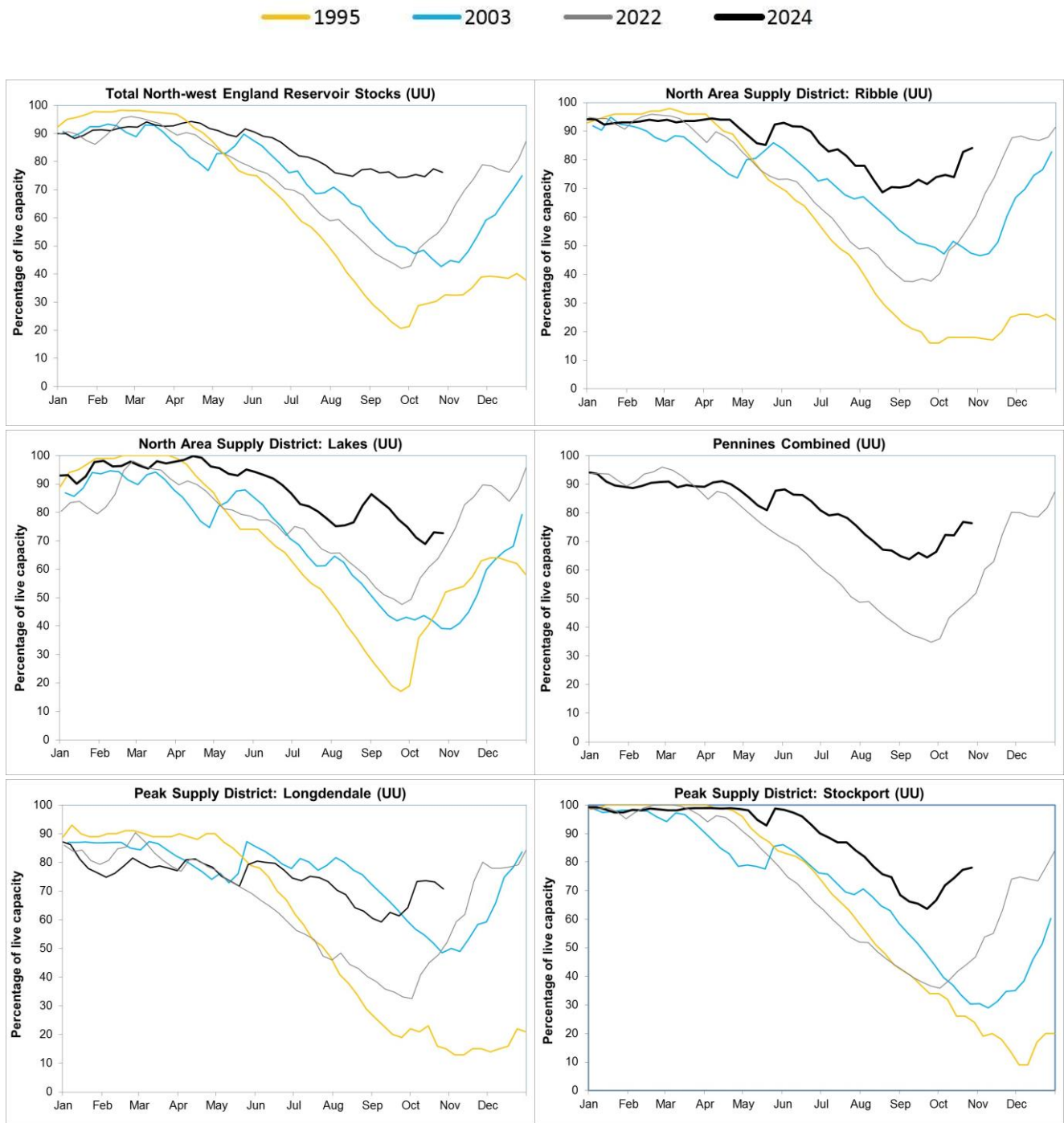
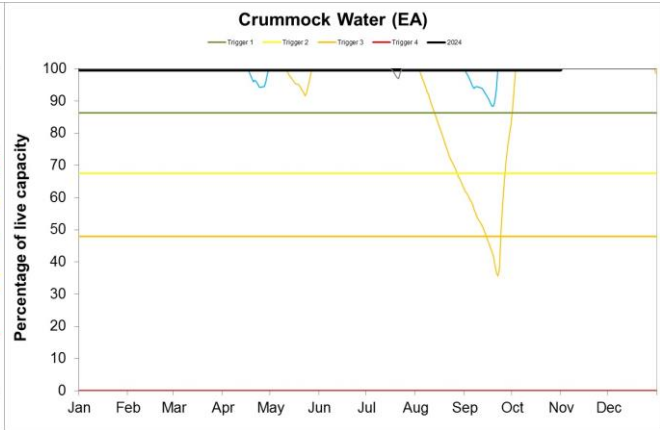
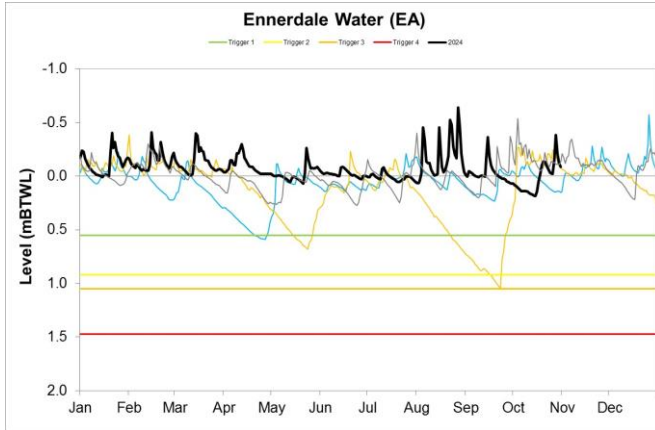
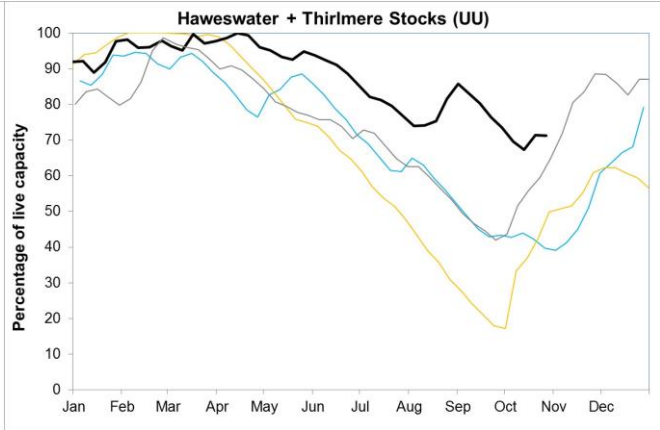
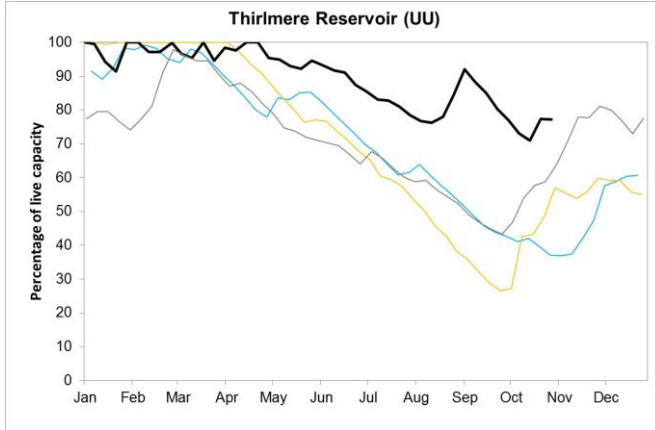
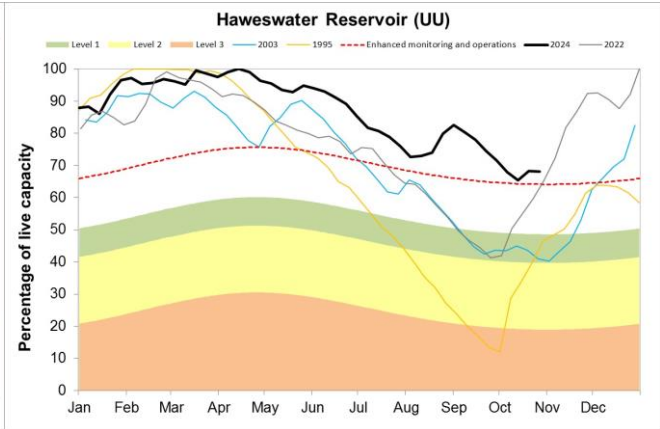
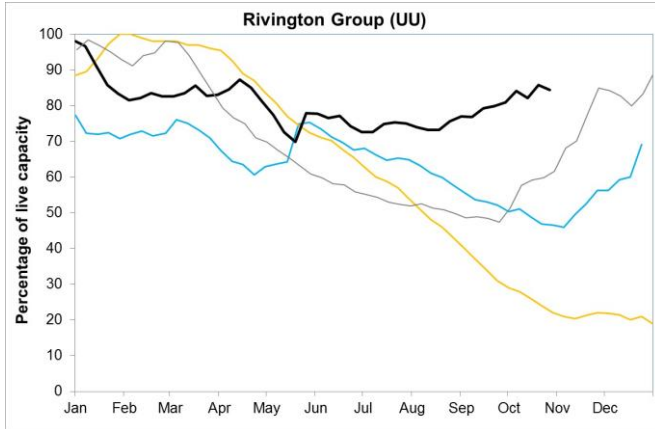
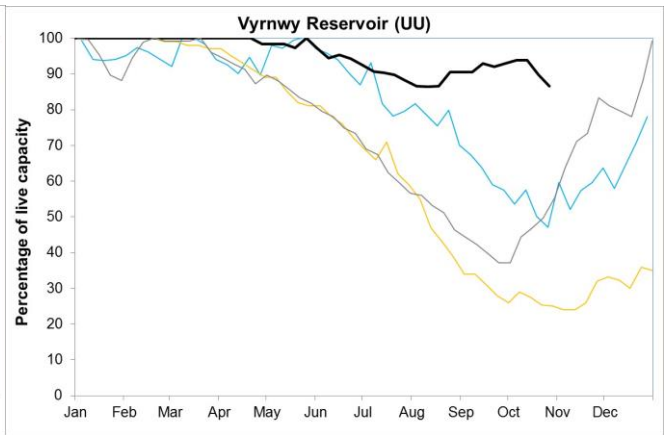
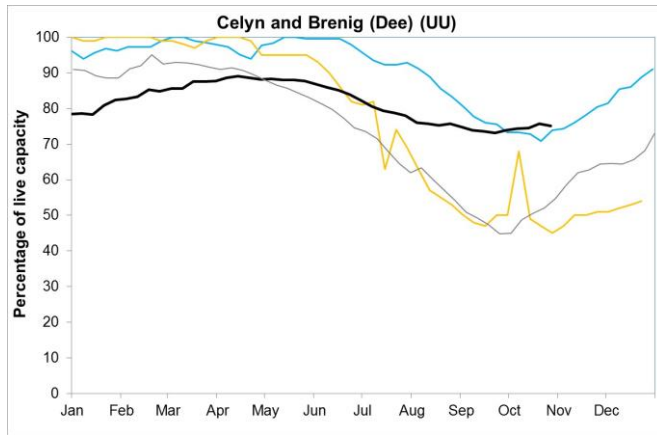


Figure 6.2: End of month reservoir storage for supply districts across North-west England and selected individual reservoirs for current year (2024) and representative years: 1995, 2003 and 2022. Note: Historic records of individual reservoirs and reservoir groups making up the regional values vary in length.







Source: (UU) United Utilities, (EA) The Environment Agency.

7 Glossary

7.1 Terminology

Aquifer

A geological formation able to store and transmit water.

Areal average rainfall

The estimated average depth of rainfall over a defined area. Expressed in depth of water (mm).

Artesian

The condition where the groundwater level is above ground surface but is prevented from rising to this level by an overlying continuous low permeability layer, such as clay.

Artesian borehole

Borehole where the level of groundwater is above the top of the borehole and groundwater flows out of the borehole when unsealed.

Cumecs

Cubic metres per second (m^3s^{-1}).

Effective rainfall

The rainfall available to percolate into the soil or produce river flow. Expressed in depth of water (mm).

Flood alert and flood warning

Three levels of warnings may be issued by the Environment Agency. Flood alerts indicate flooding is possible. Flood warnings indicate flooding is expected. Severe flood warnings indicate severe flooding.

Groundwater

The water found in an aquifer.

Long term average (LTA)

The arithmetic mean calculated from the historic record, usually based on the period 1961 to 1990. However, the period used may vary by parameter being reported on (see figure captions for details).

mAOD

Metres above ordnance datum (mean sea level at Newlyn Cornwall).

MORECS

Met Office Rainfall and Evaporation Calculation System. Met Office service providing real time calculation of evapotranspiration, soil moisture deficit and effective rainfall on a 40 by 40 km grid.

Naturalised flow

River flow with the impacts of artificial influences removed. Artificial influences may include abstractions, discharges, transfers, augmentation and impoundments.

NCIC

National Climate Information Centre. NCIC area monthly rainfall totals are derived using the Met Office 5 km gridded dataset, which uses rain gauge observations.

Recharge

The process of increasing the water stored in the saturated zone of an aquifer. Expressed in depth of water (mm).

Reservoir gross capacity

The total capacity of a reservoir.

Reservoir live capacity

The capacity of the reservoir that is normally usable for storage to meet established reservoir operating requirements. This excludes any capacity not available for use (for example, storage held back for emergency services, operating agreements or physical restrictions). May also be referred to as 'net' or 'deployable' capacity.

Soil moisture deficit (SMD)

The difference between the amount of water actually in the soil and the amount of water the soil can hold. Expressed in depth of water (mm).

7.2 Categories

Exceptionally high

Value likely to fall within this band 5% of the time.

Notably high

Value likely to fall within this band 8% of the time.

Above normal

Value likely to fall within this band 15% of the time.

Normal

Value likely to fall within this band 44% of the time.

Below normal

Value likely to fall within this band 15% of the time.

Notably low

Value likely to fall within this band 8% of the time.

Exceptionally low

Value likely to fall within this band 5% of the time.

8 Appendices

8.1 Rainfall table

Hydrological area	Oct 2024 rainfall % of long term average 1961 to 1990	Oct 2024 band	Aug 2024 to October cumulative band	May 2024 to October cumulative band	Nov 2023 to October cumulative band
Cheshire Rivers Group	119	Normal	Notably high	Notably high	Exceptionally high
Derwent (nw)	86	Normal	Above normal	Above normal	Exceptionally high
Douglas	108	Normal	Above normal	Above normal	Exceptionally high
Eden	112	Normal	Normal	Above normal	Exceptionally high
Esk (cumb)	105	Normal	Notably high	Notably high	Exceptionally high
Esk (dumfries)	115	Normal	Above normal	Above normal	Exceptionally high
Kent	113	Normal	Above normal	Notably high	Exceptionally high
Mersey And Irwell	89	Normal	Normal	Normal	Exceptionally high
Ribble	97	Normal	Normal	Normal	Exceptionally high

Wyre And Lune	114	Normal	Above normal	Above normal	Exceptionally high
North West	101	Normal	Above normal	Above normal	Exceptionally high

8.2 River flows table

Site name	River	Catchment	Oct 2024 band	Sep 2024 band
Adelphi Weir Upstream	Irwell	Irwell (Croal to Irk)	Normal	Normal
Ashbrook	Weaver (North West)	Weaver Upper	Exceptionally high	Exceptionally high
Ashton Weir	Mersey	Mersey Non Tidal	Normal	Normal
Bollington Mill	Bollin	Bollin		
Brinksway	Mersey	Mersey Non Tidal	Normal	Normal
Bullgill	Ellen	Ellen Lower	Normal	
Caton	Lune	Lune Lower Tidal	Normal	Normal
Causey Bridges	Sankey	Mersey Non Tidal	Above normal	Above normal
Crople How	Esk (North West)	Esk (South West Lakes)	Normal	Normal
Croston	Yarrow	Yarrow Lower	Above normal	Above normal
Duddon Hall	Duddon	Duddon	Normal	Normal
Hodder Place	Hodder	Hodder Lower	Normal	Normal
Kirkby	Alt	Alt	Normal	
Kirkby Stephen	Eden (North West)	Eden Cumbria Upper	Normal	Normal

Little Woolden Hall Ultrasonic	Glaze	Glaze	Above normal	Normal
Lunes Bridge	Lune	Lune Upper	Normal	Normal
Newby Bridge Fms	Leven (North West)	Leven Cumbria	Normal	Normal
Pooley Bridge	Eamont	Eamont	Normal	Normal
Portwood	Tame	Tame	Normal	Normal
Rudheath	Dane	Dane	Above normal	Above normal
Samlesbury Pgs	Ribble (North West)	Ribble Lower	Normal	Normal
Seaton Mill	Derwent (North West)	Derwent Cumbria Lower	Below normal	Normal
Sedgwick	Kent	Levens Bridge	Normal	Normal
Sheepmount	Eden (North West)	Eden Cumbria Lower	Normal	Normal
St Michaels Fms	Wyre	Brock	Above normal	Above normal

8.3 Groundwater table

Site name	Aquifer	End of Oct 2024 band	End of Sep 2024 band
Brown Bank Lay-by	West Cumbria Permo-triassic Sandstone	Notably high	Notably high
Bruntwood Hall Obh	East Cheshire Permo-triassic Sandstone	Above normal	Exceptionally high
Furness Abbey	Furness Permo-triassic Sandstone	Exceptionally high	Exceptionally high
Great Musgrave	Eden Valley And Carlisle Basin Permo-triassic Sandstone	Normal	Normal
Lea Lane	Fylde Permo-triassic Sandstone	Normal	Normal
Priors Heyes	West Cheshire Permo-triassic Sandstone	Exceptionally high	Exceptionally high
Primrose Hill	Fylde Permo-triassic Sandstone	Normal	Above normal
Richmond Park	Rufford Permo-triassic Sandstone	Exceptionally high	Exceptionally high
Skirwith	Eden Valley And Carlisle Basin Permo-triassic Sandstone	Notably high	Exceptionally high
Victoria Road Entrance	West Lancashire Quaternary Sand And Gravel Superficial Deposits	Normal	Normal