River Severn Drought Order – Exceptional Shortage of Rainfall Case

Date: 17 August 2026

Version: 3

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Audit trail

Title:	River Severn Drought Order - Exceptional Shortage of Rainfall Case
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Version history:	v.1 – Initial draft v.2 – Updated following peer review comments v.3 – Final updates to charts/graphs to provide the latest situation updates

Introduction

Purpose

This document presents the technical analysis undertaken by the Environment Agency as evidence of an Exceptional Shortage of Rainfall (ESoR). An ESoR assessment has been undertaken as evidence of the need for the River Severn Drought Order.

The legal criteria that must be met in granting a drought order include: If the Secretary of State is satisfied that, by reason of an exceptional shortage of rainfall, a serious deficiency of supplies of water in any area exists or is threatened; or such a deficiency in the flow or level of water in any inland waterway to pose a serious threat to any flora or fauna which are dependent on those waters, exists or is threatened.

There is no prescriptive approach or set definition for assessing an ESoR. This assessment makes reference to guidance within the Environment Agency's Drought permits and drought orders - Supplementary guidance and the 'Hydrological guidance for the assessment of an Exceptional Shortage of Rainfall'.

Background

The River Severn is the longest river in the UK, travelling approximately 354 km (220 miles) from its source in Plynlimon down to the Severn Estuary. Excluding the River Wye, the catchment covers approximately 11,420 km^2 with an estuary over five miles wide. The Severn has twenty-one tributaries and flows through four counties, Powys, Shropshire, Worcestershire and Gloucestershire.

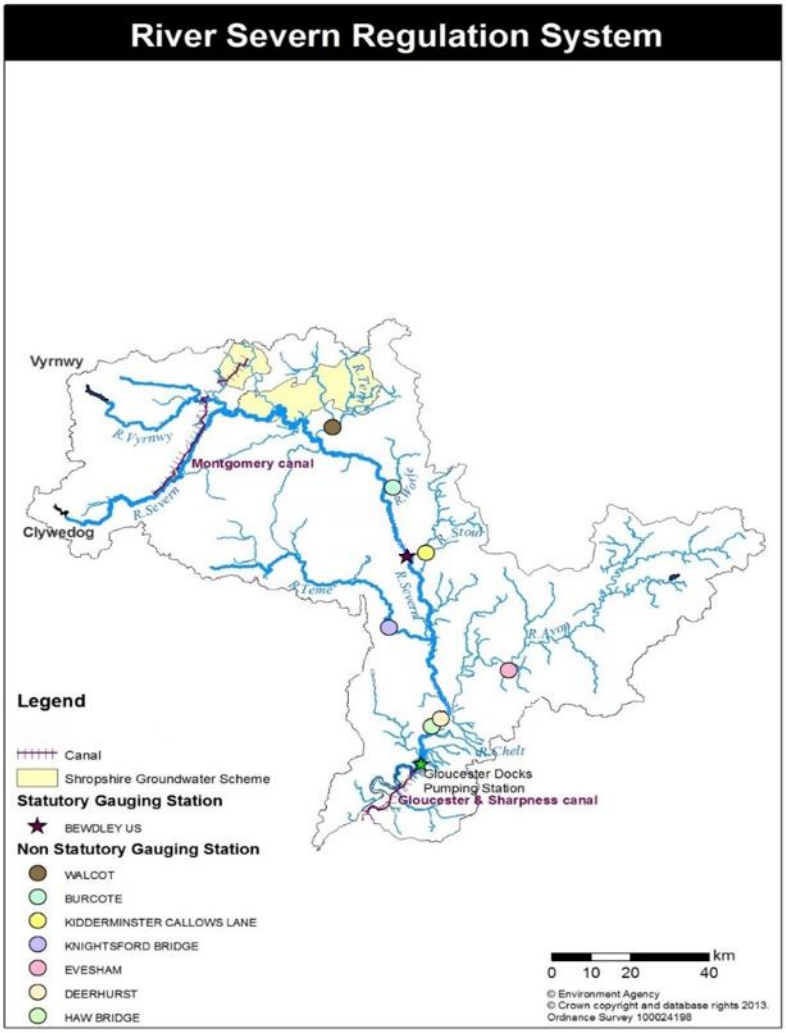

Figure 1 River Severn catchment with Environment Agency gauging stations

The Upper River Severn is augmented from water stored within Llyn Clywedog and Lake Vyrnwy reservoirs in Powys, and from boreholes that form the Shropshire Groundwater Scheme (SGS) in Shropshire. These help maintain the required flow at Bewdley gauging station situated approximately halfway down the catchment. The Environment Agency and Natural Resources Wales manage the daily releases according to the Clywedog Reservoir Joint Authority Act (1963), in cooperation with water companies under a Section 20 agreement, and the Canal & River Trust through Operating Agreements. This is known as River Severn regulation and is designed to provide a major source of water for public consumption, industry, electricity generation, navigation and agriculture, whilst maintaining an acceptable flow for the purposes of fisheries, conservation, recreation, effluent dilution and other in-river uses.

The Severn Estuary is designated as a Site of Special Scientific Interest (SSSI), a Special Protection Area (SPA), a Special Area of Conservation (SAC) and is included on the list of wetlands of international importance under the Ramsar Convention (Ramsar Site).

The Clywedog Reservoir Joint Authority Act (1963) requires that the river flow at Bewdley is regulated to a mean of 850 Ml/day over a five-day period, in order to provide adequate

freshwater flow in the estuary and to meet other demands. The Environment Agency is responsible for managing this requirement, in consultation with Natural Resources Wales. Llyn Clywedog reservoir provides the primary resource for regulation with release volumes up to 500 Ml/d. The SGS can provide up to 165 Ml/d net at Bewdley. The water bank from Lake Vyrnwy reservoir provides sustainable releases up to 70 Ml/d, higher releases can be made but the available water would soon be used up if they continued for too long.

The River Severn Drought Order aims to reduce the risk of running out of regulation water. By maintaining lower flows along the River Severn the remaining water can be used for longer. If the regulation system were to run out of water, river levels and flows along the River Severn would drop suddenly and some sections may dry up. Water supplies would be threatened, and significant environmental damage would be expected. The River Severn Drought Order is the Environment Agency's final drought management option; other measures would be in force, including abstraction restrictions and public appeals.

The River Severn Drought Order aims to ration out water by:

- capping the maximum release from Llyn Clywedog reservoir at 300 megalitres per day (Ml/d);
- reducing the prescribed flow at Bewdley from a single daily mean of 727 Ml/d and 850 Ml/d averaged over 5 days to a target of 730 Ml/d averaged over 5 days;
- reducing the prescribed flow at Bewdley below the target flow of 730 Ml/d averaged over days if River Severn Regulation releases can no longer achieve it;
- imposing a 5% reduction on water company licensed abstractions from the River Severn;
- imposing a 300 Ml/d abstraction cap on the Gloucester Docks abstraction for the Gloucester & Sharpness Canal, when flows at Deerhurst or Haw Bridge gauge are below 1200 Ml/d;
- capping releases from Llyn Clywedog reservoir to 1.5% of remaining storage if storage in Llyn Clywedog reservoir falls below the ‘emergency storage’ trigger.

The River Severn Drought Order is triggered by the volume of water in Llyn Clywedog reservoir, and not by the volume of water flowing in the river. Llyn Clywedog reservoir was constructed primarily to provide water for the Severn regulation system. Llyn Clywedog represents the largest supply of water currently available to support the River Severn and is critical to manage the water efficiently. Storage levels in the reservoir are monitored against the control curves in Figure 2 to track the available water resources and raise awareness of developing dry conditions. A forecast is used to also predict the next few months based on a user selected inflow timeseries.

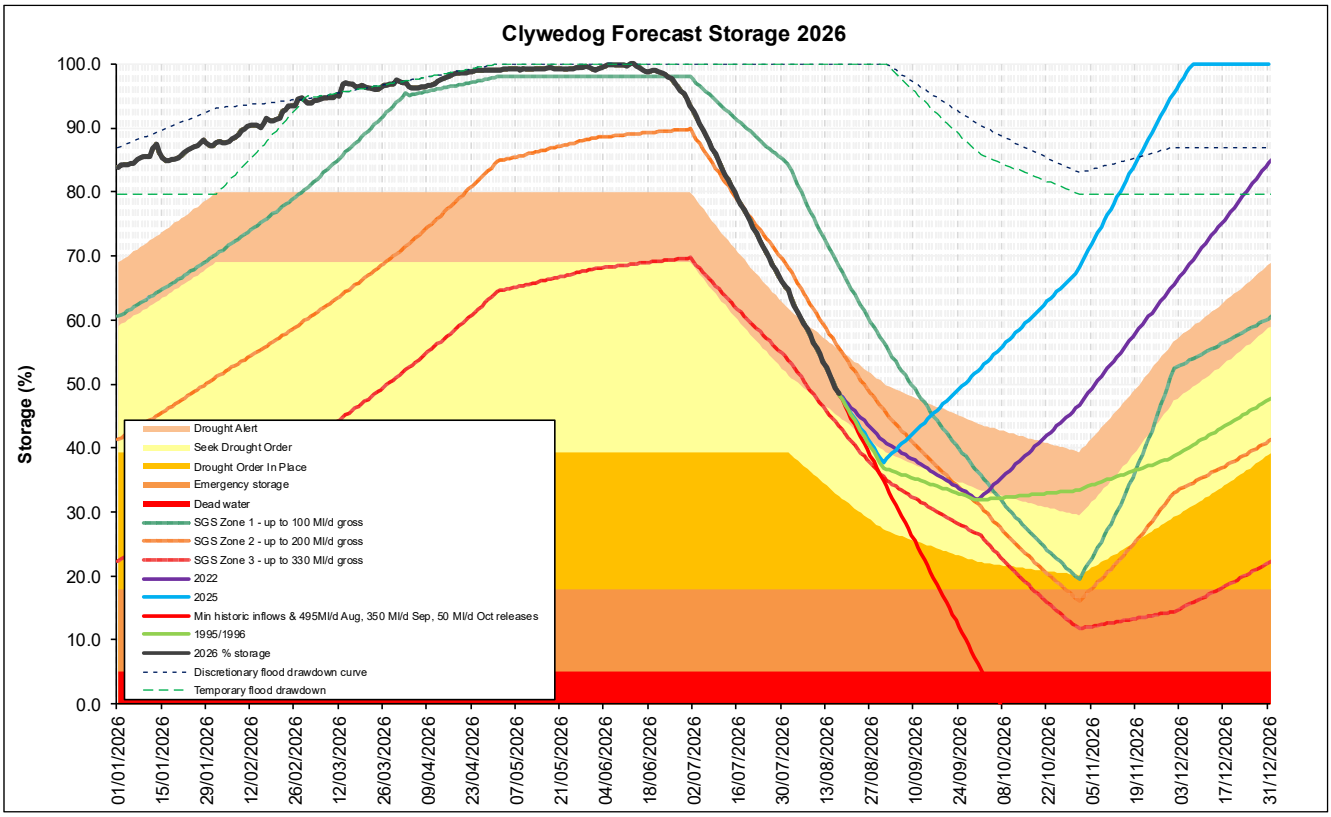

Figure 2 Clywedog Daily storage and forecast figures against the reservoir control curves (source – River Severn River Regulation Model) (updated to 17/08/2026)

As mentioned, the Bewdley gauging station is halfway down the River Severn catchment, but the lower half of the catchment can suffer from low flows after the regulated water is abstracted by the water companies in the upper half. The lower River Severn catchment at Deerhurst also contains the catchments of key rivers such as the River Teme, River Stour and River Avon. There is also the Haw Bridge gauging station nearby (approximately 3.5 km downstream of Deerhurst) and these two gauges are the last flow monitoring sites on the River Severn before the Severn Estuary. An assessment of whether there is an Exceptional Shortage of Rainfall case has been made on the Bewdley and Deerhurst catchment scales to help support any further drought plan work the EA may be considering, as both sites are key assessment points (with Hands off Flow [HoF] restrictions) within the Severn Corridor abstraction licensing strategy (ALS).

Assessment

Rainfall data

Areal rainfall data was obtained from the Met Office's HadUK and Environment Agency's Daily Rainfall Tool dataset which makes use of 1 km grid netCDF files of rainfall data. This dataset provides a monthly time series dating back to 1871.

This areal rainfall data from the EA DRT tool is calculated in accordance with British Standard BS7843-4:201296 with data from rain gauges that are quality controlled, have minimal missing data and are operated to British Standards.

HadUK and EA DRT data is also used in the Water Situation Report, which will allow for the use of charts and maps from that report as direct evidence during the assessment.

A bespoke shapefile was created of the River Severn catchment upstream of Bewdley and upstream of Deerhurst. This was then used as the rainfall catchment for the River Severn Regulation point at Bewdley gauging station and Deerhurst gauging station.

Period of analysis

The start of the period of analysis should reflect the point at which the "rainfall is lower than normal".

The start of the period of analysis that will be used in this investigation will be 1st March 2026. This is because rainfall received for both Bewdley and Deerhurst catchments fell below 100% of the monthly 1991-2020 long-term average (LTA) in March and continued to remain below their monthly LTAs up until July. March was the month which started the rainfall accumulation deficit. The analysis period will end on 31st July 2026.

Table 1: 2026 monthly rainfall figures as a percentage of their 1991-2020 LTA

2026 monthly rainfall as a percentage of their 1991-2020 LTA							
Catchment	Jan	Feb	Mar	Apr	May	Jun	Jul
Bewdley	131	170	88	51	83	68	8
Deerhurst	147	202	76	44	77	81	5

Geographical extent of analysis

A bespoke catchment has been created upstream of Bewdley gauging station on the River Severn and this has been used to create the rainfall statistics. The catchment is 4334 km^2 and stretches across the border into Wales.

The bespoke catchment includes the Welsh Mountains, Shropshire Plains and a portion of the Mid Severn hydrological areas, which the Environment Agency regularly report on within Water Situation Reports.

The Welsh Mountains hydrological area typically receives the highest rainfall of the catchment, keeping the reservoirs (Llyn Clywedog and Lake Vyrnwy) well filled. The SGS is located in the Shropshire Plains hydrological area, underneath which sits the key sandstone aquifer which SGS abstracts from. These are the key sources of supply for the River Severn Regulation Scheme.

As the key gauge for the River Severn Regulation Scheme, the Bewdley catchment was chosen for this analysis.

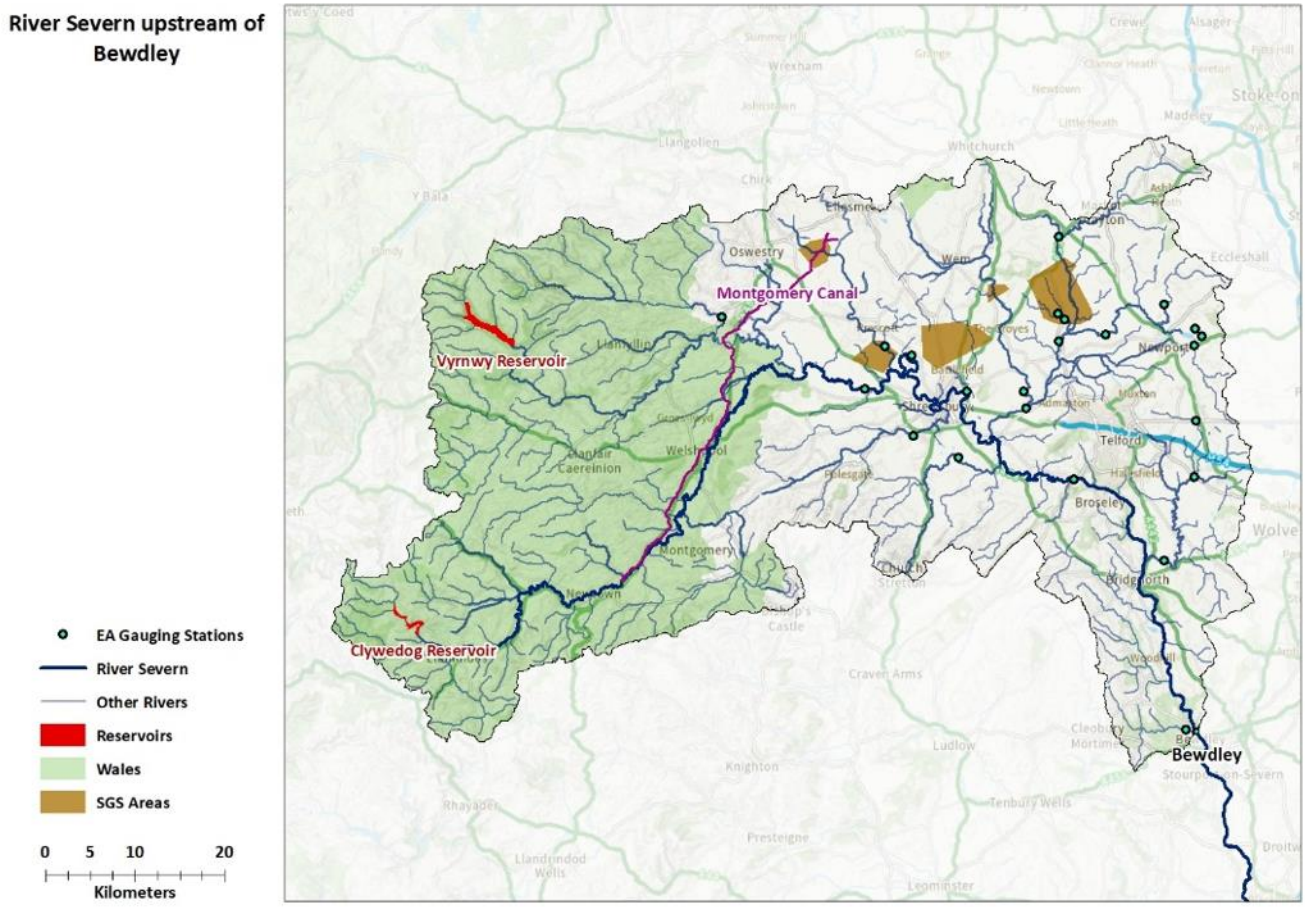

Figure 3 Bespoke River Severn catchment upstream of Bewdley gauging station where rainfall analysis has been undertaken

A bespoke catchment has also been created upstream of Deerhurst gauging station to create rainfall statistics. The catchment is 9866 km^2 and includes the entirety of the Bewdley catchment area. This catchment, along with the areas mentioned above in the Bewdley catchment, include the Lower Severn Estuary and Avon to Evesham hydrological areas.

This catchment includes the vast majority of the River Severn catchment (compare Figure 1 to Figure 4). As for the purposes of the River Severn Drought Order, this catchment is highly relevant, with many licencing decisions based off flows at Deerhurst to ensure sufficient flow gets into the Severn Estuary protected site.

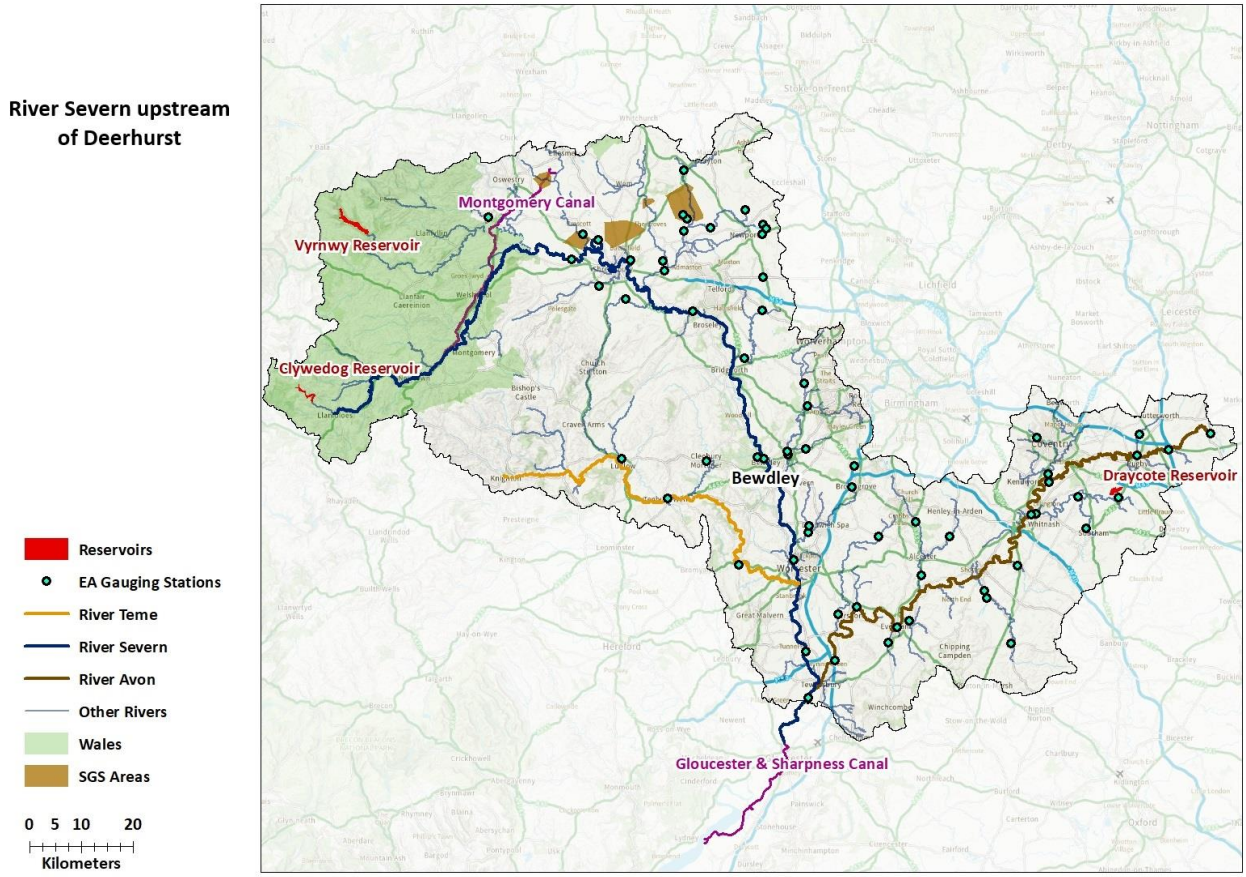

Figure 4 Bespoke River Severn catchment upstream of Deerhurst gauging station where rainfall analysis has been undertaken

Technical rainfall analysis methods

This assessment uses the following technical analysis methods to demonstrate an ESoR:

Bewdley catchment:

- Monthly rainfall as percentage of LTA
- Cumulative rainfall
- Rainfall rankings
- Rainfall probabilistic ranking using Cunnane banding
- Rainfall return periods
- Standard Precipitation Index
- Number of wet days

Deerhurst catchment:

- Monthly rainfall as percentage of LTA
- Cumulative rainfall
- Rainfall rankings
- Rainfall probabilistic ranking using Cunnane banding
- Rainfall return periods
- Standard Precipitation Index
- Number of wet days

Bewdley – Monthly rainfall as percentage of LTA

Rainfall totals in the Bewdley catchment have been consistently below 100% of the LTA since March 2026. July was a particularly extreme month for lack of rainfall total, recording only 8% of the July LTA.

Table 2: Bewdley rainfall table showing actual rainfall amounts, the LTA and the rainfall amount as a percentage of LTA

Bewdley	2026 Rainfall (mm)	LTA (1991-2020)	% of LTA
March	60.2	68.5	88
April	32.9	64.9	51
May	55.4	66.5	83
June	50.6	74.1	68
July	5.6	72.0	8

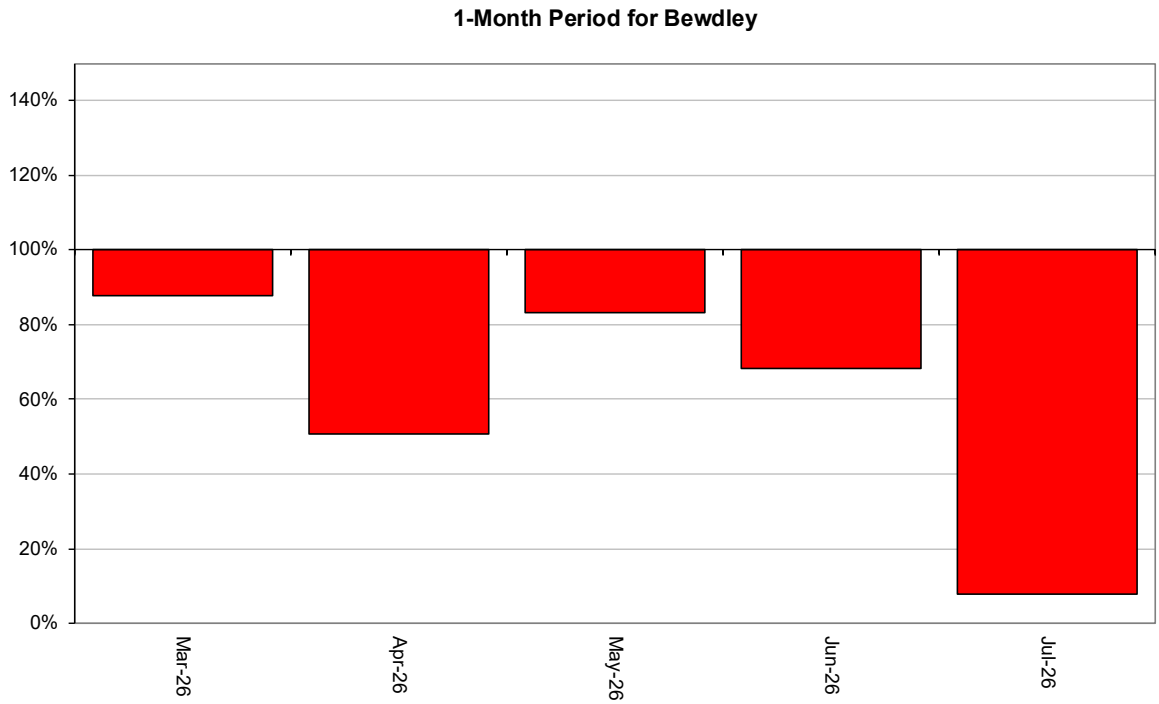

Figure 5: March-July Bewdley catchment rainfall as a percentage of LTA

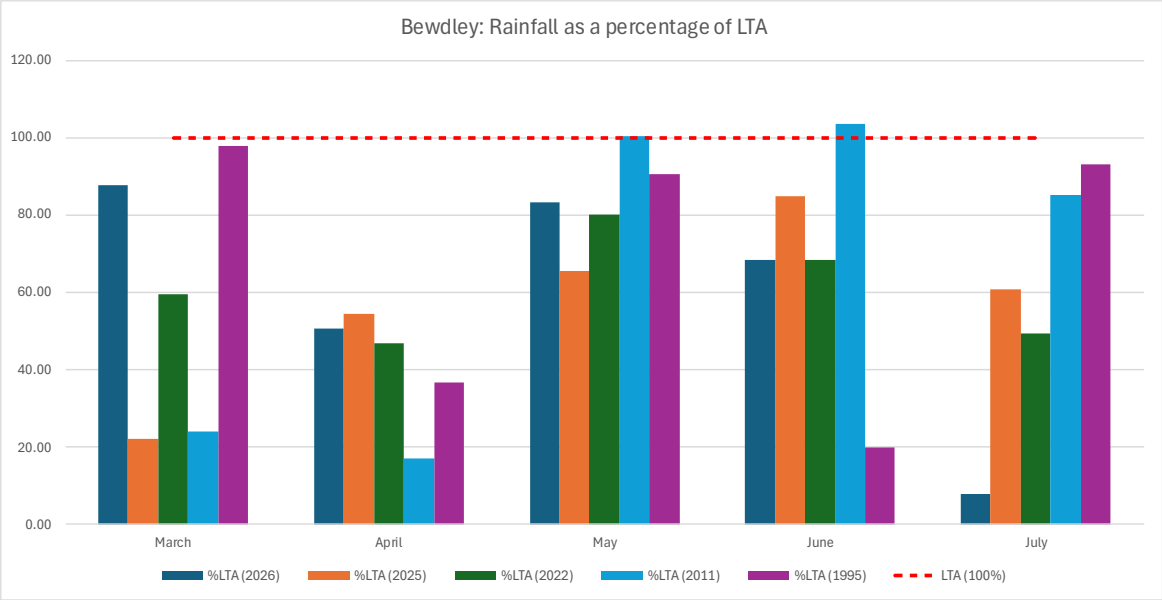

Figure 6: Bewdley catchment rainfall as a percentage of LTA compared to other drought years

Bewdley – Cumulative rainfall

Rainfall accumulation has been low since March 2026, and the rainfall accumulated up until the end of July aligns with previous recent drought years, largely as a result of the 8% of total July rainfall for 2026. The March - July cumulative rainfall totals have been tracking well below the LTA.

The River Severn Drought Order was prepared for in 2022; however timely rainfall negated the need for it. In 2025, rainfall was higher in the Welsh Mountains compared to the other relevant rainfall catchments in England, and Clywedog was able to be sufficiently topped up to prevent the need for a drought order.

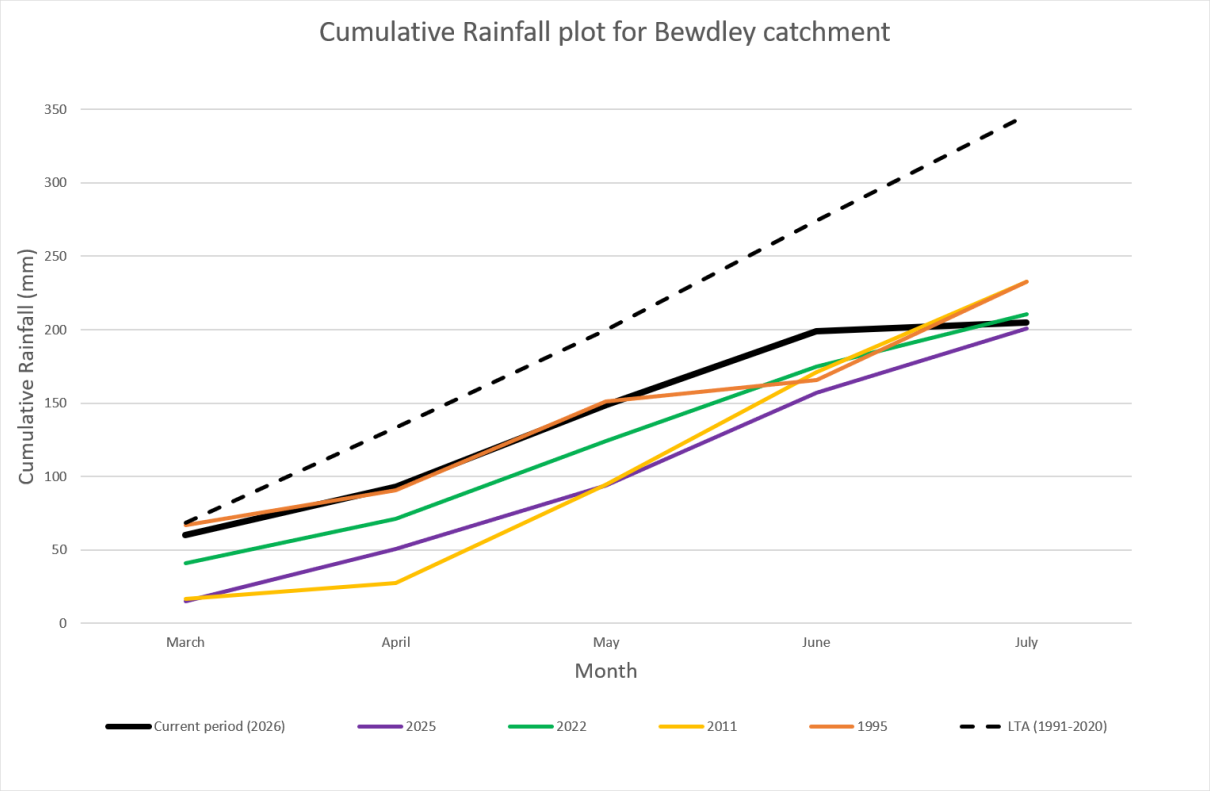

Figure 7 Cumulative rainfall for Bewdley catchment compared to recent drought years and the LTA

The River Severn Drought Order was applied for and operated in 1976, 1984 and 1989. The March – July periods for these years have been presented on Figure 8. The accumulated rainfall totals for this year (2026) between March – July are not far off from the historic years back in 1976 and 1984.

During 1989, a drought order was applied for. Water levels in Clywedog were low. However, the reason for these low levels are unclear, as the rainfall accumulation totals for March – July are much closer to the 1991-2020 LTA compared to all other River Severn Drought Order years.

It needs to be noted that the River Severn Regulation has changed over the years. We manage Clywedog and Vyrnwy reservoirs differently and have more boreholes operational within the SGS than we may have done during the earlier comparison droughts. This also makes scenario comparison difficult due to differences in operational practices especially with very historic years.

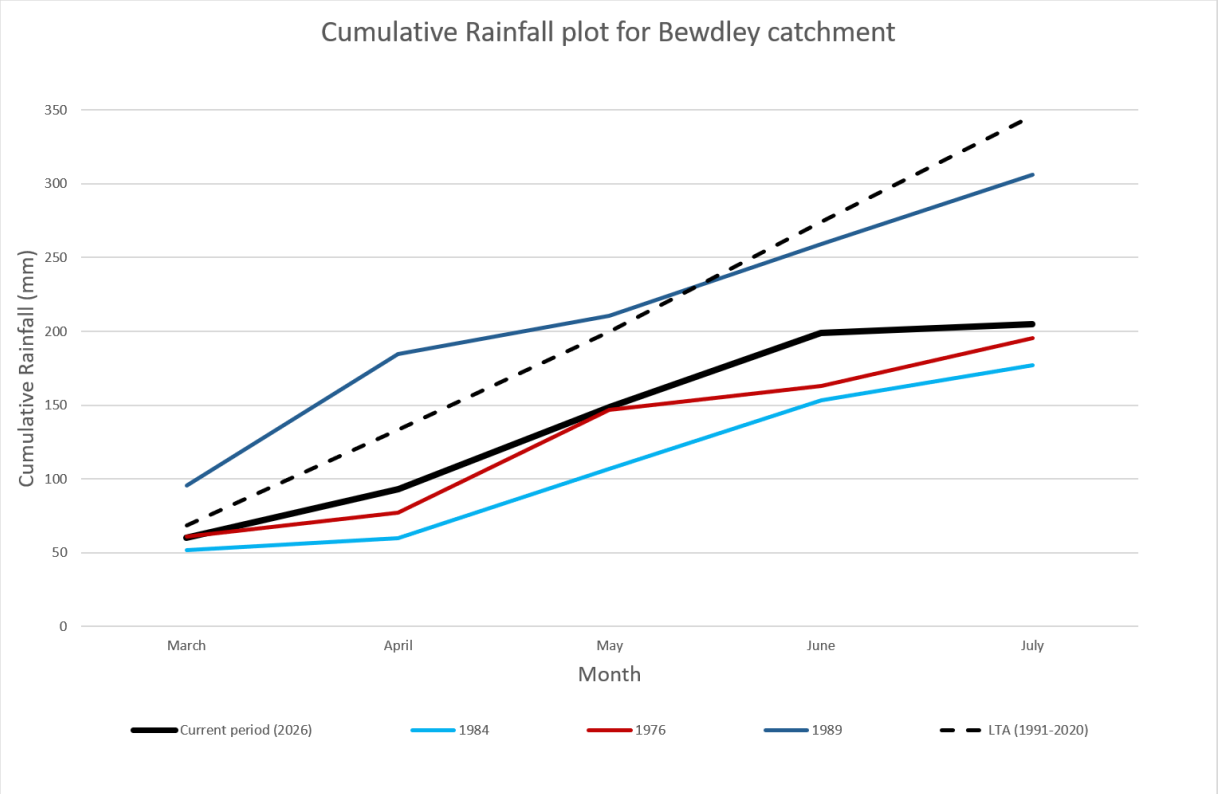

Figure 8 Cumulative rainfall for Bewdley catchment compared to River Severn Drought Order years and the LTA

Bewdley – Rainfall ranking

We have provided a table of rainfall rankings to put 2026 in context. The rainfall total from each year, including the current period, is then ranked to determine the ranking of the current period relative to the historic context. This method is especially useful for understanding the severity of a dry weather event relative to known drought years in the historic record. A label of 1 means the rainfall is ranked as the driest on record. We have done this for one month and for cumulative months since March 2026.

This analysis shows that in July, Bewdley catchment ranked 1st driest for that month since the beginning of the record in 1871 (a total of 156 years). All the accumulated rainfall totals from July (1-month to 5-months) rank in the top 10 driest accumulation periods for July.

Table 3 Rainfall rankings for Bewdley catchment with accumulated rainfall totals rankings with ranking in the top 10 shaded red

Bewdley						
Driest (ranking)						
		Mar 26	Apr 26	May 26	Jun 26	Jul 26
	1 month	67	32	63	57	1
	2 month		38	34	48	5
	3 month			34	22	2
	4 month				30	4
	5 month					7

Bewdley – Rainfall probabilistic ranking using Cunnane bandings

We have used the EA's rainfall probability ranking spreadsheet tool to rank historic monthly rainfall data, starting from 1871 onwards, against seven descriptive categories, ranging from exceptionally high to exceptionally low, known as Cunnane bandings. These bandings set the hydrological statistics into context and can tell us how likely the accumulated totals were to occur relative to historic rainfall totals (i.e. the probability of their occurrence).

By the end of July, the 1, 2, 3, 4 and 5-month rainfall accumulations for the Bewdley catchment are classified as 'Exceptionally Low'.

Code	Label
EH	Exceptionally High
NH	Notably High
AN	Above Normal
N	Normal
BN	Below Normal
NL	Notably Low
EL	Exceptionally Low

Station:	Bewdley											
Period (Months) of Cumulative Rainfall	Period Ending in Month											
	Aug 25	Sep 25	Oct 25	Nov 25	Dec 25	Jan 26	Feb 26	Mar 26	Apr 26	May 26	Jun 26	Jul 26
1	28.2	144.3	82.6	164.3	116.1	125.4	132.8	60.2	32.9	55.4	50.6	5.6
	EL	NH	N	NH	N	AN	NH	N	BN	N	N	EL
	37%	191%	83%	170%	104%	131%	170%	88%	51%	83%	68%	8%
2	72.0	172.5	226.9	246.9	280.4	241.5	258.2	193.0	93.1	88.3	106.0	56.2
	EL	N	AN	AN	NH	AN	EH	NH	BN	BN	N	EL
	49%	114%	130%	126%	135%	117%	148%	132%	70%	67%	75%	38%
3	135.0	216.3	255.1	391.2	363.0	405.8	374.3	318.4	225.9	148.5	138.9	111.6
	NL	N	N	NH	AN	NH	NH	NH	N	BN	BN	EL
	61%	97%	101%	144%	118%	134%	131%	131%	107%	74%	68%	52%
4	178.6	279.3	298.9	419.4	507.3	488.4	538.6	434.5	351.3	281.3	199.1	144.5
	NL	N	N	AN	EH	NH	EH	NH	AN	N	BN	EL
	62%	94%	92%	121%	132%	121%	141%	123%	114%	101%	73%	52%
5	213.9	322.9	361.9	463.2	535.5	632.7	621.2	598.8	467.4	406.7	331.9	204.7
	EL	N	N	N	AN	EH	NH	EH	AN	AN	N	EL
	60%	89%	91%	110%	117%	132%	129%	133%	112%	109%	94%	59%

Figure 9 EA's rainfall probabilistic ranking using Cunnane bandings with the key above. The past 12 months are shown with 1 to 5 month accumulations for each month. The numbers represent the rainfall percentage against the 1991-2020 LTA

Bewdley – Rainfall return periods

By fitting a suitable statistical distribution to the rainfall data, we estimated the probability of occurrence of the cumulative rainfall deficit based on the historic rainfall time series for Bewdley.

According to the guidance the Gamma distribution was the best fit for the 5-month (March to July) rainfall totals at Bewdley. The normal distribution was also tested but it had a few visual outliers. Lognormal was also tested, and although the visual fit was similar to Gamma, it was not chosen as it had a higher Anderson-Darling (AD) compared to Gamma.

Based on the Gamma distribution the rainfall for March to July 2026 (204.7 mm) has a chance of occurring 2.77% of the time with a return period of 36 years (with variation of 20 to 83 year return because of the extremity of such rainfall events).

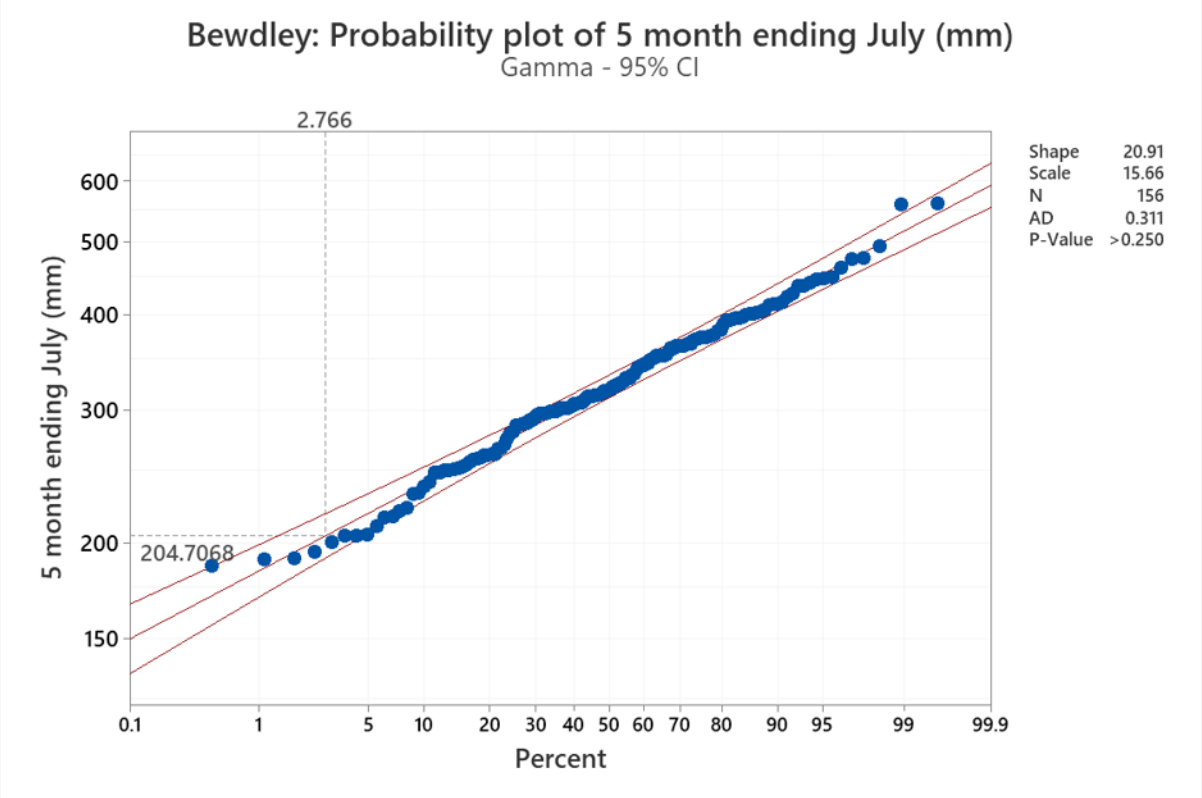

Figure 10 Gamma distribution for Bewdley. It has a 1 in 36-year event return. Lower bound 1 in 20-year return. Upper bound 1 in 83-year return.

Bewdley – Standard Precipitation Index

From the Hydrological guidance for assessment of ESoR - “The Standardised Precipitation Index (SPI) (Svoboda et al, 2012) is an internationally recognised, and recommended method of characterising how the observed cumulative rainfall deviates from the climatological average (Hayes et al, 2011). It is a statistical indicator that compares rainfall totals in a particular location or catchment over a chosen period with the long-term rainfall distribution for the same period.” Therefore, the Standardised Precipitation Index (SPI) is a tool that gives an indication of an emerging drought because it normalises rainfall based on historic record, with the size of the SPI value denoting how wet or dry any given period has been.

Our analysis shows that conditions in the Bewdley catchment have been dry for the past few months leading up to July. The SPI value of –1.92 for the 5-month (March – July) accumulation rainfall period shows that conditions have been ‘Severely dry’.

Bewdley		1m acc.	2m acc.	3m acc.	4m acc.	5m acc.
SPI	Mar-26	-0.03				
	Apr-26	-0.81	-0.62			
	May-26	-0.17	-0.82	-0.75		
	Jun-26	-0.28	-0.53	-1.02	-0.94	
	Jul-26	-3.55	-2.03	-1.90	-2.12	-1.92

SPI value	Colour Key	SPI Category
>=2.0		Extremely wet
+1.5 to + 1.99		Severely wet
+1.0 to + 1.49		Moderately wet
-0.99 to +0.99		Near normal
-1.0 to +1.49		Moderately dry
-1.5 to -1.99		Severely dry
<=-2.0		Extremely dry

Figure 11 SPI results for Bewdley catchment with key to the side

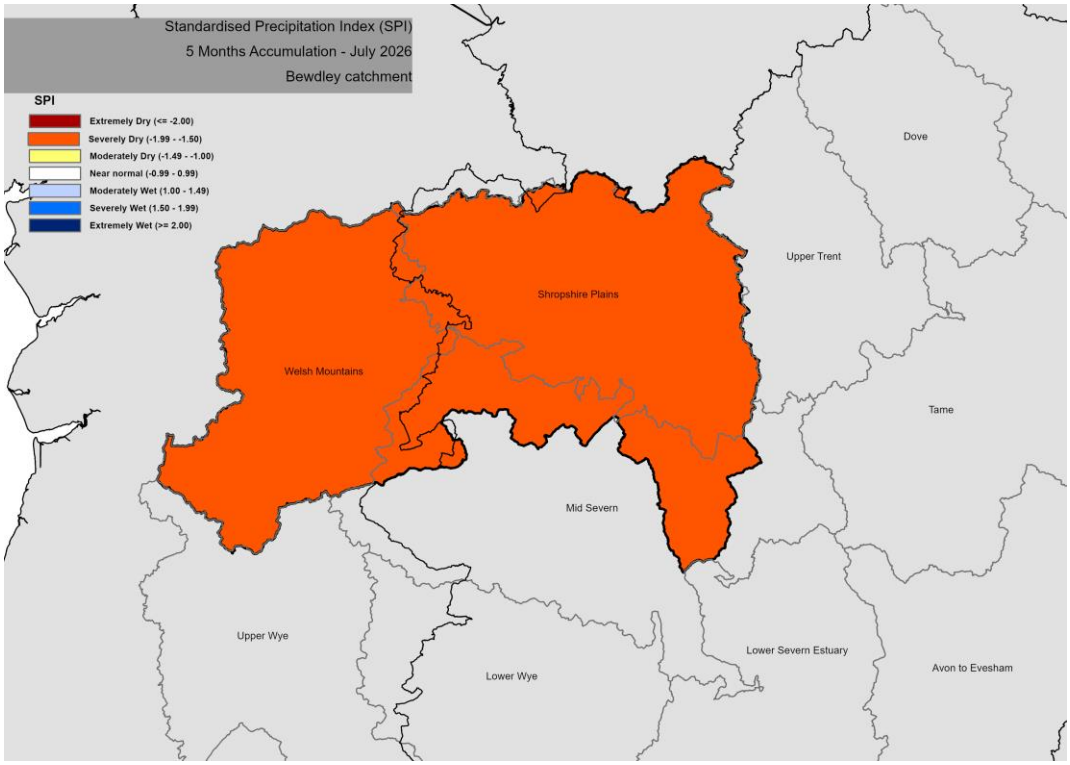

Figure 12 SPI map for the 5-month July accumulation for Bewdley catchment

Bewdley – Number of wet days

We have calculated the number of wet days across the 5-month period up to July where there has been rainfall above or equal to 1 mm. We have compared this to the average number of wet days between 1991-2020. Numerous prolonged dry periods occurred during the spring and summer so far. Compared to the LTA, there have been significantly lower number of wet days in 2026. Coupled with the increased temperatures, this has resulted in the decline of flows in the Severn.

Table 4 Number of wet days (>=1 mm) in Bewdley catchment in 2026 compared to the 1991-2020 LTA

Number of wet days in the Bewdley catchment	2026	1991-2020 LTA
Mar	11	14
Apr	11	13
May	12	13
Jun	11	13
Jul	2	13

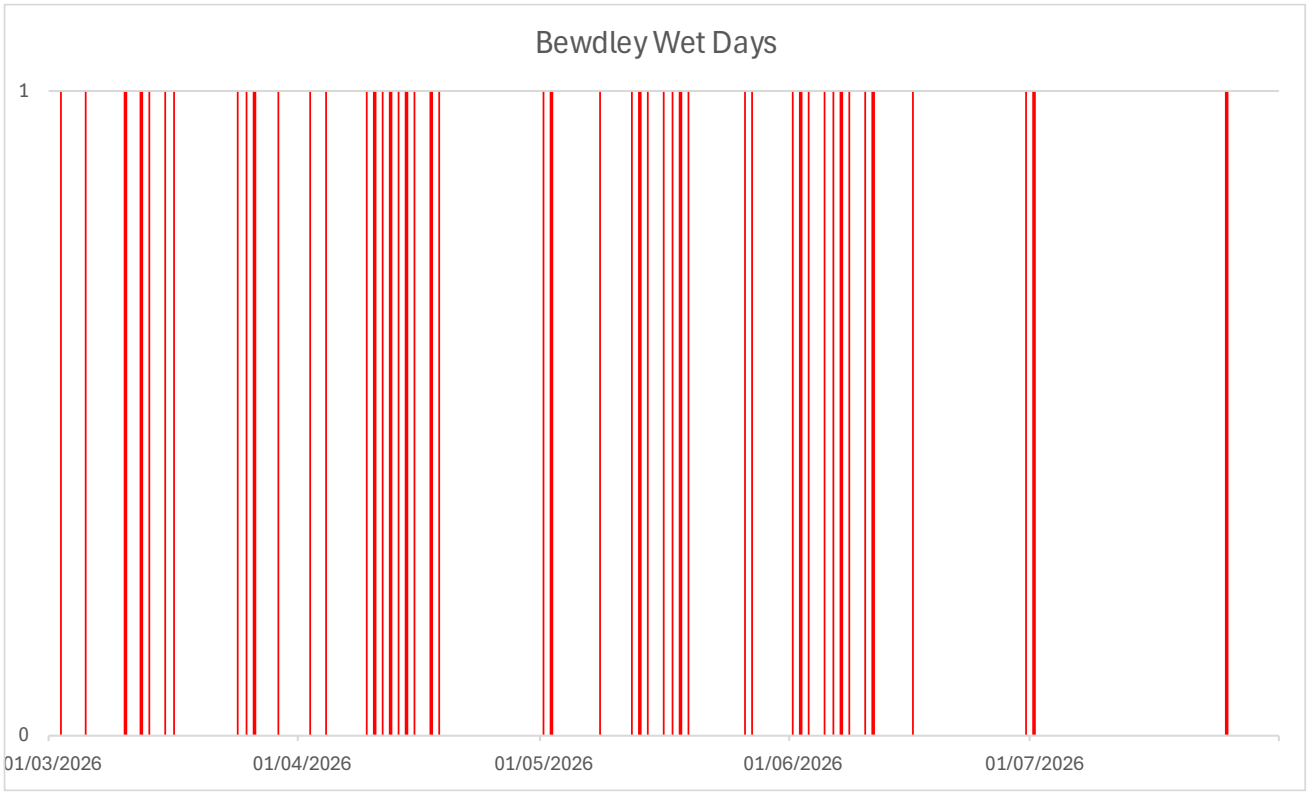

Figure 13 Number of wet days with at least 1 mm of rainfall in the Bewdley catchment depicted by the red line

Deerhurst – Monthly rainfall as percentage of LTA

Rainfall totals in the Deerhurst catchment have been consistently below 100% of the LTA since March 2026. July was a particularly extreme month for lack of rainfall total, recording only 5% of the July LTA.

Table 5 Deerhurst rainfall table showing actual rainfall amounts, the LTA and the rainfall amount as a percentage of LTA

Deerhurst	2026 Rainfall (mm)	LTA (1991-2020)	% of LTA
March	44.2	57.8	77
April	25.7	58.6	44
May	47.8	62	77
June	53.8	66.5	81
July	3.2	66.1	5

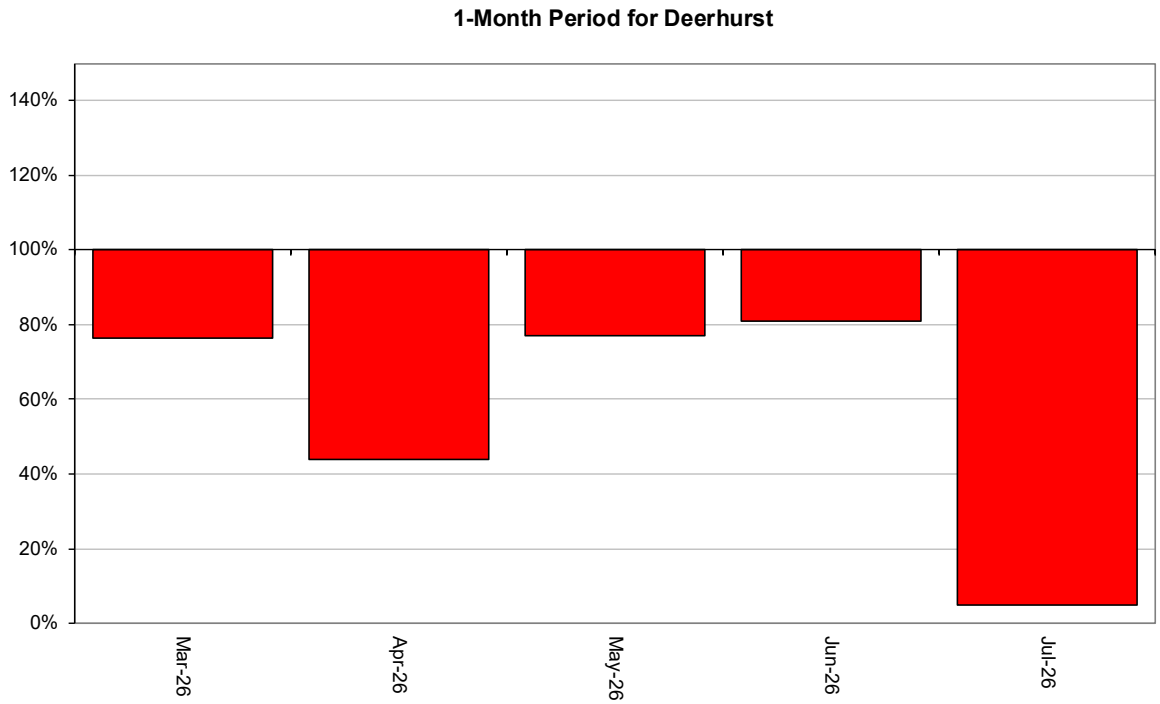

Figure 14 March-July Deerhurst catchment rainfall as a percentage of LTA

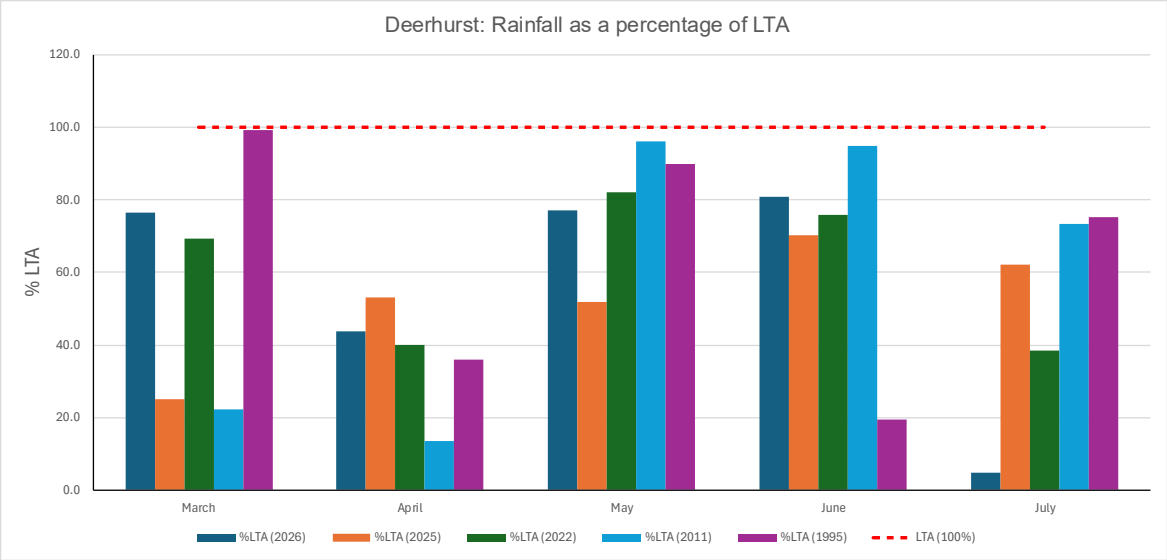

Figure 15 Deerhurst catchment rainfall as a percentage of LTA compared to other drought years

Deerhurst – Cumulative rainfall

Rainfall accumulation has been low since March 2026, and the rainfall accumulated up until the end of July aligns with previous recent drought years; the cumulative rainfall is now similar to totals seen in July 2025 thanks to July 2026 only receiving 5% of LTA rainfall. The March - July cumulative rainfall totals have been tracking well below the LTA.

The River Severn Drought Order was prepared for in 2022; however timely rainfall negated the need for it. In 2025, rainfall was higher in the Welsh Mountains compared to the other relevant rainfall catchments in England, and Clywedog was able to be sufficiently topped up to prevent the need for a drought order.

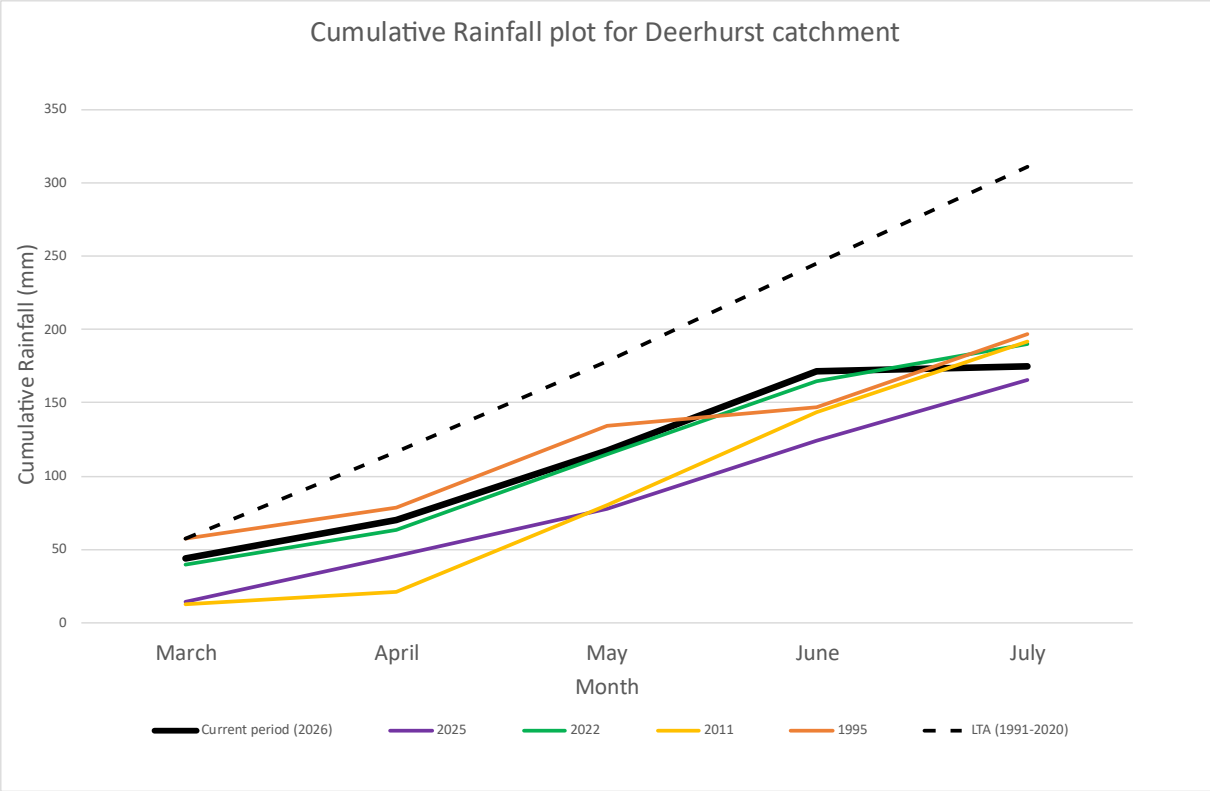

Figure 16 Cumulative rainfall for Deerhurst catchment compared to recent drought years and the LTA

The River Severn Drought Order was applied for and operated in 1976, 1984 and 1989. The March – July periods for these years have been presented on Figure 17. The accumulated rainfall totals for this year (2026) between March – July are not far off the historic years back in 1976 and 1984.

During 1989, a drought order was applied for. Water levels in Clywedog were low. However, the reason for these low levels are unclear, as the rainfall accumulation totals for March – July are much closer to the 1991-2020 LTA compared to all other River Severn Drought Order years.

It needs to be noted that the River Severn Regulation has changed over the years. We manage Clywedog and Vyrnwy reservoirs differently and have more boreholes operational within the SGS than we may have done during the earlier comparison droughts. This also makes scenario comparison difficult due to differences in operational practices especially with very historic years.

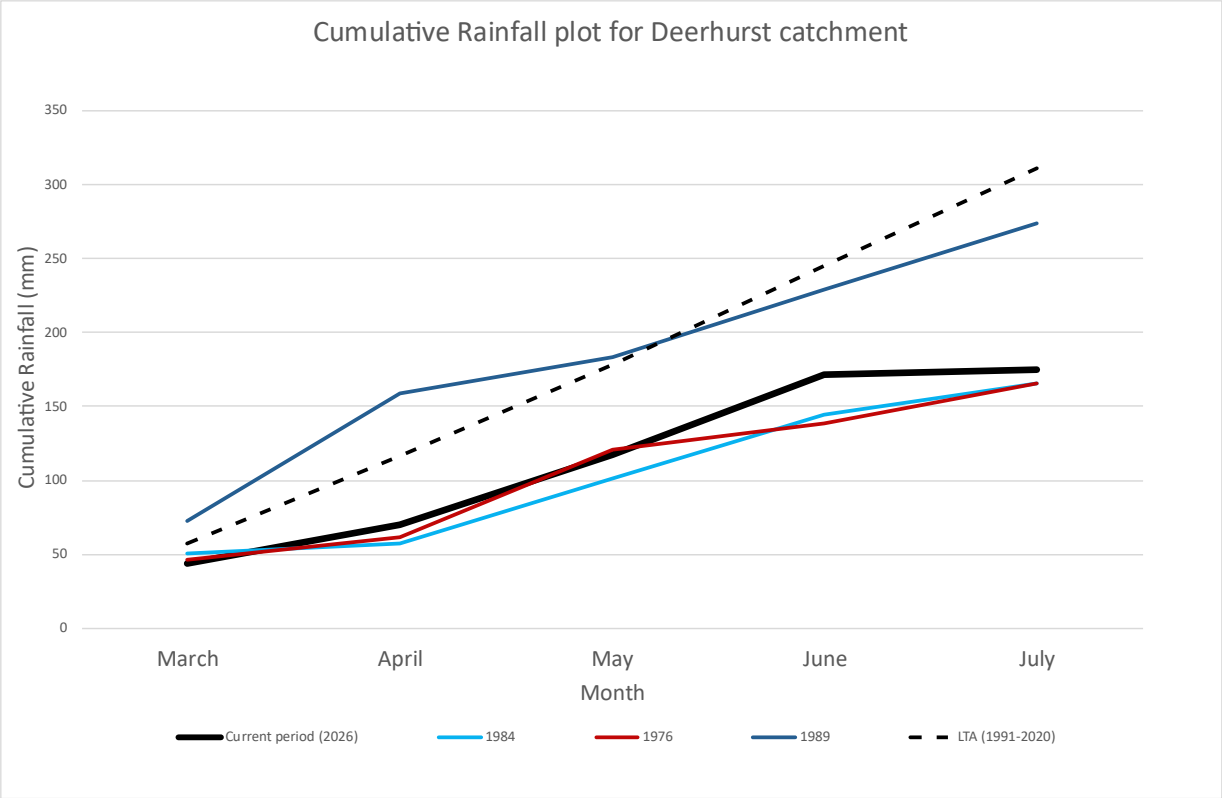

Figure 17 Cumulative rainfall for Deerhurst catchment compared to River Severn Drought Order years and the LTA

Deerhurst – Rainfall ranking

We have provided a table of rainfall rankings to put 2026 in context. The rainfall total from each year, including the current period, is then ranked to determine the ranking of the current period relative to the historic context. This method is especially useful for understanding the severity of a dry weather event relative to known drought years in the historic record. A label of 1 means the rainfall is ranked as the driest on record. We have done this for one month and for cumulative months since March 2026.

This analysis shows that in July, Deerhurst catchment ranked 1st driest for that month since the beginning of the record in 1871 (a total of 156 years). All the accumulated rainfall totals from July (1-month to 5-months) rank in the top 5 driest accumulation periods for July, apart from the 2-month totals which isn't too far behind the other months, ranking as the 6th driest.

Table 6 Rainfall rankings for Deerhurst catchment with accumulated rainfall totals rankings with ranking in the top 10 shaded red

Deerhurst						
Driest (ranking)						
		Mar 26	Apr 26	May 26	Jun 26	Jul 26
	1 month	56	22	50	72	1
	2 month		24	23	53	6
	3 month			19	24	4
	4 month				24	4
	5 month					5

Deerhurst – Rainfall probabilistic ranking using Cunnane bandings

We have used the EA's rainfall probability ranking spreadsheet tool to rank historic monthly rainfall data, starting from 1871 onwards, against seven descriptive categories, ranging from exceptionally high to exceptionally low, known as Cunnane bandings. These bandings set the hydrological statistics into context and can tell us how likely the accumulated totals were to occur relative to historic rainfall totals (i.e. the probability of their occurrence).

By the end of July, the 1, 2, 3, 4 and 5-month rainfall accumulations for the Deerhurst catchment are classified as 'Exceptionally Low'.

Code	Label
EH	Exceptionally High
NH	Notably High
AN	Above Normal
N	Normal
BN	Below Normal
NL	Notably Low
EL	Exceptionally Low

Station:	Deerhurst											
Period (Months) of Cumulative Rainfall	Period Ending in Month											
	Aug 25	Sep 25	Oct 25	Nov 25	Dec 25	Jan 26	Feb 26	Mar 26	Apr 26	May 26	Jun 26	Jul 26
1	22.5	106.4	69.4	149.0	100.7	116.4	127.5	44.2	25.7	47.8	53.8	3.2
	EL	AN	N	EH	AN	NH	EH	N	BN	N	N	EL
	32%	162%	80%	179%	112%	147%	202%	76%	44%	77%	81%	5%
2	63.6	128.9	175.8	218.4	249.7	217.1	243.9	171.7	69.9	73.5	101.6	57.0
	EL	N	N	AN	NH	NH	EH	NH	BN	BN	N	EL
	47%	95%	115%	128%	144%	129%	172%	142%	60%	61%	79%	43%
3	110.3	170.0	198.3	324.8	319.1	366.1	344.6	288.1	197.4	117.7	127.3	104.8
	EL	BN	N	NH	NH	EH	EH	EH	AN	NL	BN	EL
	54%	84%	89%	138%	123%	145%	149%	144%	110%	66%	68%	54%
4	142.4	216.7	239.4	347.3	425.5	435.5	493.6	388.8	313.8	245.2	171.5	130.5
	EL	BN	BN	AN	NH	NH	EH	NH	AN	N	BN	EL
	54%	81%	83%	113%	131%	128%	156%	134%	121%	102%	70%	52%
5	173.6	248.8	286.1	388.4	448.0	541.9	563.0	537.8	414.5	361.6	299.0	174.7
	EL	BN	BN	N	AN	EH	EH	EH	AN	AN	N	EL
	54%	75%	80%	104%	113%	134%	140%	144%	119%	113%	97%	56%

Figure 18 EA's rainfall probabilistic ranking using Cunnane bandings with the key above. The past 12 months are shown with 1 to 5 month accumulations for each month. The numbers represent the rainfall percentage against the 1991-2020 LTA

Deerhurst – Rainfall return periods

By fitting a suitable statistical distribution to the rainfall data, we estimated the probability of occurrence of the cumulative rainfall deficit based on the historic rainfall time series for Deerhurst.

According to the guidance the Gamma distribution was the best fit for the 5-month (March to July) rainfall totals at Deerhurst. The normal distribution was also tested but it had a few visual outliers. Lognormal was also tested but was not chosen as it had a higher AD value compared to Gamma.

Based on the Gamma distribution the rainfall for March to July 2026 (174.4 mm) has a chance of occurring 1.99% of the time with a return period of 50 years (with a variation of 28 to 125-year return).

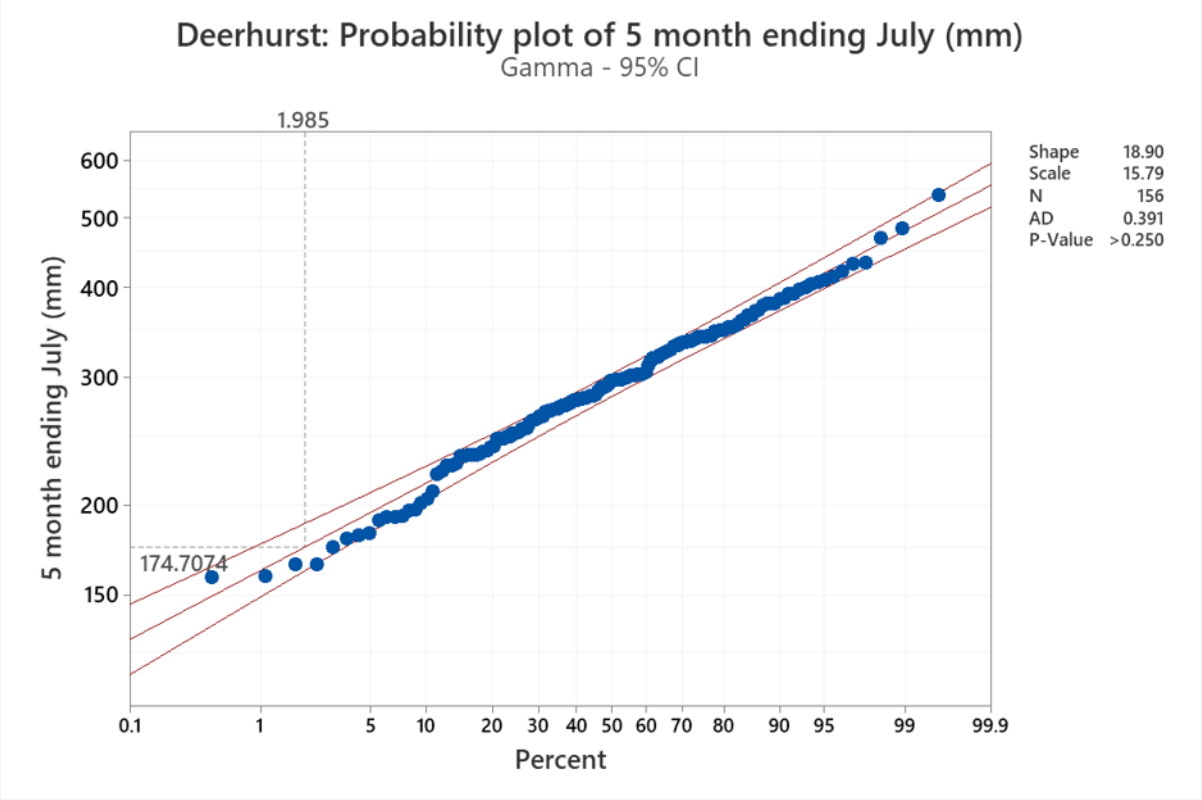

Figure 19 Gamma distribution for Deerhurst. It has a 1 in 50-year event return. Lower bound 1 in 28-year return. Upper bound 1 in 125-year return.

Deerhurst – Standard Precipitation Index

Our analysis shows that conditions in the Deerhurst catchment have been dry for the past few months leading up to July. The SPI value of –2.06 for the 5-month (March – July) accumulation rainfall period shows that conditions have been 'Extremely dry' suggesting the wider catchment has been drier compared to the Upper Severn catchment at Bewdley which was classed as 'Severely dry'.

Deerhurst		1m acc.	2m acc.	3m acc.	4m acc.	5m acc.
SPI	Mar-26	-0.30				
	Apr-26	-1.01	-0.96			
	May-26	-0.31	-1.06	-1.12		
	Jun-26	-0.02	-0.42	-1.02	-1.10	
	Jul-26	-3.82	-1.75	-1.78	-2.11	-2.06

SPI value	Colour Key	SPI Category
>=2.0		Extremely wet
+1.5 to + 1.99		Severely wet
+1.0 to + 1.49		Moderately wet
-0.99 to +0.99		Near normal
-1.0 to +1.49		Moderately dry
-1.5 to -1.99		Severely dry
<=-2.0		Extremely dry

Figure 20 SPI results for Deerhurst catchment with key to the side

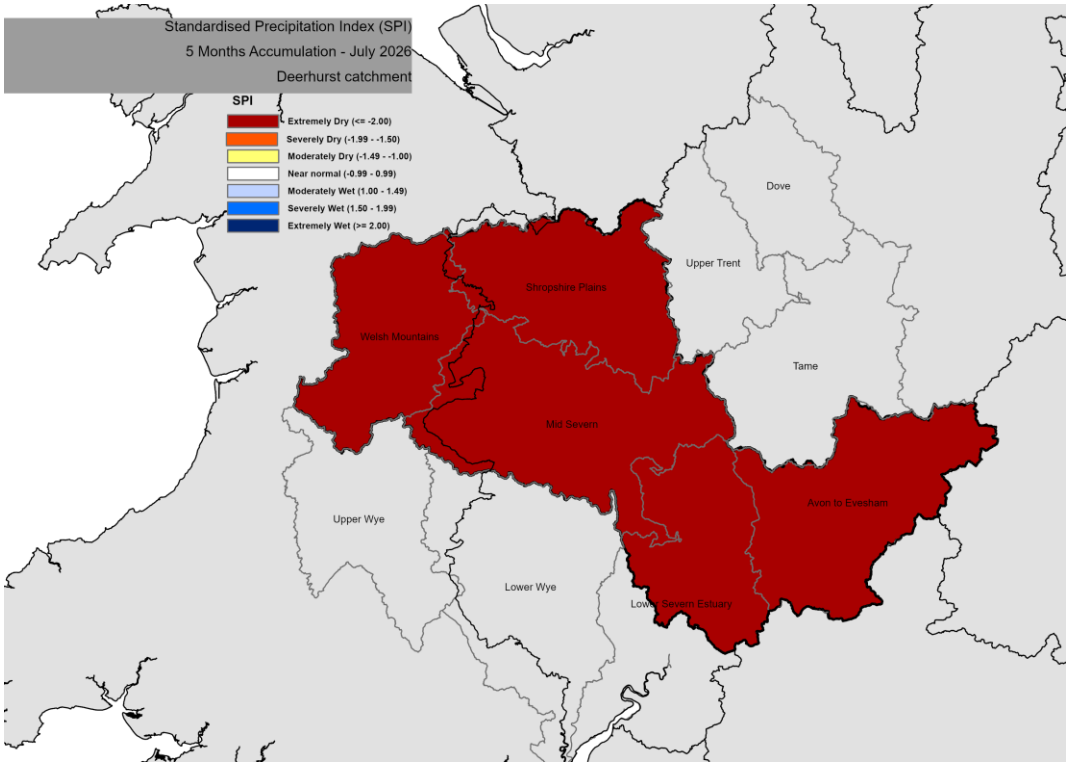

Figure 21 SPI map for the 5-month July accumulation for Deerhurst catchment

Deerhurst – Number of wet days

We have calculated the number of wet days across the 5-month period up to July where there has been rainfall above or equal to 1 mm. We have compared this to the average number of wet days between 1991-2020. Numerous prolonged dry periods occurred during the spring and summer so far. Compared to the LTA, there have been significantly lower number of wet days in 2026. Coupled with the increased temperatures, this has resulted in the decline of flows in the Severn.

Table 7 Number of wet days (>=1 mm) in Deerhurst catchment in 2026 compared to the 1991-2020 LTA

Number of wet days in the Deerhurst catchment	2026	1991-2020 LTA
Mar	10	13
Apr	7	12
May	11	12
Jun	12	12
Jul	1	13

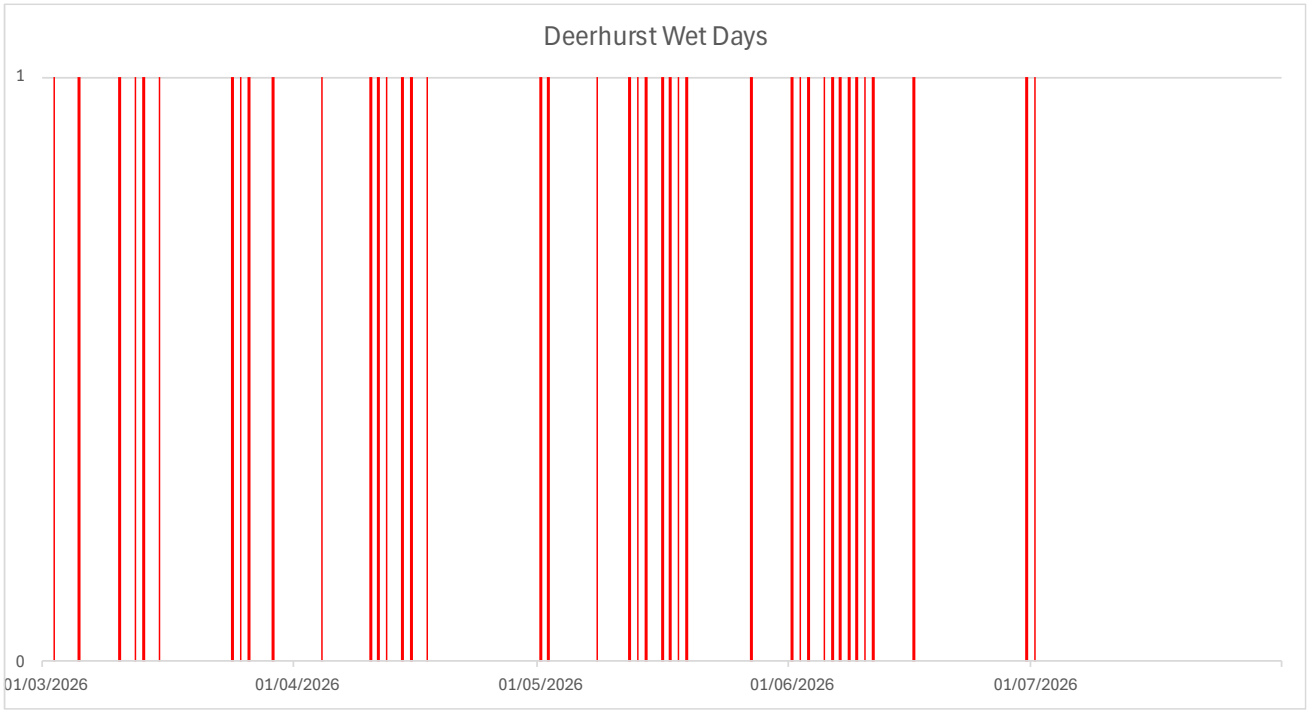

Figure 22 Number of wet days with at least 1 mm of rainfall in the Deerhurst catchment depicted by the red line

Other meteorological and hydrometric measures

This assessment considers the following variables as evidence that the ESoR has impacted upon the serious deficiency of supplies:

- Standardised Precipitation Evapotranspiration Index
- River flows
- Soil Moisture Deficit (SMD)
- Reservoir storage
- Temperature

Standardised Precipitation Evapotranspiration Index

From the Hydrological guidance for assessment of ESoR - “Standardised Precipitation Evapotranspiration Index (SPEI) is an extension of the Standardised Precipitation Index (SPI) above, where the impacts of evapotranspiration are considered alongside precipitation. SPEI can be a more effective tool to assess the impacts of increased temperatures associated with dry weather or drought conditions.” SPEI uses potential evapotranspiration (PET) data, also obtained from the EA’s Daily Rainfall Tool, though this data dates back to 1961.

According to the Met Office, Spring 2026 was warm, dry and sunny across England and Wales. An exceptionally early and record-breaking spell of heat at the end of May helped make spring the warmest on record for both England and Wales since records began in 1884. Rainfall was below average throughout the season, contributing to increasingly dry ground conditions. Summer has continued this pattern of exceptionally warm and dry weather. June 2026 was the warmest June on record for England, with temperatures across England and Wales remaining well above seasonal averages. July was particularly notable, with multiple prolonged heatwave conditions affecting many areas. Sunshine levels were also exceptional, with England and Wales recording their sunniest July on record.

Consequently, the prolonged period of warm, dry and sunny weather throughout spring and summer has resulted in increased evapotranspiration, showing in the SPEI figures. At Bewdley and Deerhurst respectively, the SPEI values of -2.08 and -2.06 for the 5-month (March – July) accumulation rainfall period shows that conditions, accounting for temperature, have been ‘Extremely dry’.

Bewdley		1m acc.	2m acc.	3m acc.	4m acc.	5m acc.
SPEI	Mar-26	-0.54				
	Apr-26	-1.23	-1.15			
	May-26	-0.77	-1.42	-1.43		
	Jun-26	-0.89	-1.41	-1.76	-1.58	
	Jul-26	-2.63	-2.22	-2.38	-2.34	-2.08
Deerhurst		1m acc.	2m acc.	3m acc.	4m acc.	5m acc.
SPEI	Mar-26	-0.78				
	Apr-26	-1.37	-1.33			
	May-26	-1.00	-1.58	-1.61		
	Jun-26	-0.65	-1.37	-1.77	-1.64	
	Jul-26	-2.73	-2.20	-2.31	-2.26	-2.06

SPEI value	Colour Key	SPEI Category
>=2.0		Extremely wet
+1.5 to + 1.99		Severely wet
+1.0 to + 1.49		Moderately wet
-0.99 to +0.99		Near normal
-1.0 to +1.49		Moderately dry
-1.5 to -1.99		Severely dry
<=-2.0		Extremely dry

Figure 23 SPEI results for Bewdley and Deerhurst catchment with key to the side

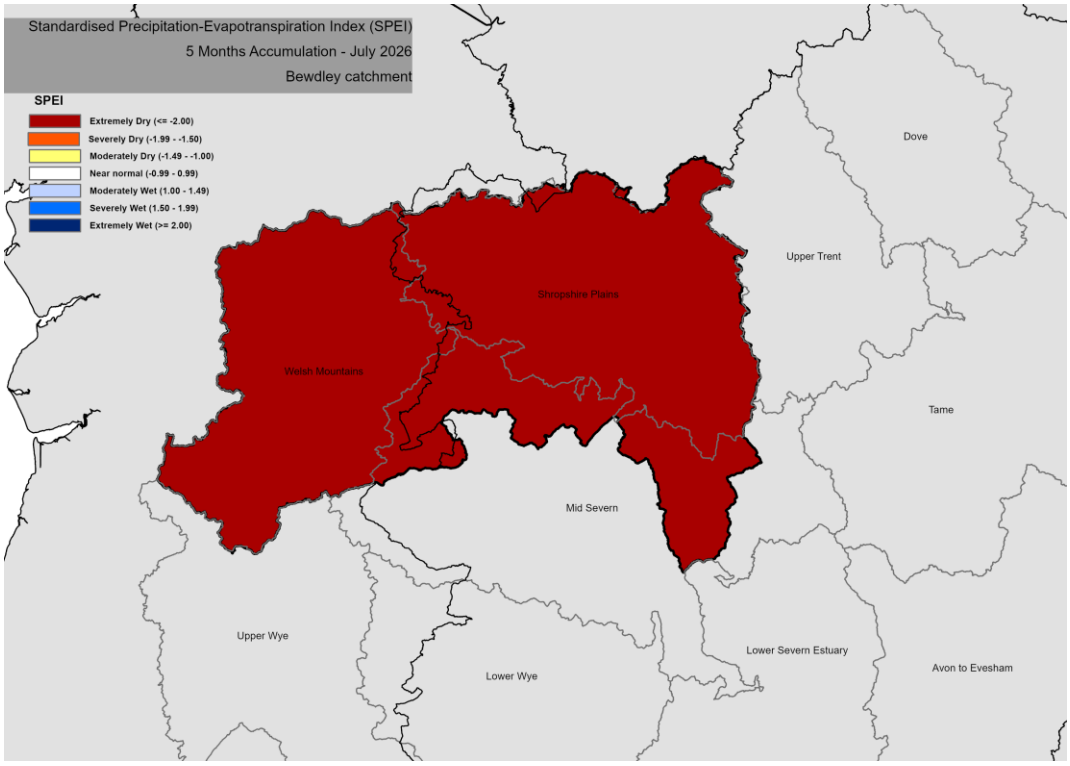

Figure 24 SPEI map for the 5-month July accumulation for Bewdley catchment

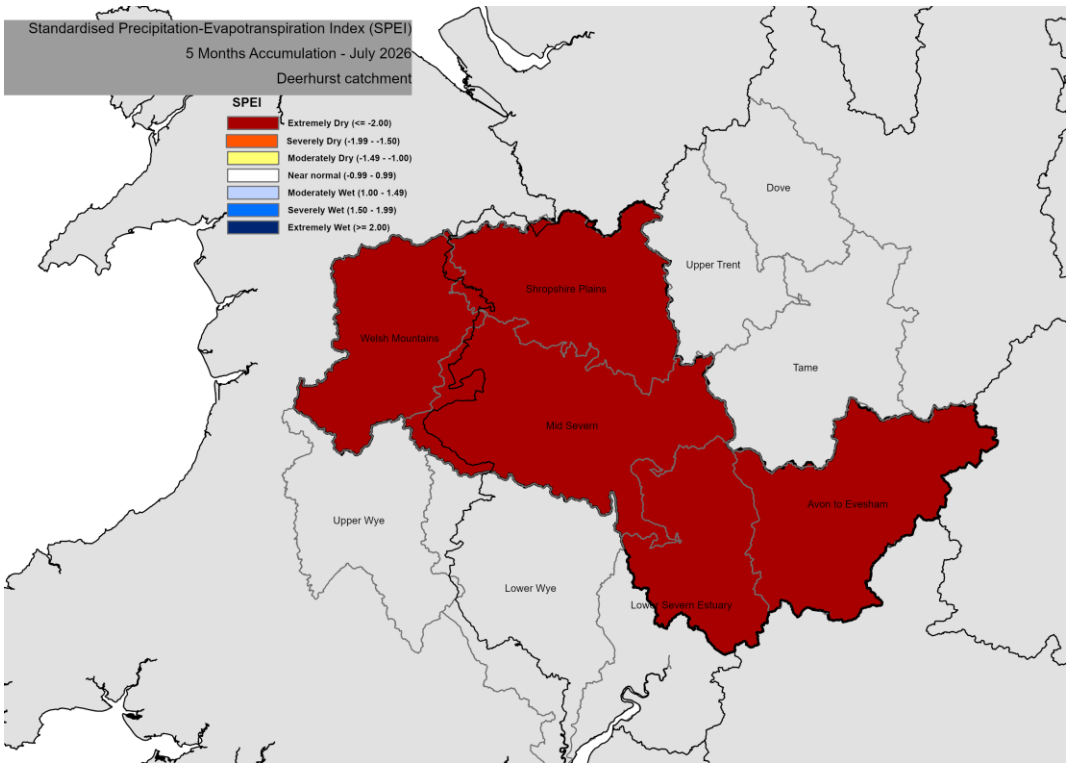

Figure 25 SPEI map for the 5-month July accumulation for Deerhurst catchment

River flows

As mentioned in the introduction, the river flow at Bewdley gauging station is regulated to a mean flow of 850 Ml/day over a five-day period. The graph below shows how close we have been to this figure since the end of June. River Severn Regulation has tried to maintain flows above 850 Ml/day, with releases from Clywedog and Vyrnwy reservoirs and the SGS maintaining flows. Consequently, reservoir levels in Clywedog have been dropping rapidly, as detailed in the reservoir storage section, supporting the need for a River Severn Drought Order.

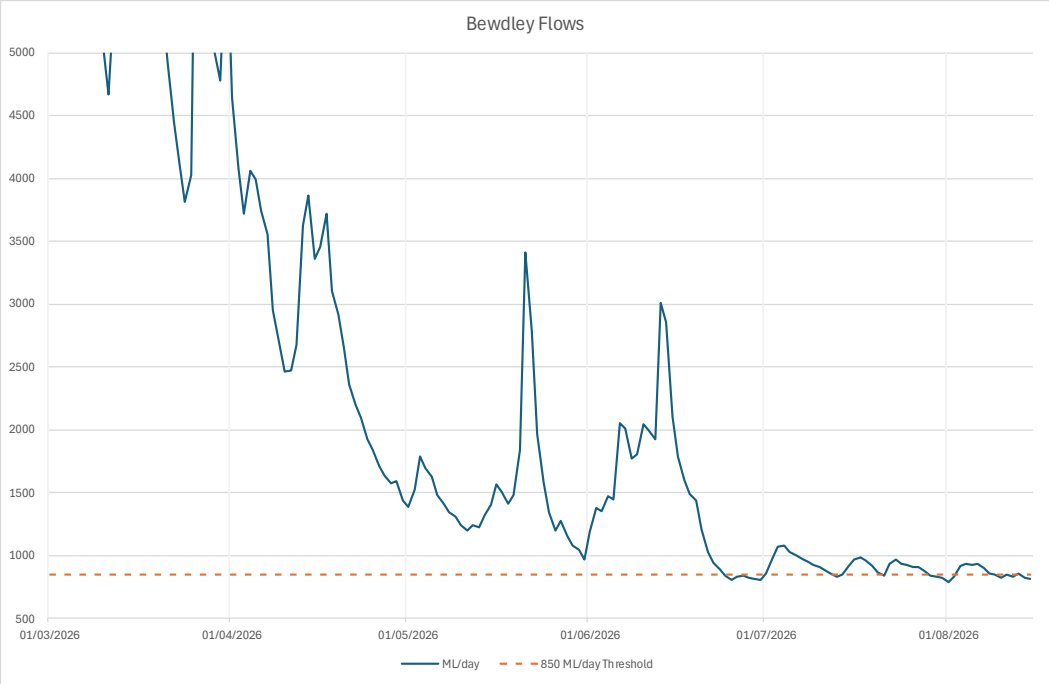

Figure 26 Hydrograph of Bewdley against the 850Ml/d 5-day mean regulation flow target

Haw Bridge is a gauge located immediately downstream of the Deerhurst gauge, with no tributaries or significant abstractions/discharges in between. Deerhurst is currently not recording flows due to a planned upgrade. Therefore, we have taken Haw Bridge flows as a proxy for Deerhurst.

Influence on river flows from Severn Regulation releases is considered negligible by the time flows reach Haw Bridge. Therefore, it can better demonstrate the natural climatic conditions in the River Severn catchment compared to Bewdley gauging station.

The following graph shows that flows have been steadily declining at Haw Bridge since March 2026. Flows reached Q95 (flows equalled or exceeded 95% of any given time and is a low flow indicator) in June and then have been holding predominantly around Q99 in July. This further supports the River Severn catchment upstream of Haw Bridge has been dry because with little runoff flows are now reaching these extreme Q99 figures.

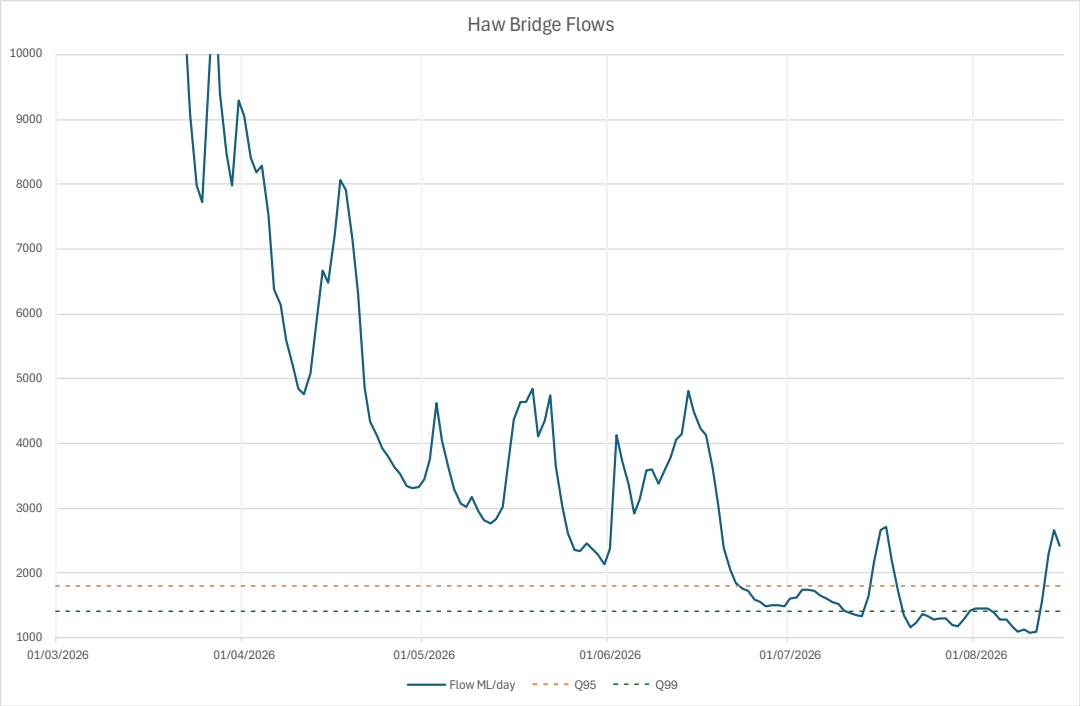

Figure 27 Hydrograph of Haw Bridge against the Q95 and Q99

We have focused on flows at Bewdley and Haw Bridge (as a proxy for Deerhurst), as these gauging stations are the most representative of the Bewdley and Deerhurst catchments. They both represent the River Severn and will be monitored carefully for impacts following a River Severn Drought Order.

Soil Moisture Deficit (SMD)

Bewdley's catchment covers three hydrological areas (Welsh Mountains, Shropshire Plains and Mid-Severn). Deerhurst catchment also covers these three areas but also with the addition of Lower Severn and Avon catchments. Therefore, the below analysis has been combined as both gauging stations cover similar areas.

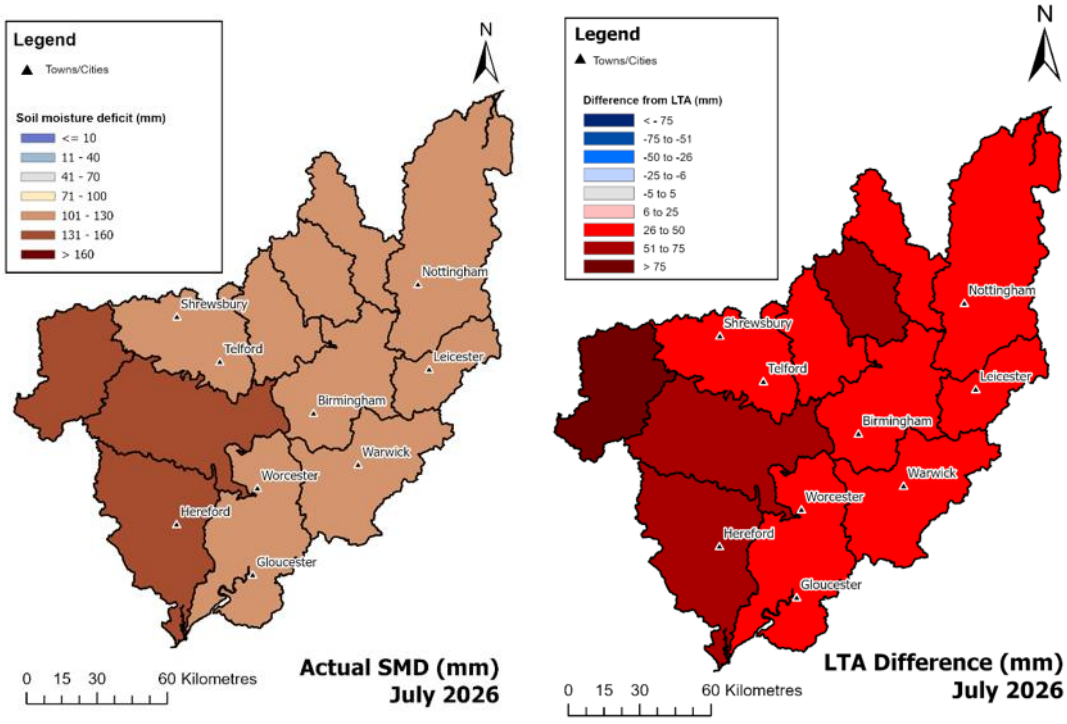

Figure 28 Midlands SMD maps showing actual SMD and the difference compared to the LTA

All catchments had near saturated soils (0 – 10 mm SMD) in January, February and March 2026 which was to be expected in the wetter winter period. However, moving into April and May, soils began to dry out; the deficit was 6 to 25 mm higher than expected in April, which dried out further to 26 to 50 mm higher than expected for May for Mid Severn and Shropshire Plains. A deficit has continued to grow into July for the mid-Severn catchment where deficits are now 51 to 75 mm higher than should be expected for the month, furthermore the deficit is now >75 mm higher than the LTA in July for the Welsh Mountains.

This trend of progressively drying soils since March mirrors what happened during the 2025 drought, which is a particular problem for the large numbers of pasture and agricultural land spread throughout the four catchments with some news stories suggesting dry soils have caused the worst harvest in history.

Britain could face food shortages as drought continues, farmers warn | Farming | The Guardian

Prolonged drought could cause shortage of some foods, farmers' union head says - BBC News

Britain's Vegetables Set to Shrink and Cost More as Drought Grips Farms - NATIONAL NEWS - The Worcester Observer

Reservoir storage

Clywedog is currently 49% full and Vyrnwy 76% full as of 17st August 2026.

Both are below their LTA for this time of year, with levels at Clywedog dropping sharply in the past few months as a result of continuous high releases to reach the 850 Ml/d 5-day mean flow at Bewdley.

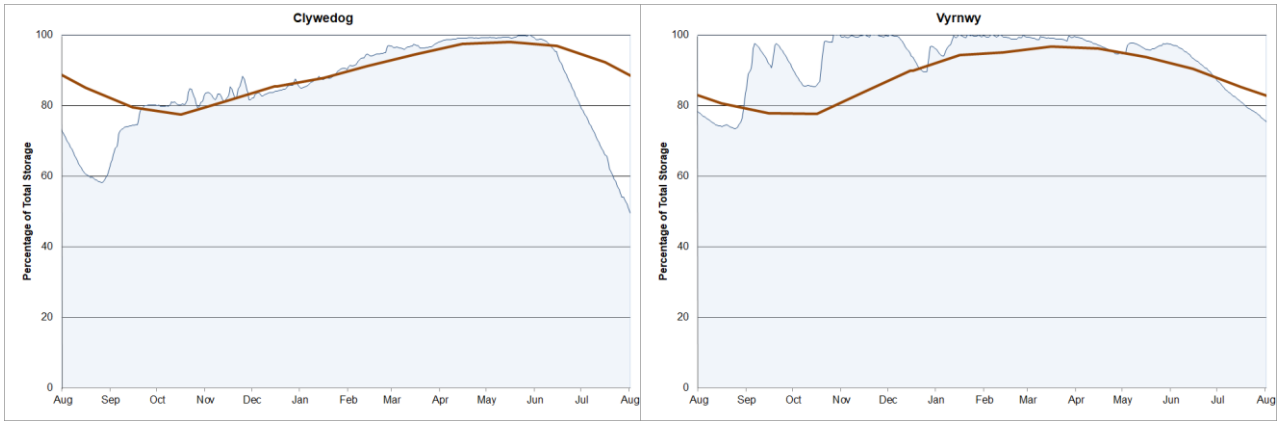

Figure 29 Clywedog and Vyrnwy reservoir storage graphs up to 17/08/2026 with the key above

Comparing this year to historic years in Figure 30, you can see that storage levels at are now below multiple historic drought years. By the mid-August we are tracking lower than the 1989 storage levels. This was a River Severn Drought Order year. At the current rate of decline, we are forecast to reach emergency storage levels for Clywedog in September 2026.

It needs to be noted that the River Severn Regulation has changed over the years. We manage Clywedog and Vyrnwy reservoirs differently and have more boreholes operational within the SGS than we may have done during the earlier comparison droughts. This also makes scenario comparison difficult due to differences in operational practices especially with very historic years.

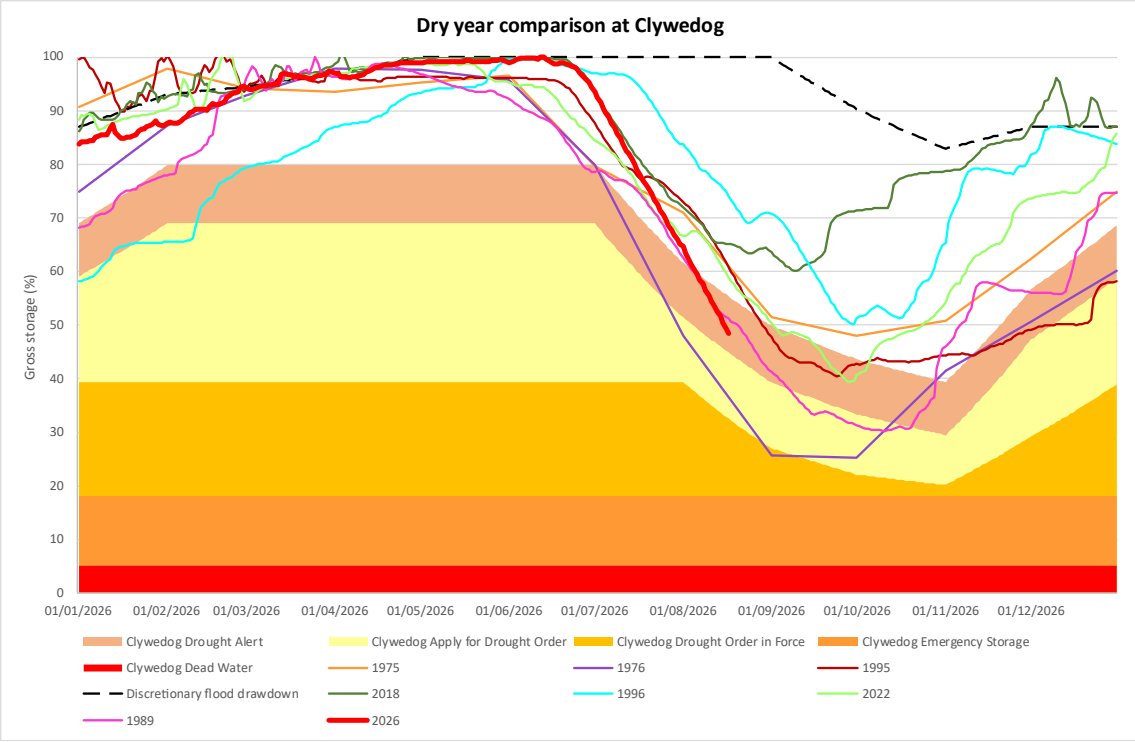

Figure 30 A comparison of Clywedog Daily storage figures for historic dry years against the reservoir control curves (source – River Severn River Regulation Model) (updated to 17/08/2026)

Temperature

During 2026, multiple heatwaves and periods of sustained high temperatures have increased public water supply demand across the River Severn catchment. The increased demand requires higher abstraction rates from the River Severn at a time when water resources are already under pressure from exceptionally low rainfall. The combination of reduced natural inflows and increased customer demand has accelerated the drawdown of water resource storage and increased reliance on the River Severn regulation system.

In particular, the requirement to support flows in the River Severn has resulted in increased releases from Llyn Clywedog Reservoir. Whilst reservoir storage is managed carefully throughout the year, sustained periods of hot, dry weather can rapidly increase demand for regulated flows and reduce the resilience provided by Severn Regulation. 2026 is demonstrating how prolonged high temperatures can rapidly compound the impacts of an exceptional shortage of rainfall by increasing evapotranspiration losses, reducing effective runoff and driving higher abstraction demand.

Temperature can be as significant a driver of drought risk as rainfall deficiency. Even where resource conditions are manageable at the start of the season, extended periods of above-average temperatures can substantially increase water demand, increase evapotranspiration rates, and accelerate reservoir drawdown, increasing pressure on both Llyn Clywedog storage and the wider River Severn regulation system.

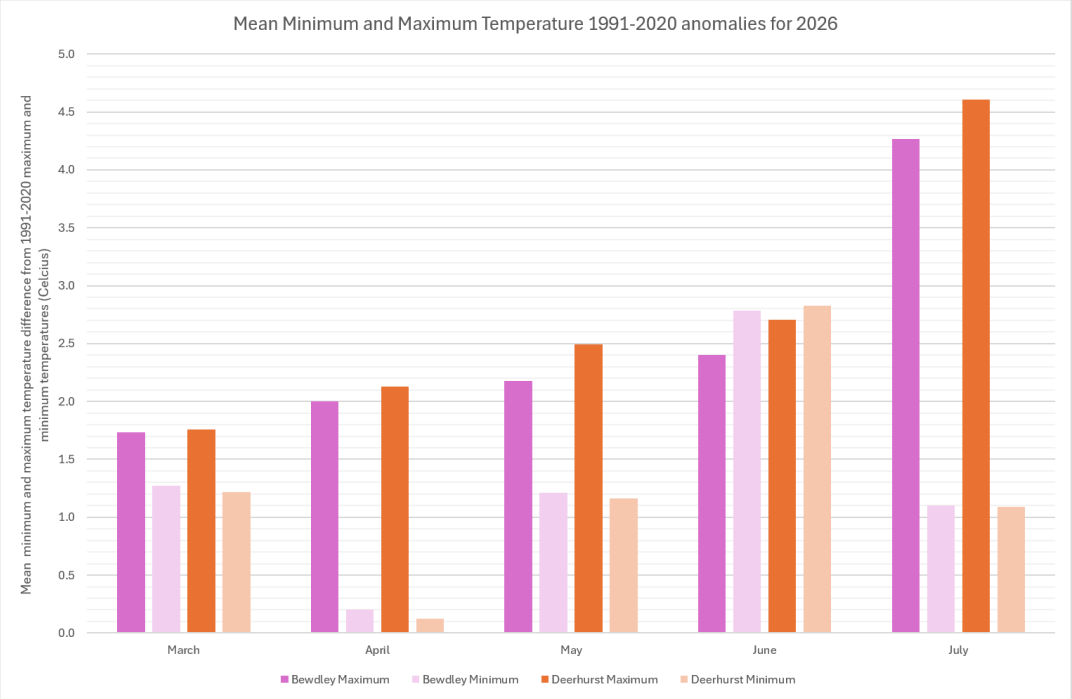

Figure 31 The mean monthly minimum and mean monthly maximum temperatures compared to the 1991-2020 LTA baseline

Our analysis shows that mean monthly minimum and mean monthly maximum temperatures in 2026 in the Bewdley and Deerhurst catchments have increasingly been above the 1991-2020 LTA. Maximum temperature anomalies in Bewdley was 4.3°C above the LTA in July. Maximum temperature anomalies in Deerhurst was 4.6°C above the LTA in July.

Forward Look

By mid-August, the trend of hot and dry weather has continued. The Met Office 3-month outlook for the UK for August to October indicates that this trend is here to stay, suggesting warmer temperatures and lower precipitation accumulations than normal.

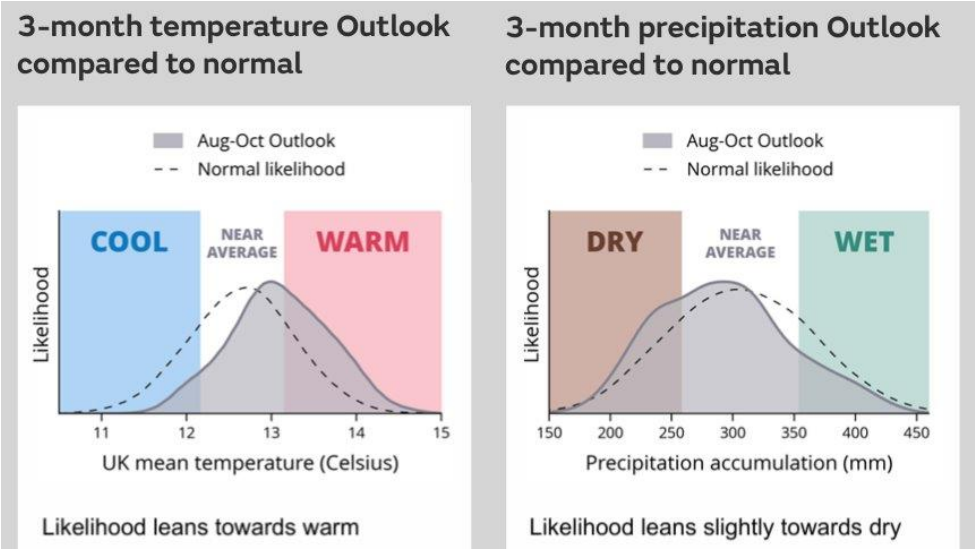

Figure 32 The Met Office 3-month outlook (Met Office © Crown Copyright)

The graphs below depict precipitation and temperature forecasts for the UK from the European Centre for Medium-Range Weather Forecasts (ECMWF) model for the next month. Overall, the ECMWF extended-range outlook does not indicate any prolonged period of significantly above-average rainfall through late August and into September. Apart from a short-lived signal for slightly wetter conditions in late August and early September, rainfall is generally forecast to remain near climatological levels. Temperatures are predominantly near or above average, particularly during September, which may support continued drying of soils and elevated evaporative demand, limiting opportunities for meaningful recovery from existing rainfall deficits.

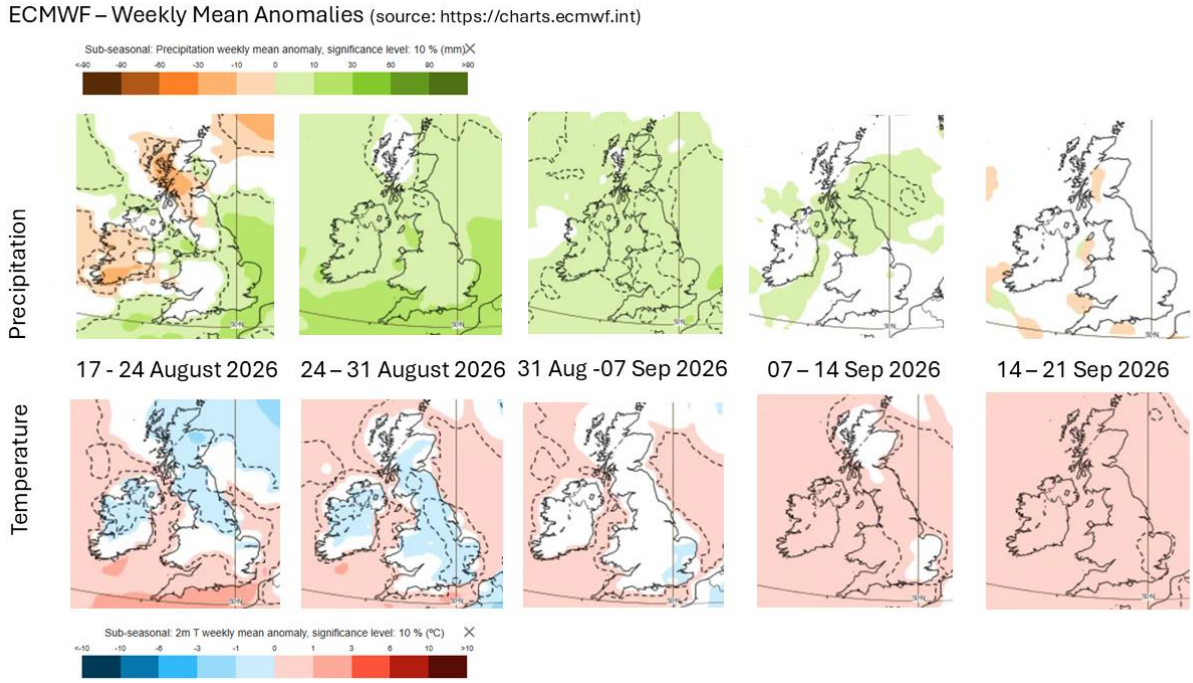

Figure 33 ECMWF forecasts for the next month (accessed on 17/08/2026)

Summary and conclusions

Since March 2026 the monthly rainfall totals for both the Bewdley and Deerhurst catchments have been below their respective monthly LTA values, leading to cumulative rainfall deficits by the end of July 2026 of 141.9 mm and 136.3 mm respectively compared to the 1991-2020 LTA. These figures are classified as 'Exceptionally low' in the Cunnane bandings. This 5-month time-period results in 7th driest on record for the Bewdley catchment and the 5th driest on record for the Deerhurst catchment. This is out of 156 years of data.

The SPI analysis demonstrates further how the cumulative rainfall is deviating away from the expected climatological average. In the case of Bewdley, there is the 5-month SPI value of –1.92, meaning the March to July time-period is classed as 'Severely dry'. In the Deerhurst catchment, the 5-month SPI value is –2.06, meaning the same time-period is classed as 'Extremely dry'.

Rainfall return period analysis demonstrated that the rainfall which fell within Bewdley and Deerhurst catchments March – July 2026 has a chance of occurring 2.77% and 1.99% in any year. These correspond to annual probabilities of approximately 1 in 36 and 1 in 50.

The supporting elements for the ESoR case can demonstrate the impact of the rainfall deficits; with extremely dry SPEI figures, low flows in the River Severn catchment, dry and cracking soils and the levels in the Clywedog reservoir system dropping rapidly. With a lack of significant rainfall in the weather forecast over the next month, the hydrological situation is looking to become more dire.

Based on the above, rainfall over the assessed period is considered to constitute an ESoR for both the Bewdley and Deerhurst catchments, and subsequently, the River Severn.

Peer review and sign-off

The ESoR assessment has been peer reviewed by David Lindsay, Senior Hydrology Specialist in the Yorkshire Area of the Environment Agency.

The analysis has followed the hydrological guidance for the assessment of an ESoR published by the Environment Agency using best practice methods and data. The geographical extent of the analysis is appropriate and relevant for the River Severn Drought Order. The period of analysis is reasonable given rainfall has been below average since March. There is perhaps a case for the analysis period to start from April, the point where rainfall fell into the 'below normal' category, but this does not make a material difference to the case for ESoR, in fact the 4-month period from April is ranked higher and has a greater SPI than the 5-month period used in the analysis.

The analysis shows that the Severn catchment has moved from a position of being moderately dry with below normal rainfall accumulation at the end of June to being severely / extremely dry with exceptionally low rainfall accumulation at the end of July. This change has been driven by the very dry month in July, which saw less than 10% of the LTA rainfall. Extremely high temperatures have exacerbated the impact of low rainfall, evident in the high soil moisture deficit and SPEI figures and the rapid decline in reservoir storage.

The evidence from the range of analysis methods presented in this report demonstrate there has been an exceptional shortage of rainfall in the River Severn catchment. With a dry start to August and forecast of drier and warmer weather to continue, this does present a serious threat of deficiency to supply.

Rob Bissell, Team Leader - Hydrology, Geomorphology & Water Resources Management, Natural Resources Wales

My name is Rob Bissell and I work for Natural Resources Wales as Team Leader of the Hydrology, Geomorphology and Water Resources Management team, covering North Wales and the Upper Severn catchment in Wales. I have over 20 years of experience as a Hydrologist.

Having reviewed the data and analyses described in this report, I am satisfied this demonstrates an exceptional shortage of rainfall across the River Severn catchment. I fully support the conclusions of the report.

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