## Overview

Monthly rainfall totals were above average compared to their long-term averages for October and wettest in the south and west of the country. Monthly average rivers flows increased throughout October at all river flow monitoring stations; and are generally below the long-term monthly average in the east and above the long-term monthly average in the west of the country. Similarly, for lake level monitoring stations, most of these (90%) increased throughout October with highest levels observed in the west and northwest of the country.

Average groundwater levels increased at 62% of groundwater monitoring stations between September and October 2021 across the country. Above normal monthly average groundwater levels are observed in the north and northwest of the country. Similarly, spring flows were above average monthly flows for October in the western part of the country.

## Rainfall

The majority of monthly rainfall totals were above their Long-Term Average (LTA). Percentage of monthly rainfall values ranged from 78% (monthly rainfall total of 81.1 mm) at Gurteen, Co Tipperary to 172% (monthly rainfall total of 187.0 mm) at Roche's Point, Co Cork. Monthly rainfall totals ranged from 75.2 mm (95% of its LTA) at Phoenix Park, Co Dublin to 265.7 mm (151% of its LTA) at Newport, Co Mayo (its wettest October since 2011). The highest daily rainfall total was 64.7 mm at Valentia Observatory, Co Kerry on Friday 8th. The number of rain days ranged from 18 days at Casement Aerodrome, Co Dublin to 28 days at a few stations. The number of wet days ranged from 13 days at Dublin Airport, Co Dublin to 25 days at both Newport, Co Mayo and Malin Head, Co Donegal. The number of very wet days3 ranged from 1 day at Gurteen, Co Tipperary to 11 days at Newport, Co Mayo. Sherkin Island, Co Cork had its wettest October since 1988 with 205.8 mm (161% of its LTA). Both Valentia Observatory, Co Kerry (264.9 mm, 150% of its LTA) and Belmullet, Co Mayo (222.4 mm, 152% of its LTA) had their wettest October since 2000. Cork Airport, Co Cork had its wettest October since 2005 with 197.6 mm (143% of its LTA).

## River Flows

River flows increased throughout the country in October and were higher at all monitoring stations compared to flows observed in September 2021. The monthly average flows are below the long-term monthly average for October in the east and are above the long-term monthly average in the west of the country. Analysis of monthly average flows at 161 river monitoring sites across the country identified; 14 (9%) were ‘particularly high’, 28 (17%) were above normal, 76 (47%) were ‘normal’, 41 (25%) were ‘below normal’ and 2 (1%) were classed as ‘particularly low’ for this time of year.

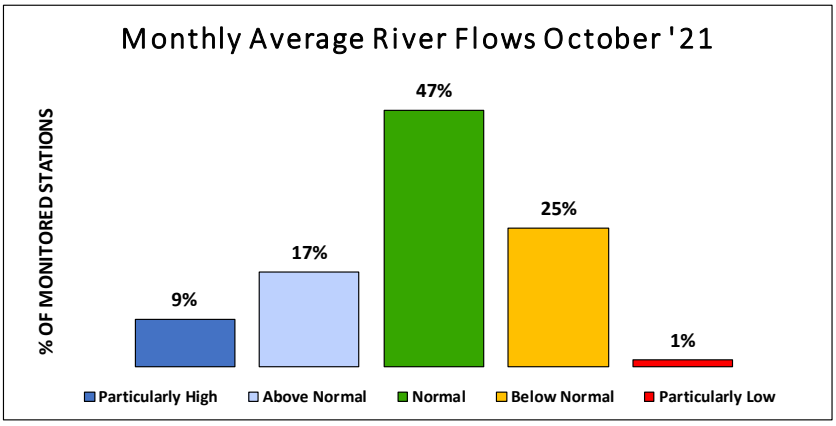



*Figure 1: Percentage distribution of river flow monitoring sites within each of the percentile flow categories for October 2021*

## Lake Levels

Average lake levels were also higher at 90% of monitored lakes compared to levels observed in September, with highest levels observed in the west and northwest of the country. Average lake levels at 43 lakes were classified as 'particularly high' at 4 (9%), 'above normal' at 15 (35%), 'normal' at 19 (44%), 'below normal' at 4 (9%) lakes and 'particularly low' at 1 (2%) [L. Skeagh, Co. Cavan], for the month of October.

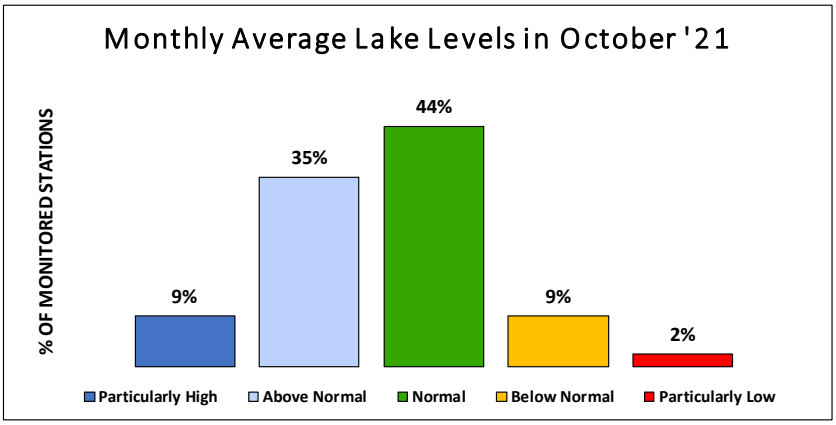



*Figure 2: Percentage distribution of lake level monitoring sites within each of the percentile flow categories for October 2021*

## Groundwater Levels and Spring Flows

Average groundwater levels increased between September and October at 62% monitoring wells analysed. Above normal monthly average groundwater levels are observed in the north and northwest of the country. October groundwater levels were classified as 'particularly high' at 4

(10%), 'above normal' at 7 (18%), 'normal' at 11 (28%), 'below normal' at 10 (26%) and 'particularly low' at 7 (18%) monitoring wells across the county.

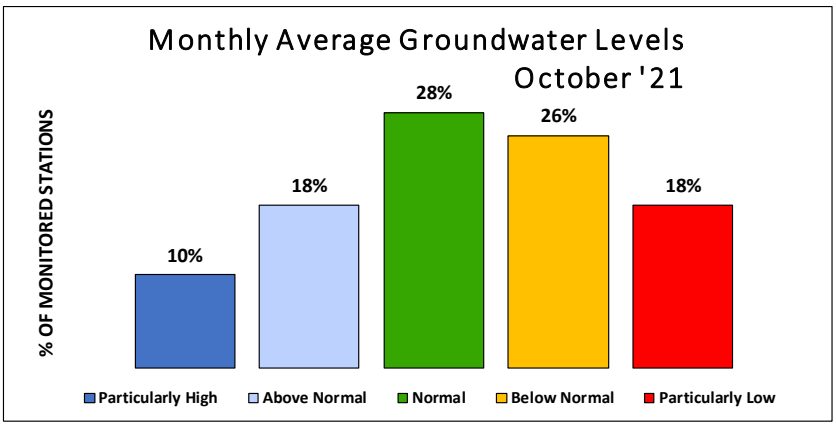



*Figure 3: Percentage distribution of groundwater level sites within each of the percentile flow categories for October 2021*

Spring outflows were also monitored at 9 EPA monitoring sites. The outflows from these springs were compared to previously recorded flows for October, and 1 spring was 'particularly high' (Ballindine Spring, Co. Mayo), 6 springs were 'normal', and 2 springs were 'below normal' for this time of year.

## Rainfall

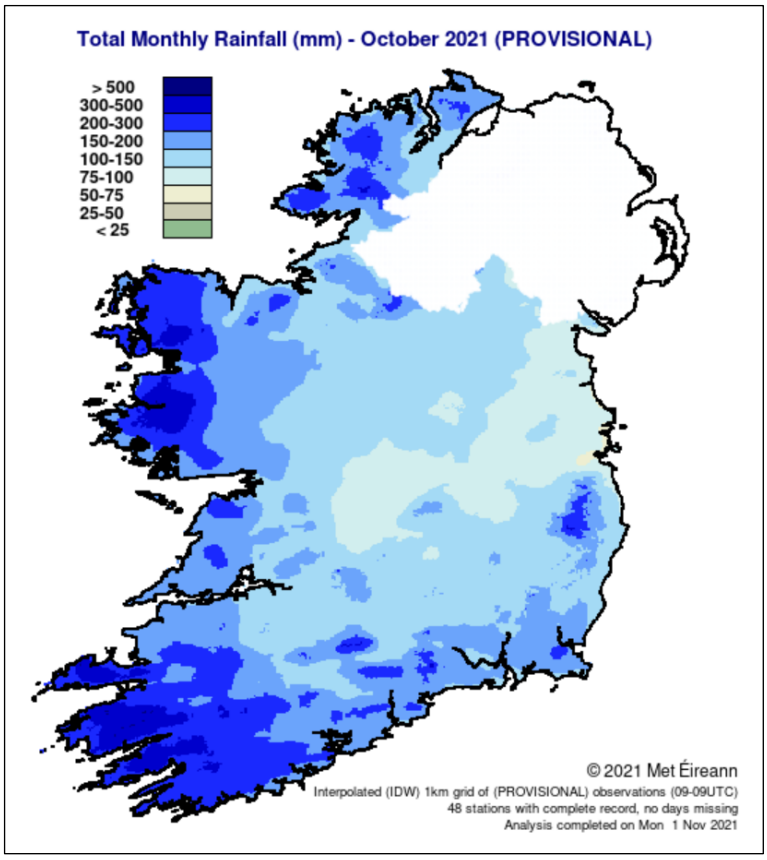



*Figure 4:Rainfall map for Ireland October 2021* ***(Source: Met Eireann.ie)***

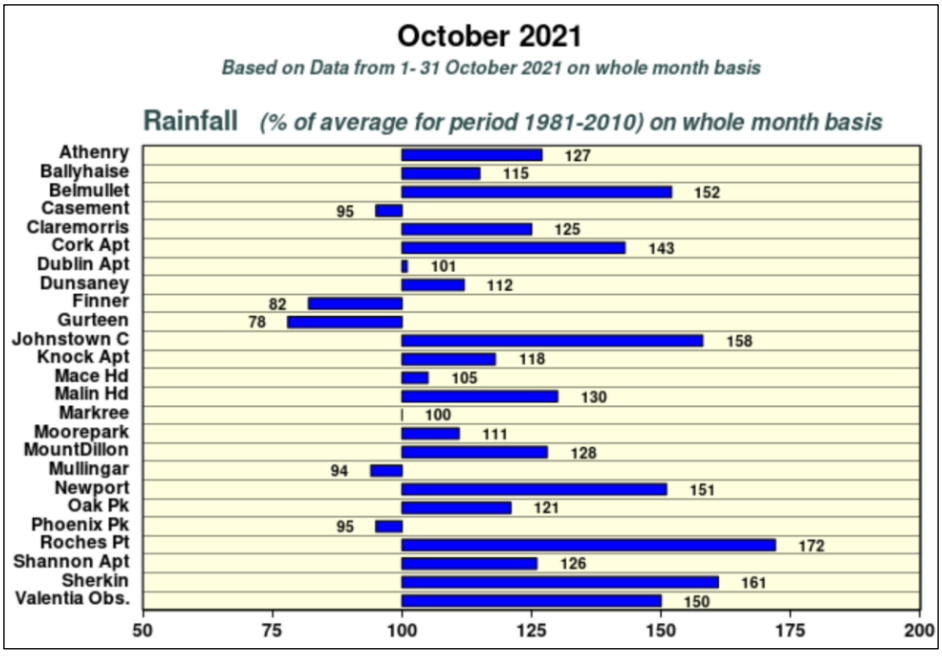



*Figure 5: Summary of rainfall at synoptic stations October 2021, figures indicate the percentage difference from the Long-Term Average rainfall for October.* ***(Source: Met Eireann.ie)***

## River Flows

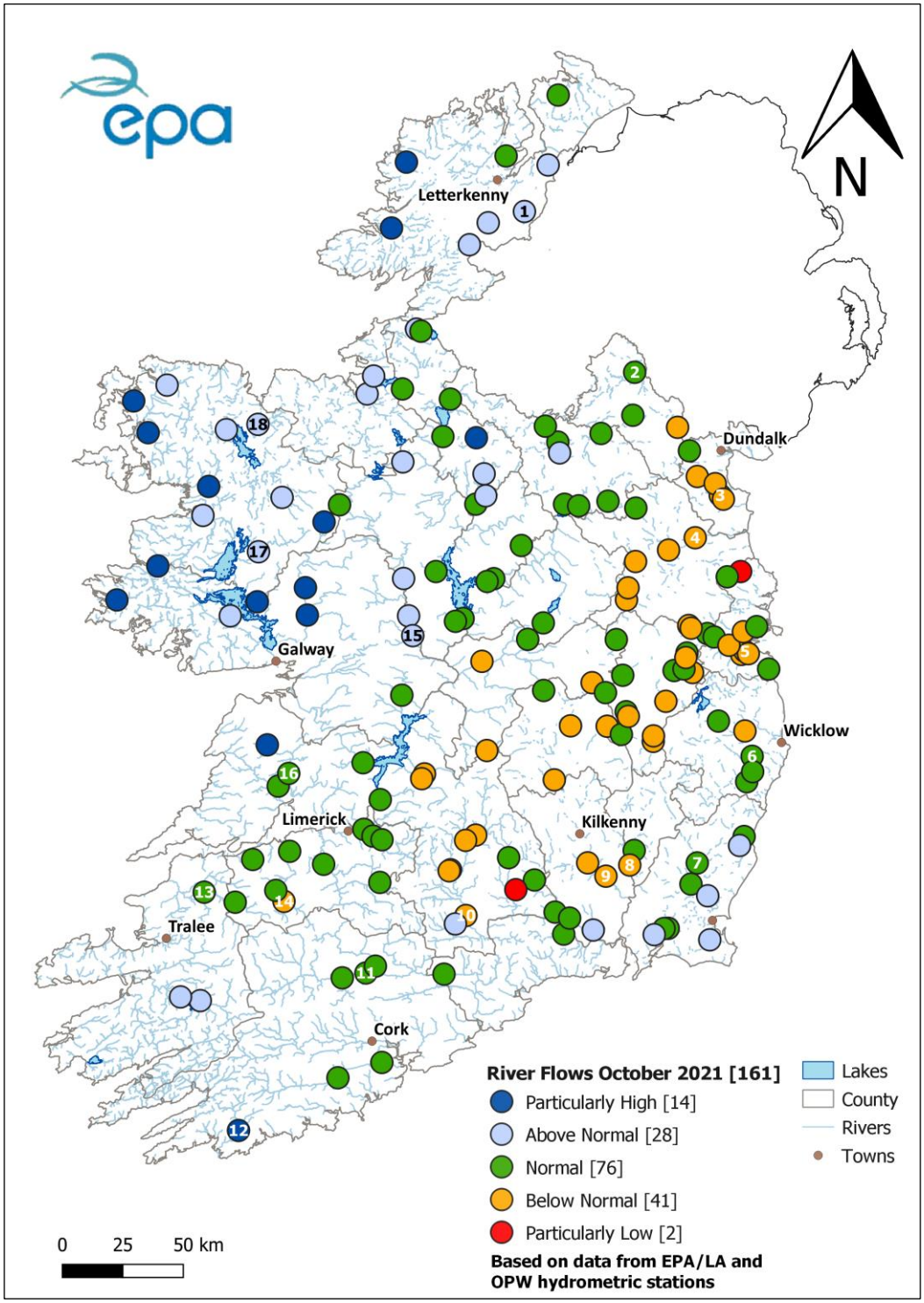



*Figure 6: Monthly average river flows for October 2021 relative to historic monthly average flows expressed as percentile of the long-term values of monthly flow. Numbered sites are represented in the hydrographs below. All data are provisional and may be subject to revision.* ***(Source: EPA, OPW).***

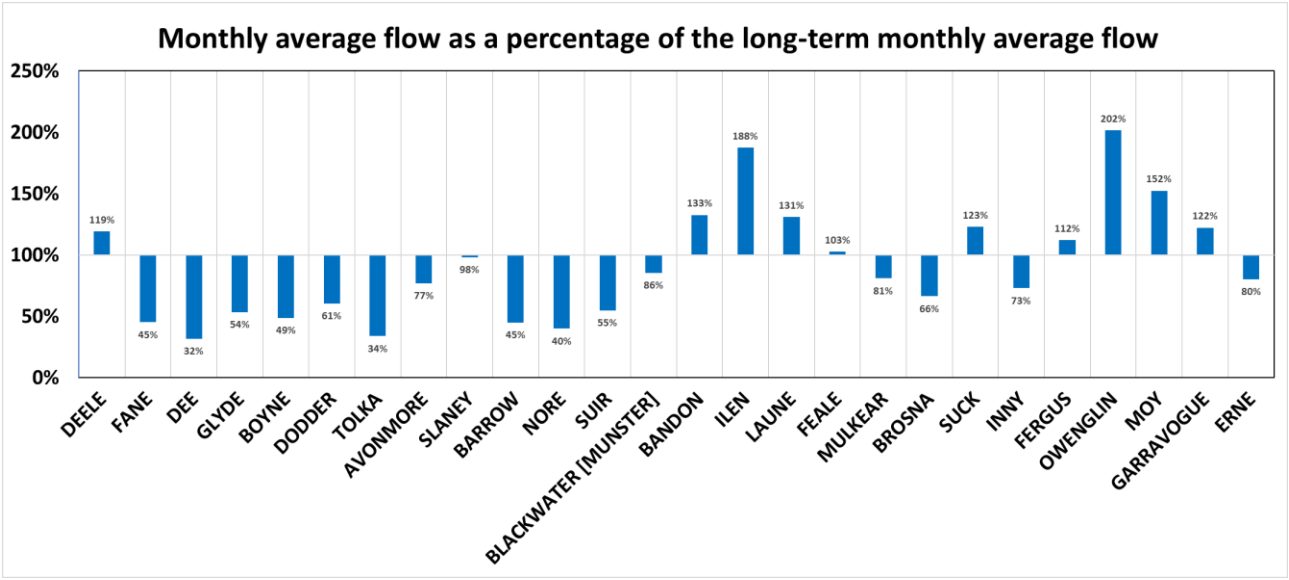
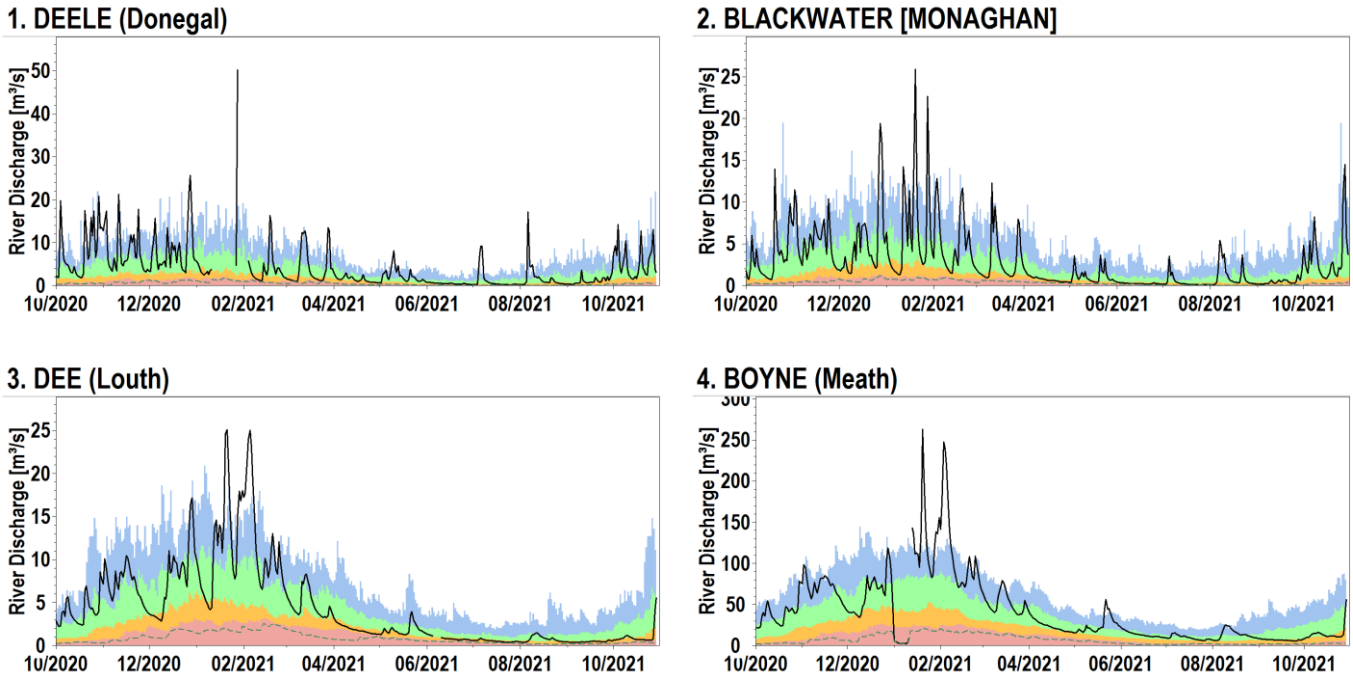
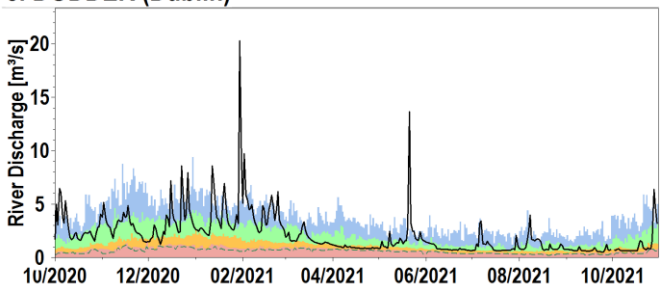



*Figure 7: Octoberr 2021 average flows as a percentage of the long-term monthly average flow for October at a selected number of stations. All data are provisional and may be subject to revision.* ***(Source: EPA, OPW)***

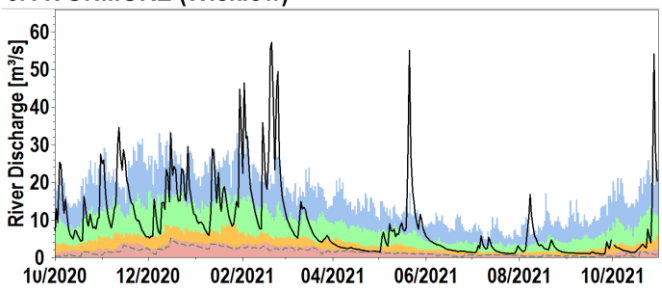
## Flow Hydrographs for selected Rivers



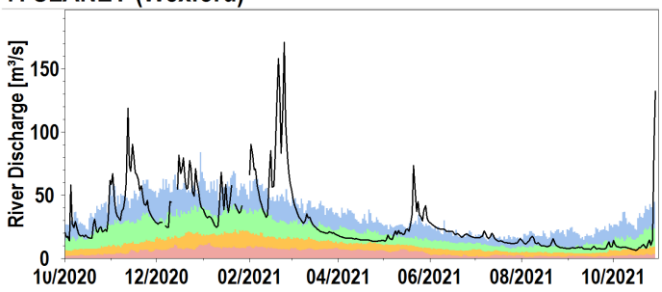
5. DODDER (Dublin)



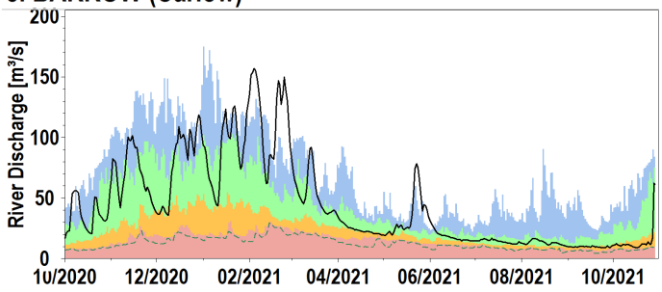

6. AVONMORE (Wicklow)



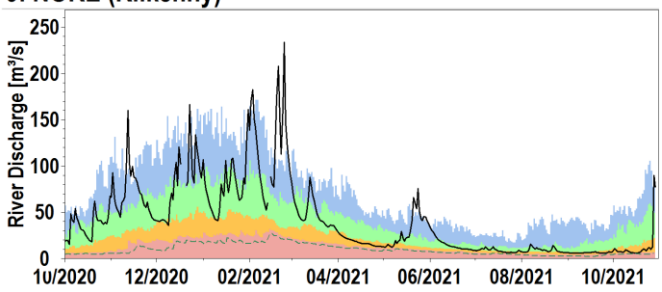

7. SLANEY (Wexford)



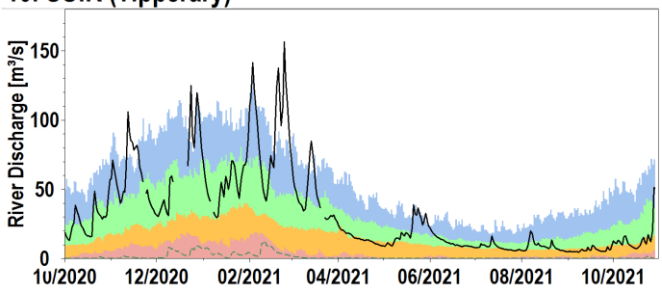

8. BARROW (Carlow)



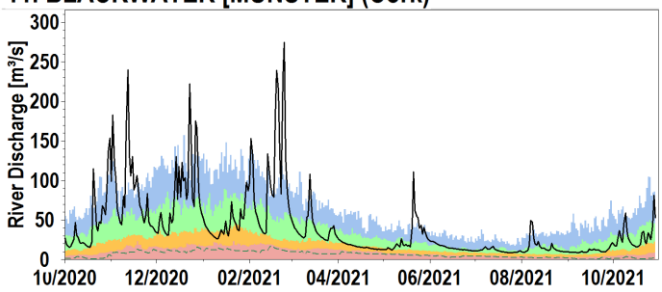

9. NORE (Kilkenny)



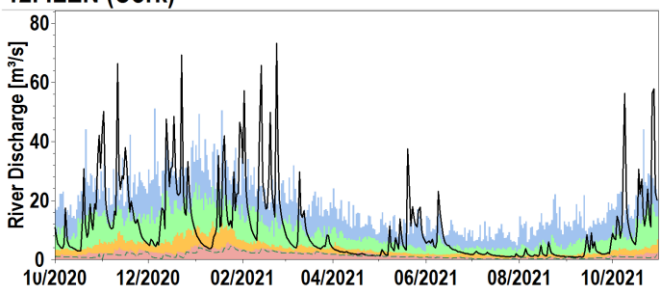

10. SUIR (Tipperary)




11. BLACKWATER [MUNSTER] (Cork)




12. ILEN (Cork)



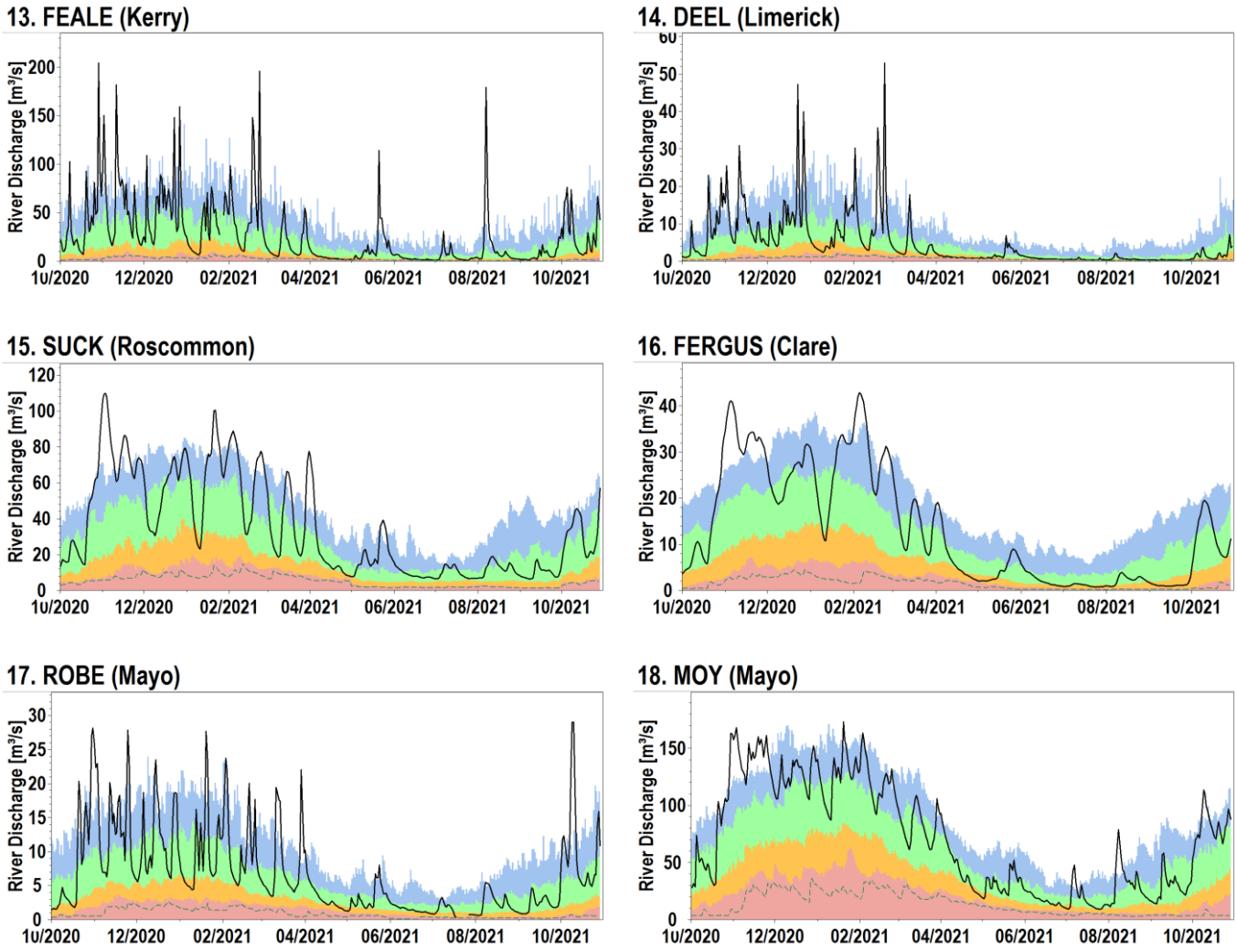



*Figure 8: Daily average river flows up to October 2021 relative to historic daily average flows expressed as percentile of the long-term values of each day. All data are provisional and may be subject to revision.* ***(Source: EPA, OPW)***

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

## Lake Levels

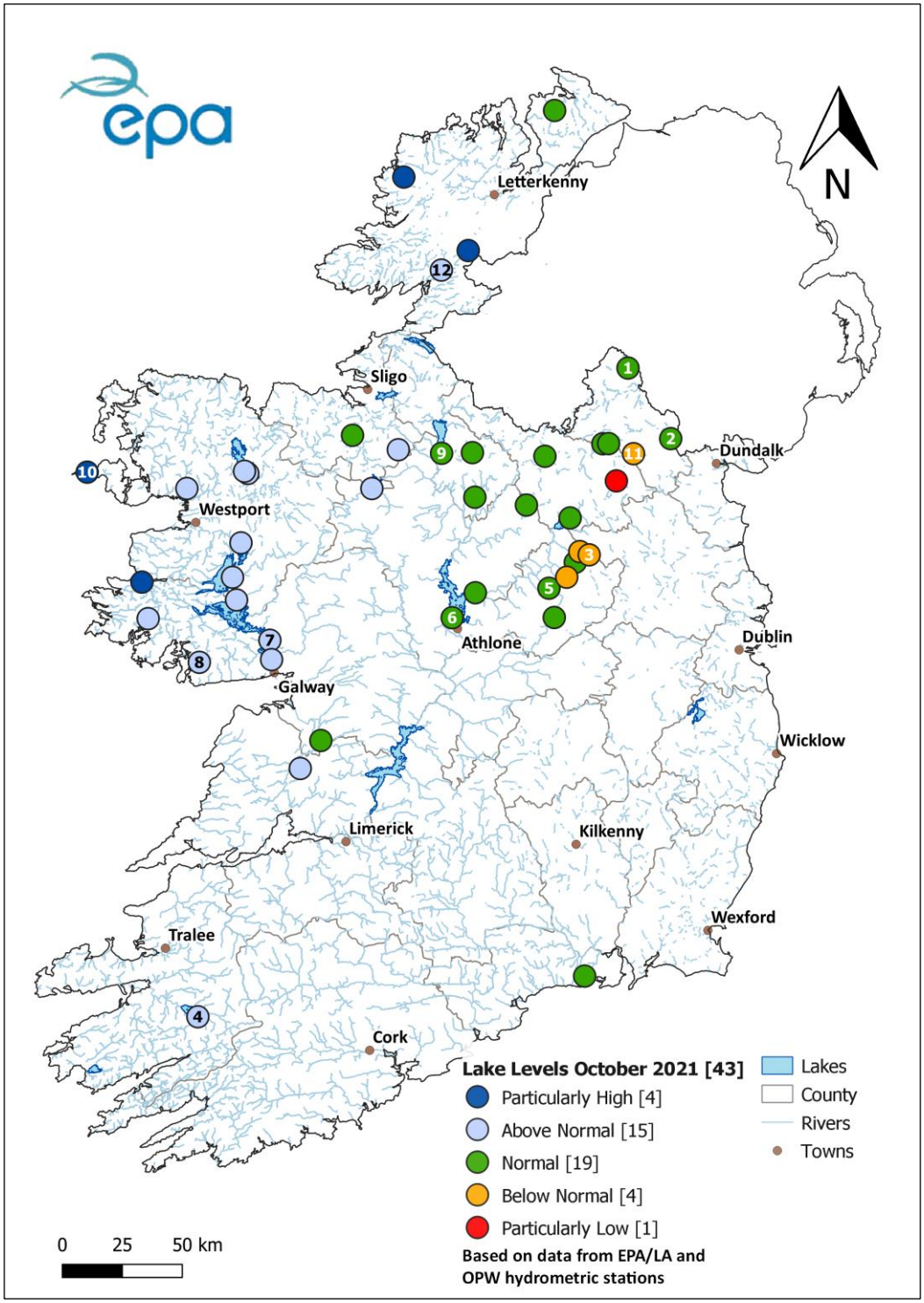
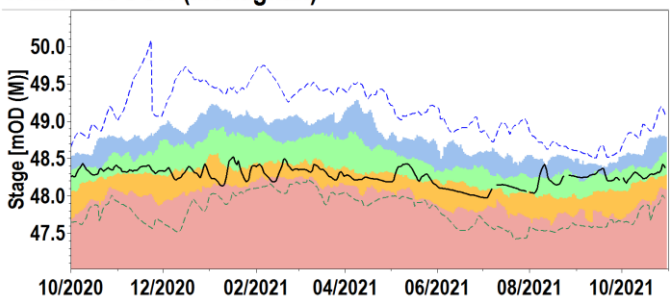


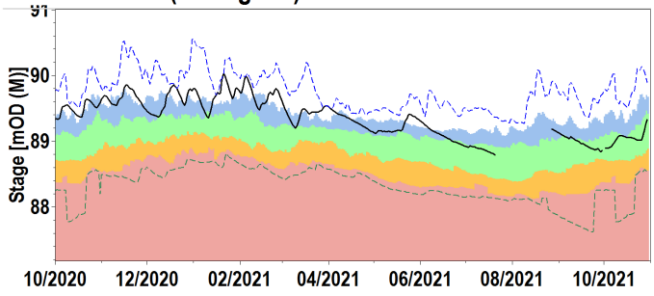

*Figure 9: Monthly average lake levels for October 2021 relative to historic monthly average levels expressed as percentile of the long- term values of October. Numbered sites are represented in the hydrographs below. All data are provisional and may be subject to revision.* ***(Source: EPA, OPW)***

## Water Level Hydrographs for selected Lakes

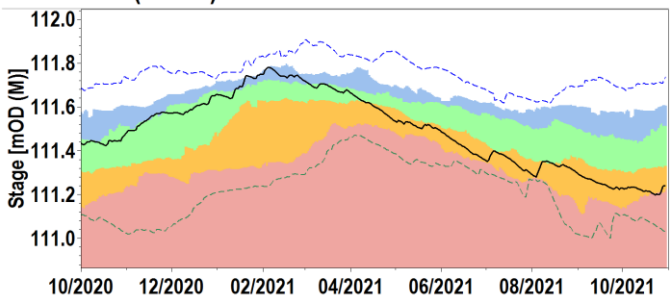
**1. EMY LOUGH (Monaghan)**



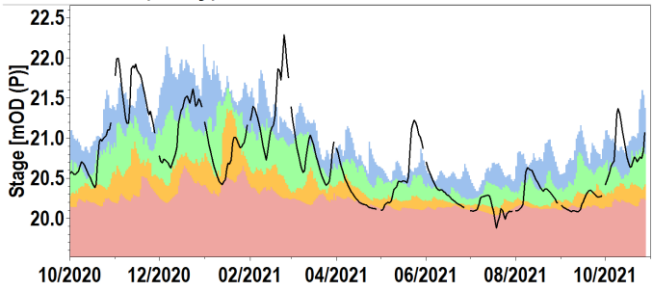

**2. L. MUCKNO (Monaghan)**



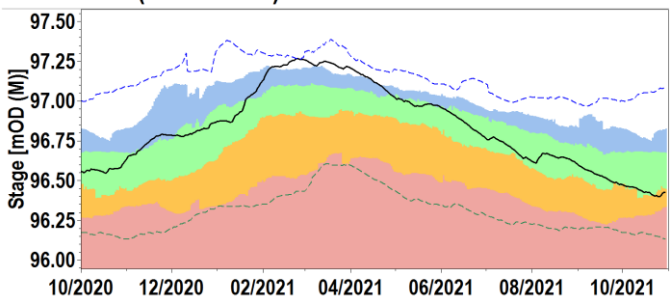

**3. L. BANE (Meath)**



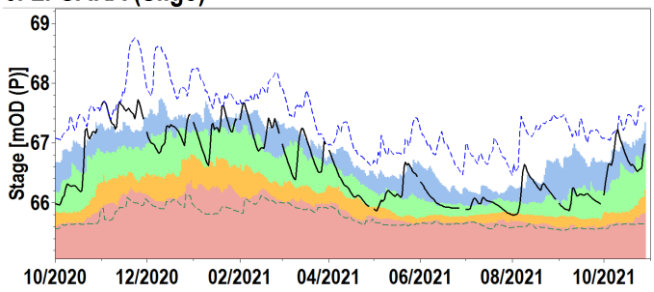

**4. L. LEANE (Kerry)**




**5. L. OWEL (Westmeath)**




**6. L. GARA (Sligo)**



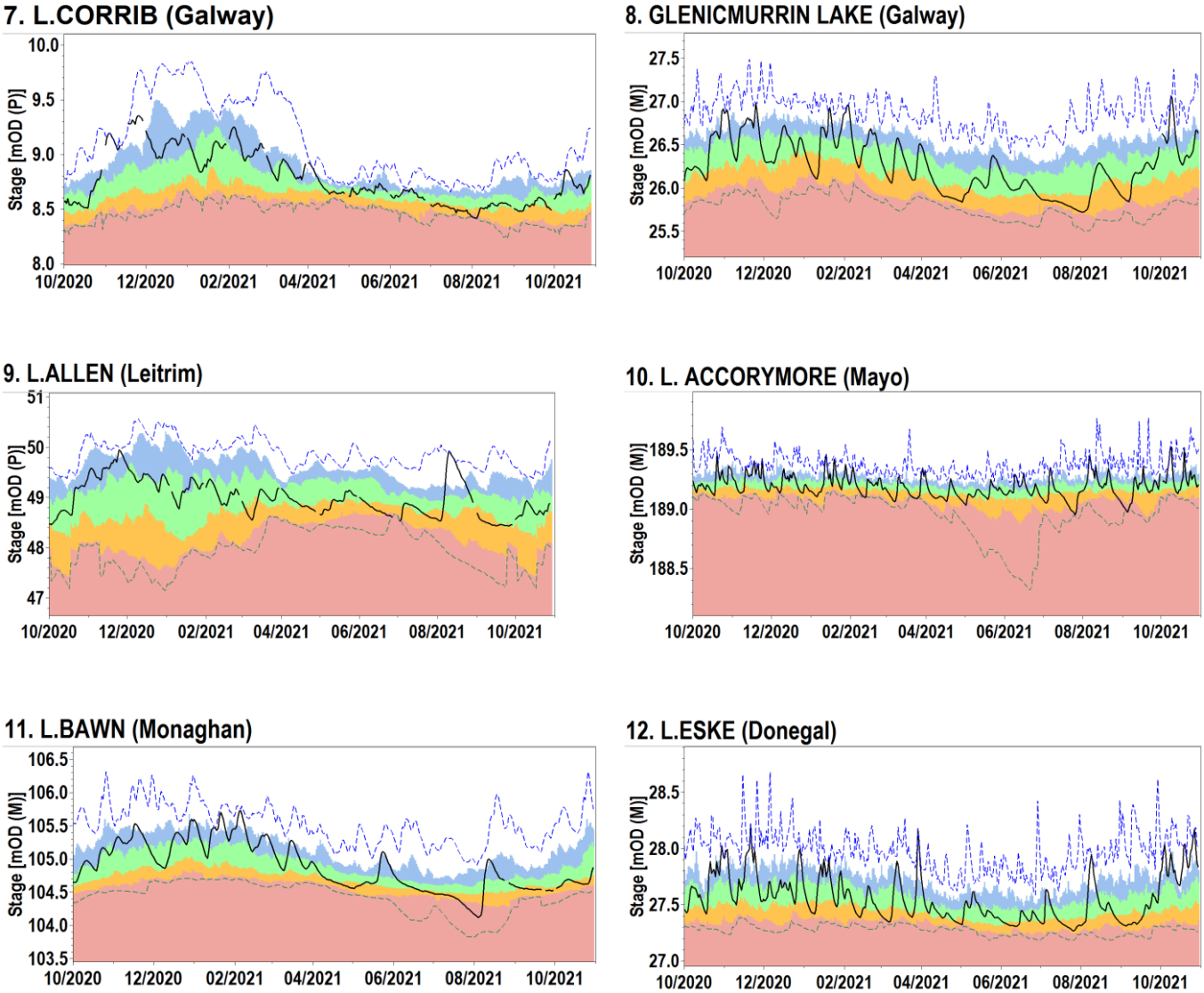



*Figure 10: Daily mean lake levels classed relative to historic daily mean levels expressed as percentile of the values of each day with long-term maximum and minimum daily levels. All data are provisional and may be subject to revision.* ***(Source: EPA, OPW)***

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

## Groundwater Levels and Spring Flows

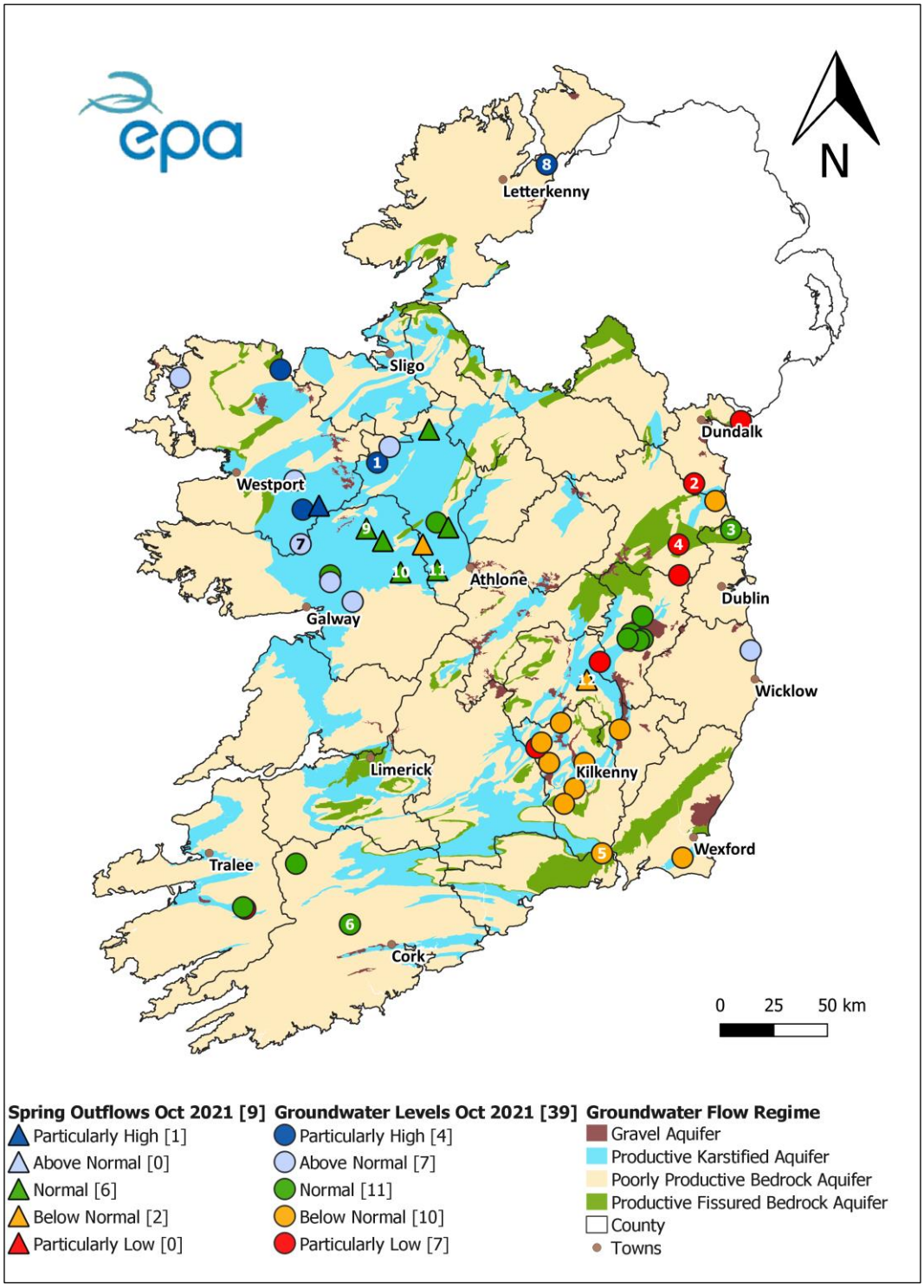
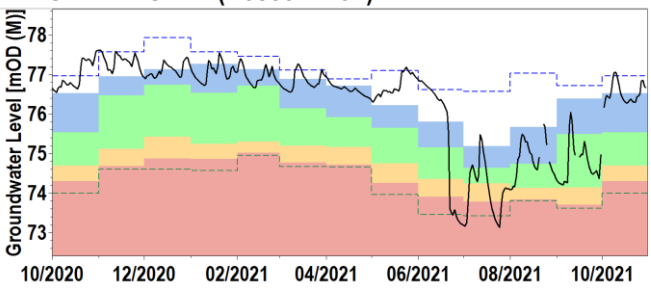


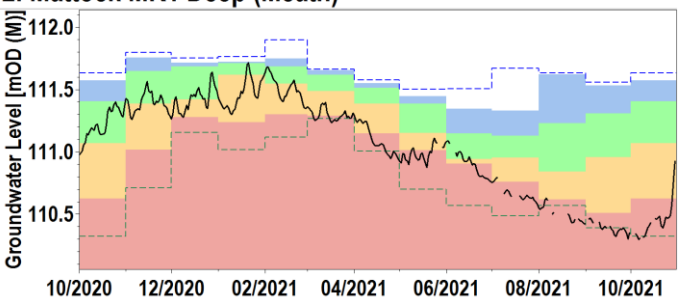

*Figure 11: Groundwater level and Spring Flow status for October 2021, relative to historic October groundwater levels. Numbered sites are represented in the hydrographs below. All data are provisional and may be subject to revision.* ***(Source: EPA)***

## Groundwater and Spring Hydrographs

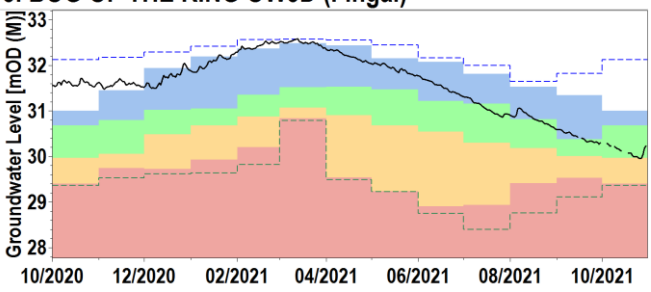
1. AGHADRESTAN (Roscommon)



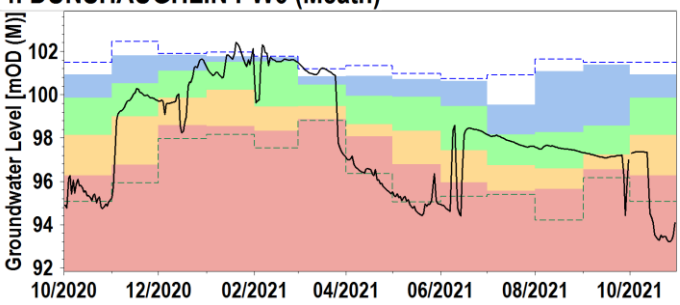

2. Mattock MK1 Deep (Meath)



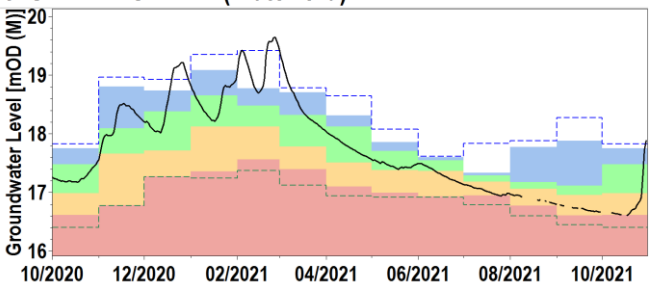

3. BOG OF THE RING OW3D (Fingal)



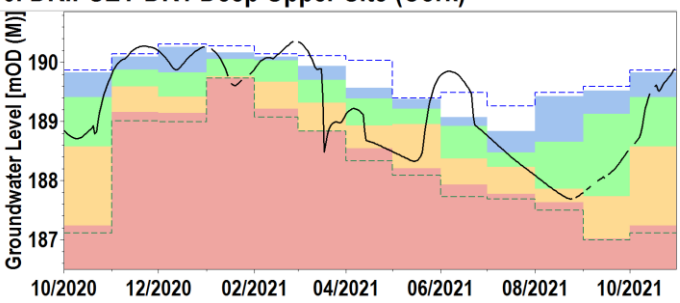

4. DUNSHAUGHLIN PW6 (Meath)



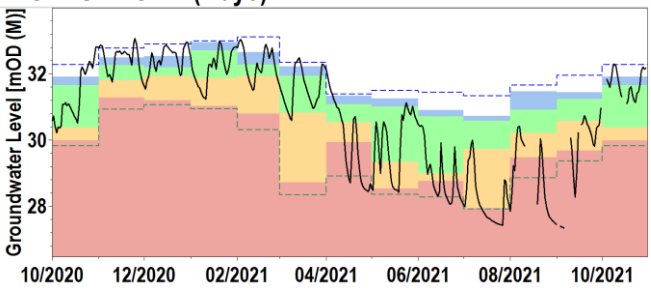

5. SLIEVEROE BH1 (Waterford)



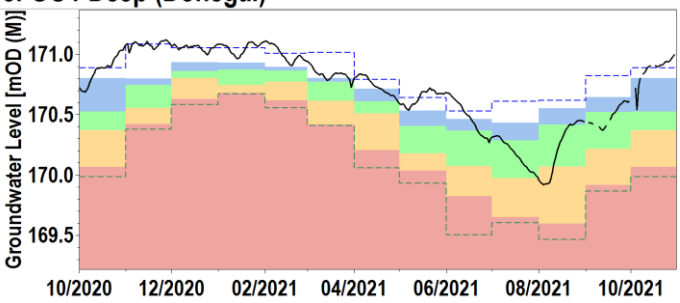

6. DRIPSEY DR1 Deep Upper Site (Cork)




7. SHRULE GWL (Mayo)




8. GO1 Deep (Donegal)



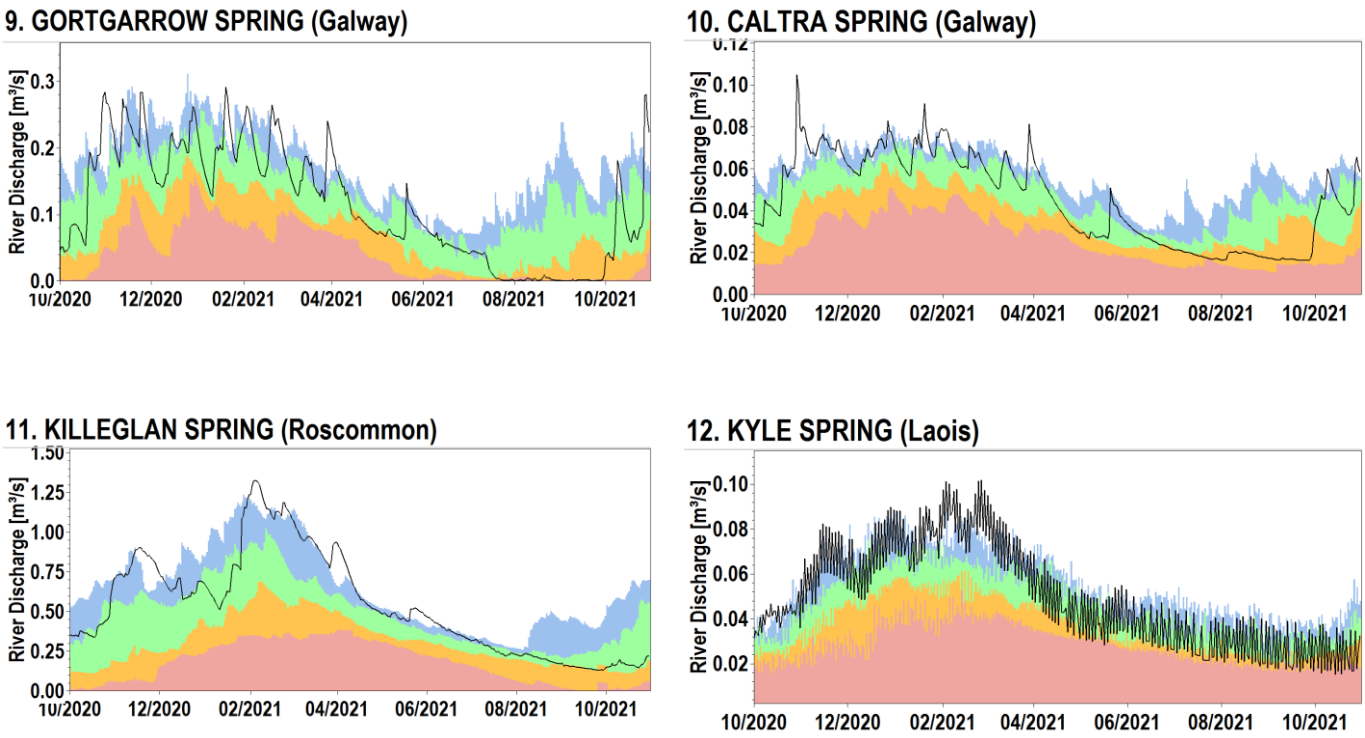



*Figure 12: Daily mean groundwater levels (black trace) measured in meters above ordnance datum compared to the 10%tile, 30%tile, 70%tile and 95%tile for each month for the period of record and long-term maximum and minimum levels. All data are provisional and may be subject to revision.* ***(Source: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

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

## 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:<br>➢ Karstic (Rk and Lk) aquifers;<br>➢ Gravel (Rg and Lg) aquifers;<br>➢ Productive fractured bedrock (Rf and Lm) aquifers;<br>➢ Poorly productive bedrock (Ll, Pl 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. |

## 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.