Monthly water situation report: Midlands

1 Summary - March 2024

Please see Section 7.3 for a map detailing the Midlands regional coverage of this report.

Rainfall - During March, 5 of the Midlands hydrological catchments received exceptionally high rainfall totals relative to the long-term average (LTA). Four hydrological catchments received notably high rainfall totals. Three hydrological areas received an above normal rainfall relative to the LTA.

Soil moisture deficit - As of the end of March, the soils are saturated or at 'field capacity' meaning that there is no soil moisture deficit (SMD) remaining.

River flows - In March, the majority of flow sites recorded notably high monthly mean flows compared to the LTA. Six sites recorded exceptionally high monthly mean flows and a further 3 sites recorded above normal flows compared to the LTA.

Groundwater levels - As of the end of March, 4 sites recorded exceptionally high groundwater level compared to the LTA. Two sites recorded above normal groundwater levels compared to the LTA.

Reservoir stocks - As of the end of March, the majority of the Midlands reservoirs in this report recorded (except Dove) above average storage levels compared to the LTA. All of reservoirs are at or near full capacity.

1.1 Rainfall

During March, 5 of the Midlands hydrological catchments received exceptionally high rainfall totals relative to the LTA. These areas received rainfall totals ranging from 165% to 201% of the LTA. A further 4 hydrological areas received notably high rainfall totals relative to the LTA. These are the Derwent, Tame, Avon, and Mid Severn Tame. Three hydrological areas received above normal rainfall relative to the LTA. These areas are the Welsh Mountains, Lower Trent, and Soar.

In the last 3 months, the majority of the Midlands hydrological areas received exceptionally high rainfall totals, ranging from 144% to 175% of the 3-month LTA. Two hydrological areas received notably high rainfall totals. These are the Welsh Mountains in the west and Derwent in the north-east of the Midlands.

Looking at the last 6 months, all of the Midlands hydrological areas recorded exceptionally high rainfall totals compared to the 6-month LTA. These areas received rainfall totals ranging from 146% to 182% of the LTA respectively.

Over the last 12 months, all hydrological catchments with the exception of the Lower Wye received exceptionally high rainfall totals compared to the 12-month LTA. The Lower Wye hydrological catchment received a notably high rainfall total of 132% of the LTA.

1.2 Soil moisture deficit and recharge

Soil moisture deficit has remained consistent across the whole of the Midlands since November 2023, with March continuing to have 10mm or less of SMD. As of the end of March, the soils are saturated or at 'field capacity' meaning that there is no soil moisture deficit (SMD) remaining. Soils in the eastern and southern regions of the Midlands were slightly wetter than the LTA for March.

1.3 River flows

In March, the majority of flow monitoring sites in the Midlands recorded notably high monthly mean flows ranging from 145% to 223% of the LTA. These are located in the central, northeastern and southwestern parts of the Midlands. A further 6 sites recorded exceptionally high monthly mean flows compared to the LTA. These are Clifton Hall, Ebley Mill, Great Bridgeford, Walcot, Wedderburn Bridge and Yoxall. Three sites recorded above normal which are Kegworth, Llanyblodwel, and Whatstandwell. Only Deerhurst recorded normal monthly mean flows relative to the LTA.

1.4 Groundwater levels

As of the end of March, groundwater monitoring sites are at normal status or above. Four sites; Weir Farm, Rider Point, Four Crosses, and Coxmoor, are recording exceptionally high groundwater levels compared to the LTA. Southards Lane and Crossley Hill in the north of the Midlands recorded above normal groundwater levels compared to the LTA. Anthony's Cross in the south of the Midlands recorded notably high groundwater levels compared to the LTA. Ram Hall recorded normal groundwater levels compared to the LTA.

1.5 Reservoir stocks

As of the end of March, the majority of the Midlands reservoirs in this report (except Dove) recorded above average storage levels compared to the LTA. Reservoirs storage across the region ranged between 90% and 100%. Furthermore, all of reservoirs are at or near full capacity.

1.6 River Severn operations

The River Severn is regulated to maintain a minimum flow at Bewdley gauging station. This ensures sufficient water flows along the river to support environmental and water supply requirements. Regulation is instigated when flows drop below a threshold. The 2023 regulation season saw 49 days of river regulation, which commenced on 29 May followed by a dry June then unsettled weather from then late into the season. The last day of regulation was 12 September 2023. Regulation hasn't yet been instigated for 2024.

1.7 River Wye operations

Throughout March, Elan storage was above the release control line and flows at Redbrook were above the regulation threshold. Therefore, regulation releases were not in operation during March.

1.8 Water abstraction restrictions

As of 2 April 2024, there are no water abstraction licence restrictions in place across the Midlands.

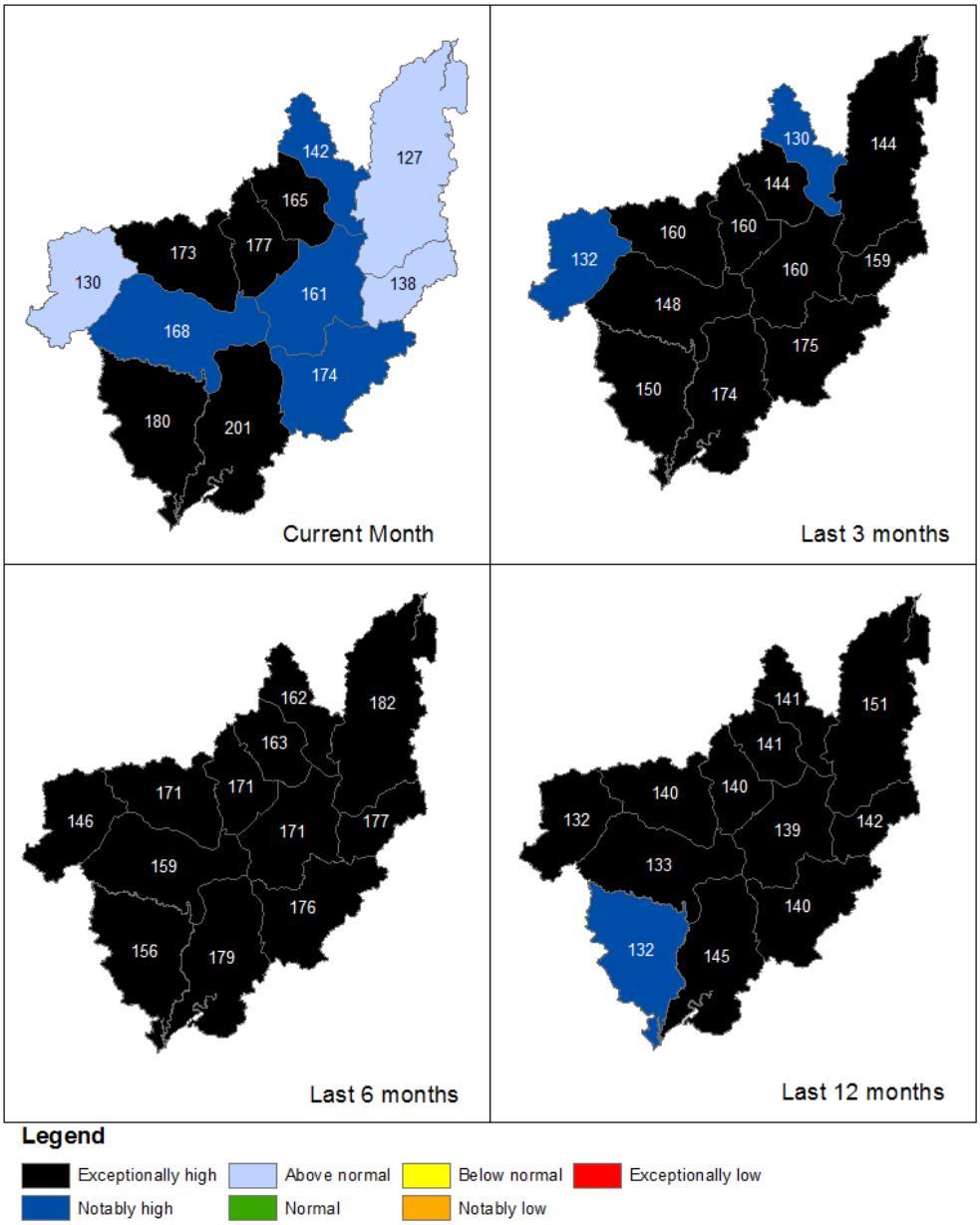
Author: Midlands Hydrology, midlandshydrology@environment-agency.gov.uk

Contact Details: 03708 506 506

2 Rainfall

2.1 Rainfall map

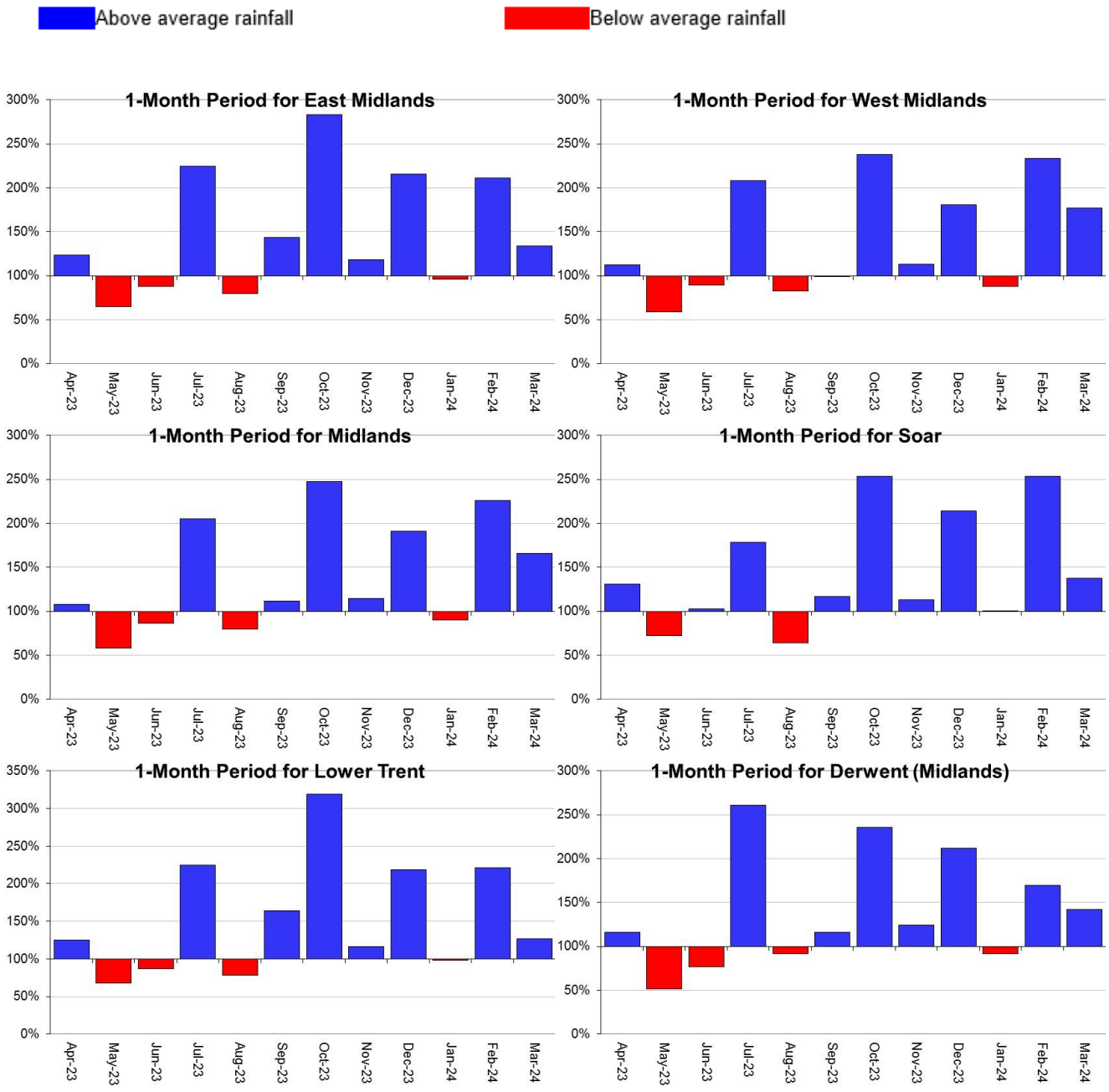
Figure 2.1: Total rainfall for hydrological areas for the current month (up to 31 March 2024), the last 3 months, the last 6 months, and the last 12 months, classed relative to an analysis of respective historic totals. Table available in the appendices with detailed information. Please see Section 7.4 for a map of the hydrological catchments for which rainfall is reported on.

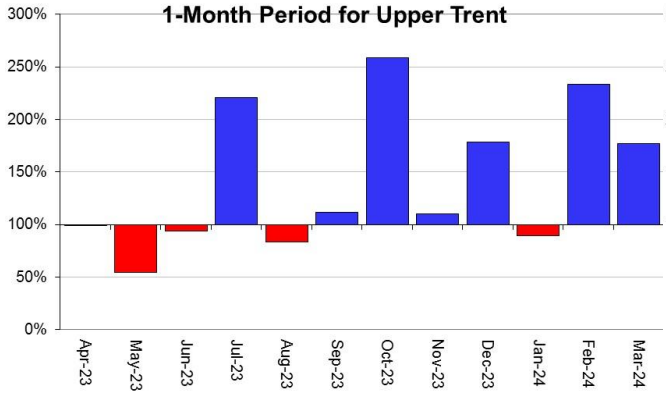


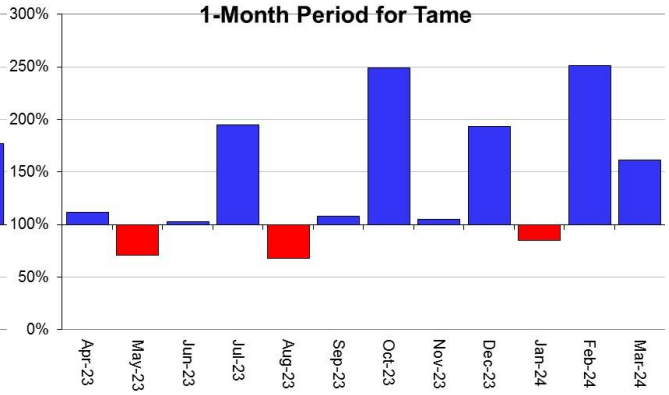
Rainfall data for 2023, extracted from Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. (Source: Environment Agency. Crown

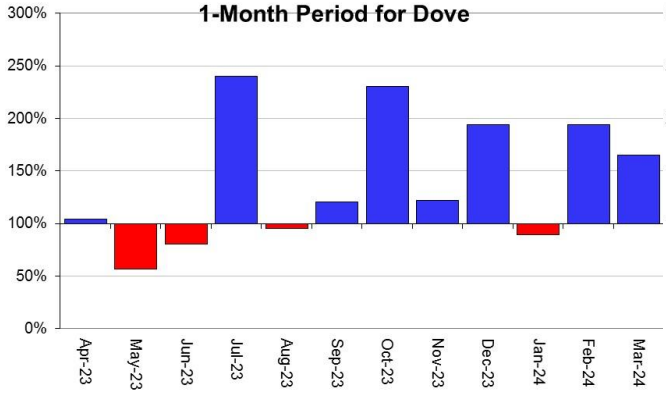
2.2 Rainfall charts

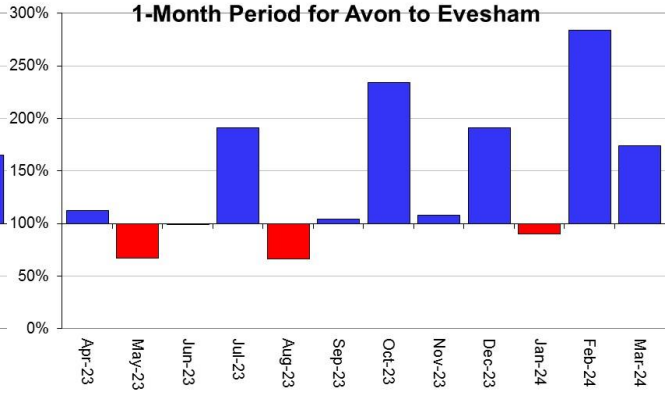
Figure 2.2: Monthly rainfall totals for the past 12 months as a percentage of the 1961 to 1990 long term average for hydrological areas across the Midlands region.

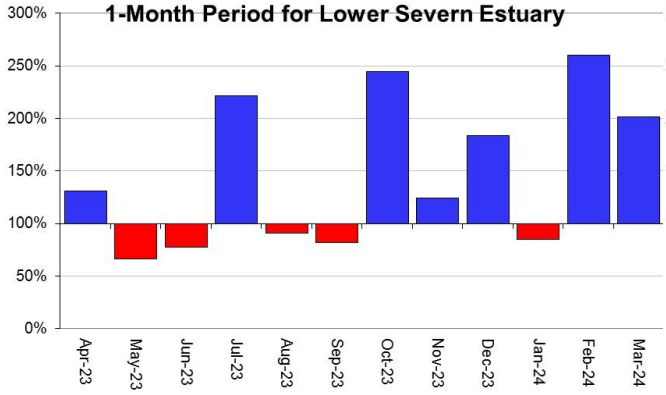


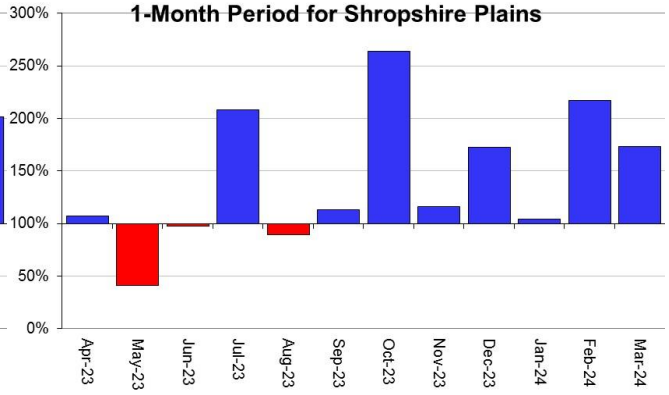

1-Month Period for Upper Trent
300%
250%
200%
150%
100%
50%
0%
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-24

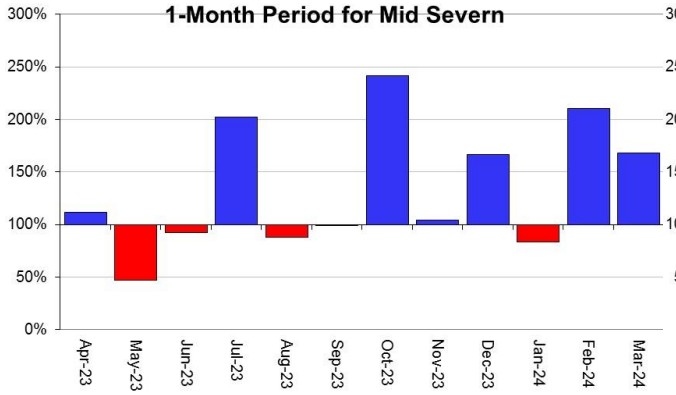

1-Month Period for Tame
300%
250%
200%
150%
100%
50%
0%
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-24

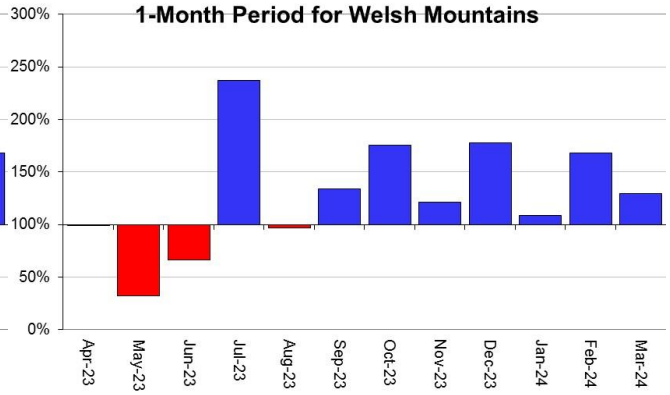

1-Month Period for Dove
300%
250%
200%
150%
100%
50%
0%
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-24

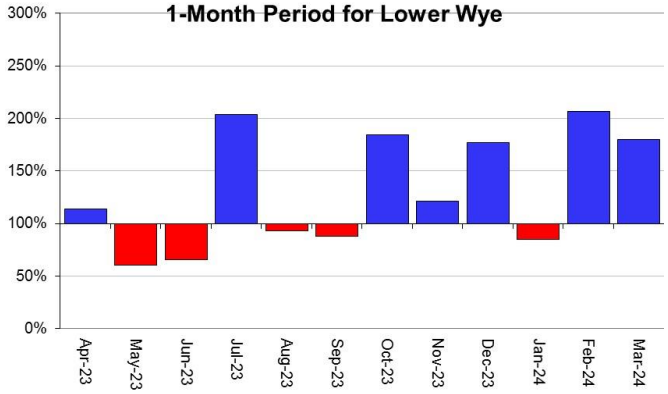

1-Month Period for Avon to Evesham
300%
250%
200%
150%
100%
50%
0%
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-24


1-Month Period for Lower Severn Estuary
300%
250%
200%
150%
100%
50%
0%
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-24


1-Month Period for Shropshire Plains
300%
250%
200%
150%
100%
50%
0%
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-24





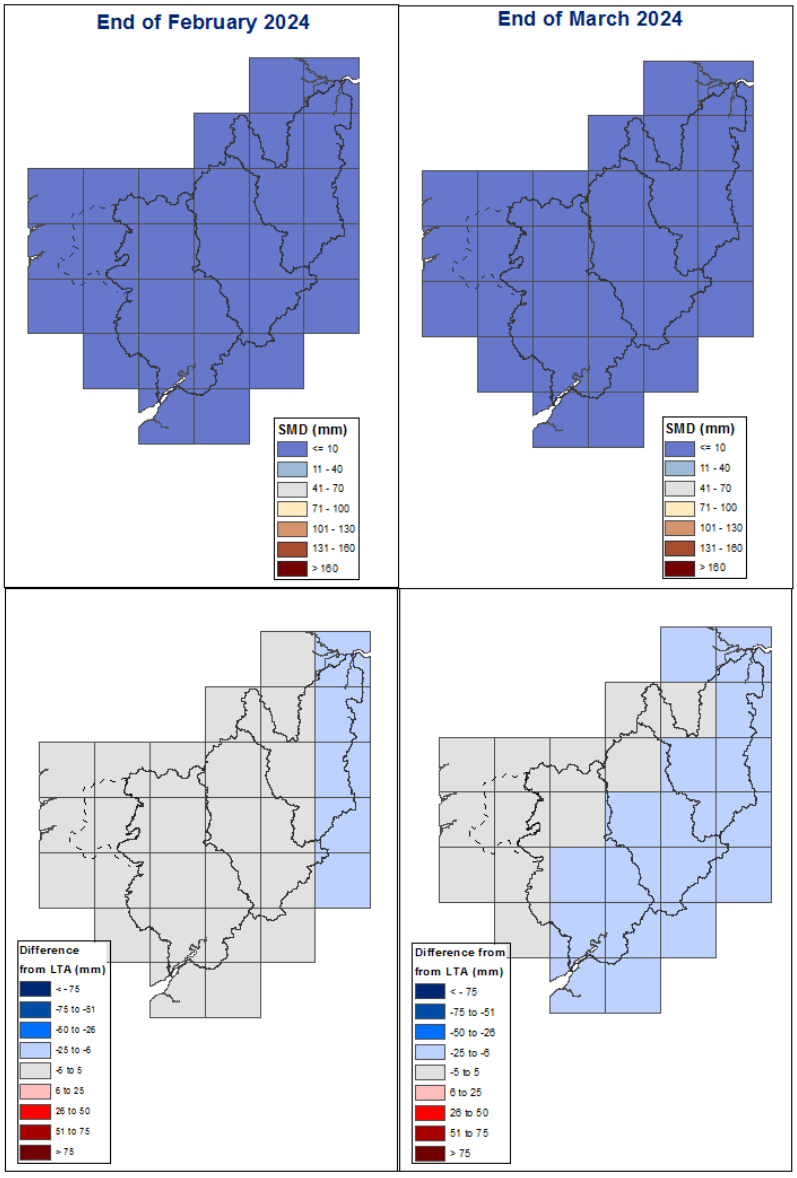


Daily Rainfall Tool data (from January 2023), final HadUK rainfall data until December 2022 (Source: Environment Agency/Met Office, Crown Copyright, 2024).

3 Soil moisture deficit

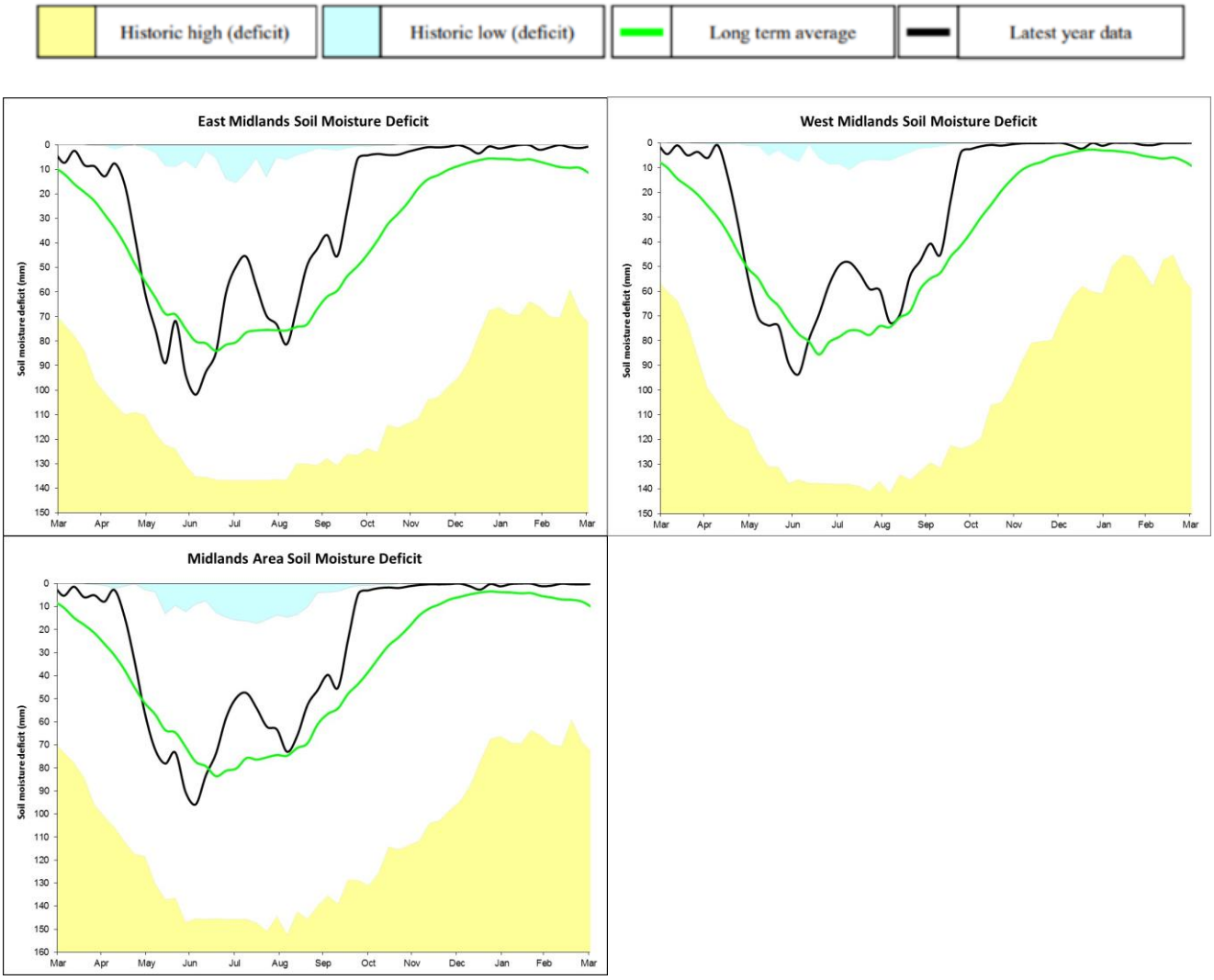
3.1 Soil moisture deficit map

Figure 3.1: Soil moisture deficits for weeks ending 31 March 2024. Shows the difference (mm) of the actual soil moisture deficit from the 1961 to 1990 long term average soil moisture deficits. MORECS data for real land use.



3.2 Soil moisture deficit charts

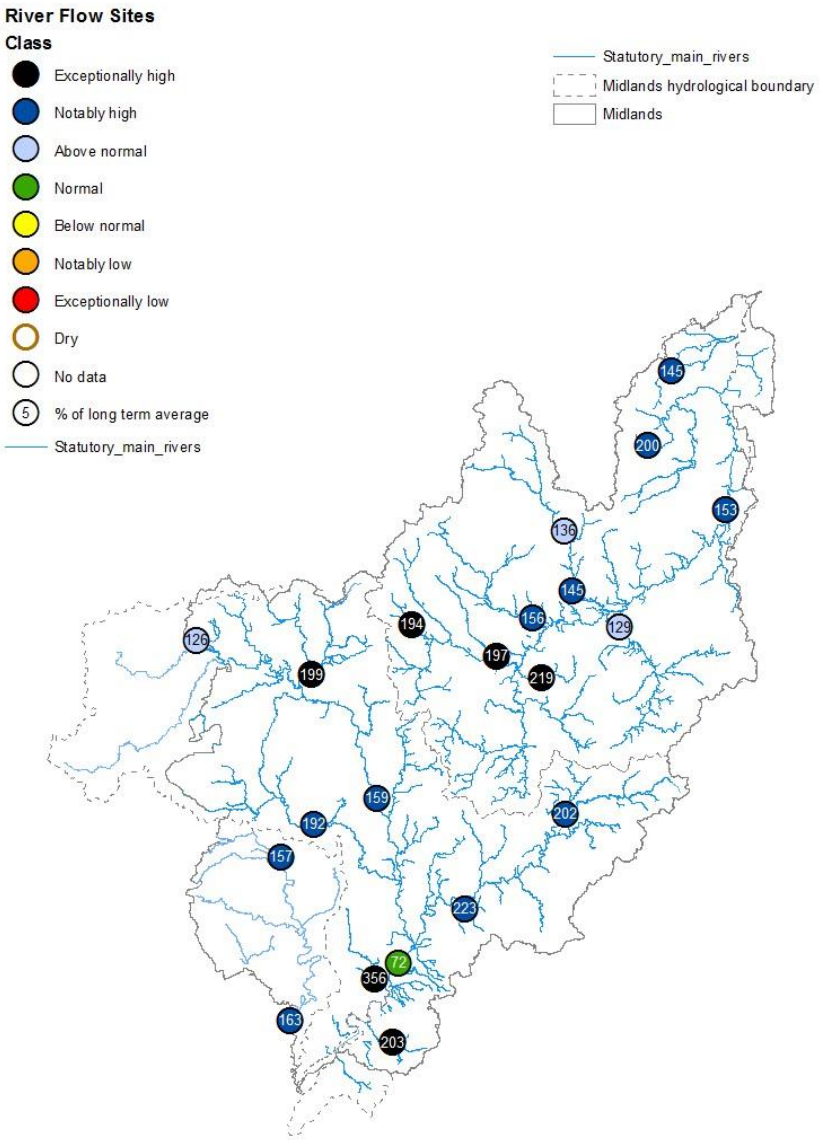
Figure 3.2: Latest soil moisture deficit charts for selected areas across the Midlands.



4 River flows

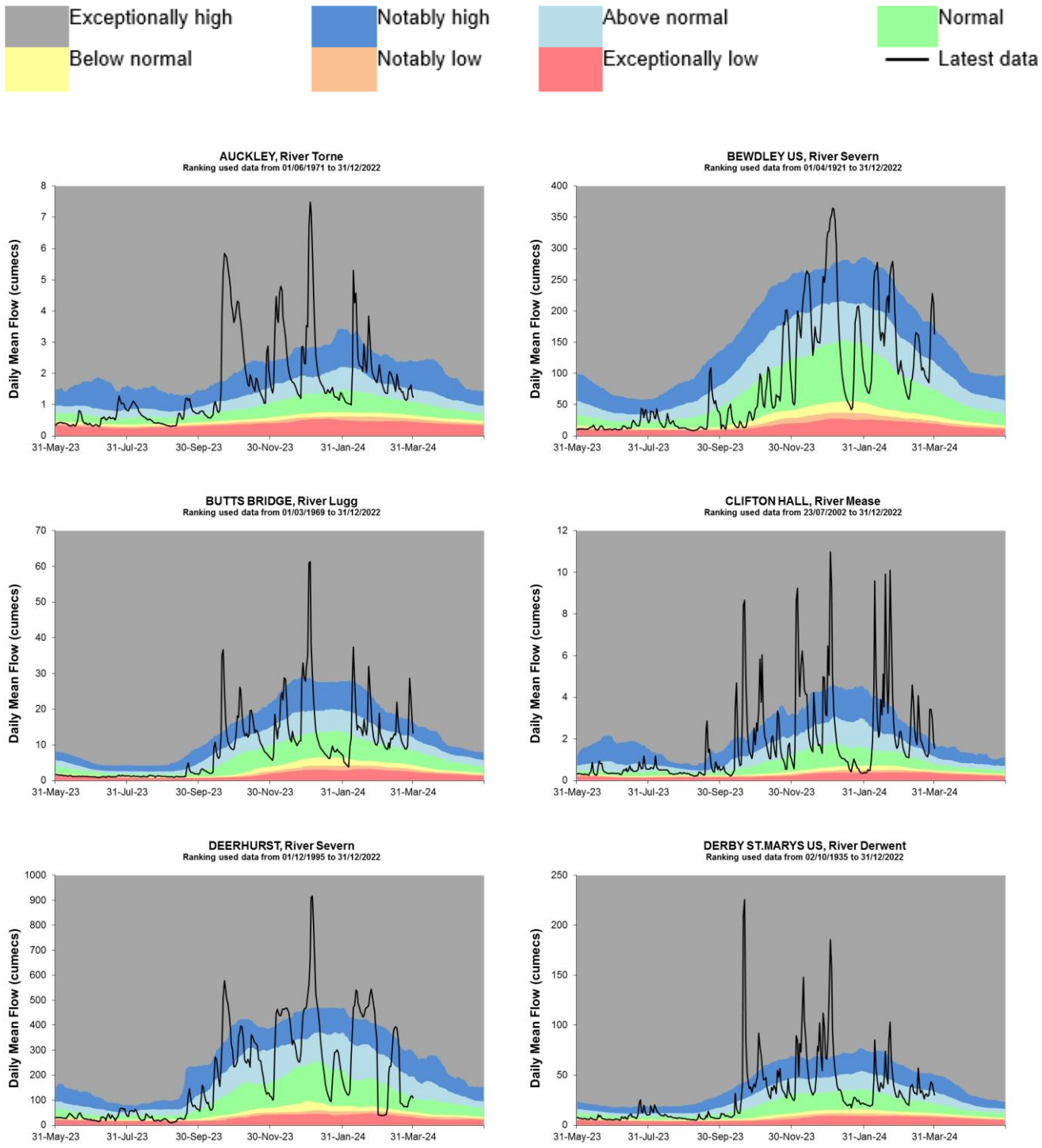
4.1 River flows map

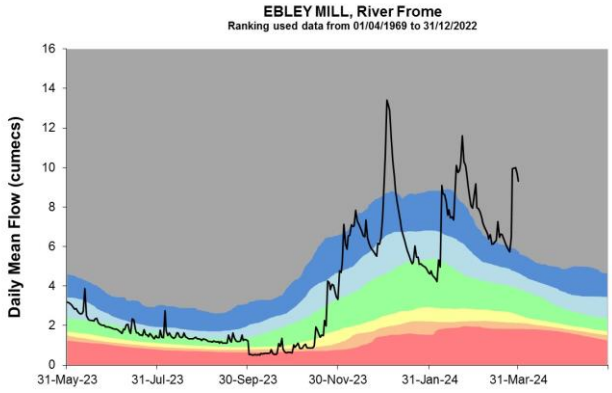
Figure 4.1: Monthly mean river flow for indicator sites for [March 2024], expressed as a percentage of the respective long term average and classed relative to an analysis of historic March monthly means. Table available in the appendices with detailed information.

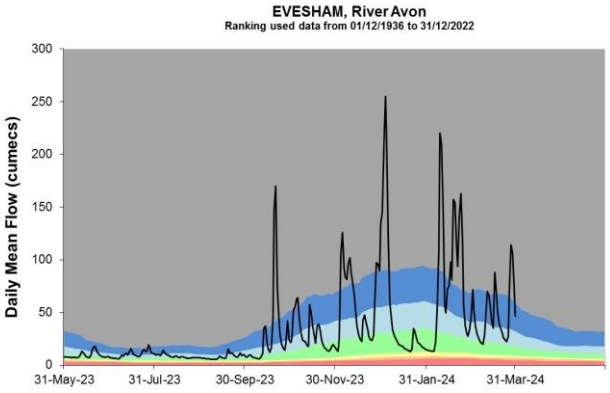


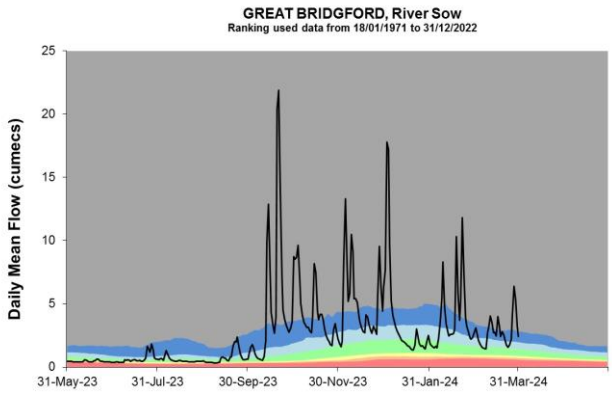
4.2 River flow charts

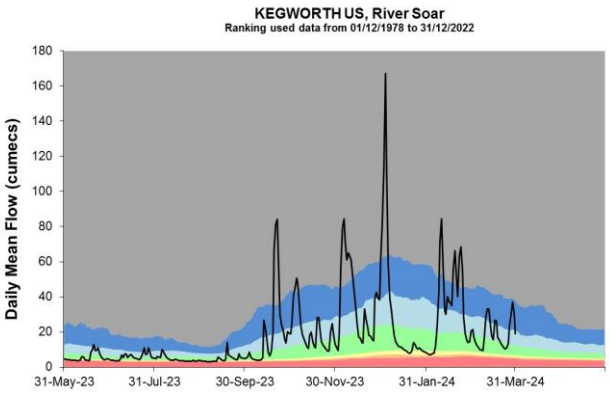
Figure 4.2: Daily mean river flow for index sites over the past 10 months, compared to an analysis of historic daily mean flows.

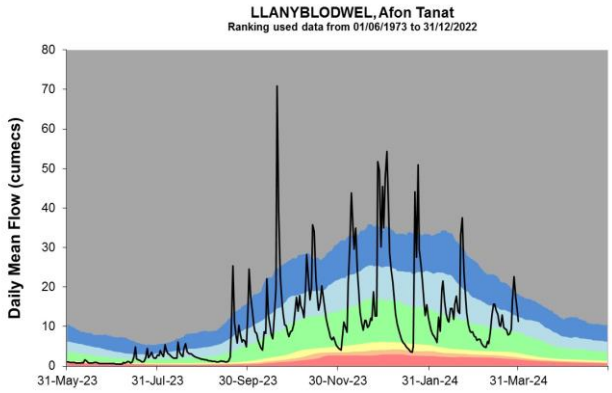


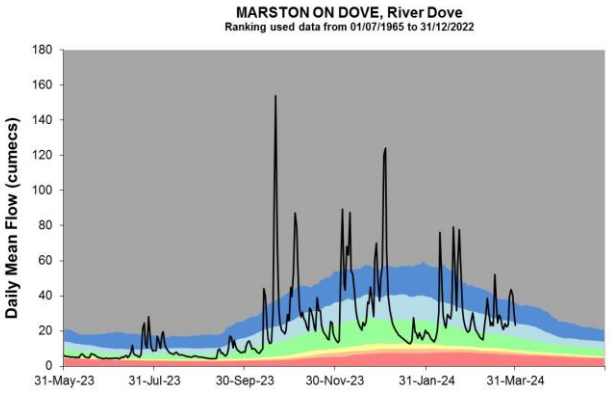

EBLEY MILL, River Frome
Ranking used data from 01/04/1969 to 31/12/2022
Daily Mean Flow (cumecs)
0
2
4
6
8
10
12
14
16
31-May-23
31-Jul-23
30-Sep-23
30-Nov-23
31-Jan-24
31-Mar-24

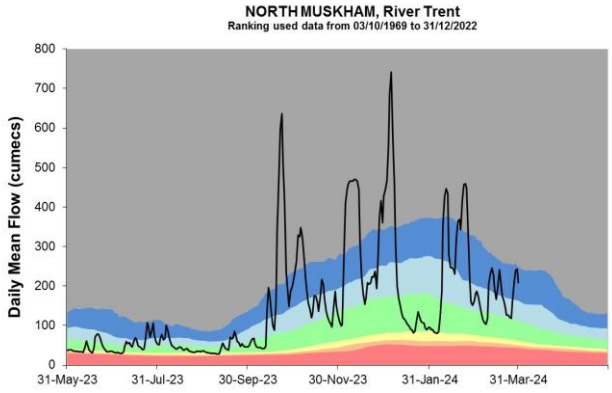

EVESHAM, River Avon
Ranking used data from 01/12/1936 to 31/12/2022
Daily Mean Flow (cumecs)
0
50
100
150
200
250
300
31-May-23
31-Jul-23
30-Sep-23
30-Nov-23
31-Jan-24
31-Mar-24

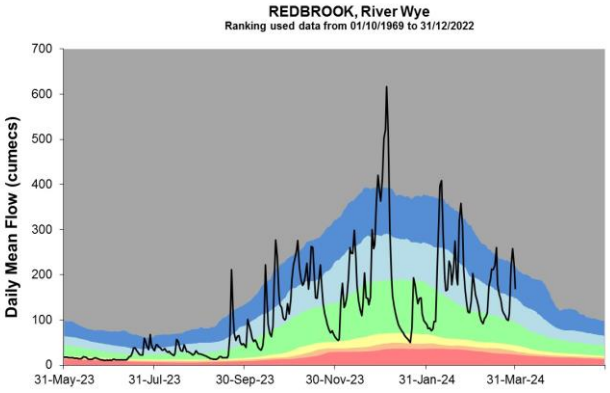

GREAT BRIDGFORD, River Sow
Ranking used data from 18/01/1971 to 31/12/2022
Daily Mean Flow (cumecs)
0
5
10
15
20
25
31-May-23
31-Jul-23
30-Sep-23
30-Nov-23
31-Jan-24
31-Mar-24


KEGWORTH US, River Soar
Ranking used data from 01/12/1978 to 31/12/2022
Daily Mean Flow (cumecs)
0
20
40
60
80
100
120
140
160
180
31-May-23
31-Jul-23
30-Sep-23
30-Nov-23
31-Jan-24
31-Mar-24

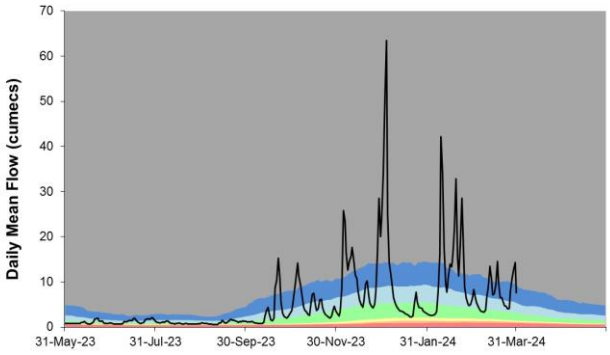

LLANYBLODWEL, Afon Tanat
Ranking used data from 01/06/1973 to 31/12/2022
Daily Mean Flow (cumecs)
0
10
20
30
40
50
60
70
80
31-May-23
31-Jul-23
30-Sep-23
30-Nov-23
31-Jan-24
31-Mar-24


MARSTON ON DOVE, River Dove
Ranking used data from 01/07/1965 to 31/12/2022
Daily Mean Flow (cumecs)
0
20
40
60
80
100
120
140
160
180
31-May-23
31-Jul-23
30-Sep-23
30-Nov-23
31-Jan-24
31-Mar-24

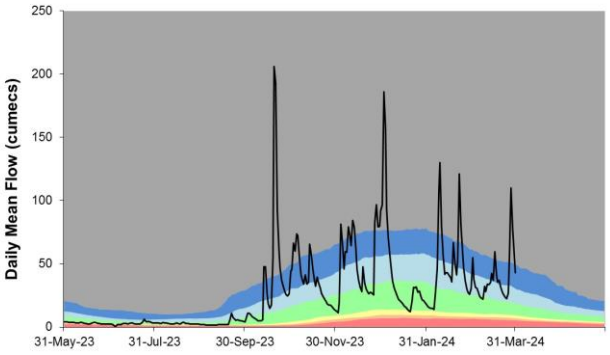

NORTH MUSKHAM, River Trent
Ranking used data from 03/10/1969 to 31/12/2022
Daily Mean Flow (cumecs)
0
100
200
300
400
500
600
700
800
31-May-23
31-Jul-23
30-Sep-23
30-Nov-23
31-Jan-24
31-Mar-24


REDBROOK, River Wye
Ranking used data from 01/10/1969 to 31/12/2022
Daily Mean Flow (cumecs)
0
100
200
300
400
500
600
700
31-May-23
31-Jul-23
30-Sep-23
30-Nov-23
31-Jan-24
31-Mar-24

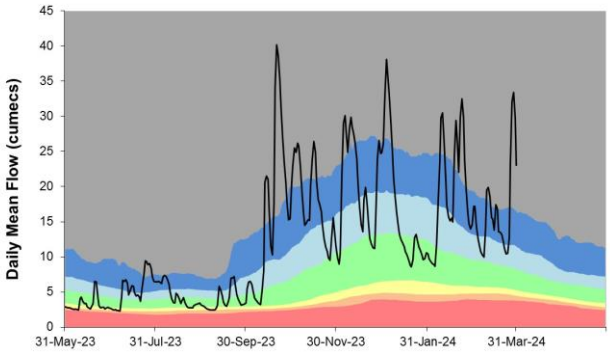
STARETON, River Avon
Ranking used data from 01/10/1962 to 31/12/2022



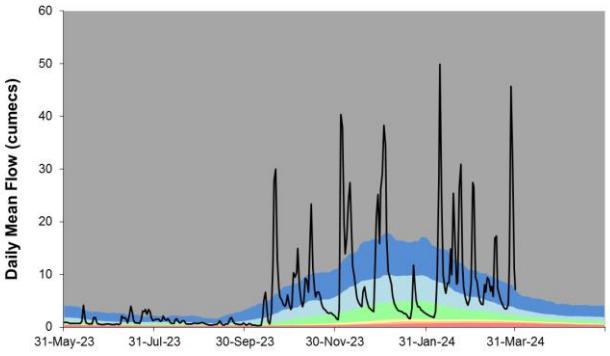
TENBURY, River Teme
Ranking used data from 01/10/1956 to 31/12/2022



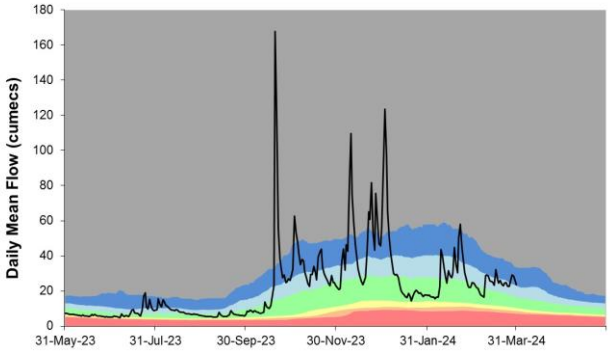
WALCOT, River Tern
Ranking used data from 01/10/1960 to 31/12/2022



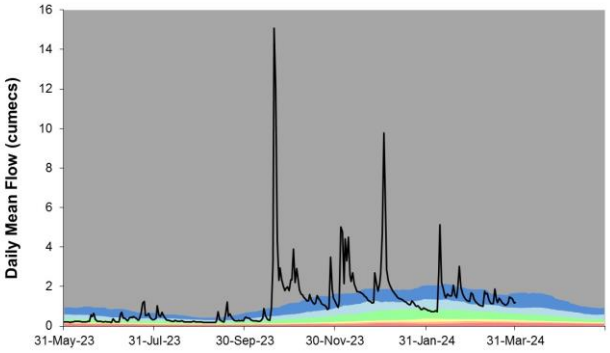
WEDDERBURN BRIDGE, River Leadon
Ranking used data from 21/07/1961 to 31/12/2022



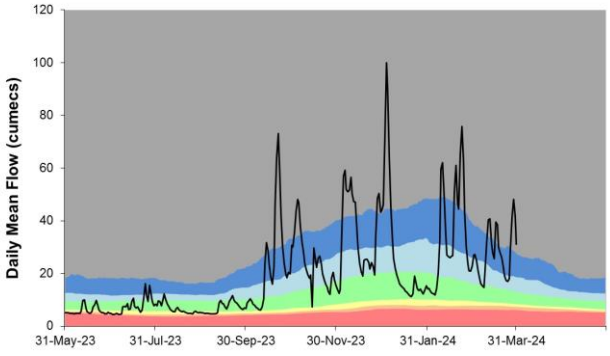
WHATSTANDWELL, River Derwent
Ranking used data from 01/10/1992 to 31/12/2022



WORKSOP, River Ryton
Ranking used data from 18/06/1970 to 31/12/2020



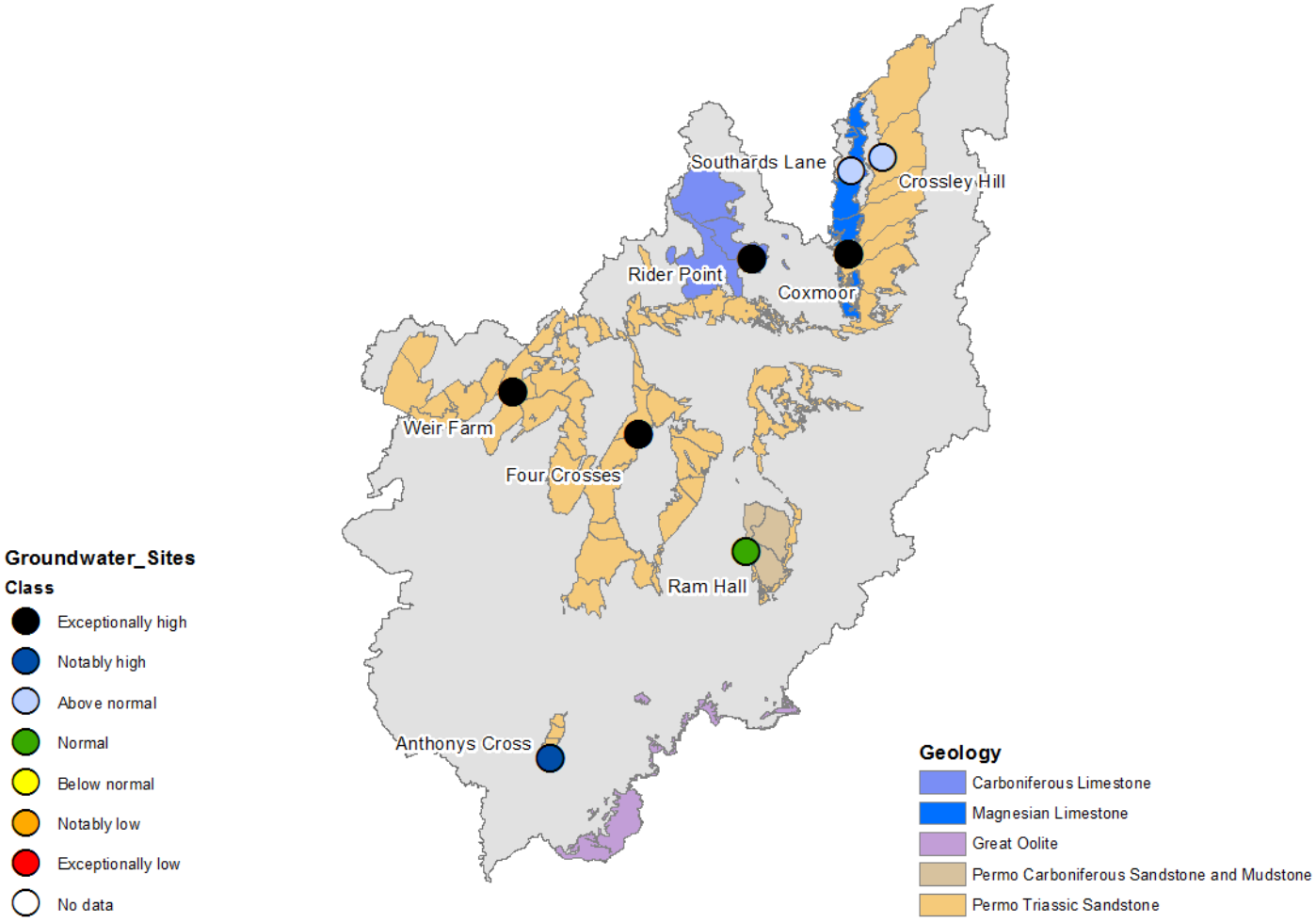
YOXALL, River Trent
Ranking used data from 01/10/1959 to 31/12/2022



5 Groundwater levels

5.1 Groundwater levels map

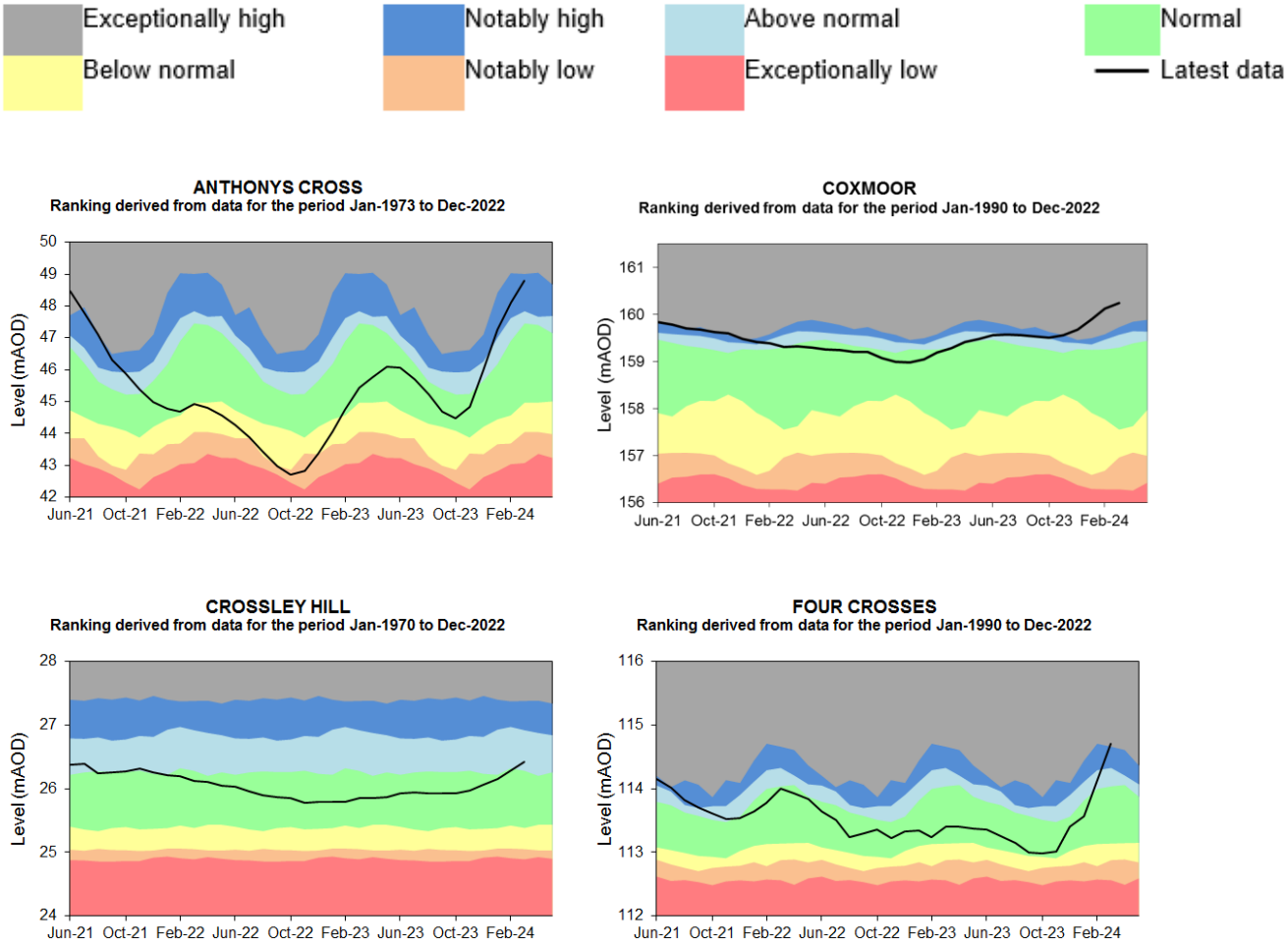
Figure 5.1: Groundwater levels for indicator sites at the end of [March 2024], classed relative to an analysis of respective historic March levels. Table available in the appendices with detailed information.

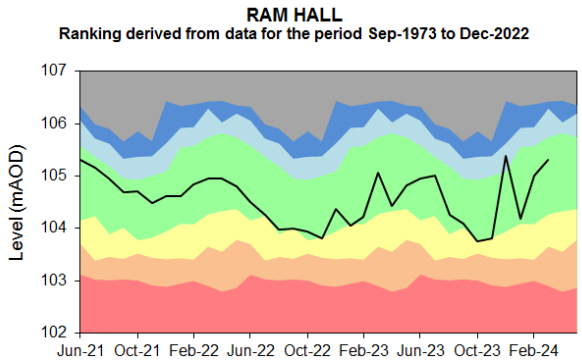


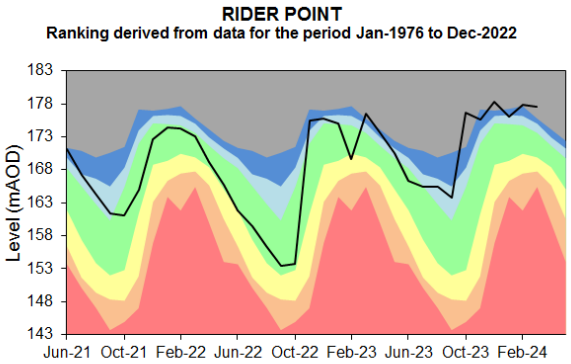
(Source: Environment Agency). Geological map reproduced with kind permission from UK Groundwater Forum, BGS copyright NERC. Crown copyright. All rights reserved. Environment Agency, 100024198, 2024.

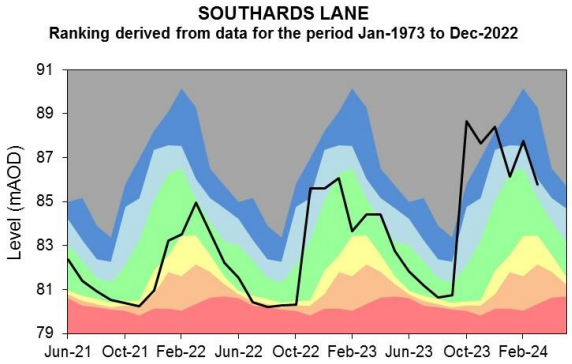
5.2 Groundwater level charts

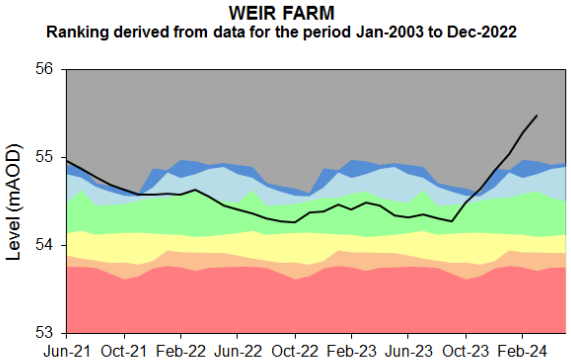
Figure 5.2: End of month groundwater levels at index groundwater level sites for major aquifers. 34 months compared to an analysis of historic end of month levels.







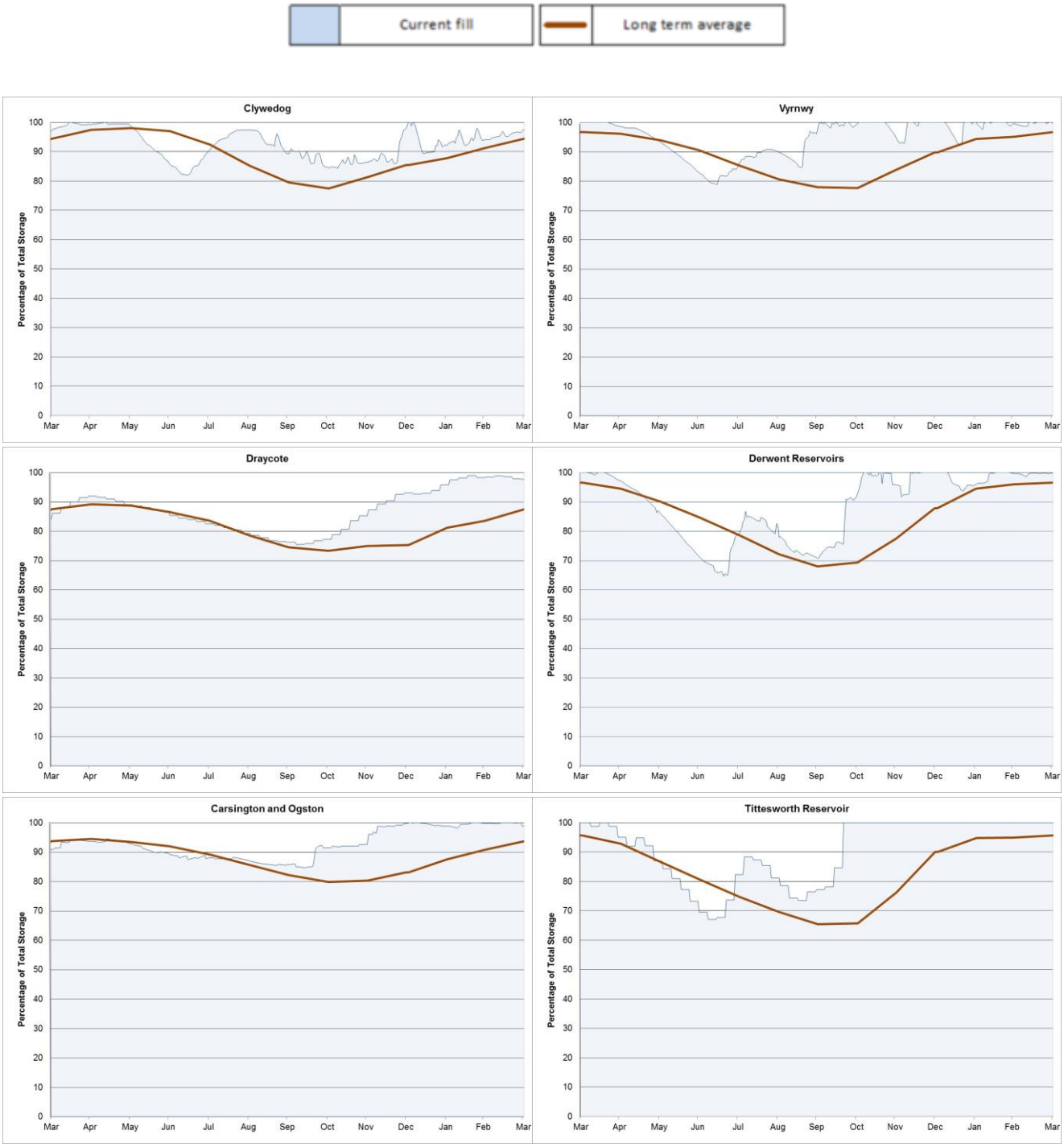


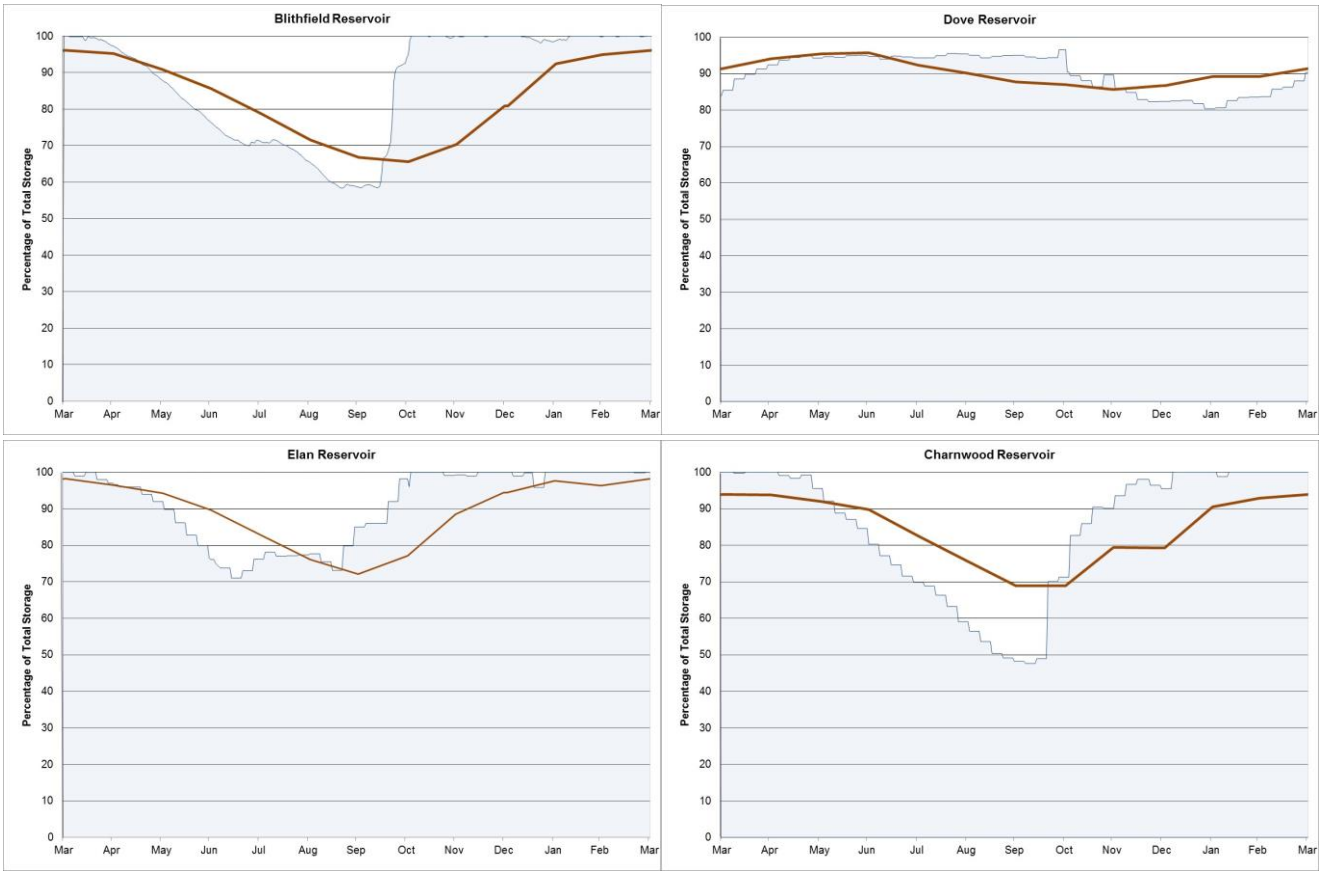


Source: Environment Agency, 2024.

6 Reservoir stocks

Figure 6.1: End of month regional reservoir stocks compared to long term average stocks. Note: Historic records of individual reservoirs and reservoir groups making up the regional values vary in length. Please see Section 7.5 for a map detailing the locality of the Midlands reservoirs reported on.





(Source: water companies).

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

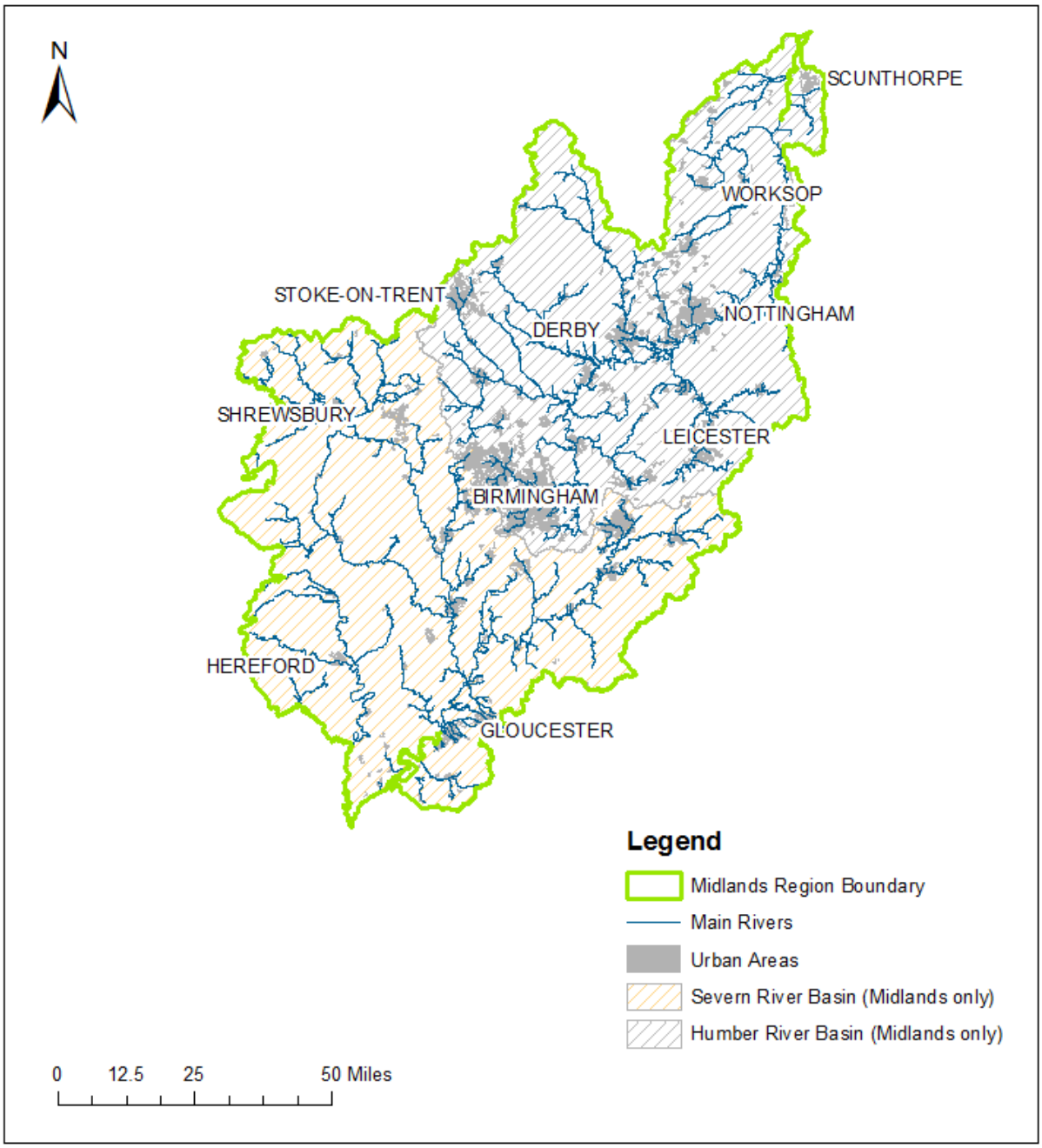
Value likely to fall within this band 8% of the time.

Exceptionally low

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

7.3 Midlands regional coverage

Figure 7.1: The Midlands regional boundary and the hydrological boundaries of the River Severn and River Trent.

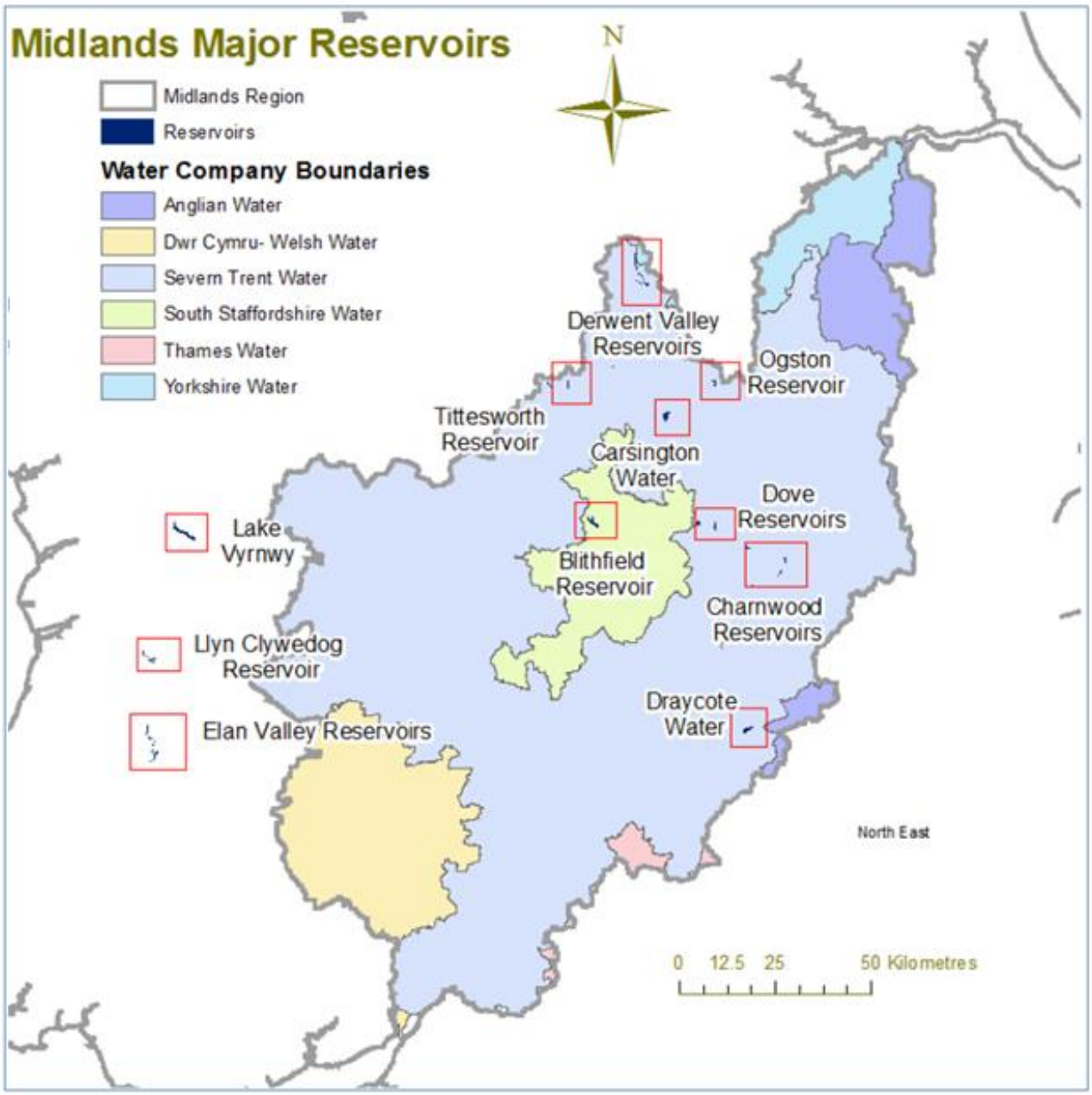


7.4 Midlands hydrological areas

Figure 7.2: The 12 hydrological areas that make up the Midlands region. Natural Resources Wales are not currently producing a monthly water situation report.

7.5 Midlands major reservoirs

Figure 7.3: Location of major reservoirs in the Midlands.



8 Appendices

8.1 Rainfall table

Hydrological area	Mar 2024 rainfall % of long term average 1961 to 1990	Mar 2024 band	Jan 2024 to March cumulative band	Oct 2023 to March cumulative band	Apr 2023 to March cumulative band
Avon To Evesham	174	Notably High	Exceptionally high	Exceptionally high	Exceptionally high
Derwent (midlands)	142	Notably High	Notably high	Exceptionally high	Exceptionally high
Dove	165	Exceptionally High	Exceptionally high	Exceptionally high	Exceptionally high
Lower Severn Estuary	201	Exceptionally High	Exceptionally high	Exceptionally high	Exceptionally high
Lower Trent	127	Above Normal	Exceptionally high	Exceptionally high	Exceptionally high
Lower Wye	180	Exceptionally High	Exceptionally high	Exceptionally high	Notably high
Mid Severn	168	Notably High	Exceptionally high	Exceptionally high	Exceptionally high
Shropshire Plains	173	Exceptionally High	Exceptionally high	Exceptionally high	Exceptionally high
Soar	138	Above Normal	Exceptionally high	Exceptionally high	Exceptionally high

Tame	161	Notably High	Exceptionally high	Exceptionally high	Exceptionally high
Upper Trent	177	Exceptionally High	Exceptionally high	Exceptionally high	Exceptionally high
Welsh Mountains	130	Above Normal	Notably high	Exceptionally high	Exceptionally high

8.2 River flows table

Site name	River	Catchment	Mar 2024 band	Feb 2024 band
Auckley	Torne	Torne	Notably high	Notably high
Bewdley Us	Severn	Severn Lower Mid	Notably high	Notably high
Butts Bridge	Lugg	Lugg	Notably high	Notably high
Clifton Hall	River Mease	Mease	Exceptionally high	Exceptionally high
Deerhurst	Severn	Severn Lower	Normal	Exceptionally high
Derby St.marys Us	Derwent	Derwent Der to Markeaton con	Notably high	Above normal
Ebley Mill	Frome (glos)	Frome Gloucs	Exceptionally high	Exceptionally high
Evesham	Avon (mi)	Avon Warwks Lower	Notably high	Exceptionally high
Great Bridgford	Sow	Sow Upper	Exceptionally high	Exceptionally high
Kegworth Us	Soar	Soar to Kingston Brook confl	Above normal	Exceptionally high
Llanyblodwel	Tanat	Severn Upper River Tanat	Above normal	Above normal

Marston On Dove	Dove (mi)	Dove Derb to Hilton Br confl	Notably high	Notably high
North Muskham	Trent	Trent to Cromwell	Notably high	Exceptionally high
Stareton	Avon (mi)	Avon Warwks Upper	Notably high	Exceptionally high
Tenbury	Teme	Teme	Notably high	Notably high
Walcot	Tern	Tern	Exceptionally high	Exceptionally high
Wedderburn Bridge	Leadon	Leadon	Exceptionally high	Exceptionally high
Whatstandwell	Derwent	Derwent Derb to Amber conf	Above normal	Above normal
Worksop	Ryton	Ryton Upper to Oldcoates Dyke	Notably high	Notably high
Yoxall	Trent	Trent to Tame Mease confl	Exceptionally high	Exceptionally high
Redbrook	Wye (herefordshire)	Wye H and W d s Lugg	Notably high	Above normal

8.3 Groundwater table

Site name	Aquifer	End of Mar 2024 band	End of Feb 2024 band
Anthony's Cross	Severn Vale Permo Triassic Sandstone	Notably high	Notably high
Coxmoor	Permo Triassic Sandstone	Exceptionally high	Exceptionally high
Crossley Hill	Permo Triassic Sandstone	Above normal	Normal
Four Crosses	Grimsby Ancholme Louth Limestone	Exceptionally high	Above normal
Ram Hall, Meriden	Grimsby Ancholme Louth Limestone	Normal	Normal
Rider Point Via Gellia	Carboniferous Limestone	Exceptionally high	Exceptionally high
Southards Lane, Bolsover	Magnesian Limestone	Above normal	Notably high
Weir Farm	Bridgnorth Sandstone Formation	Exceptionally high	Exceptionally high