

Monthly Hydrology Bulletin: Edition 035: March 2023

Overview

In marked contrast to February, during March, rainfall was above average nearly everywhere and was wettest in the south and east of the country. Average river flows also recovered and were above the long-term average at two-thirds (67%) of river monitoring stations during March. Lake and turlough levels generally increased during March with 41% of lakes having water levels above the long-term average and 45% of lakes in the normal range for this month.

Average monthly groundwater levels increased, with 39% of monitoring wells having water levels in the normal range for March. Similarly, almost all monitored spring outflows were in 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 90% (the month's lowest monthly rainfall total of 93.2 mm) at Finner, Co Donegal to 227% (monthly rainfall total of 119.3 mm) at Dublin Airport, Co Dublin (its wettest March since 1947). Monthly rainfall totals were as much as 239.2 mm (193% of its LTA) at Valentia Observatory, Co Kerry (its wettest March since 1963). The highest daily rainfall total was 34.7 mm at Cork Airport, Co Cork on Thursday 9th (its highest daily fall for March since 2013). The number of rain days ranged from 22 days at Claremorris, Co Mayo to 28 days at Oak Park, Co Carlow. The number of wet days ranged from 18 days at Malin Head, Co Donegal to 23 days at both Roche's Point, Co Cork and Valentia Observatory, Co Kerry. The number of very wet days ranged from zero days at Finner, Co Donegal to 10 days at Valentia Observatory, Co Kerry.

Four stations had their wettest March on record. These were Athenry, Co Galway with 185.9 mm (record length 32 years), Mace Head, Co Galway with 151.2 mm (length 18 years), Mount Dillon, Co Roscommon with 169.8 mm (length 18 years) and Casement Aerodrome, Co Dublin with 109.3 mm (length 59 years). Along with Dublin Airport, Phoenix Park, Co Dublin also had its wettest March since 1947 with 121.3 mm. Claremorris, Co Mayo had its wettest March since 1978 with 164.5 mm and Cork Airport, Co Cork had its wettest March since 1981 with 211.3 mm. Sherkin Island, Co Cork had its wettest March since 1989 with 179.6 mm and Moore Park, Co Cork had its wettest March since 1996 with 144.4 mm.

River Flows

Average river flows for March rose at almost all monitoring stations compared to average flows observed in February 2023. The monthly average flows at 161 river monitoring sites identified: 41 (25%) as being 'particularly high', 68 (42%) 'above normal', 50 (31%) as 'normal', 1 (1%) as 'below normal' [Greensemout, Co. Kildare] and 1 (1%) as 'particularly low' [Cregg, Co. Tipperary] for this time of year.

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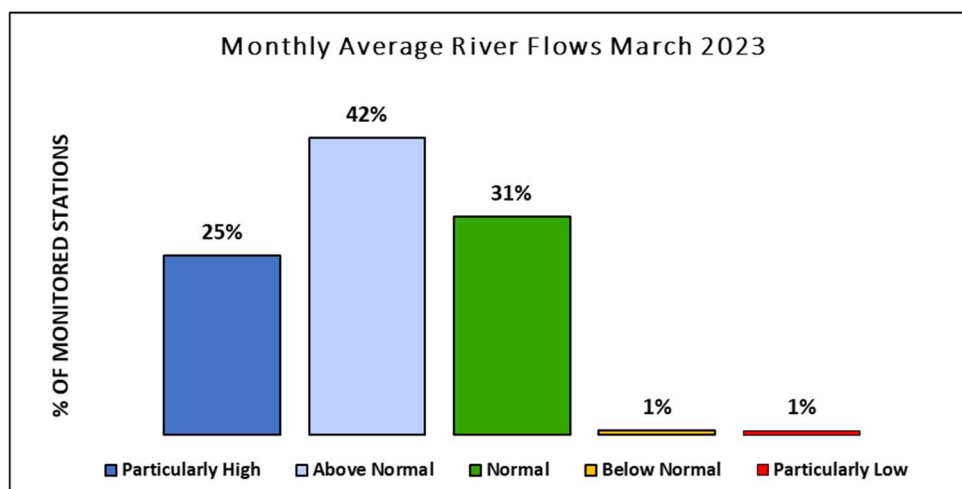


Figure 1: Percentage distribution of river flow monitoring sites within each of the percentile flow categories for March 2023.

Lake and Turlough Levels

Average water levels during March increased at 61% of monitored lakes compared to average levels for February. Analysis of monthly average levels at 38 lakes and 4 turloughs were classified as being 'particularly high' at 12 (29%), 'above normal' at 5 (12%), 'normal' at 19 (45%) and 'below normal' at 6 (14%) monitoring locations for the month of March.

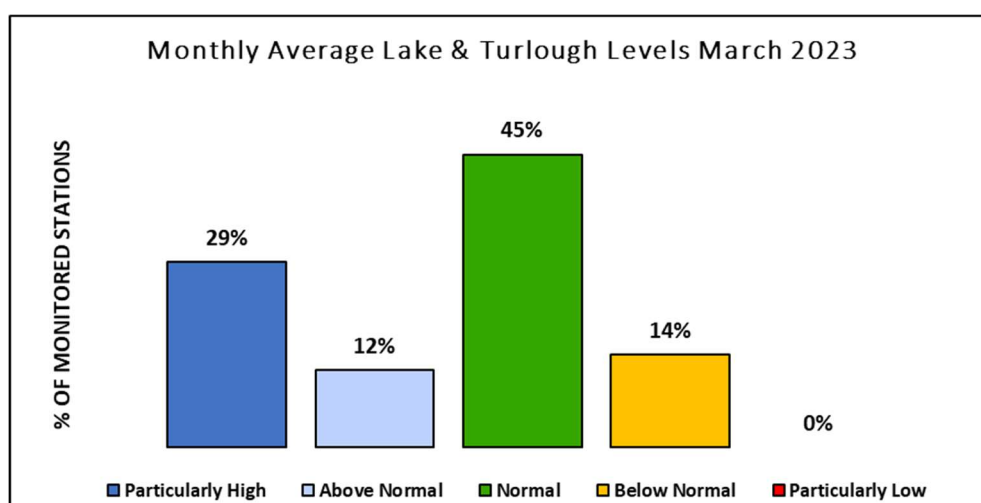


Figure 2: Percentage distribution of lake and turlough level monitoring sites within each of the percentile flow categories for March 2023.

Groundwater Levels and Spring Flows

Average groundwater levels in March rose at 76% of monitoring wells compared to average levels observed in February. During March, groundwater levels were classified as being 'particularly high' at 3 wells (7%), 'above normal' at 11 wells (27%), 'normal' at 16 wells (39%), 'below normal' at 7 wells (17%), and 'particularly low' at 4 wells (10%) across the country.

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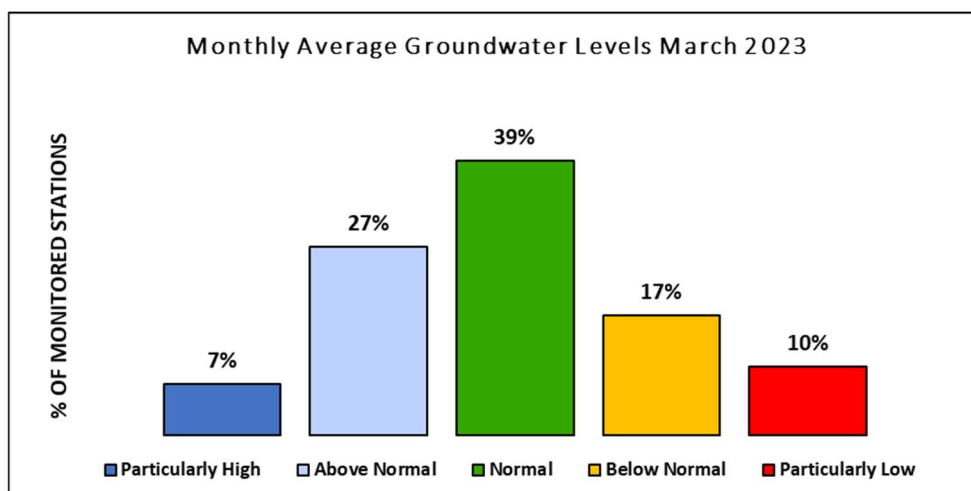


Figure 3: Percentage distribution of groundwater level sites within each of the percentile flow categories for March 2023.

Spring outflows were also monitored at 10 EPA monitoring sites for March. The outflows from these springs were compared to previously recorded flows for March and were 'particularly high' at 1 location [Mid Galway, Co. Galway] and 'normal' at 9 monitoring locations for this time of year.

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Rainfall

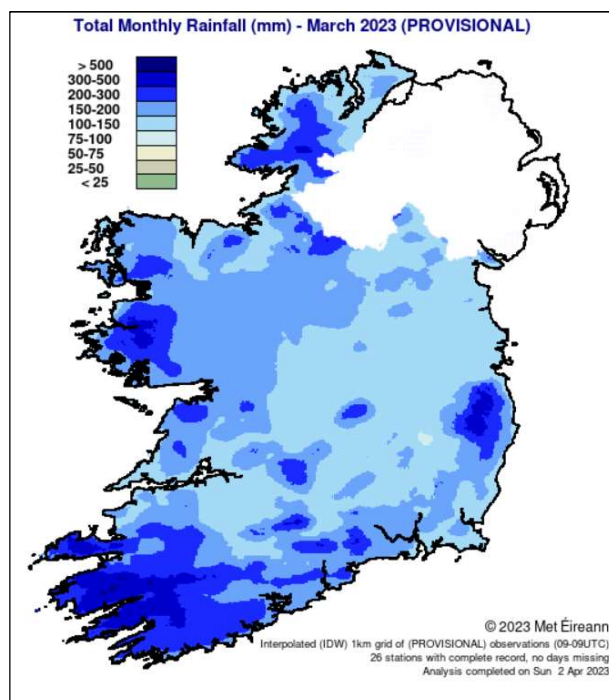


Figure 4: Rainfall map for Ireland March 2023 (Source: Met Éireann.ie).

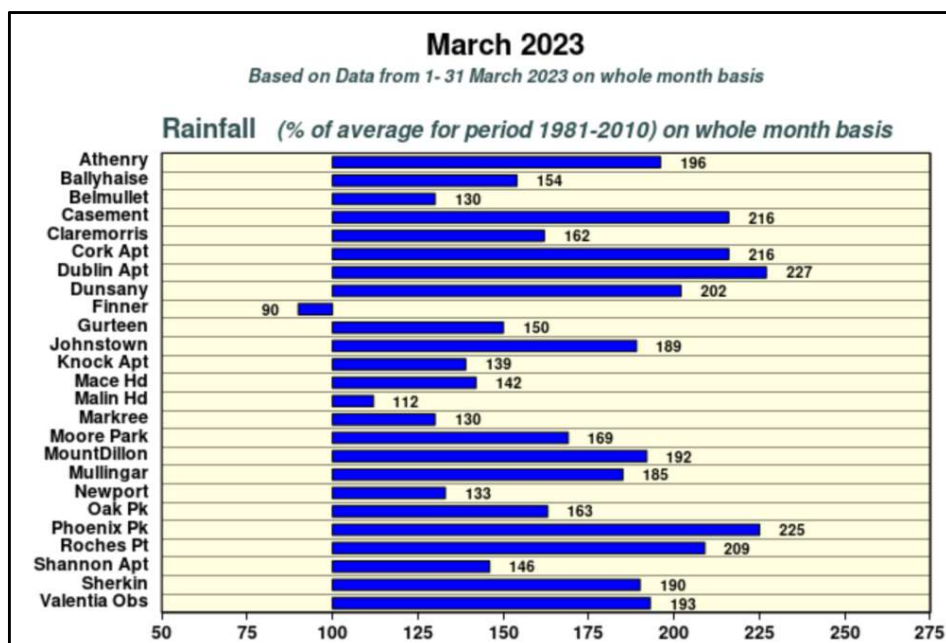


Figure 5: Summary of rainfall at synoptic stations for March 2023, figures indicate the percentage difference from the Long-Term Average rainfall for this month (Source: Met Éireann.ie).

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River Flows

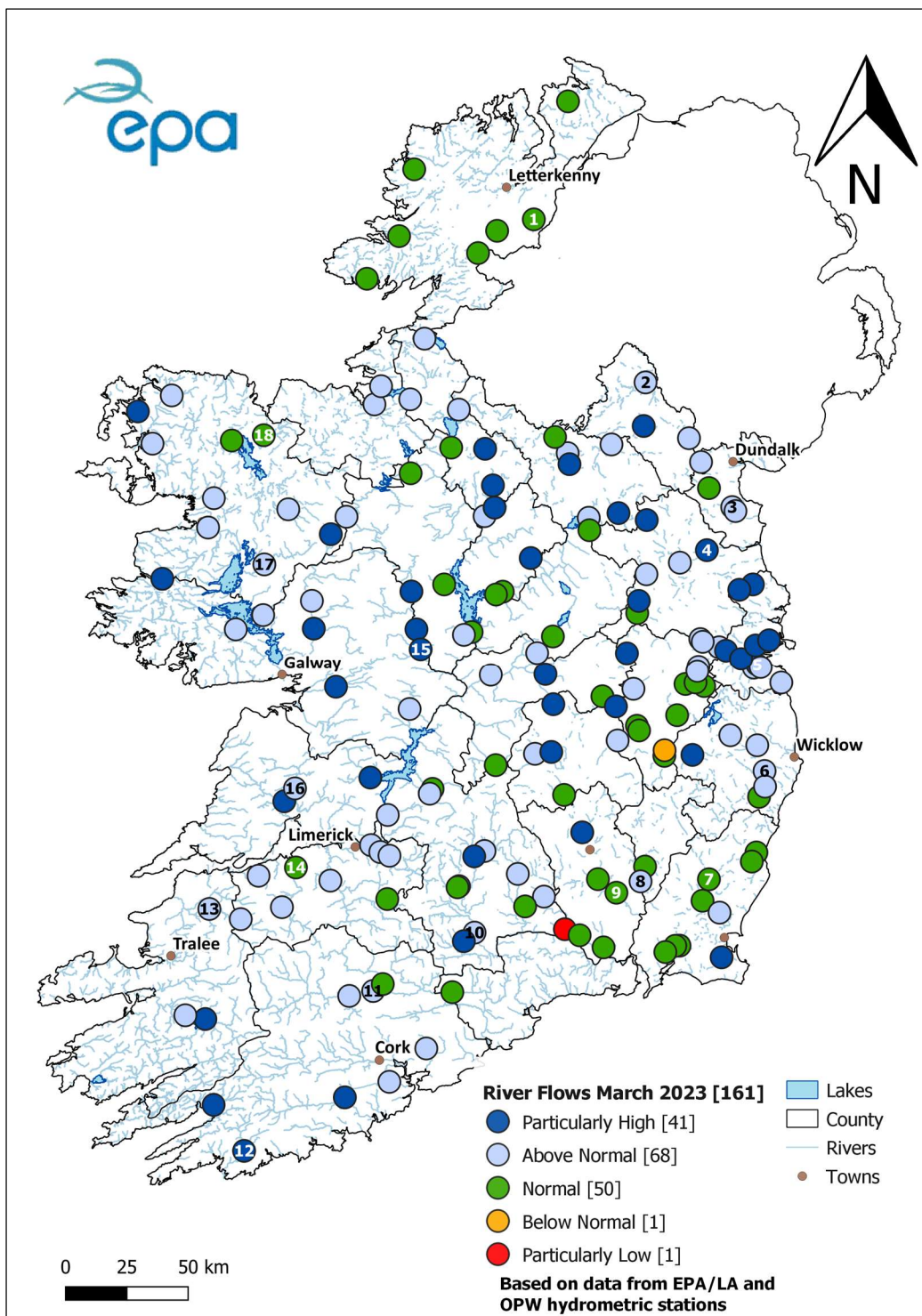


Figure 6: Monthly average river flows for March 2023 relative to historic monthly average flows expressed as percentile of the long-term values of monthly flow. Numbered sites are represented in the hydrographs below. All data are provisional and may be subject to revision (Source: EPA, OPW).

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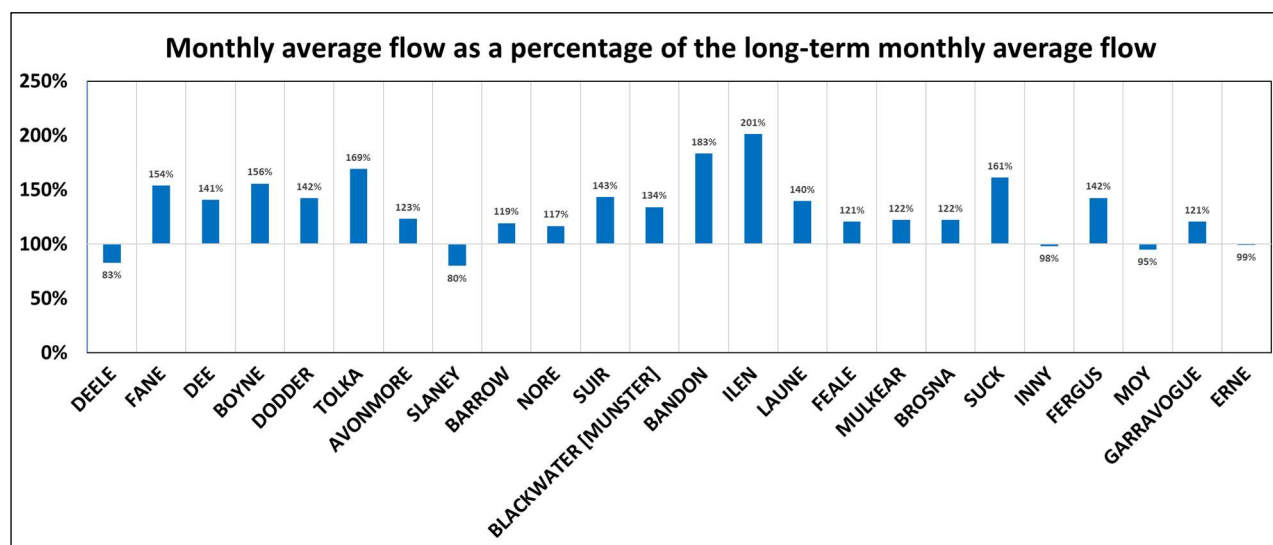
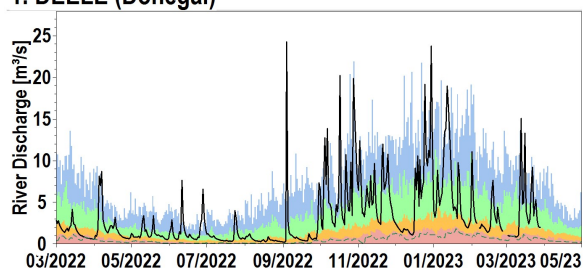


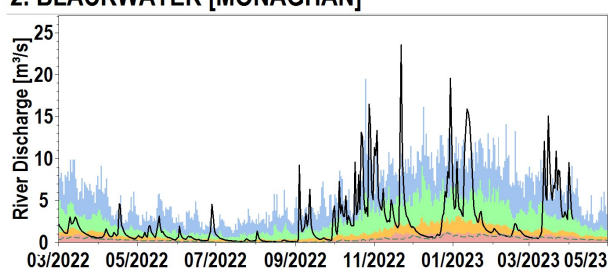
Figure 7: March 2023 average flows as a percentage of the long-term monthly average flow for this month at a selected number of stations. All data are provisional and may be subject to revision (Source: EPA, OPW).

Flow hydrographs for selected rivers

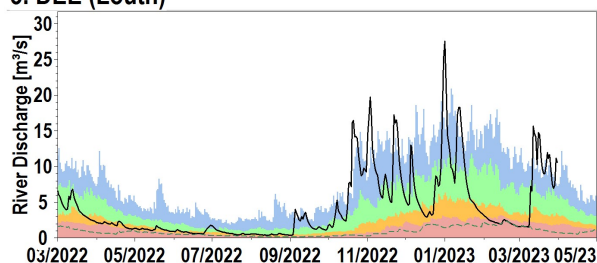
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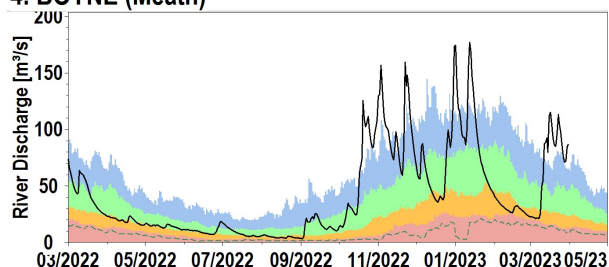
2. BLACKWATER [MONAGHAN]



3. DEE (Louth)

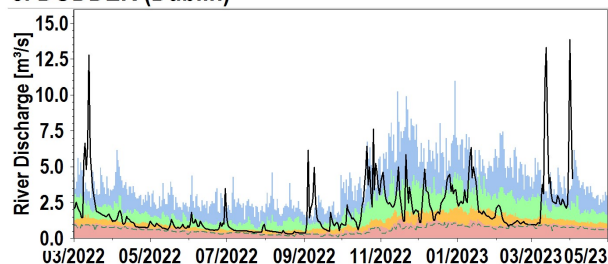


4. BOYNE (Meath)

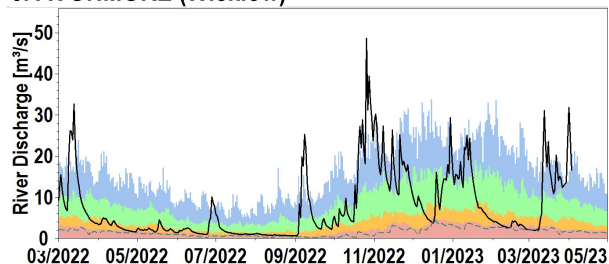


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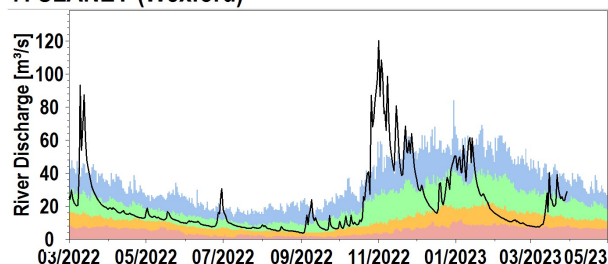
5. DODDER (Dublin)



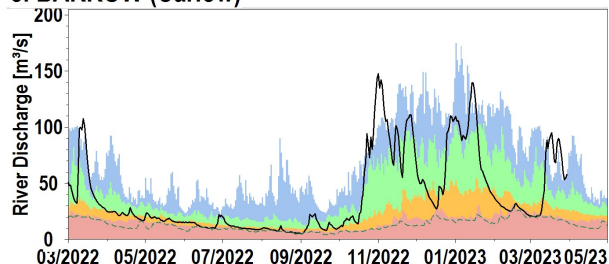
6. AVONMORE (Wicklow)



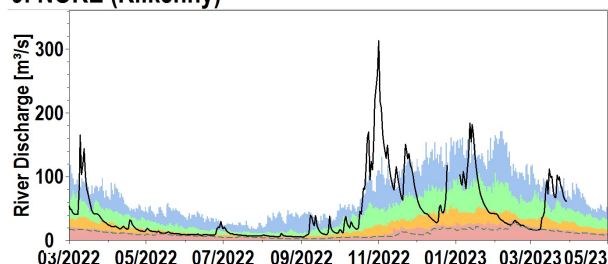
7. SLANEY (Wexford)



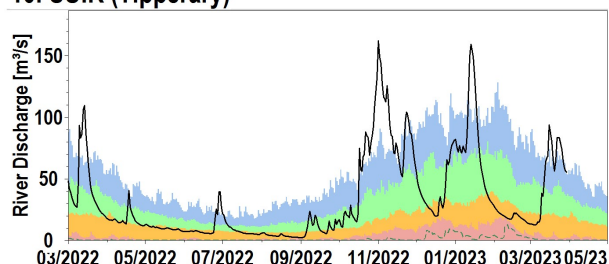
8. BARROW (Carlow)



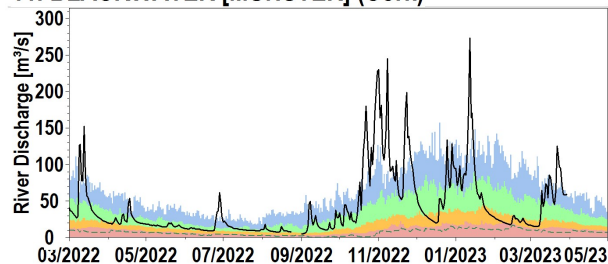
9. NORE (Kilkenny)



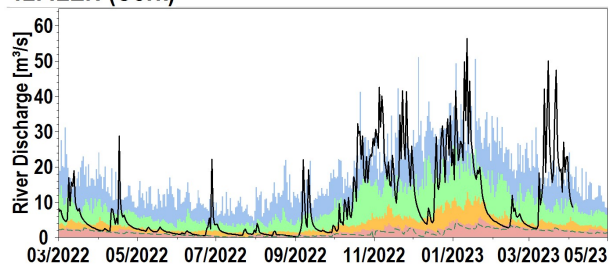
10. SUIR (Tipperary)



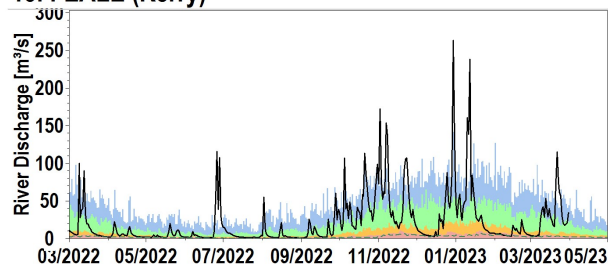
11. BLACKWATER [MUNSTER] (Cork)



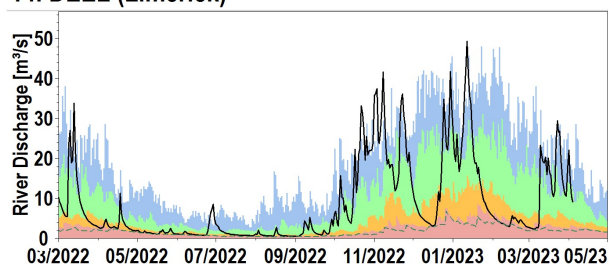
12. ILEN (Cork)



13. FEALE (Kerry)

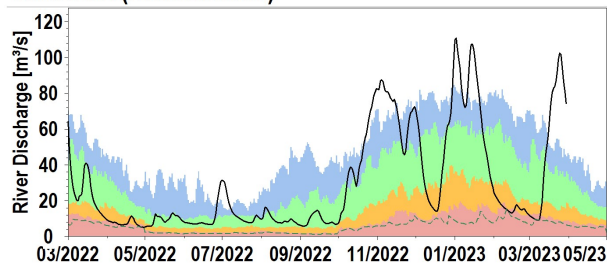


14. DEEL (Limerick)

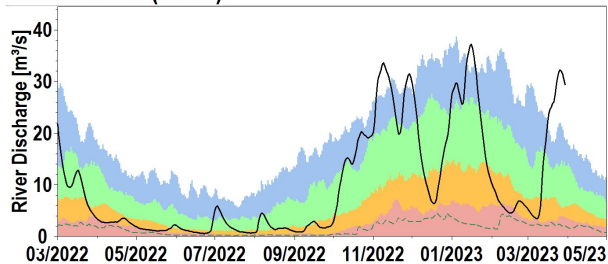


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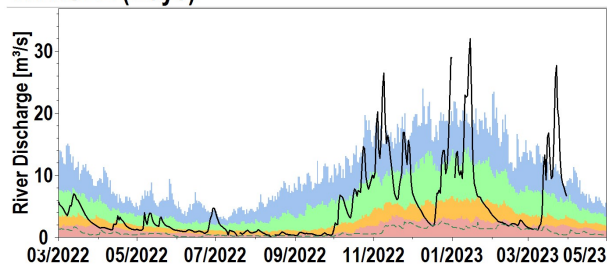
15. SUCK (Roscommon)



16. FERGUS (Clare)



17. ROBE (Mayo)



18. MOY (Mayo)

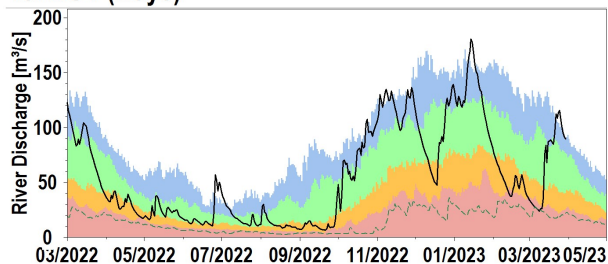




Figure 8: Daily average river flows measured in cubic metres per second relative to historic daily average flows expressed as percentile of the long-term values of each day and long-term minimum flows. All data are provisional and may be subject to revision (Source: EPA, OPW).

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		

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Lake and Turlough Levels

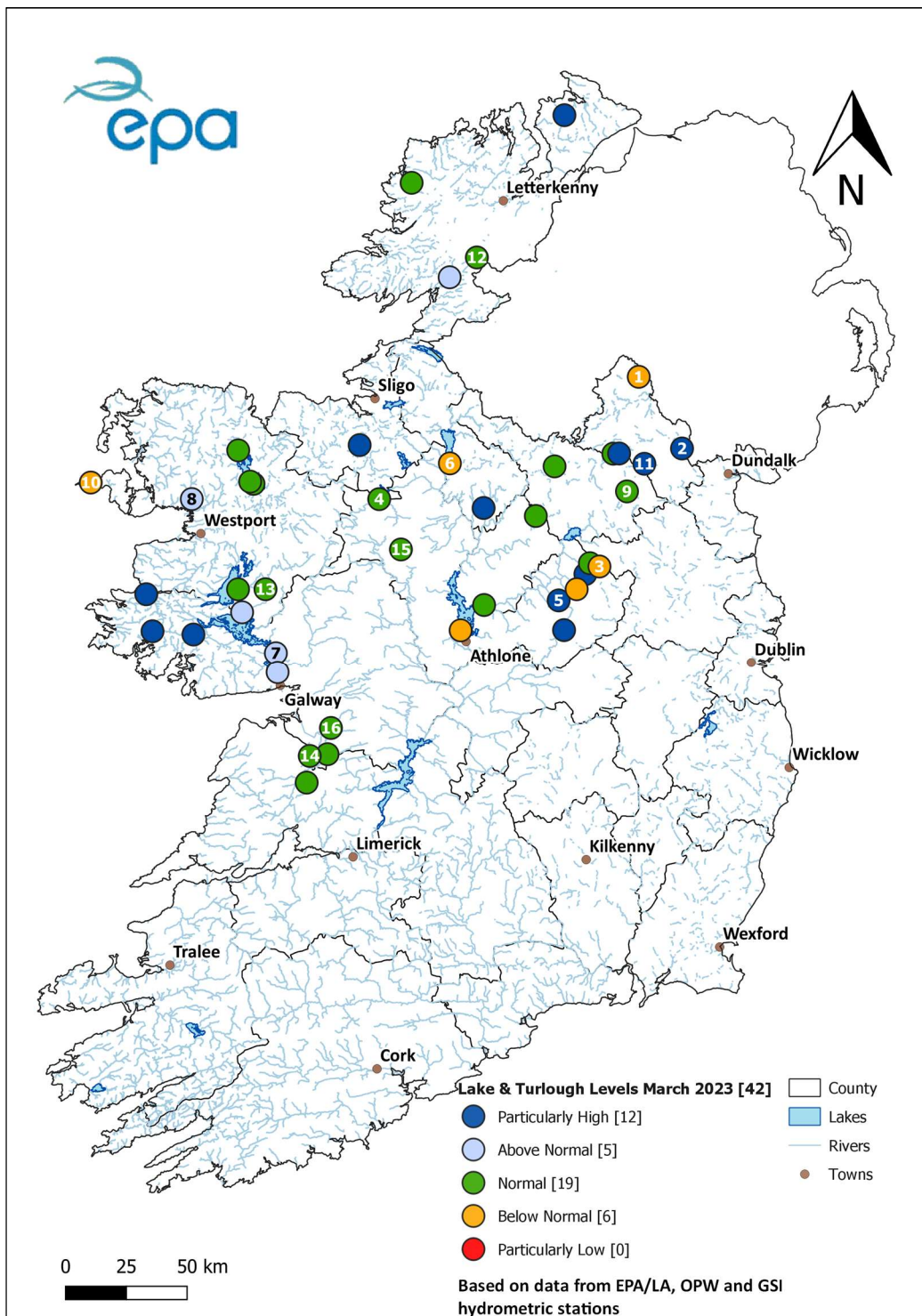
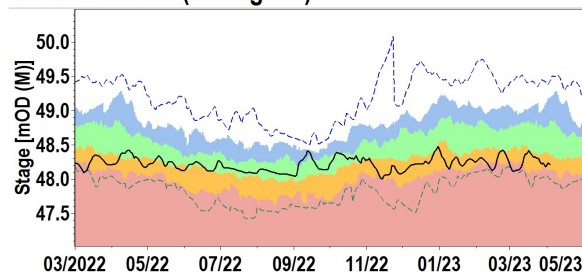


Figure 9: Monthly average lake levels for March 2023 relative to historic monthly average levels expressed as percentile of the long-term values for this month. Numbered sites are represented in the hydrographs below. All data are provisional and may be subject to revision (Source: EPA, OPW and GSI).

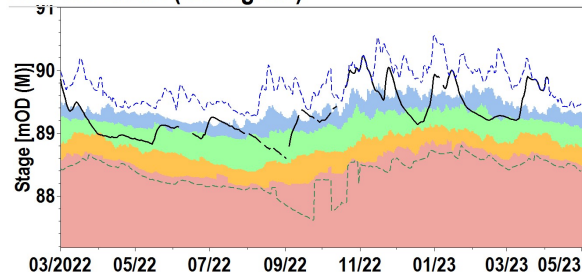
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Water level hydrographs for selected lakes and turloughs

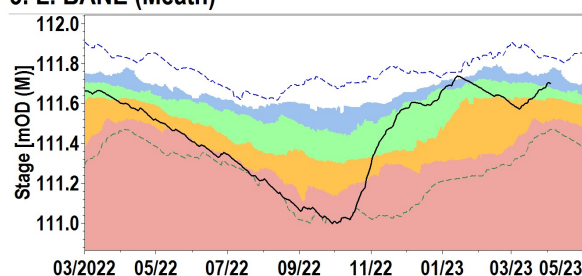
1. EMY LOUGH (Monaghan)



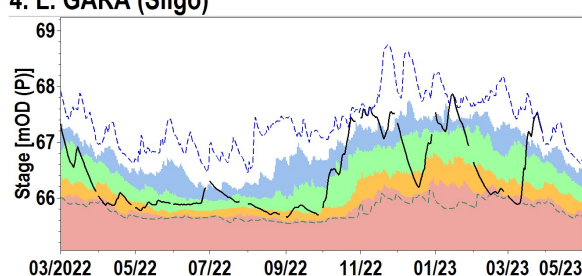
2. L. MUCKNO (Monaghan)



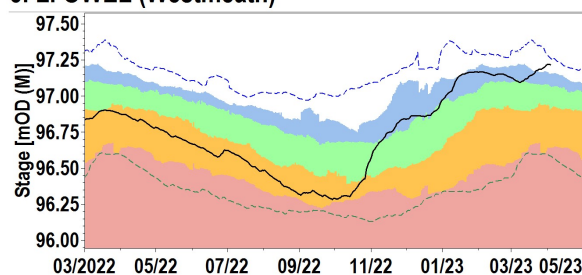
3. L. BANE (Meath)



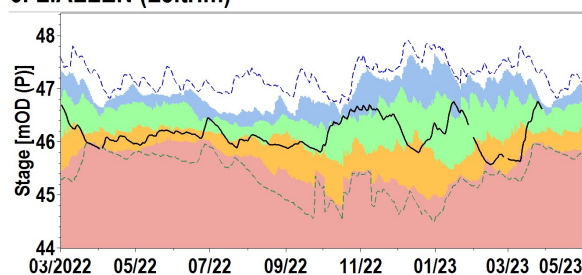
4. L. GARA (Sligo)



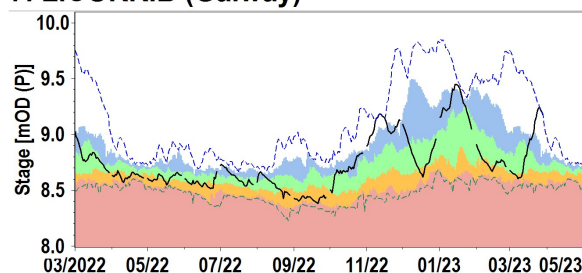
5. L. OWEL (Westmeath)



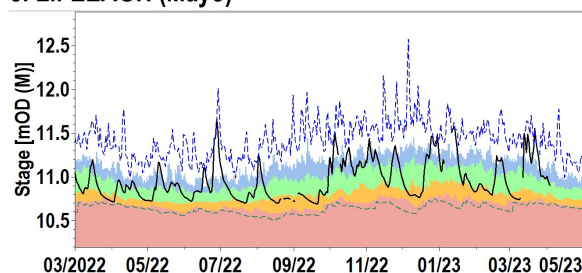
6. L. ALLEN (Leitrim)



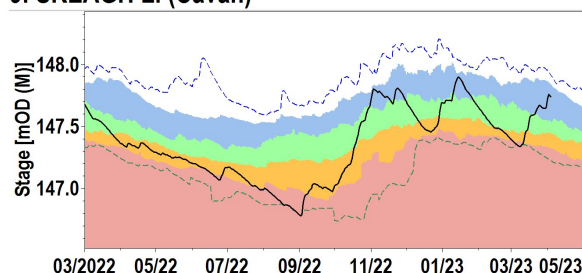
7. L. CORRIB (Galway)



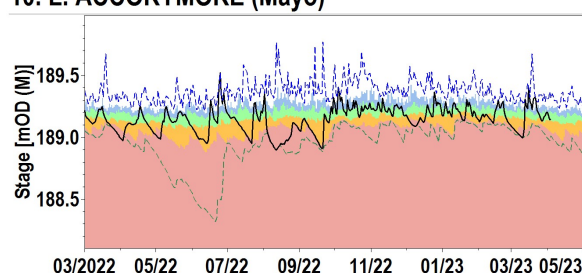
8. L. FEEAGH (Mayo)



9. SKEAGH L. (Cavan)

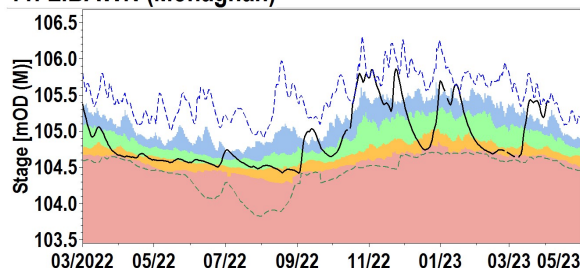


10. L. ACCORMORE (Mayo)

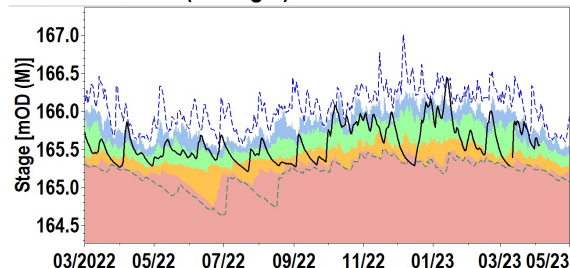


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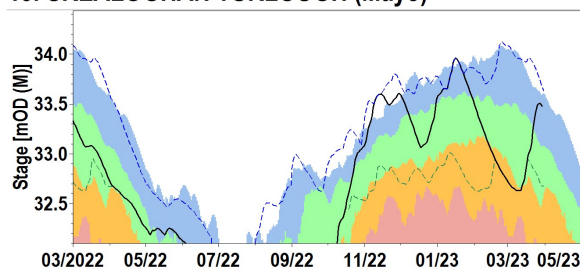
11. L.BAWN (Monaghan)



12. L. MOURNE (Donegal)

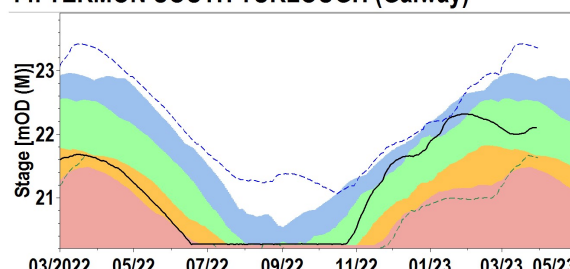


13. SKEALOGHAN TURLOUGH (Mayo)



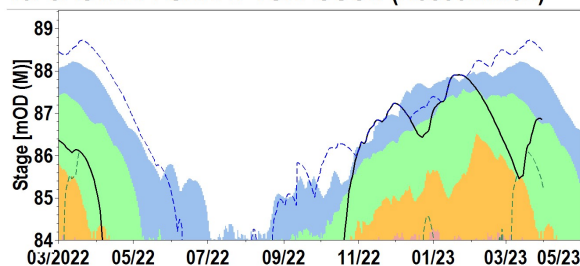
** Modelled long-term percentiles

14. TERMION SOUTH TURLOUGH (Galway)



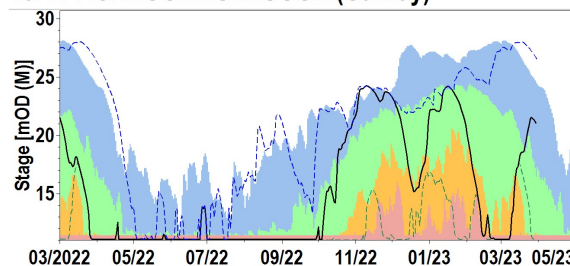
** Modelled long-term percentiles

15. CASTLEPLUNKET TURLOUGH (Roscommon)






** 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

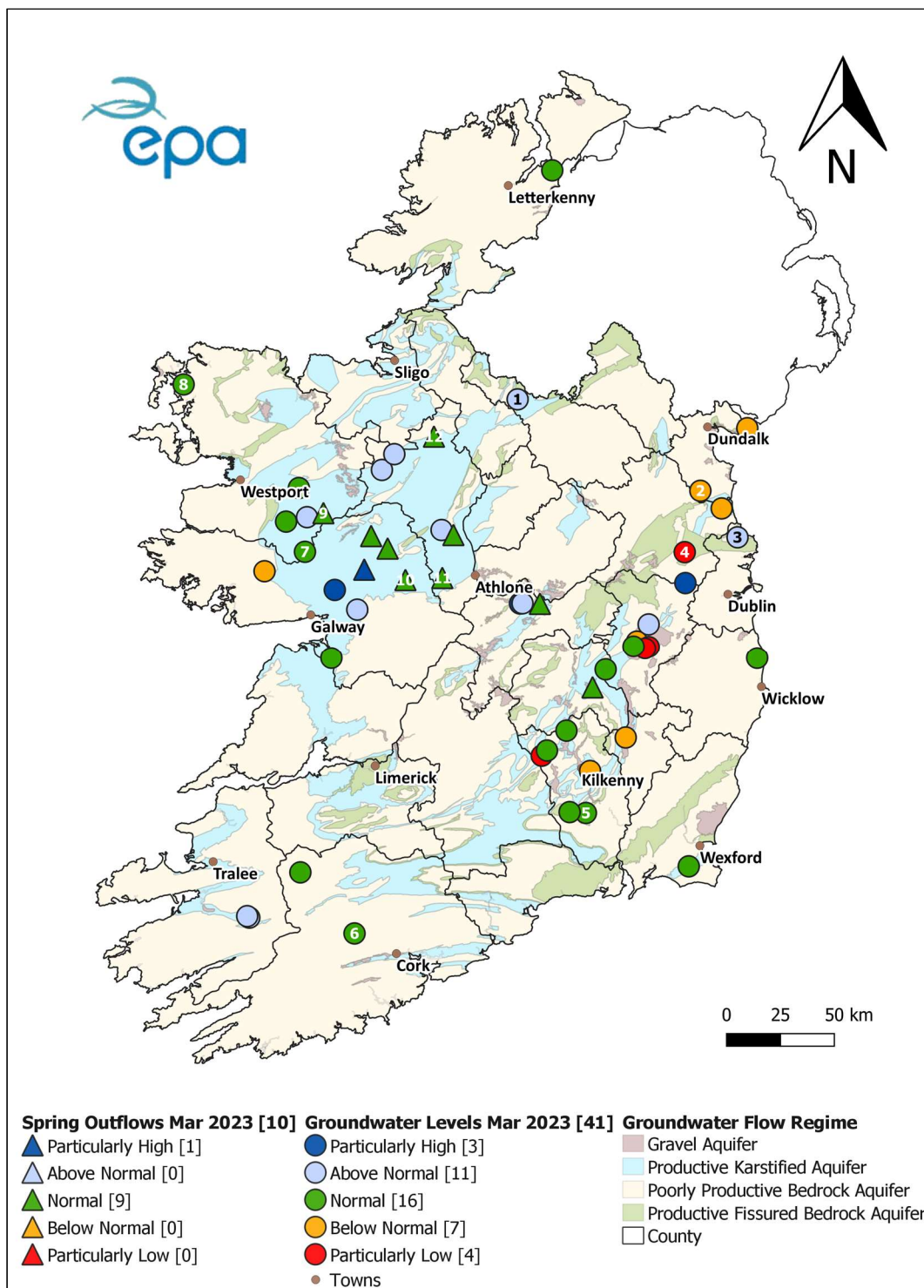
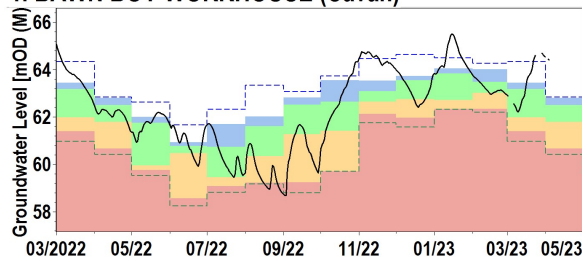


Figure 11: Groundwater level and Spring Flow status for March 2023, relative to historic monthly groundwater levels. Numbered sites are represented in the hydrographs below. All data are provisional and may be subject to revision (**Source: EPA**).

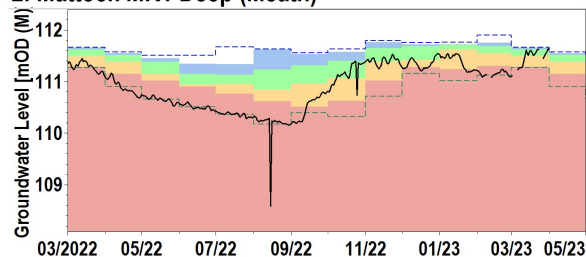
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Groundwater and spring hydrographs

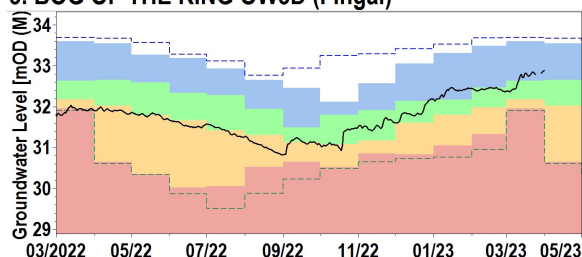
1. BAWN BOY WORKHOUSE (Cavan)



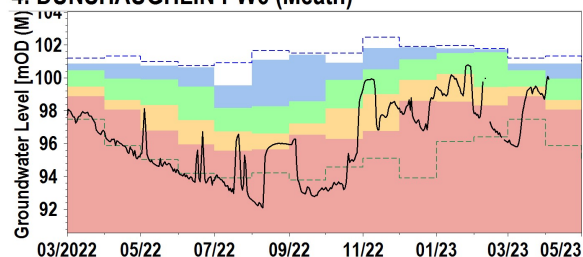
2. Mattock MK1 Deep (Meath)



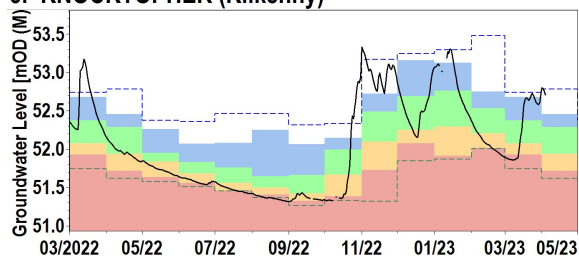
3. BOG OF THE RING OW3D (Fingal)



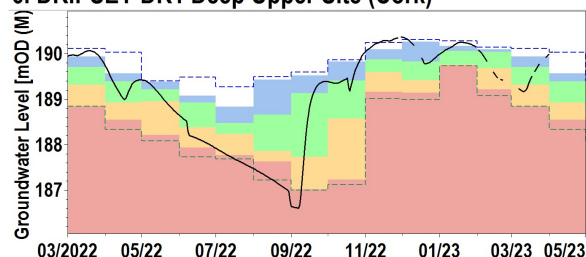
4. DUNSHAUGHLIN PW6 (Meath)



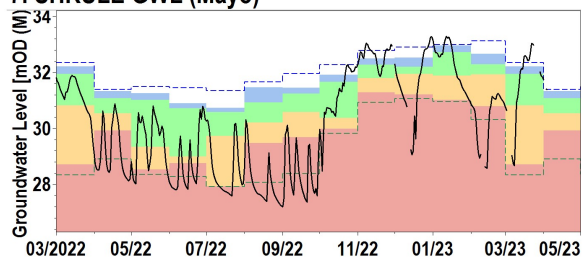
5. KNOCKTOPHER (Kilkenny)



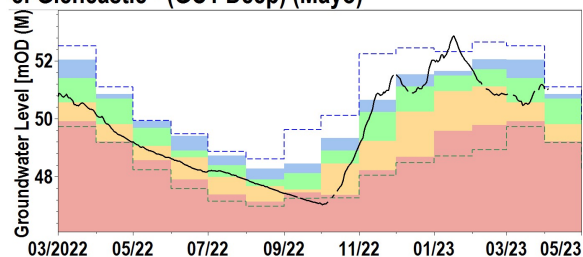
6. DRIPSEY DR1 Deep Upper Site (Cork)



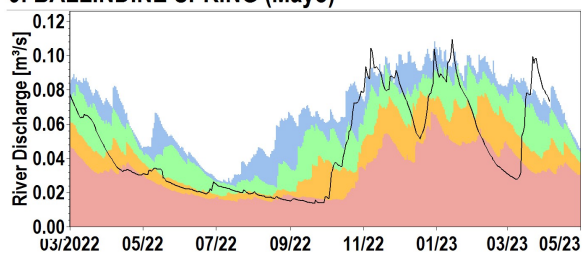
7. SHRULE GWL (Mayo)



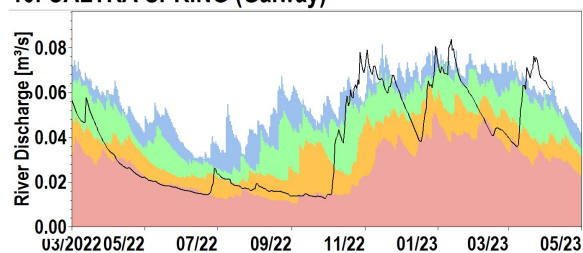
8. Glencastle - (GC1 Deep) (Mayo)



9. BALLINDINE SPRING (Mayo)

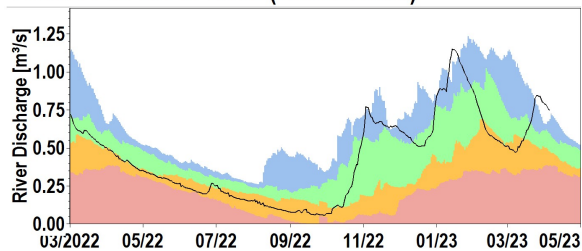


10. CALTRA SPRING (Galway)



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11. KILLEGLAN SPRING (Roscommon)



12. ROCKINGHAM (Roscommon)

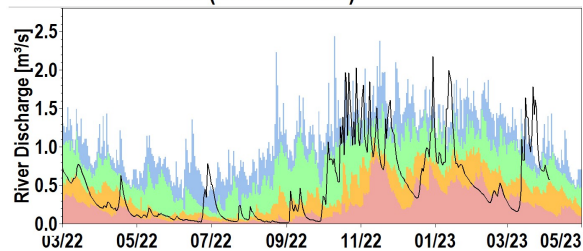





Figure 12: Daily mean groundwater levels (black trace) measured in meters above ordnance datum compared to the 10%tile, 30%tile, 70%tile and 95%tile for each month for the period of record and long-term maximum and minimum levels. All data are provisional and may be subject to revision (Source: EPA).

Explanation - Classes							
Particularly Low	Below Normal	Normal	Above Normal	Particularly High	Daily Mean Level mOD	Highest Month Mean Level mOD	Lowest Month Mean Level mOD
<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"> ➤ Karstic (Rk and Lk) aquifers; ➤ Gravel (Rg and Lg) aquifers; ➤ Productive fractured bedrock (Rf and Lm) aquifers; ➤ Poorly productive bedrock (LI, PI and Pu) aquifers.
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	Groundwater levels or lake levels above ordnance datum. In most cases this is relative to mean sea level at Malin but in some cases is relative to Poolbeg.
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](#).