

### Overview

October was very wet in the Midlands, South and East, especially during the second half of the month, with record high October rainfall in places. Saturated ground due to well above average rainfall over the previous three months, along with some intense rainfall events during October, led to several significant flooding episodes.

The monthly average river flows for October remained high since last month, with 89% of river flows above the long-term normal for October. 86% of lake and turlough monitoring stations observed levels above the long-term normal range for this month.

Average monthly groundwater levels increased with 86% of monitoring wells recording levels above the long-term average for October. Similarly, most monitored spring outflows were above the normal range for this time of year.

### Rainfall

The majority of monthly rainfall totals were above their 1981-2010 Long-Term Average (LTA). Percentage of monthly rainfall values ranged from 67% (the month's lowest monthly rainfall total of 92.0 mm) at Finner, Co Donegal to 222% (monthly rainfall total of 242.1 mm and 307.2 mm) at Roche's Point, Co Cork and Cork Airport, Co Cork respectively. Monthly rainfall totals were highest at Cork Airport with 307.2 mm (222% of its LTA) (its highest October rainfall on record and its third highest overall monthly rainfall behind December 2015 and January 1974 (record length 61 years)).

The month's wettest day was also recorded at Cork Airport with 55.6 mm on Wednesday 18<sup>th</sup> (its highest daily fall for October since 1995). The number of rain days ranged from 18 days at Phoenix Park, Co Dublin to 28 days at Cork Airport. The number of wet days ranged from 14 days at Casement Aerodrome, Co Dublin to 21 days at both Johnstown Castle, Co Wexford and Valentia Observatory, Co Kerry including 10 consecutive wet days at Johnstown Castle ongoing up to the end of the month. The number of very wet days ranged from 2 days at Malin Head, Co Donegal to 11 days at both Valentia Observatory and Cork Airport including 4 consecutive very wet days at Cork Airport and Moore Park, Co Cork associated with storm Babet.

Along with Cork Airport and Roches Point (record length 19 years), Moore Park (record length 59 years) also had its wettest October on record with 250.8 mm (221% of its LTA). Johnstown Castle had its wettest October since 2002 with 265.0 mm (217% of its LTA). Both Phoenix Park with 131.4 mm (165% of its LTA) and Casement Aerodrome with 116.0 mm (142% of its LTA) had their wettest October since 2011 and Dublin Airport had its wettest October since 2013 with 126.1 mm (160% of its LTA).

### River Flows

The average river flows for October increased at 98% of river monitoring stations compared to average flows observed in September 2023. Analysis of the monthly average flows at 141 river

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monitoring sites identified 105 (74%) as ‘particularly high’, 21 (15%) as ‘above normal’, 15 (11%) as ‘normal’ and none were ‘Below Normal’ or ‘Particularly Low’. Geographically, the ‘particularly high’ river flows were observed in the South, East and Midlands. Severe localised flooding occurred in some locations following very intensive rainfall events in these regions.

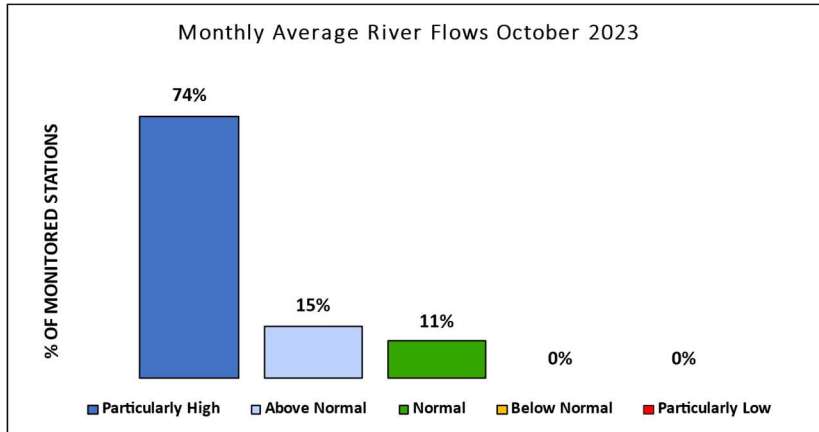


Figure 1: Percentage distribution of river flow monitoring sites within each of the percentile flow categories for October 2023.

## Lake and Turlough Levels

Average water levels during October increased at all the monitored lakes and turlough sites compared to average levels for September. Analysis of monthly average levels at 37 lakes and 3 turloughs were classified as being ‘particularly high’ at 17 (43%), ‘above normal’ at 17 (43%), ‘normal’ at 5 (12%) and ‘below normal’ at 1 monitoring location (2%) [Lough Accorymore, Co. Mayo graph no. 10] for the month of October.

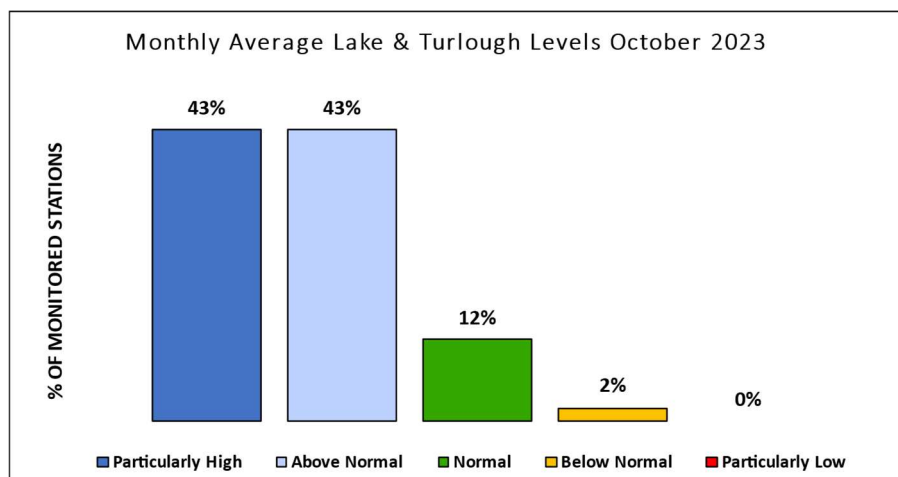


Figure 2: Percentage distribution of lake and turlough level monitoring sites within each of the percentile flow categories for October 2023.

## Groundwater Levels and Spring Flows

Average groundwater levels in October were higher at 97% of monitoring wells compared to average levels observed in September. Groundwater levels for October were classified as being

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‘particularly high’ at 21 wells (60%) ‘above normal’ at 9 wells (26%), ‘normal’ at 4 wells (11%) and ‘below normal’ at 1 monitoring well (3%) [Ballysax, Co.Kildare].

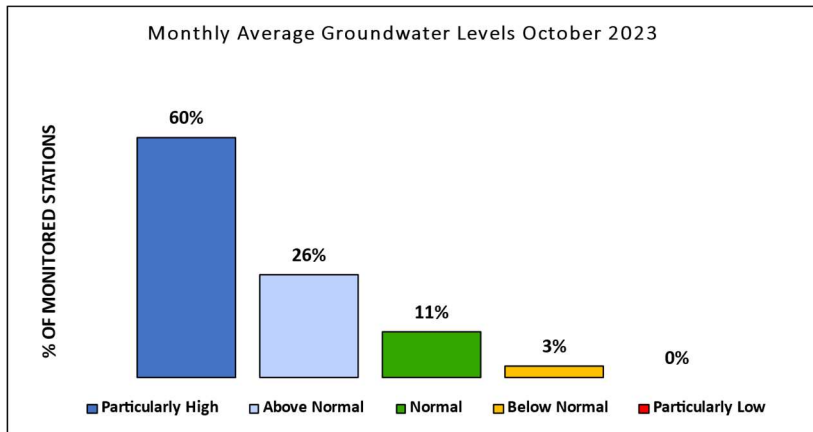


Figure 3: Percentage distribution of groundwater level sites within each of the percentile flow categories for October 2023.

Spring outflows were also monitored at 9 EPA monitoring sites. When compared to previously recorded October flows, the outflows from these springs were ‘particularly high’ at 4 locations, ‘above normal’ at 4 locations and ‘normal’ at 1 location.

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## Rainfall

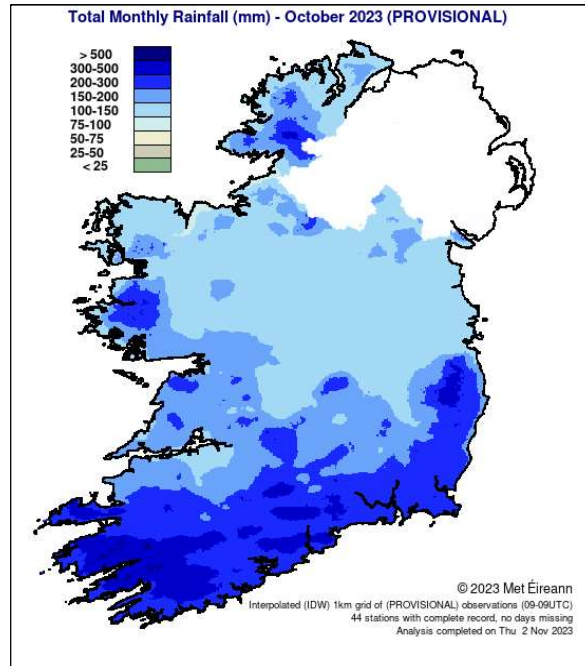


Figure 4: Rainfall map for Ireland October 2023 (Source: Met Eireann.ie).

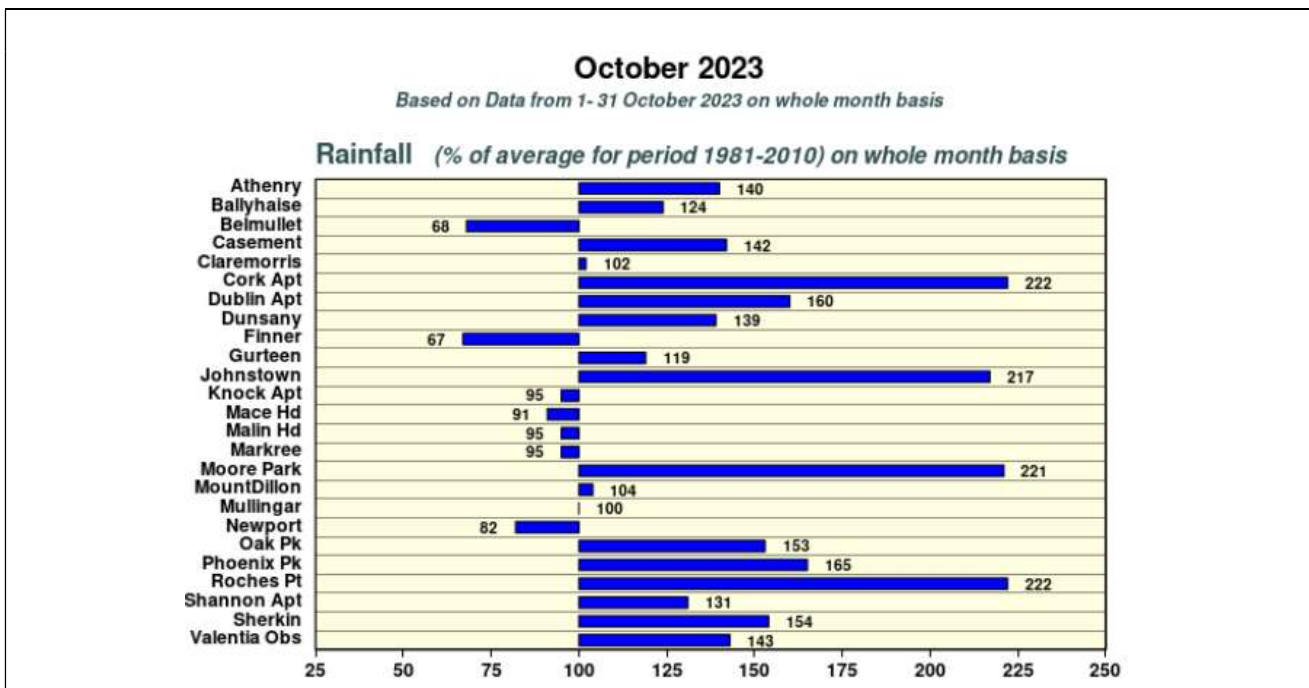


Figure 5: Summary of rainfall at synoptic stations for October 2023, figures indicate the percentage difference from the Long-Term Average rainfall for this month (Source: Met Eireann.ie).



## River Flows

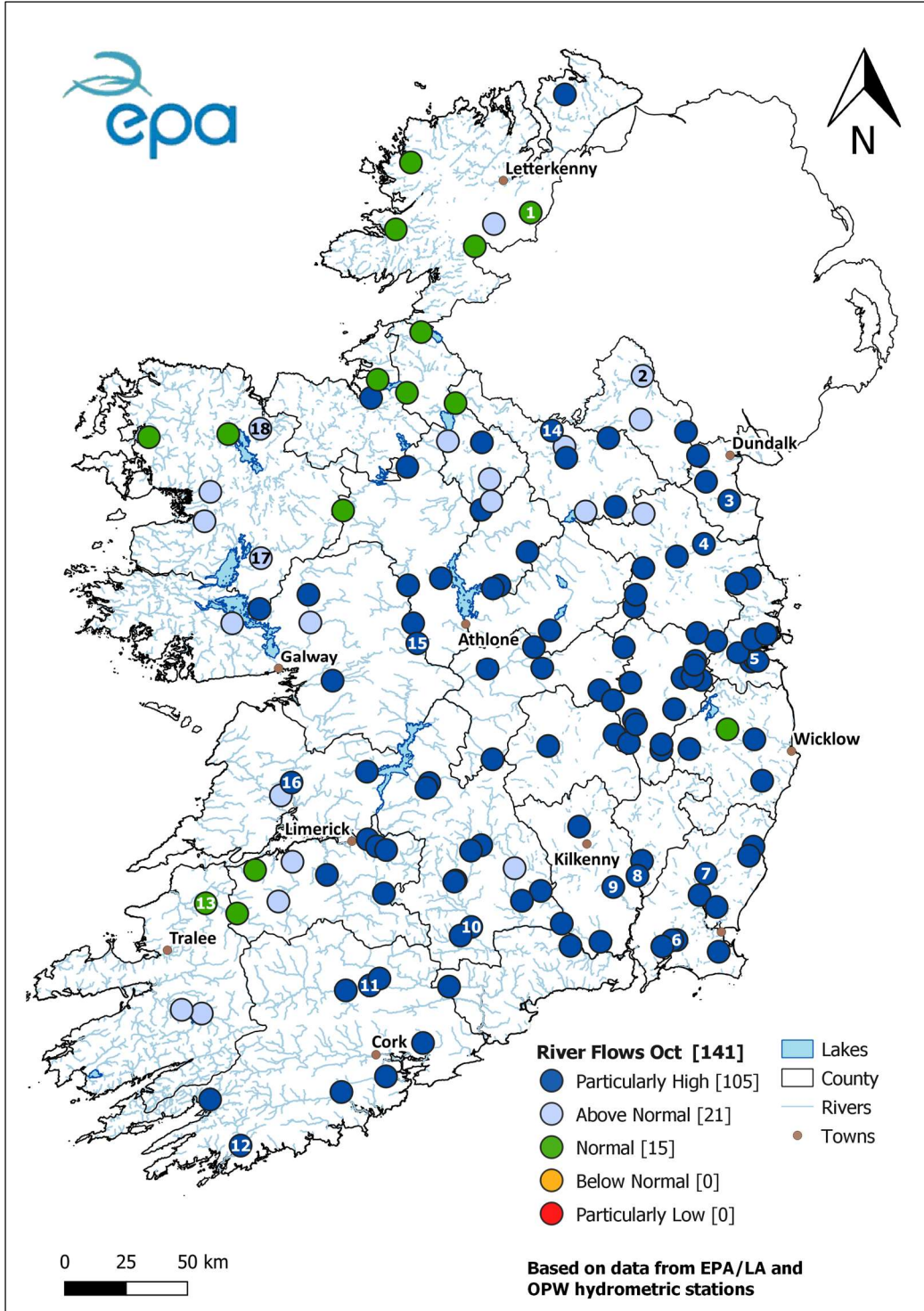


Figure 6: Monthly average river flows for October 2023 relative to historic monthly average flows expressed as percentile of the long-term values of monthly flow. Numbered sites are represented in the hydrographs below. All data are provisional and may be subject to revision (Source: EPA, OPW).

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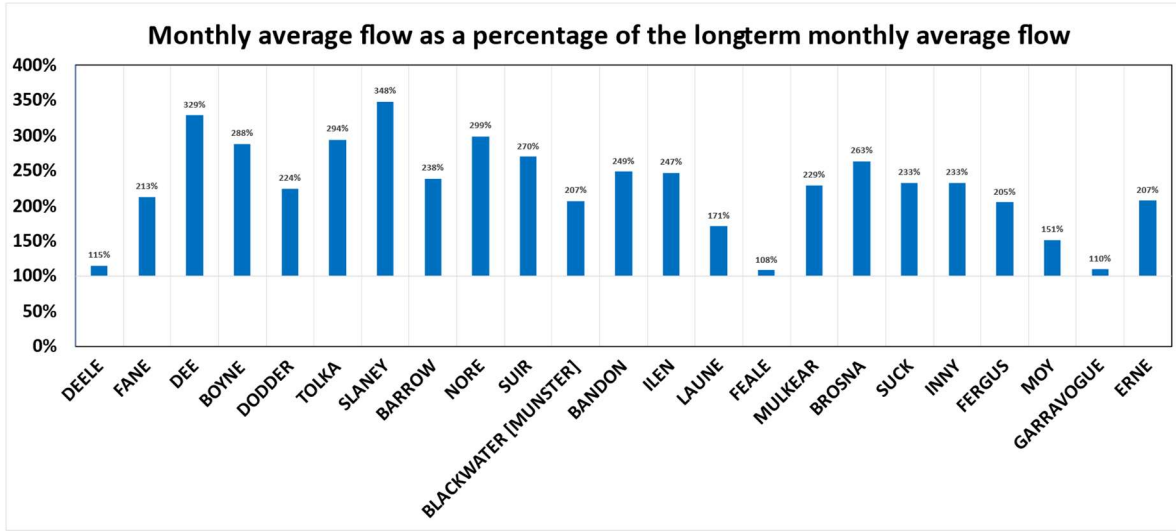
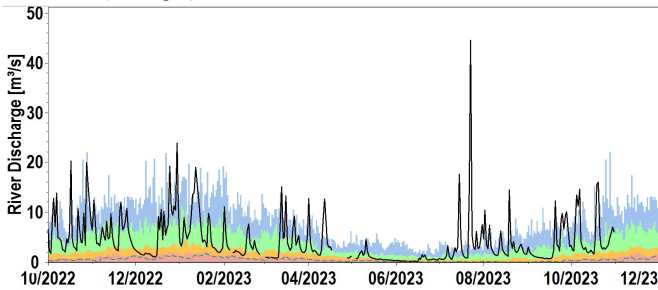


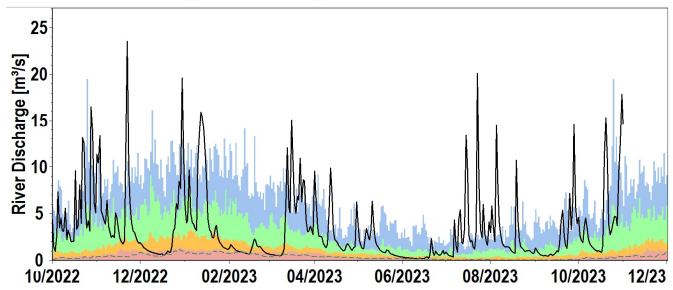
Figure 7: October 2023 average flows as a percentage of the long-term monthly average flow for this month at a selected number of stations. All data are provisional and may be subject to revision (Source: EPA, OPW).

## Flow hydrographs for selected rivers

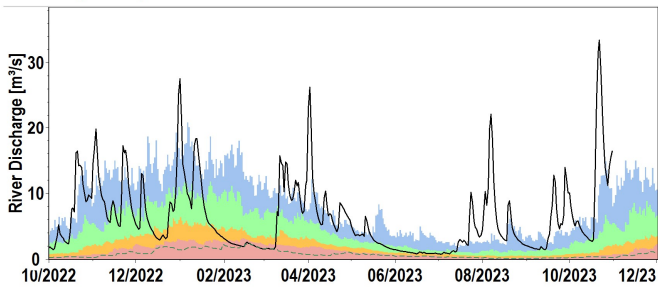
1. DEELE (Donegal)



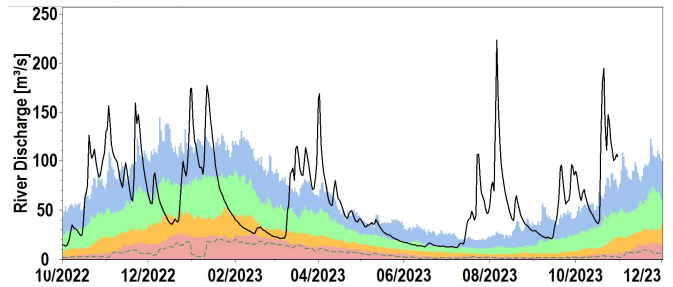
2. BLACKWATER [MONAGHAN]



3. DEE (Louth)

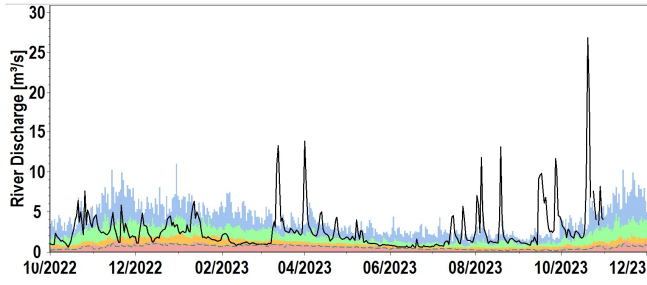


4. BOYNE (Meath)

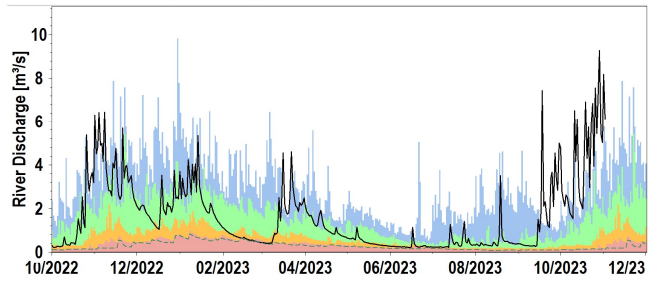


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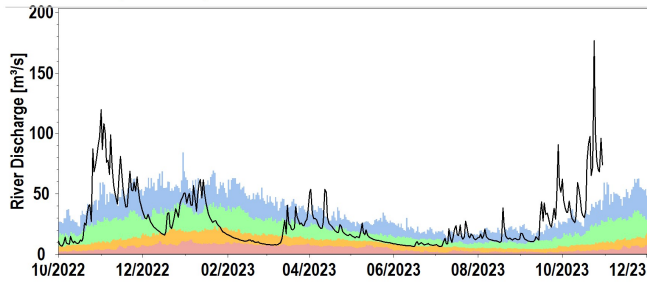
**5. DODDER (Dublin)**



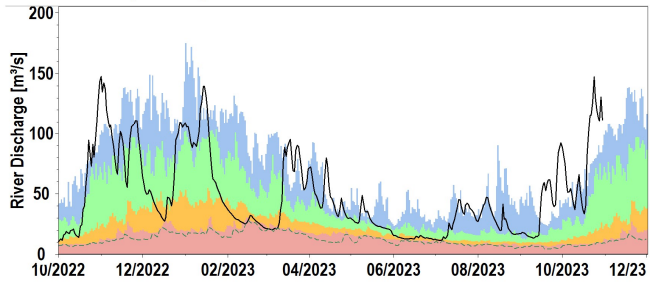
**6. MULMONTRY (Wexford)**



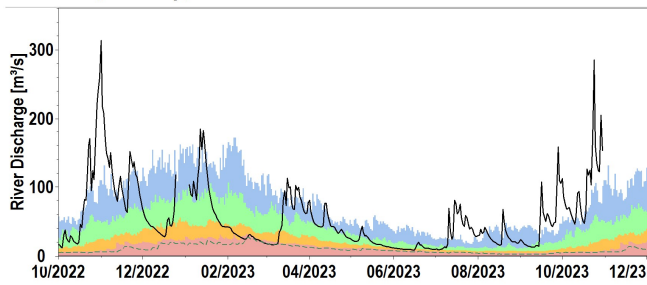
**7. SLANEY (Wexford)**



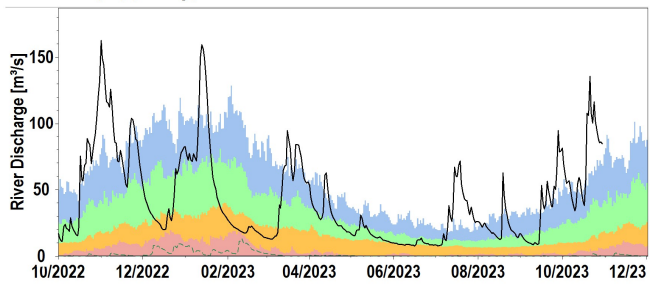
**8. BARROW (Carlow)**



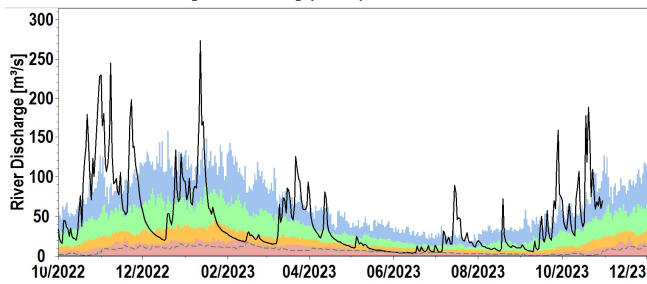
**9. NORE (Kilkenny)**



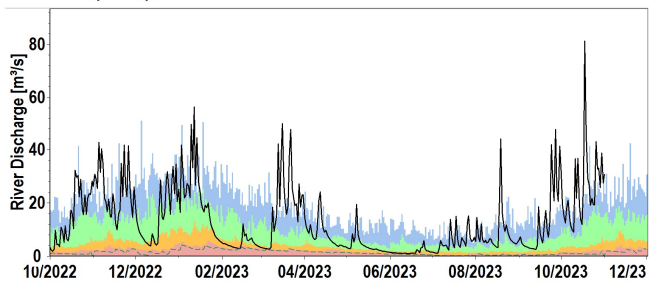
**10. SUIR (Tipperary)**



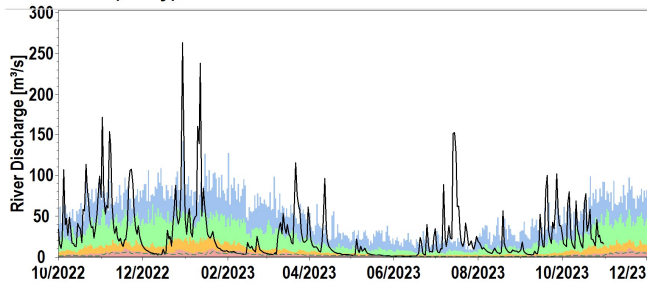
**11. BLACKWATER [MUNSTER] (Cork)**



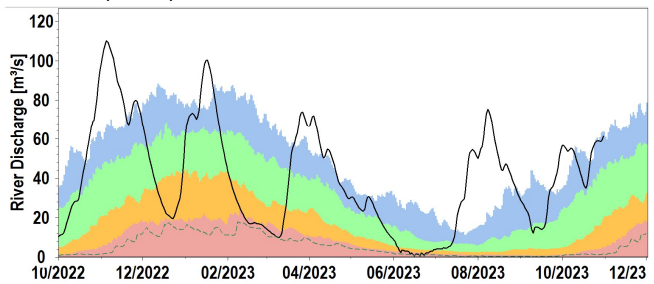
**12. ILEN (Cork)**



**13. FEALE (Kerry)**



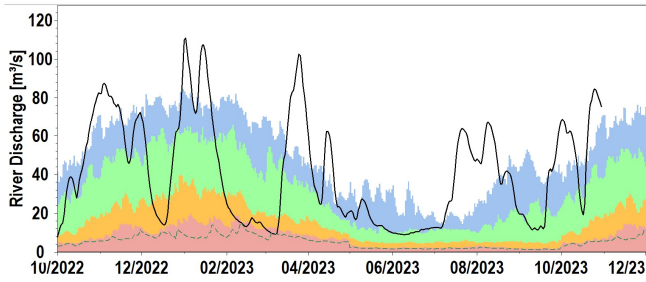
**14. ERNE (Cavan)**



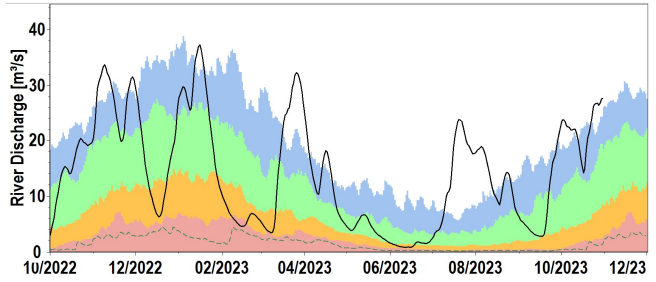


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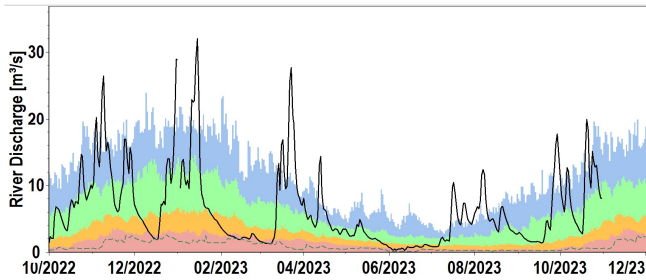
15. SUCK (Roscommon)



16. FERGUS (Clare)



17. ROBE (Mayo)



18. MOY (Mayo)

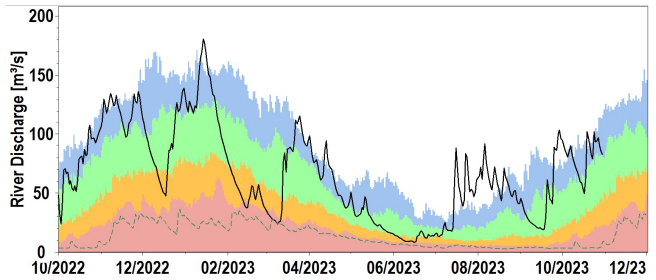




Figure 8: Daily average river flows measured in cubic metres per second relative to historic daily average flows expressed as percentile of the long-term values of each day and long-term minimum flows. All data are provisional and may be subject to revision (Source: EPA, OPW).

Explanation - Classes

Particularly Low	Below Normal	Normal	Above Normal	Particularly High	Daily Mean Flow	Lowest Daily Mean Flow
<95%tile daily average flow	>95%tile <70%tile daily average flow	>70 %tile <30%tile daily average flow	>30%tile 10%tile daily average flow	>10%tile daily average flow		

## Lake and Turlough Levels

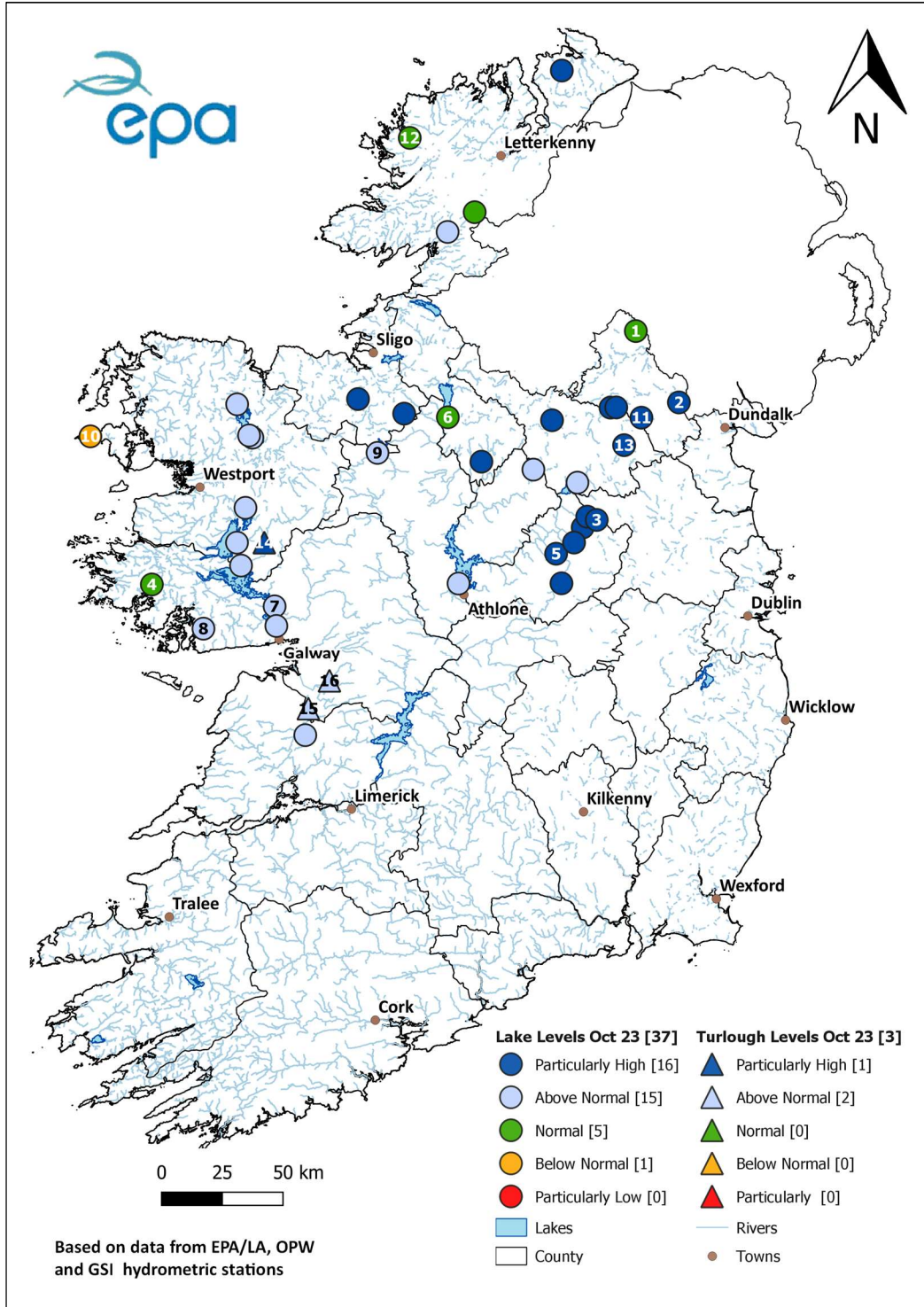
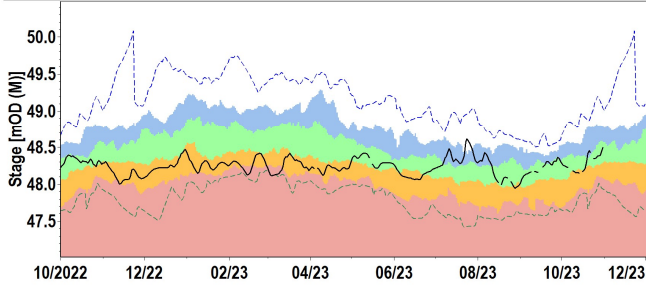


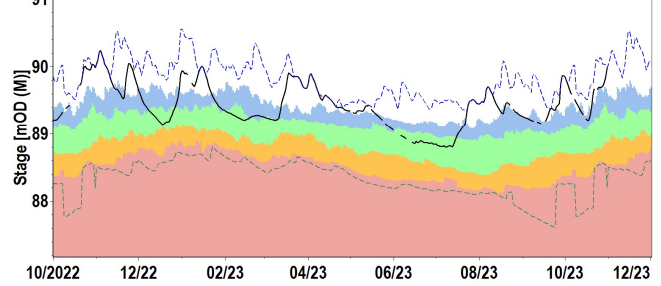
Figure 9: Monthly average lake & turlough levels for October 2023 relative to historic monthly average levels expressed as percentile of the long-term values for this month. Numbered sites are represented in the hydrographs below. All data are provisional and may be subject to revision (Source: EPA, OPW and GSI).

## Water level hydrographs for selected lakes and turloughs

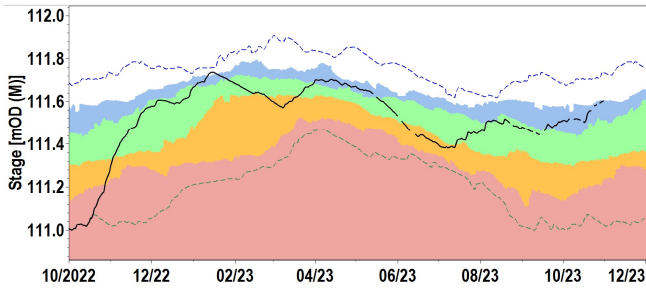
1. EMY LOUGH (Monaghan)



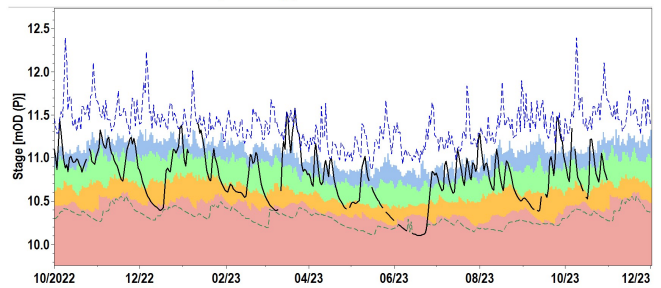
2. L. MUCKNO (Monaghan)



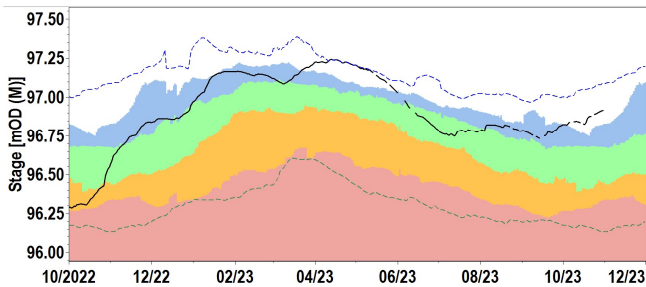
3. L. BANE (Meath)



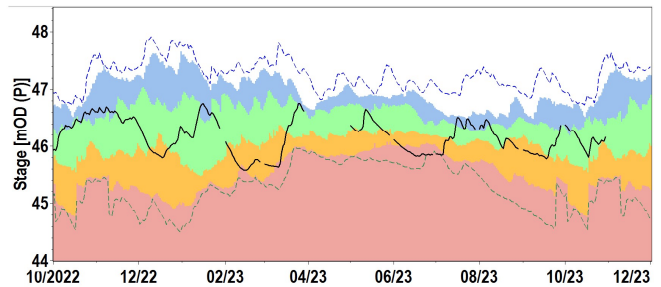
4. DERRYCLARE L. (Galway)



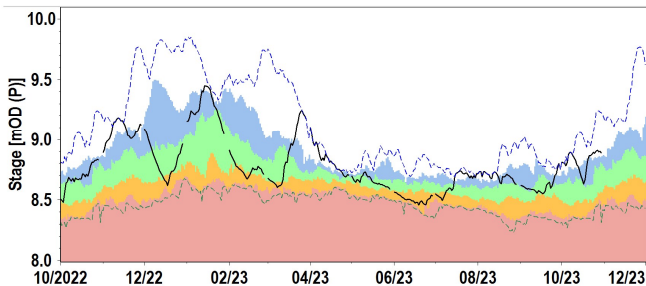
5. L. OWEL (Westmeath)



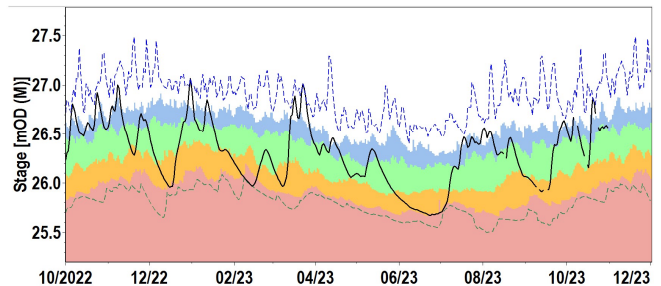
6. L.ALLEN (Leitrim)



7. L.CORRIB (Galway)



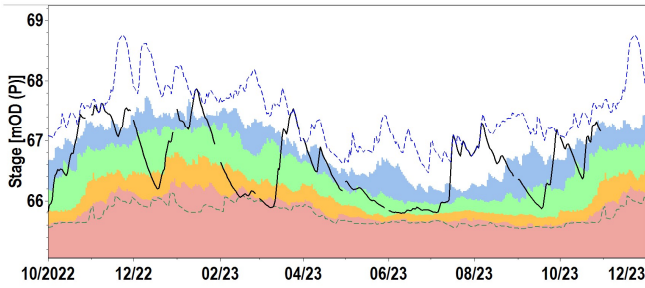
8. GLENICMURRIN LAKE (Galway)



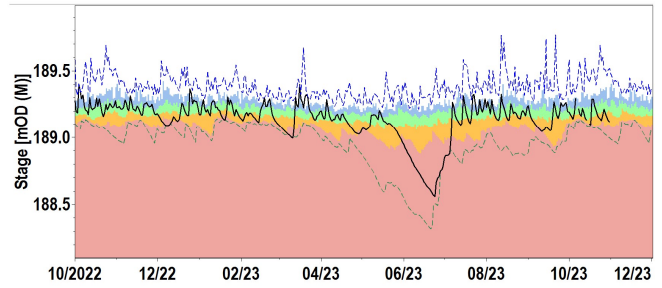


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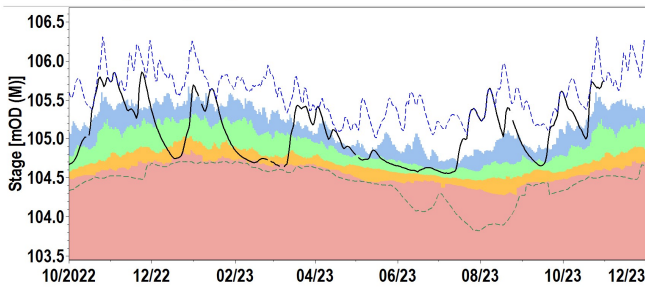
9. L. GARA (Sligo)



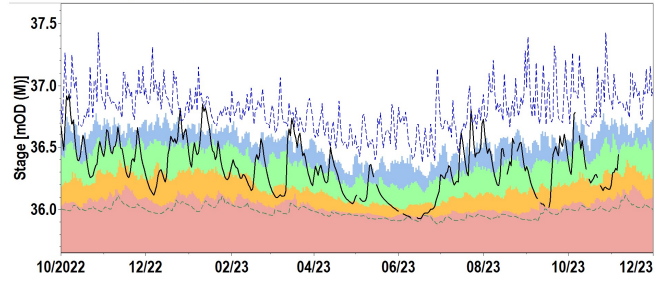
10. L. ACCORMORE (Mayo)



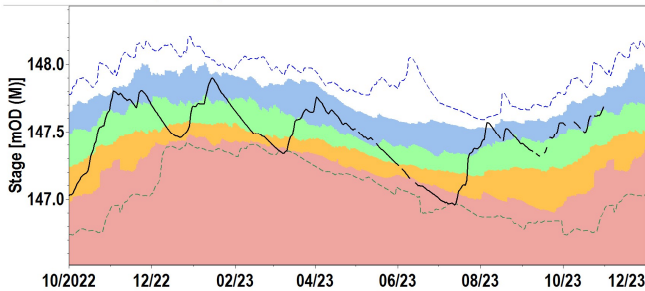
11. L. BAWN (Monaghan)



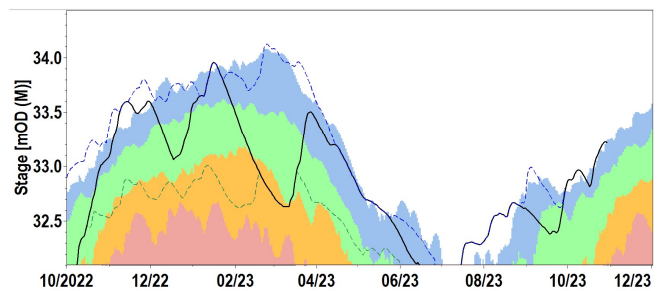
12. L. ANURE (Donegal)



13. SKEAGH L. (Cavan)

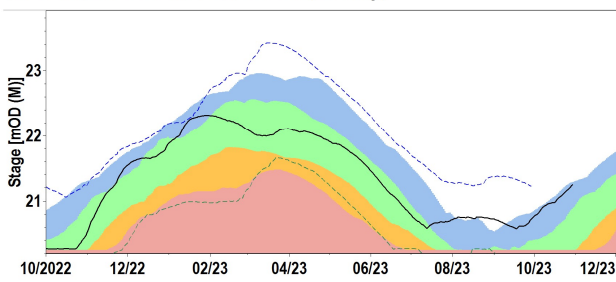


14. SKEALOGHAN TURLOUGH (Mayo)



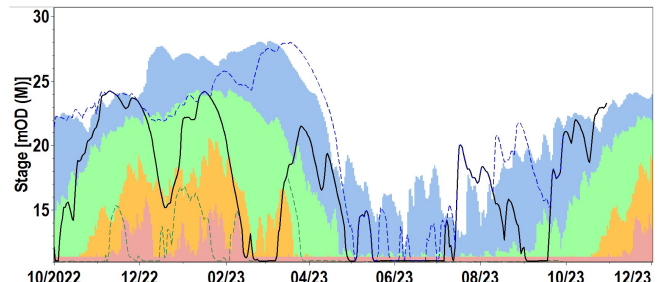
\*\* Modelled long-term percentiles

15. TERMON SOUTH TURLOUGH (Galway)



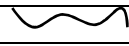


\*\* Modelled long-term percentiles

16. BLACKROCK TURLOUGH (Galway)



\*\* Modelled long-term percentiles

Figure 10: Observed daily mean lake and turlough levels (black trace) measured in meters above ordnance datum compared to the 10%tile, 30%tile, 70%tile and 95%tile for each month for the period of record and observed long-term maximum and minimum levels. Note historic percentiles for turloughs are based on modelled data. All data are provisional and may be subject to revision (Source: EPA, OPW, GSI, TCD, IT Carlow).

Explanation - Classes							
Particularly Low	Below Normal	Normal	Above Normal	Particularly High	Daily Mean Level mOD	Highest Daily Mean Level mOD	Lowest Daily Mean Level mOD
<95%tile daily average level	>95%tile <70%tile daily average level	>70 %tile <30%tile daily average level	>30%tile <10%tile daily average level	>10%tile daily average level			

## Groundwater Levels and Spring Flows

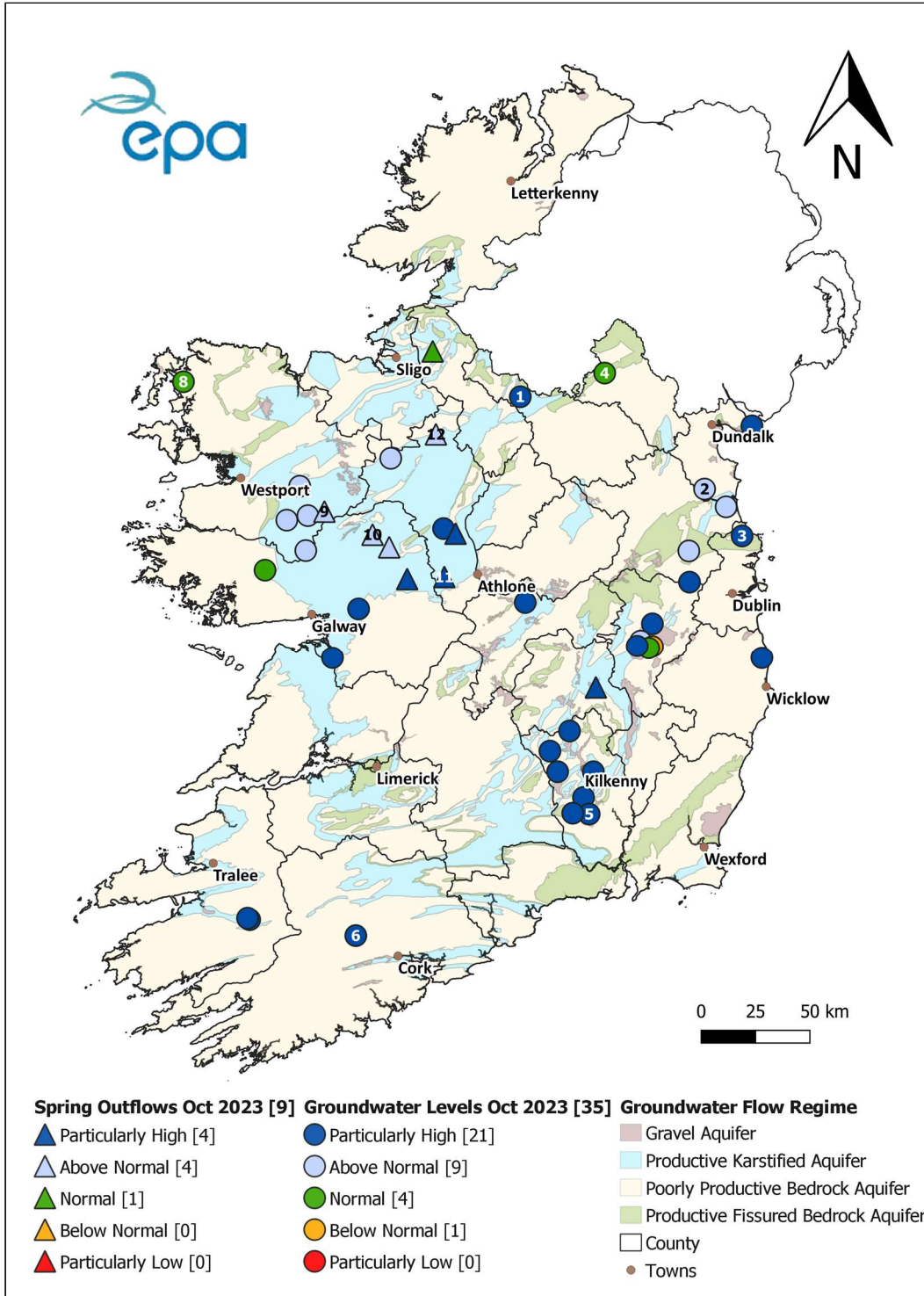
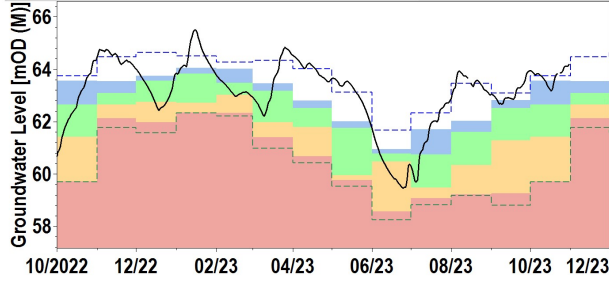


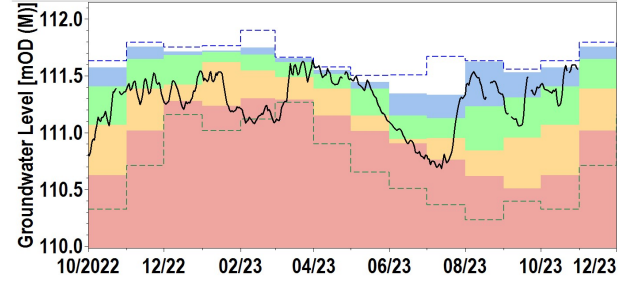
Figure 11: Groundwater level and Spring Flow status for October 2023, relative to historic monthly groundwater levels. Numbered sites are represented in the hydrographs below. All data are provisional and may be subject to revision (Source: EPA).

## Groundwater and spring hydrographs

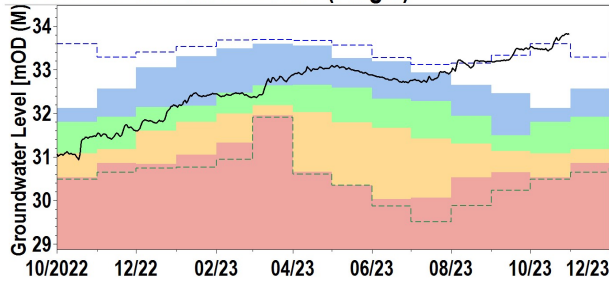
**1. BAWN BOY WORKHOUSE (Cavan)**



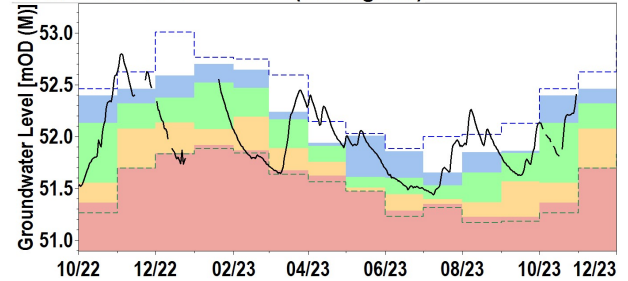
**2. Mattock MK1 Deep (Meath)**



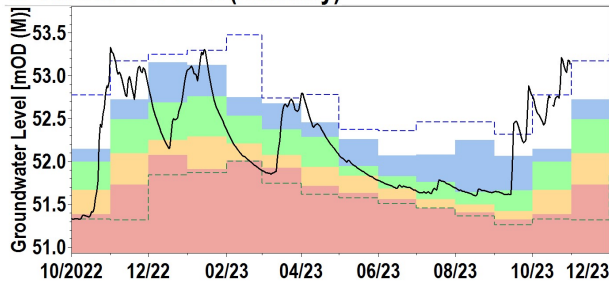
**3. BOG OF THE RING OW3D (Fingal)**



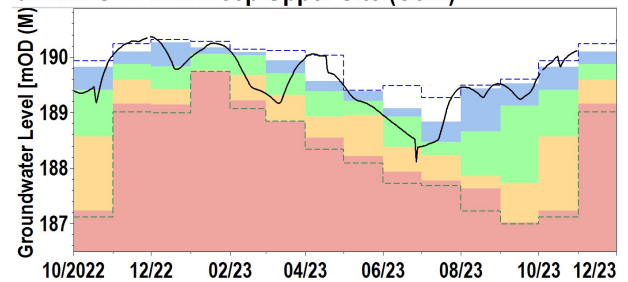
**4. MAGHERARNEY GWL (Monaghan)**



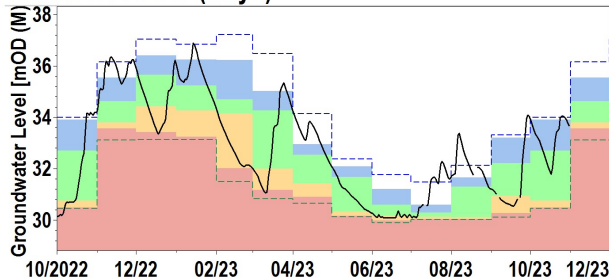
**5. KNOCKTOPHER (Kilkenny)**



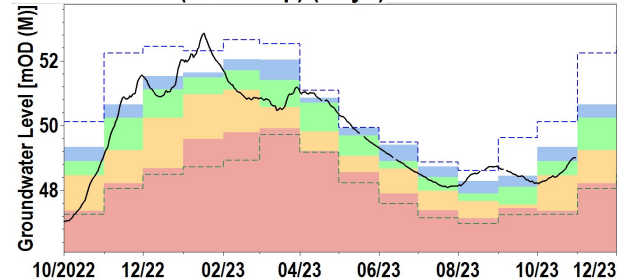
**6. DRIPSEY DR1 Deep Upper Site (Cork)**



**7. MAYO ABBEY (Mayo)**



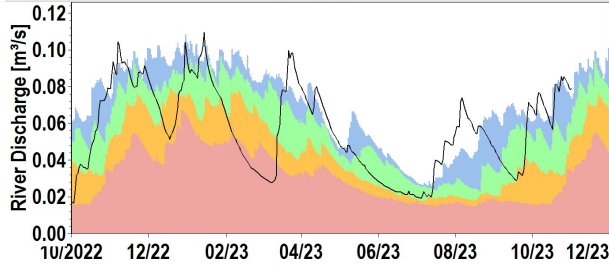
**8. Glencastle - (GC1 Deep) (Mayo)**



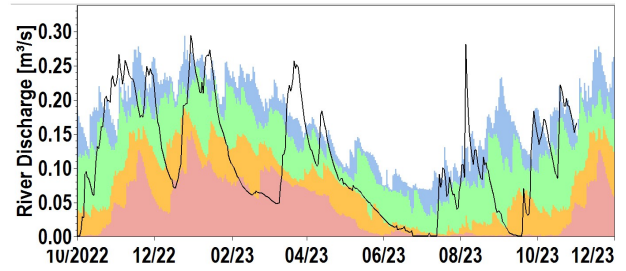


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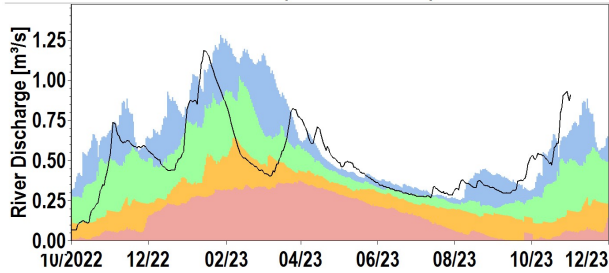
## 9. BALLINDINE SPRING (Mayo)



## 10. GORTGARROW SPRING (Galway)



## 11. KILLEGLAN SPRING (Roscommon)



## 12. ROCKINGHAM (Roscommon)

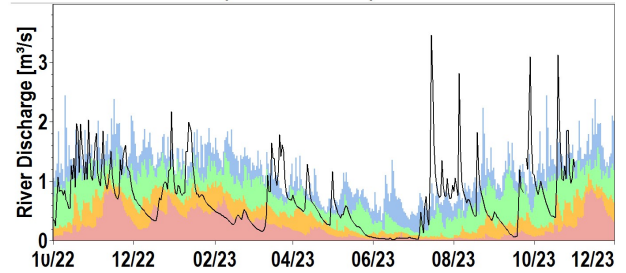





Figure 12: Daily mean groundwater levels (black trace) measured in meters above ordnance datum compared to the 10%tile, 30%tile, 70%tile and 95%tile for each month for the period of record and long-term maximum and minimum levels. All data are provisional and may be subject to revision (Source: EPA).

Explanation - Classes							
							
<b>Particularly Low</b>	<b>Below Normal</b>	<b>Normal</b>	<b>Above Normal</b>	<b>Particularly High</b>	<b>Daily Mean Level mOD</b>	<b>Highest Month Mean Level mOD</b>	<b>Lowest Month Mean Level mOD</b>
<95%tile monthly average level	>95%tile <70%tile monthly average level	>70 %tile <30%tile monthly average level	>30%tile <10%tile monthly average level	>10%tile monthly average level			

## Glossary of terms

Aquifer Type	An aquifer is an underground body of water bearing rock or unconsolidated materials (gravel or sand) from which groundwater can be extracted in useful amounts. For the purposes of this report they have been grouped into four aquifer categories as follows: <ul style="list-style-type: none"> <li>➤ Karstic (Rk and Lk) aquifers;</li> <li>➤ Gravel (Rg and Lg) aquifers;</li> <li>➤ Productive fractured bedrock (Rf and Lm) aquifers;</li> <li>➤ Poorly productive bedrock (LI, PI and Pu) aquifers.</li> </ul>
Dry spell	A dry spell is a period of 15 or more consecutive days to none of which is credited 1.0 mm or more of precipitation (i.e. daily tot < 1.0 mm).
Long term average (LTA)	The arithmetic mean calculated from historic record. For rainfall, the period 1981 to 2010 is used. For other parameters, such as groundwater levels, lake levels and river flow the period may vary according to data availability.
mOD (M or P)	Groundwater levels or lake levels above ordnance datum. In most cases this is relative to mean sea level at Malin (M) but in some cases is relative to Poolbeg (P).
Long-term monthly average	The arithmetic mean calculated from historic record of all monthly averages.
Percentile Level/Flow	Level or flow that is equalled or exceeded the stated percent of the time, e.g. 30%tile is the level or flow that is equalled or exceeded 30 percent of the time.
Very Wet Days	A very wet day is a day with 10.0 mm or more of rainfall.
Wet Days	A wet day is a day with 1.0 mm or more of rainfall.
Dry Spell	A dry spell is a period of 15 or more consecutive days to none of which is credited 1.0mm or more of precipitation (i.e. daily tot < 1.0 mm).
Absolute Drought	An absolute drought is a period of 15 or more consecutive days to none of which is credited 0.2 mm or more of precipitation.
Partial Drought	A partial drought is a period of at least 29 consecutive days, the mean daily rainfall of which does not exceed 0.2 mm

## Description of flow and level percentile classifications

Particularly High	>10%tile exceedance	Monthly level or flow that can occur 10% of the time
Above Normal	>30%tile <10%tile exceedance	Monthly level or flow that can occur 20% of the time
Normal	>70%tile <30%tile exceedance	Monthly level or flow that can occur 40% of the time
Below Normal	>95%tile <70%tile exceedance	Monthly level or flow that can occur 20% of the time
Particularly Low	<95%tile exceedance	Monthly level or flow that can occur 5% of the time

## Useful links

Access to EPA/LA Hydrometric data on [HydroNet](#)

Access to provisional water level only data from OPW hydrometric stations on [waterLevel.ie](#)

Access to archived water level and flow data from OPW hydrometric stations on [HydroData](#)

Access to turlough and borehole level data from GSI hydrometric stations on [gwlevel.ie](#)

Access to this month's Met Éireann and historic [weather statements](#).