

# Monthly water situation report

## East of England

### Summary – October 2021

October was a wetter month in East Anglia with 84mm of rainfall across the area, an above normal total for the time of year. Soil Moisture Deficit (SMD) continued to decrease and by the end of October 42% of the indicator sites for groundwater began to show initial signs of recharge. River flows reflected these conditions with all sites having lows that were normal or higher for the time of year. Reservoir storage had a mixed response in October with some sites increasing whilst other continued to decrease.

### Rainfall

There was 84mm of rainfall across East Anglia during October which at 159% of the Long Term Average (LTA) is classified as above normal for the time of year. After a month of above average rainfall, the totals over the last 6 and 12 months are also above normal with 115% of the LTA over the past year. The rainfall was widely spread across the area with totals that were normal or above normal in every catchment. Lowest totals were in Central Area Fenland at 67mm (145% LTA, normal) and North Norfolk with 74mm (133% LTA, normal) with highest totals in South Essex with 97mm (194% LTA, above normal).

### Soil Moisture Deficit/Recharge

SMD ended the month at 47mm and so is classified as normal for the time of year. SMD values decreased throughout the month as expected with the above normal rainfall totals and remained right at the top of the normal banding for the majority of the month. The decrease in the SMD totals occurred throughout the area although parts of the Ely Ouse and North Norfolk catchments retained relatively higher values.

### River Flows

River flows at all sites in October were normal or higher for the time of year. 29% of indicator sites were above normal with 2 rivers having notably high flows for the time of year – the river Burn and river Lark. Flows at all sites increased in October compared to the previous month with the exception of the river Burn and river Heacham.

### Groundwater Levels

Groundwater levels at all indicator sites in October remained normal or higher for the time of year. 47% of sites recorded levels that were above normal and levels were notably high at Bury St Edmunds in the Upper Lark Chalk. 42% of sites began to show signs of recharge at the end of the month with some increase in levels reflecting the reduction in SMD and the above normal rainfall.

### Reservoir Storage/Water Resource Zone Stocks

Levels at Grafham and Hanningfield both slightly increased in October, with levels at the end of the month above normal and notably high respectively. The other three reservoirs had reduced levels although Abberton remains above the normal operating curve. Levels at Abberton and Alton are normal for the time of year with levels at Ardleigh below normal.

### Environmental Impact

Groundwater support scheme operations slightly increased in October with an additional pump turned on in the Rhee scheme. The Lodes-Granta groundwater support scheme had 4 of the 6 pumps operating while the Rhee groundwater support scheme had 4 of the 8 pumps operating. The Hiz and Thet-Little Ouse schemes both remained with no pumping

## Forward Look

### Probabilistic ensemble projections for river flows at key sites

**December 2021:** There is an increased probability of flows being above normal or higher at all sites

**March 2022:** There is a reduced probability of exceptionally low flows at all sites. There is an increased probability of flows being above normal or higher in the rivers Stiffkey and Ivel.

### Probabilistic ensemble projections for groundwater levels in key aquifers

**March 2022:** There is a highly reduced probability of notably low or lower levels at all sites. There is an increased probability of exceptionally high levels in the North West Norfolk Chalk (Bircham Newton and Rougham) and of above normal levels or higher in the North Herts Chalk (Therfield Rectory), Upper Lark Chalk (Bury St Edmunds) and Essex Chalk (Smeetham).

**September 2022:** There is an increased probability of normal or higher groundwater levels at all indicator sites.

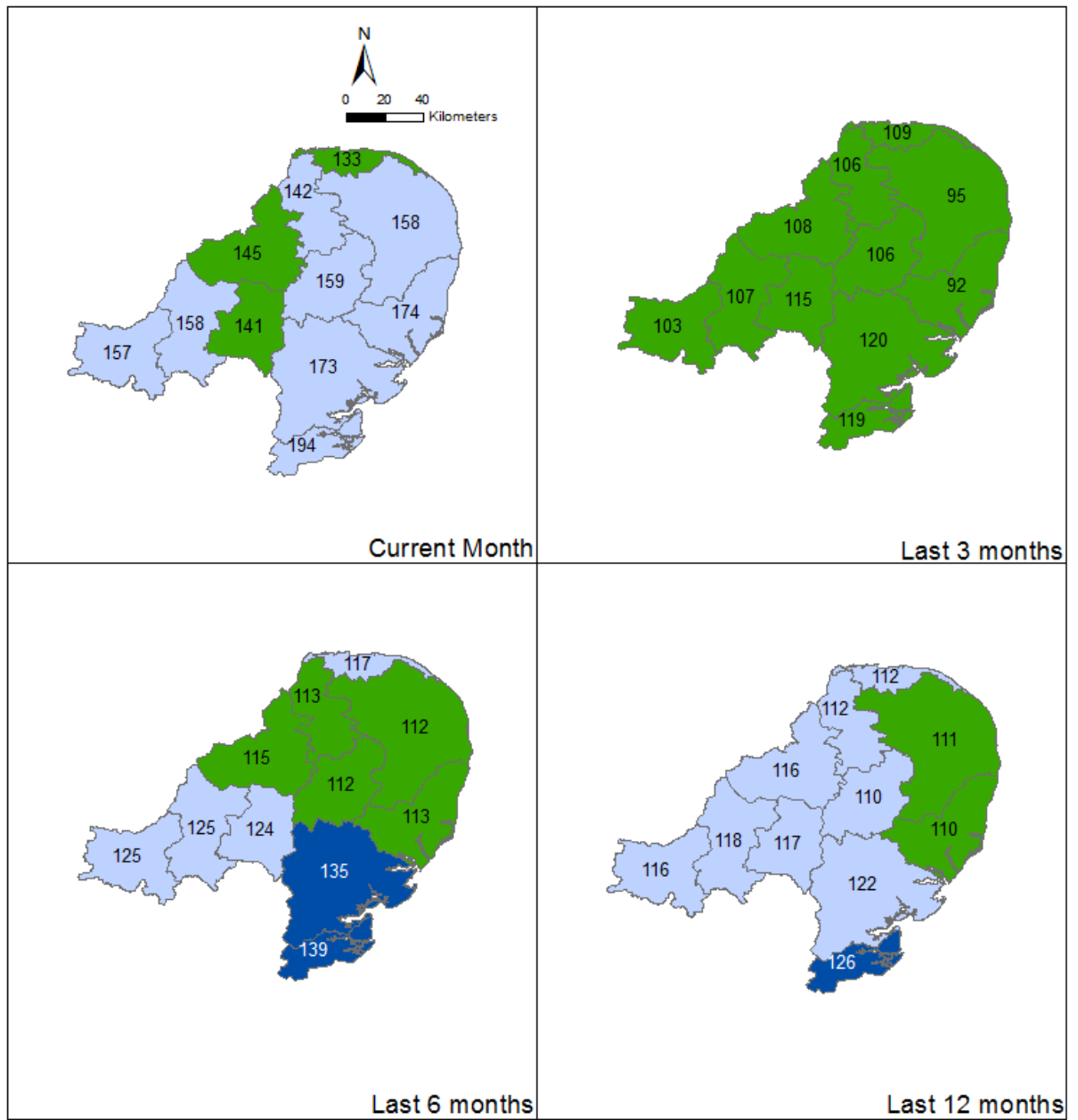
Author:

[ANG-Hydrology](#)

Contact details: 03708506506

# Rainfall

October 2021



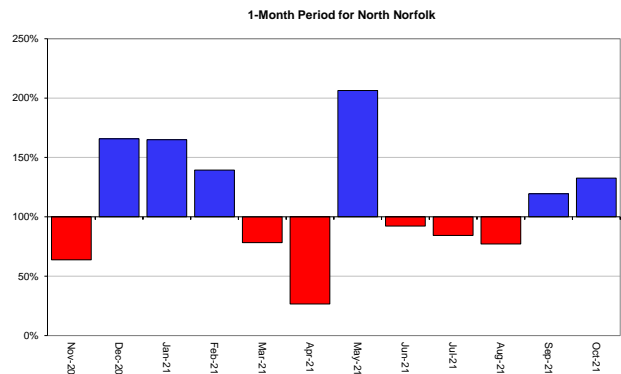
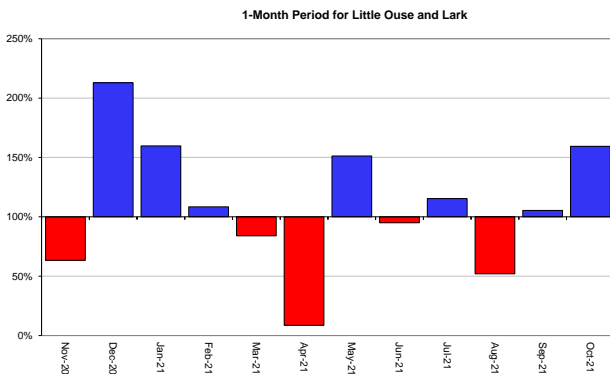
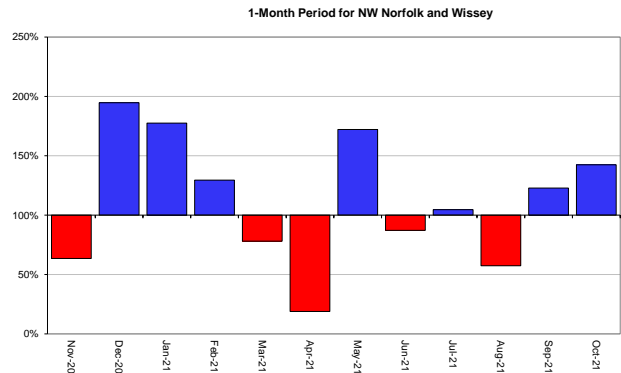
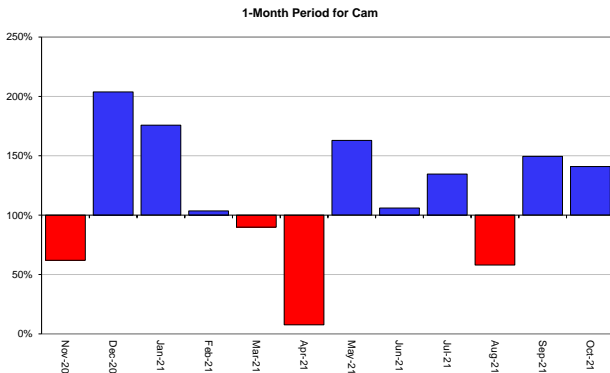
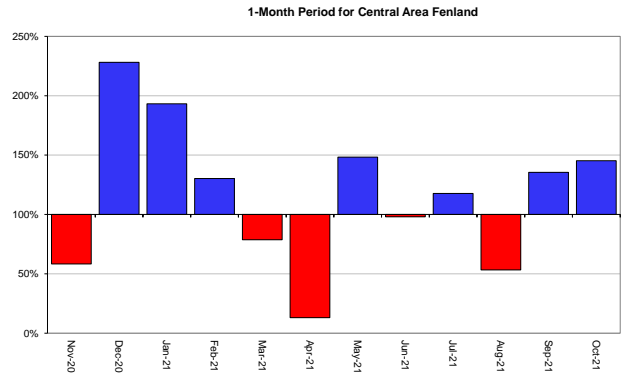
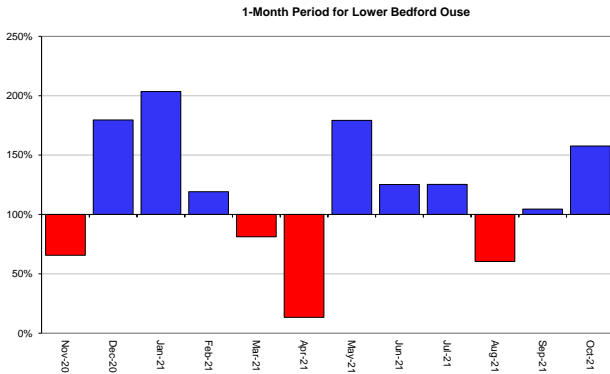
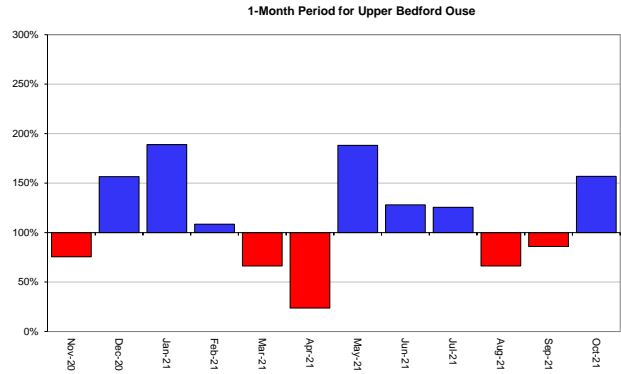
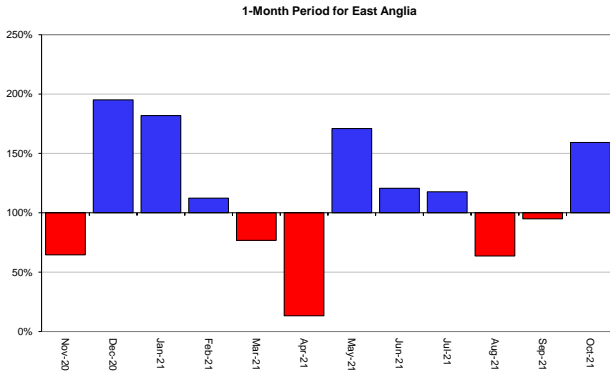
- Exceptionally high
- Notably high
- Above normal
- Normal
- Below normal
- Notably low
- Exceptionally low

Rainfall expressed as percentage of 1961-1990 Long Term Average for the specified duration. Classes derived from data for the period 1891 to 2017 based on the HadUK dataset (Met Office © Crown Copyright)

Total rainfall for hydrological areas across England for the current month, the last three months, the last six months, and the last 12 months, classed relative to an analysis of respective historic totals. Final HadUK data based on the Met Office 1 km gridded rainfall dataset derived from rain gauges (Source: Met Office © Crown Copyright, 2021). Provisional data based on Environment Agency 1 km gridded rainfall dataset derived from Environment Agency intensity rain gauges. Crown copyright. All rights reserved. Environment Agency, 100024198, 2021.

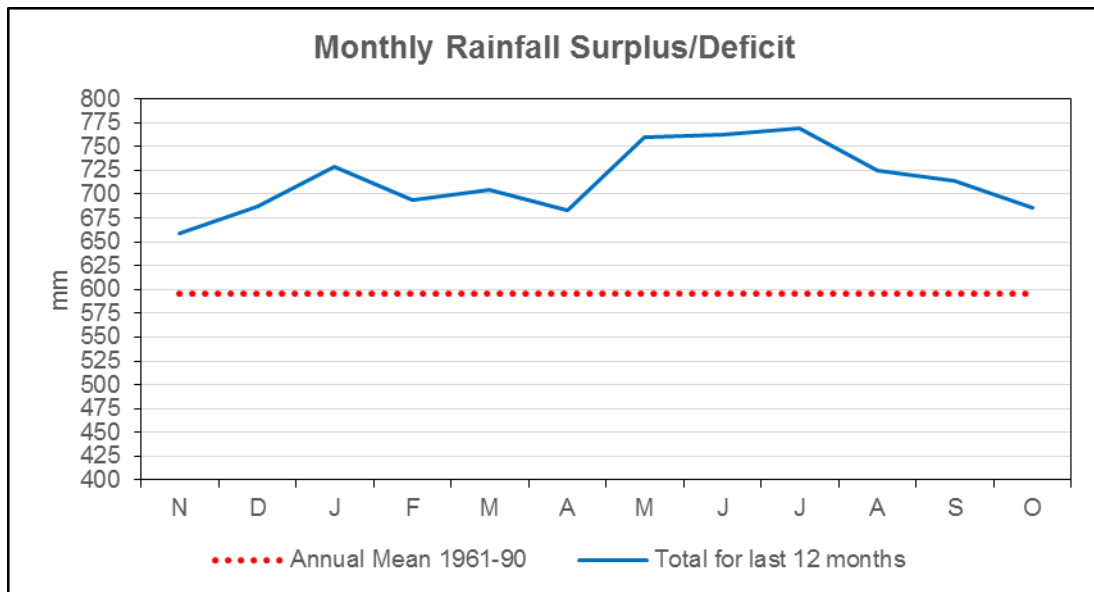
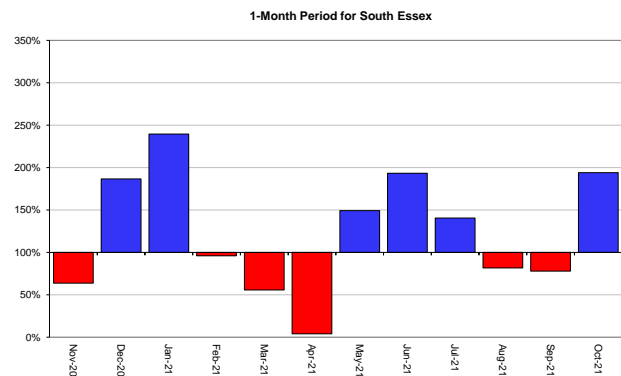
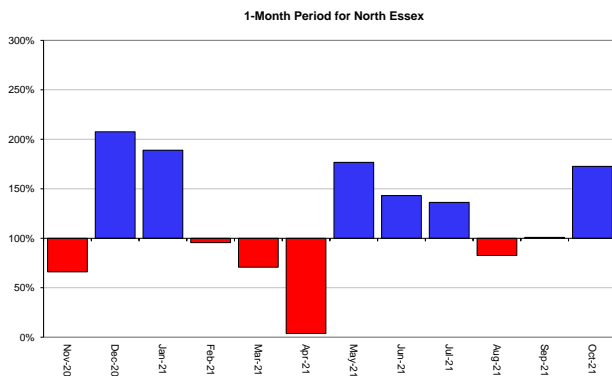
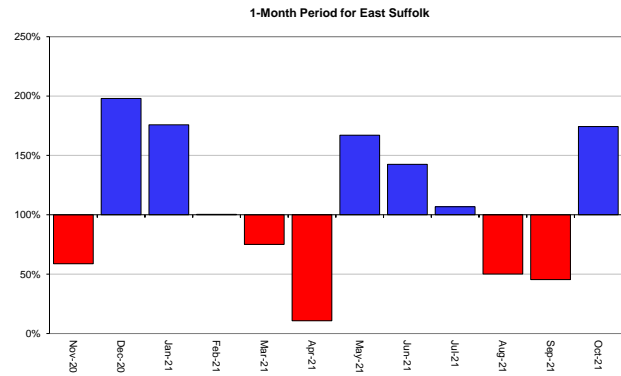
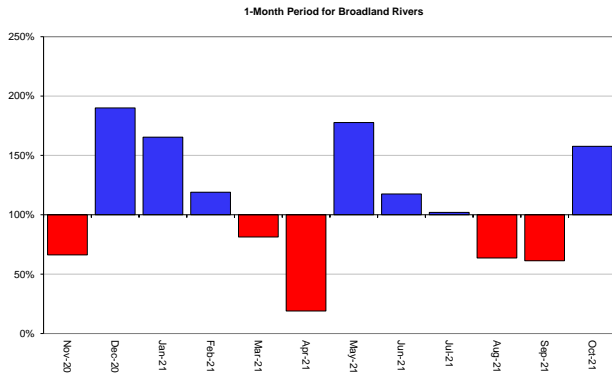
**Above average rainfall**

**Below average rainfall**

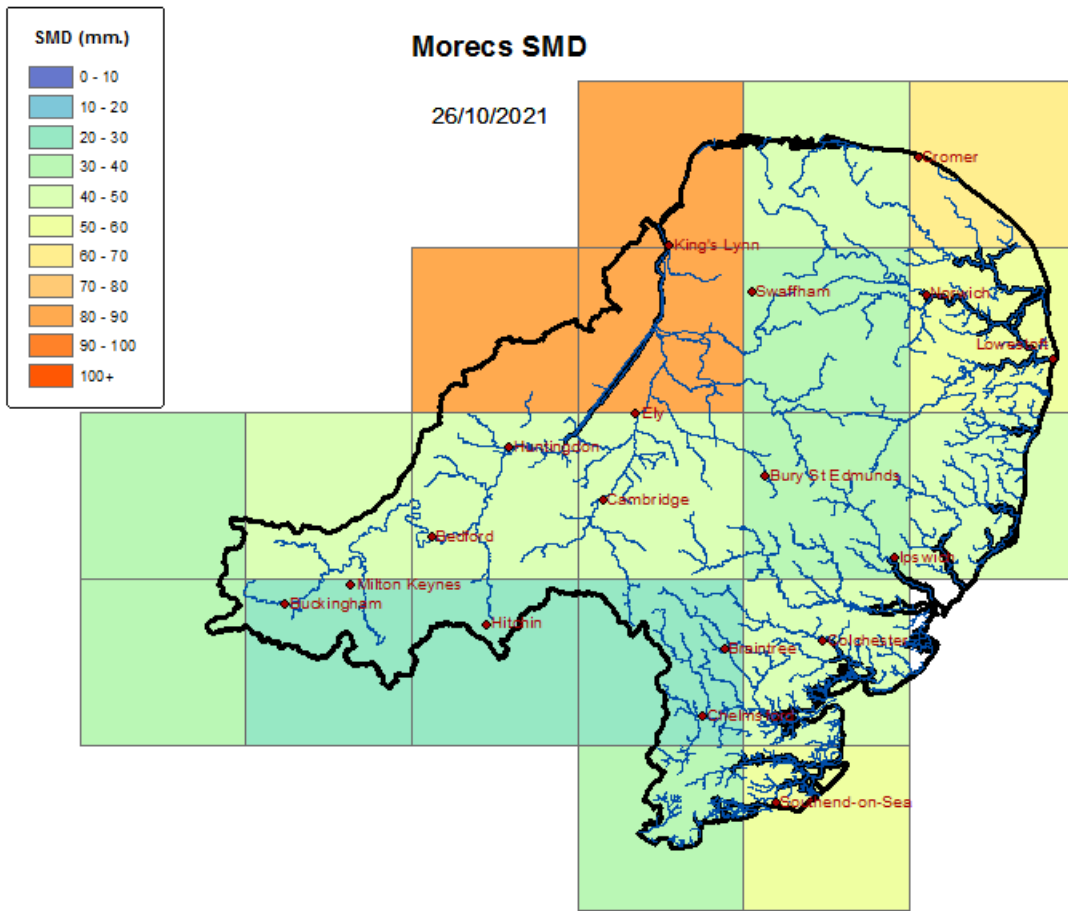


**Above average rainfall**

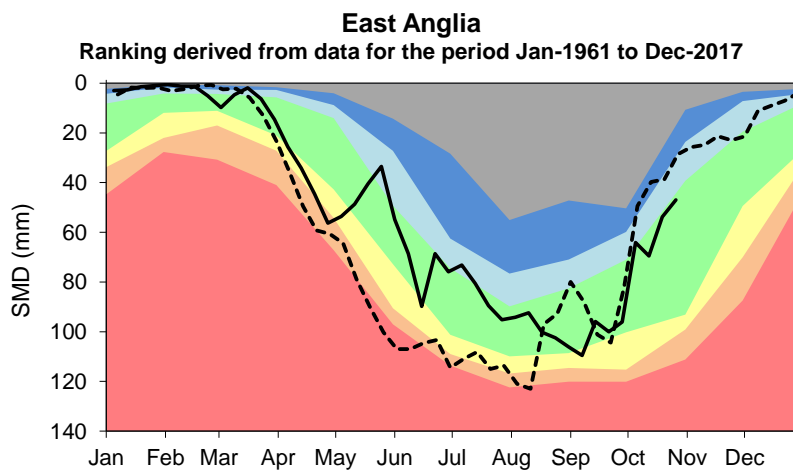
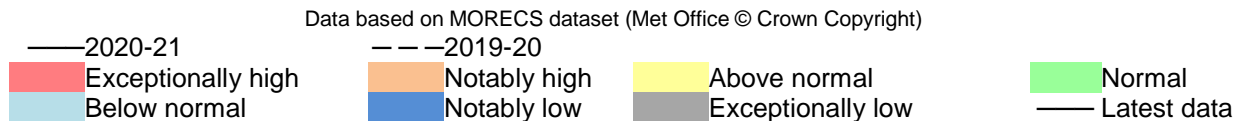
**Below average rainfall**



# Soil Moisture Deficit

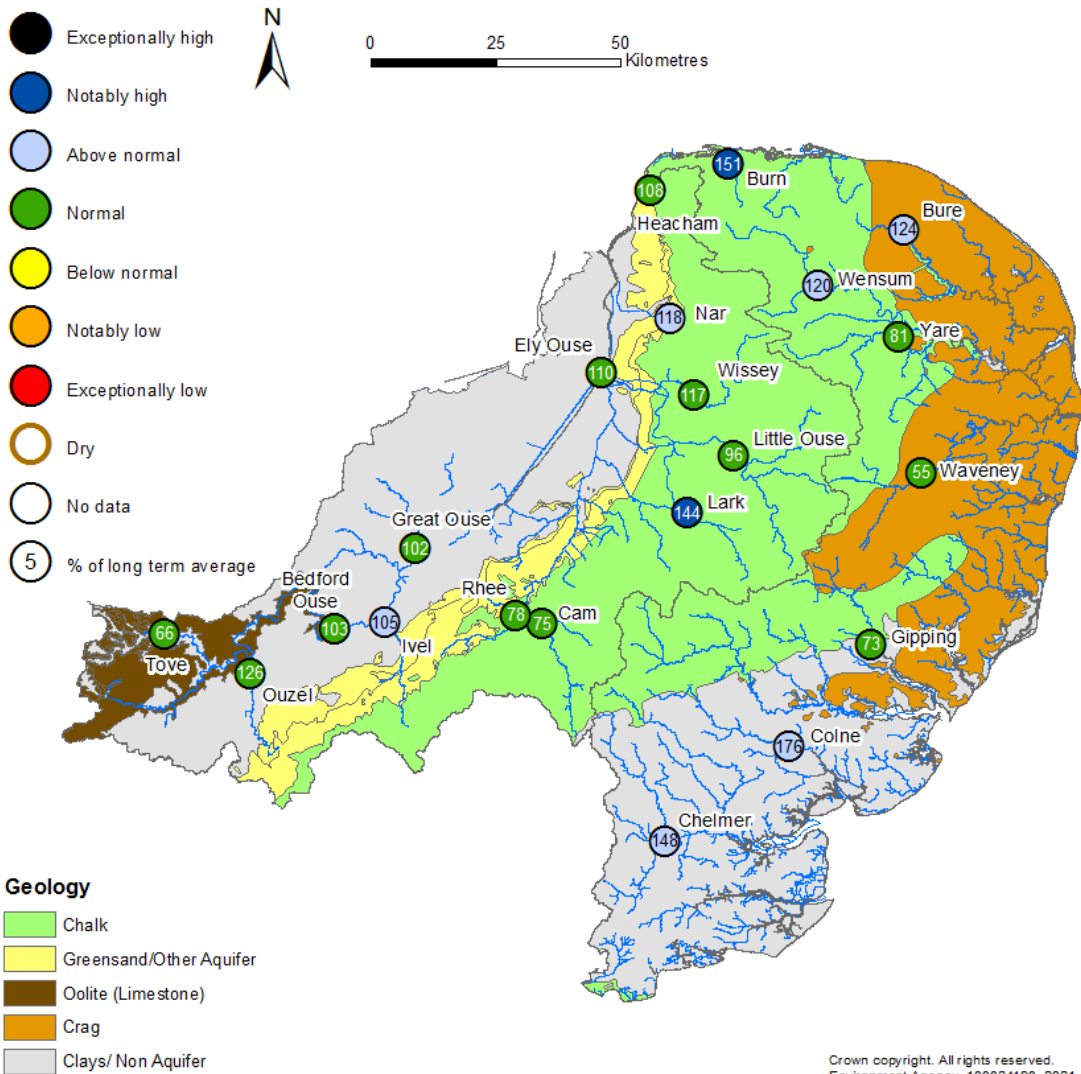


Data based on MORECS (Met Office © Crown Copyright)

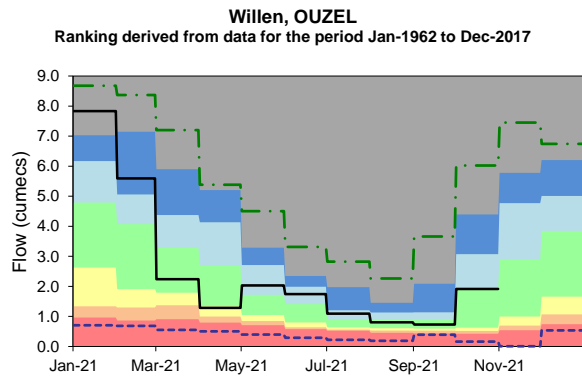
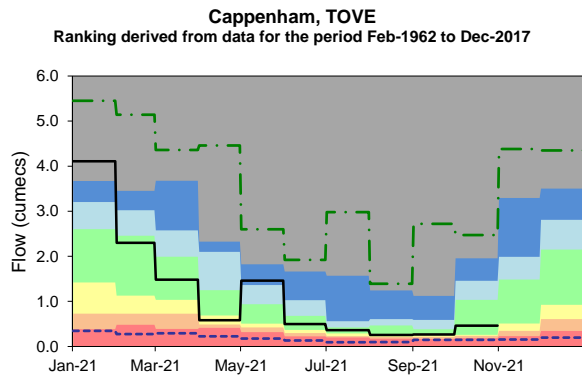


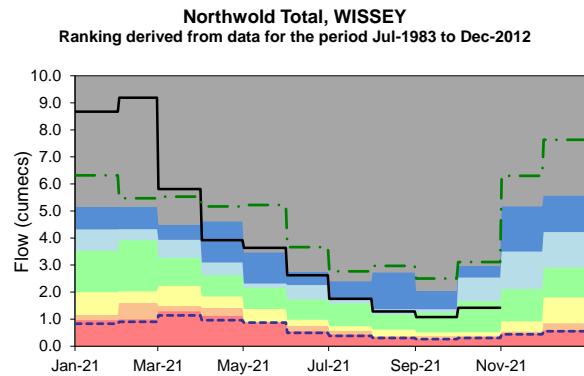
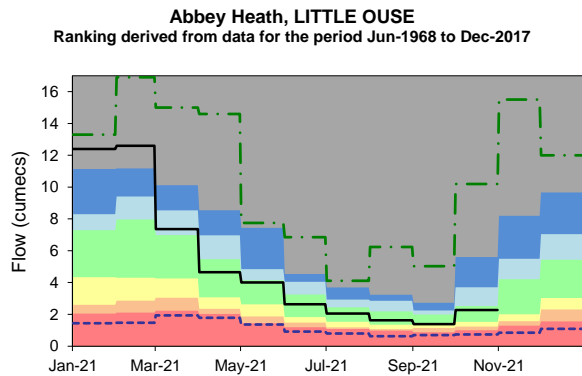
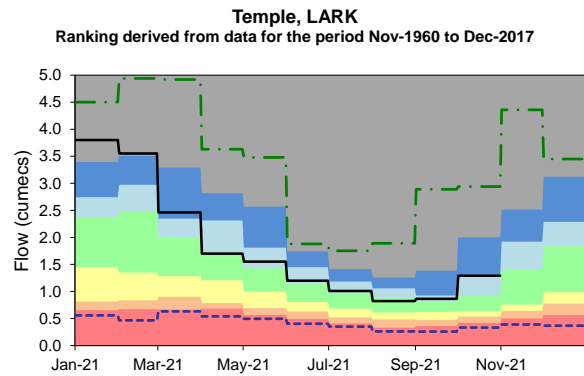
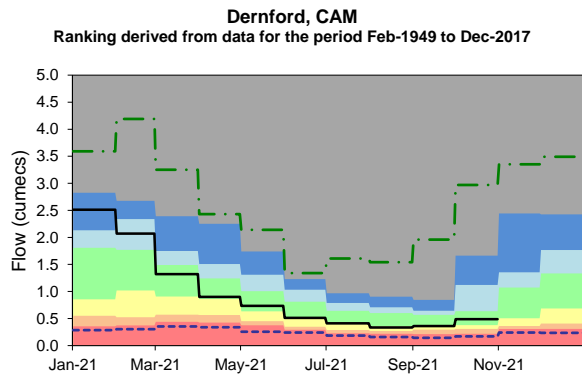
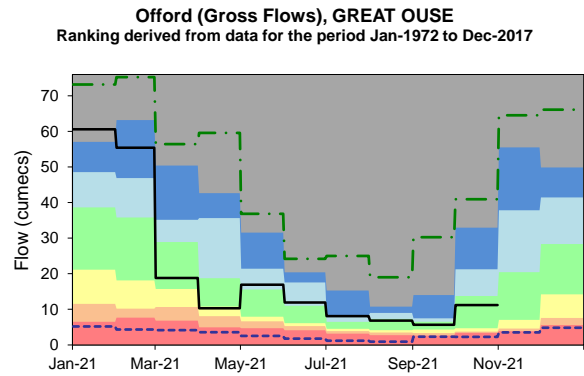
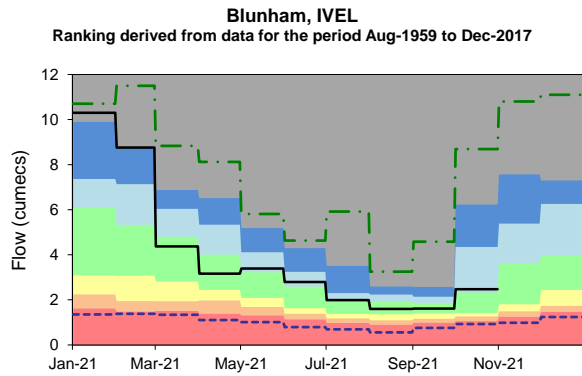
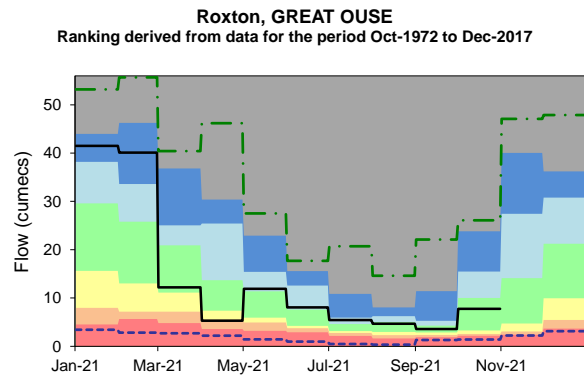
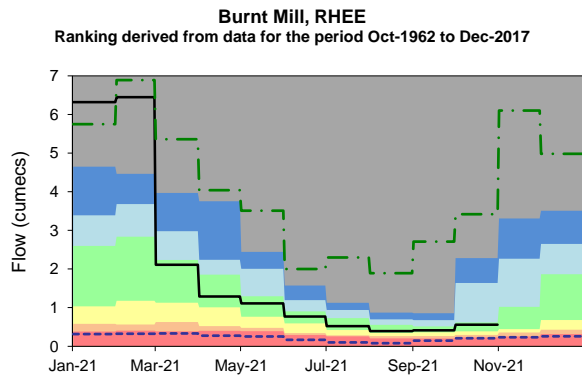
# River Flow

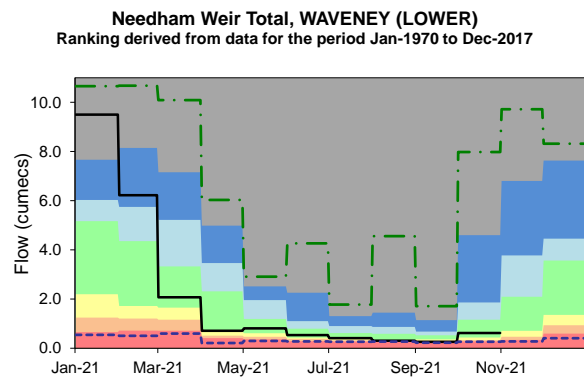
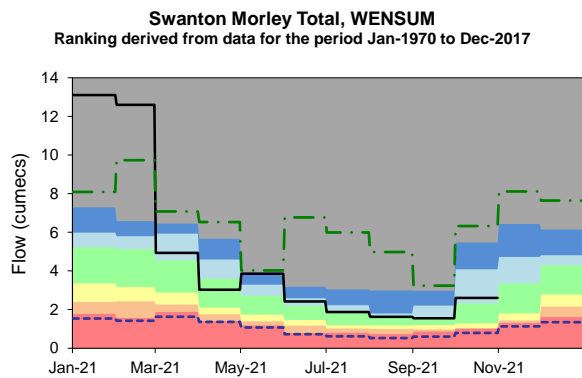
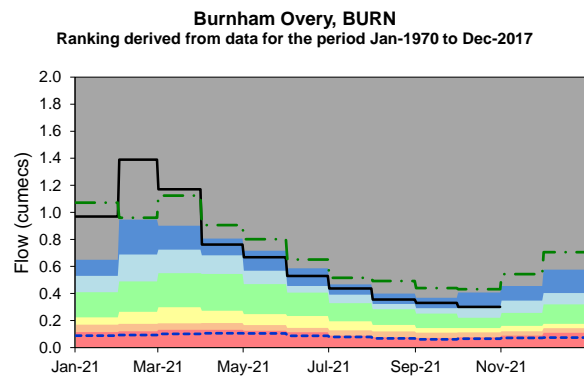
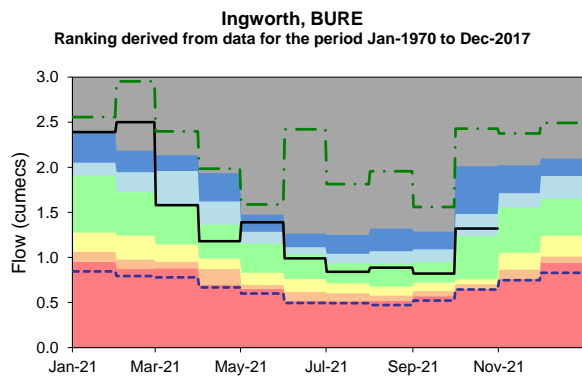
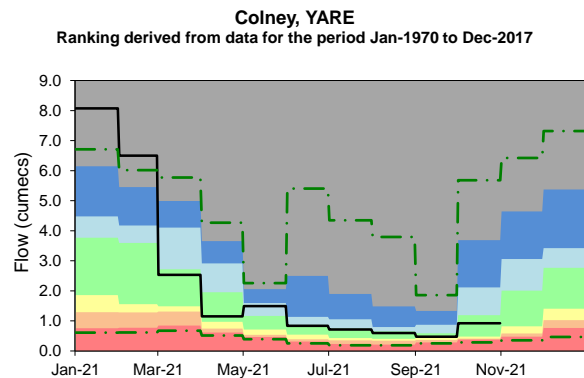
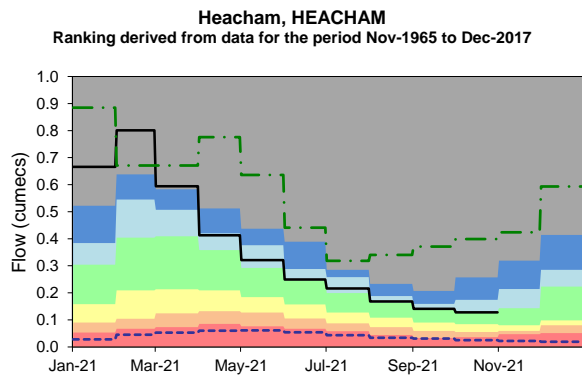
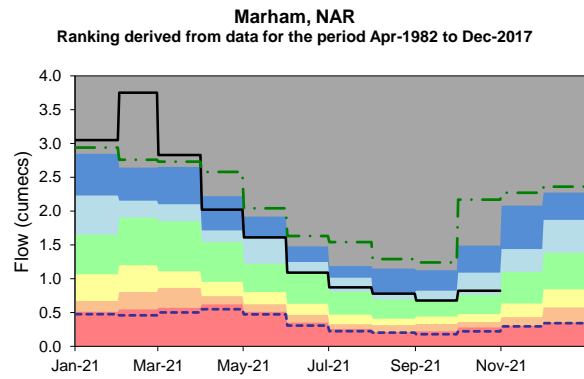
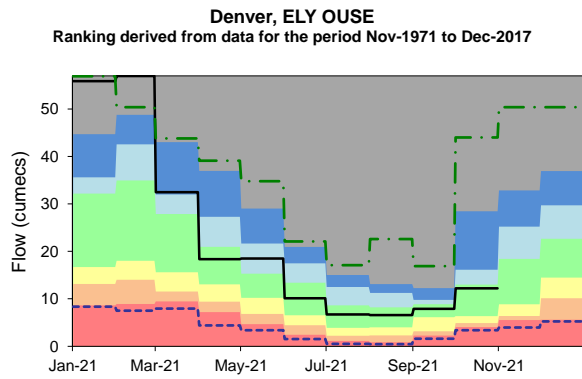
October 2021



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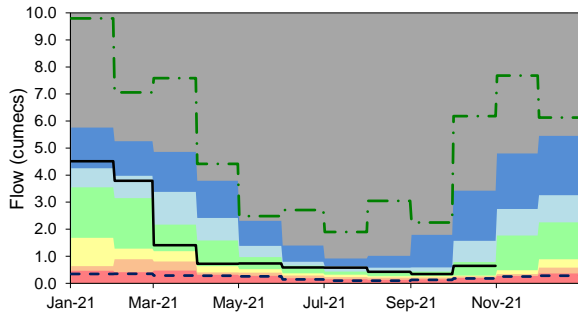






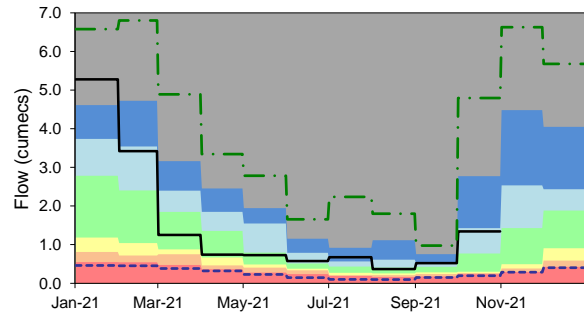
**Bramford, GIPPING**

Ranking derived from data for the period Jan-1970 to Dec-2017



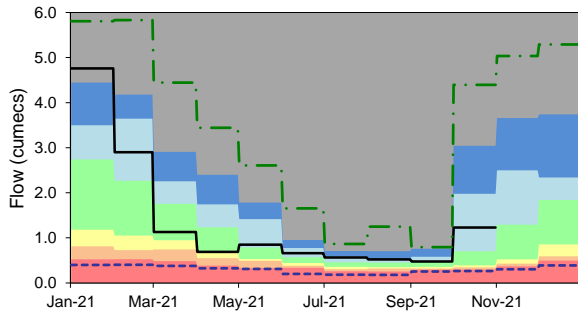
**Lexden, COLNE**

Ranking derived from data for the period Jan-1970 to Dec-2017



**Springfield, CHELMER**

Ranking derived from data for the period Jan-1970 to Dec-2017



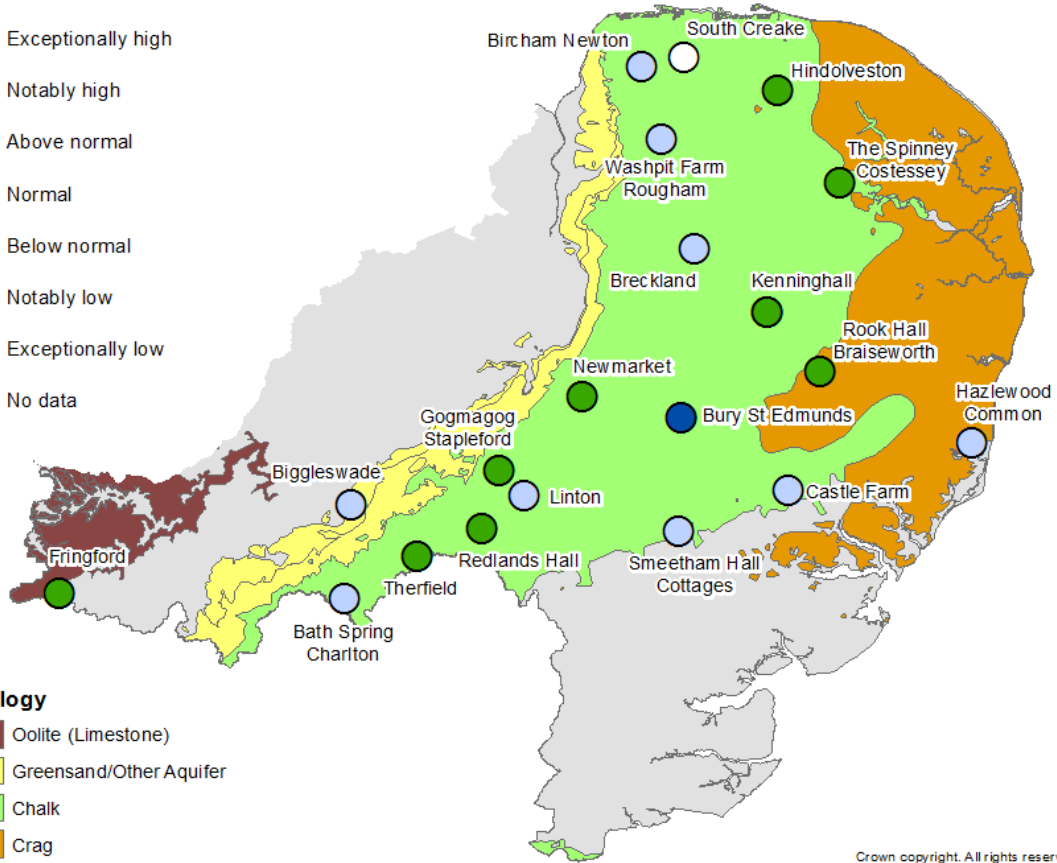
# Groundwater Levels October 2021



- Exceptionally high
- Notably high
- Above normal
- Normal
- Below normal
- Notably low
- Exceptionally low
- No data

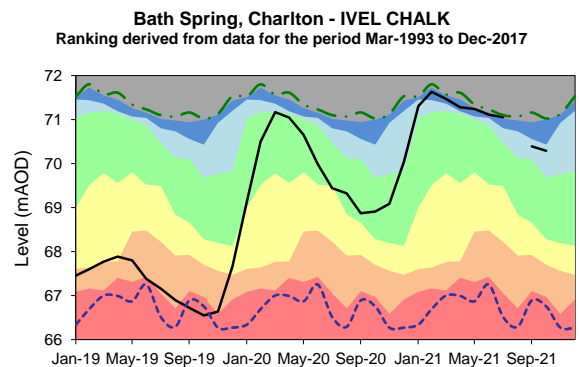
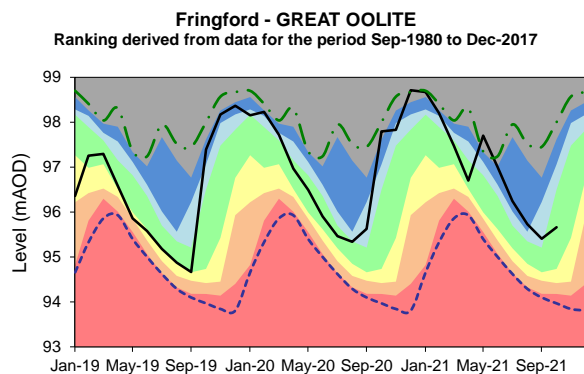
### Geology

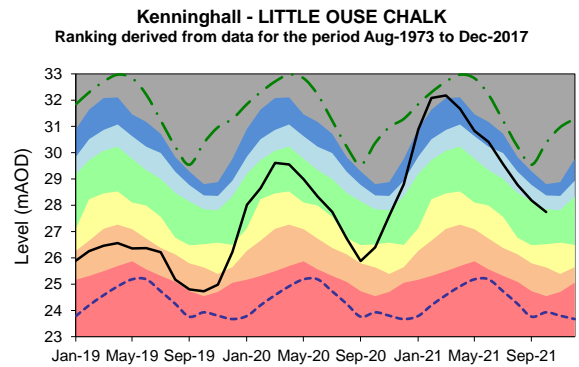
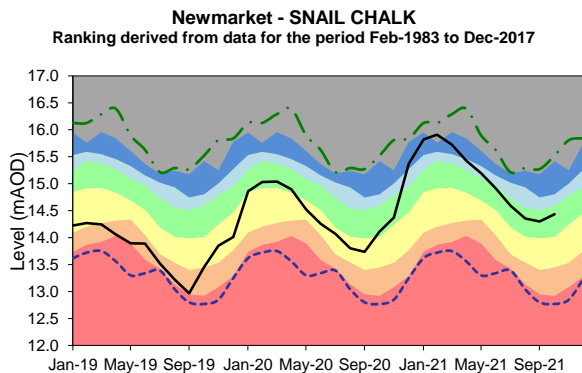
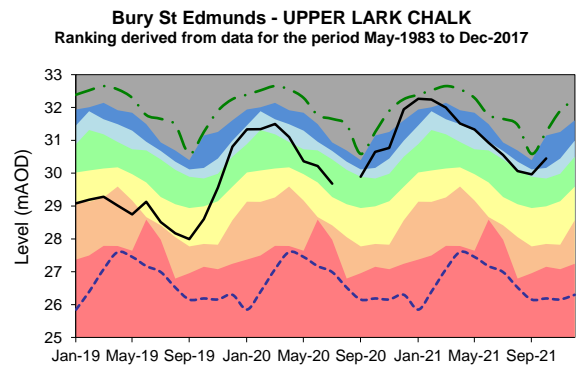
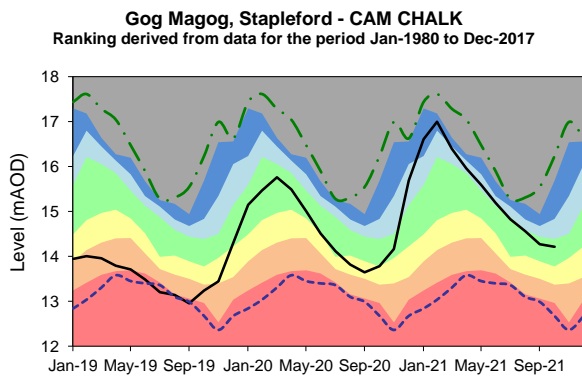
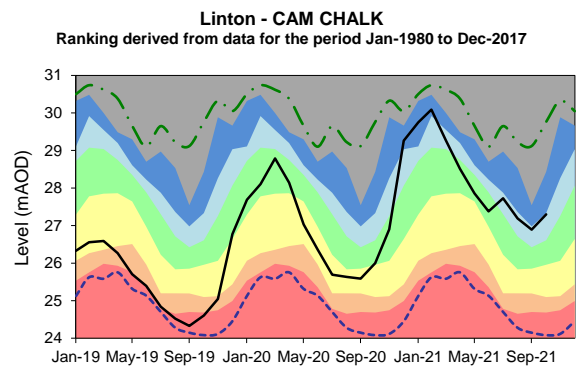
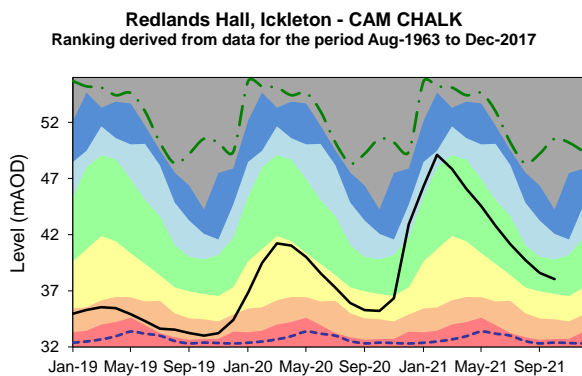
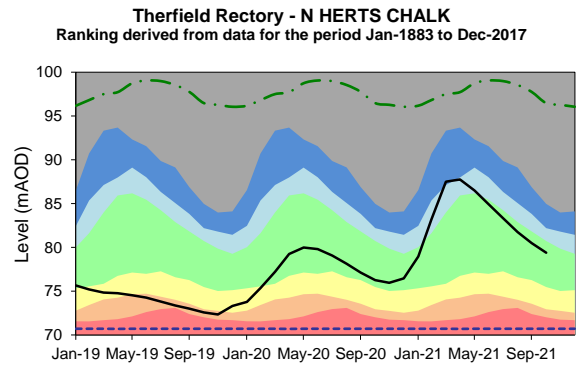
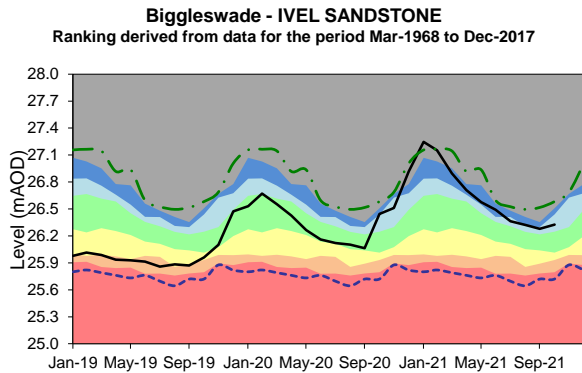
- Oolite (Limestone)
- Greensand/Other Aquifer
- Chalk
- Crag
- Clays/N on Aquifer



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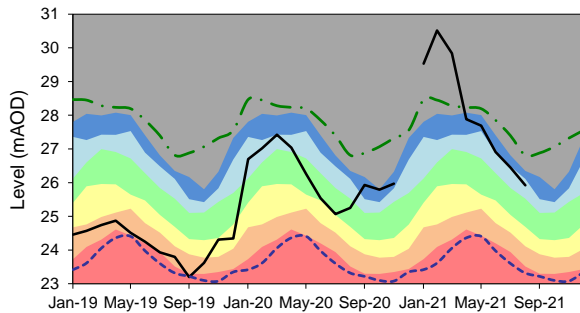
- Exceptionally high
- Notably high
- Above normal
- Normal
- Max
- Below normal
- Notably low
- Exceptionally low
- Latest data
- Min



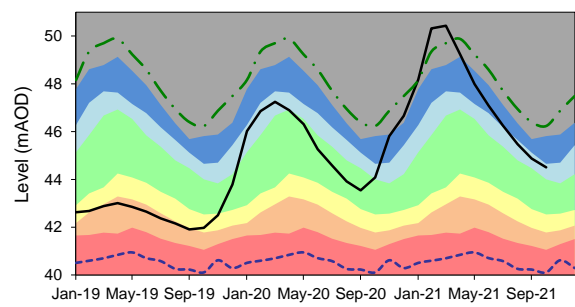




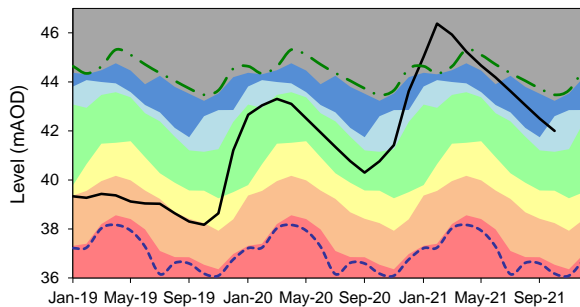
**Breckland - WISEY CHALK**  
Ranking derived from data for the period Jan-1971 to Nov-2017



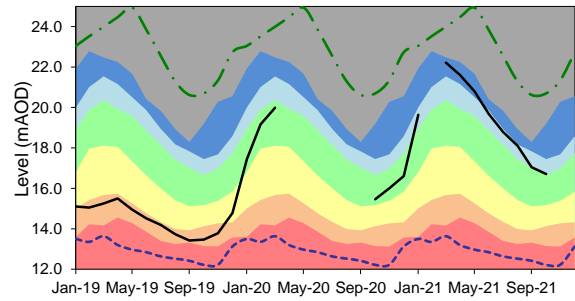
**Washpit Farm, Rougham - NW NORFOLK CHALK**  
Ranking derived from data for the period May-1950 to Dec-2017



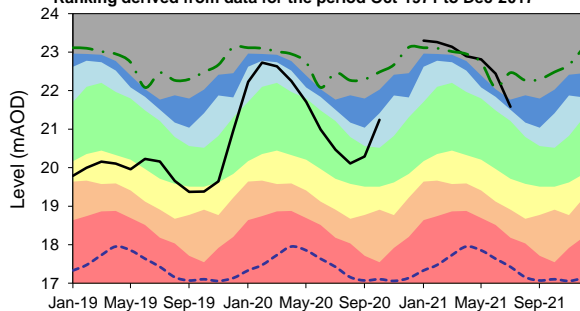
**Bircham Newton - NW NORFOLK CHALK**  
Ranking derived from data for the period Mar-1995 to Sep-2017



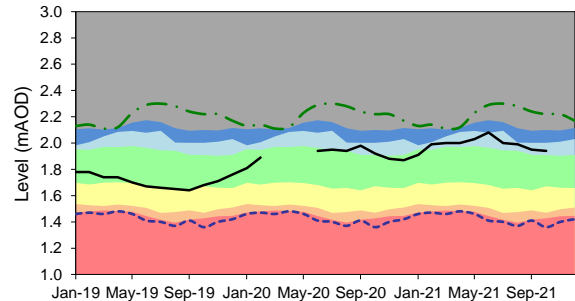
**Castle Farm, Offton - MID SUFFOLK CHALK**  
Ranking derived from data for the period Mar-1967 to Dec-2017



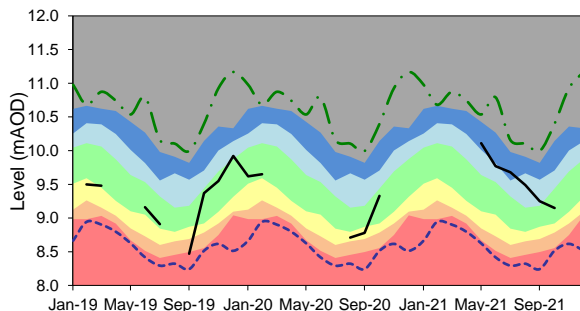
**Old Primary School, South Creake - NW NORFOLK CHALK**  
Ranking derived from data for the period Oct-1971 to Dec-2017



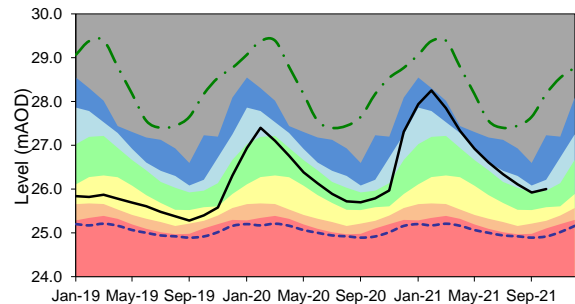
**Hazlewood Common - SUFFOLK CRAG**  
Ranking derived from data for the period Oct-1988 to Feb-2020



**The Spinney, Costessey - WENSUM CHALK**  
Ranking derived from data for the period Oct-1971 to Dec-2017

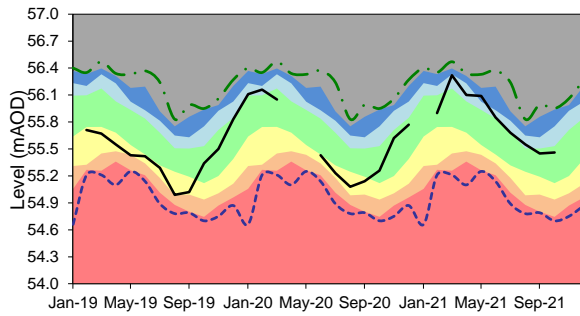


**Smeetham Hall Cottages, Bulmer - ESSEX CHALK**  
Ranking derived from data for the period Jan-1964 to Dec-2017

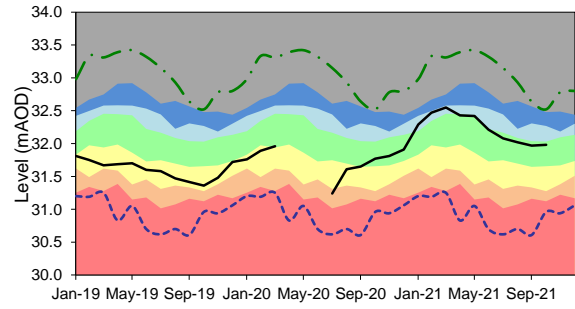




**Hindolveston - NORFOLK CHALK**  
Ranking derived from data for the period Sep-1984 to Nov-2017



**Rook Hall, Braiseworth - SUFFOLK CHALK**  
Ranking derived from data for the period Jan-1980 to Dec-2017

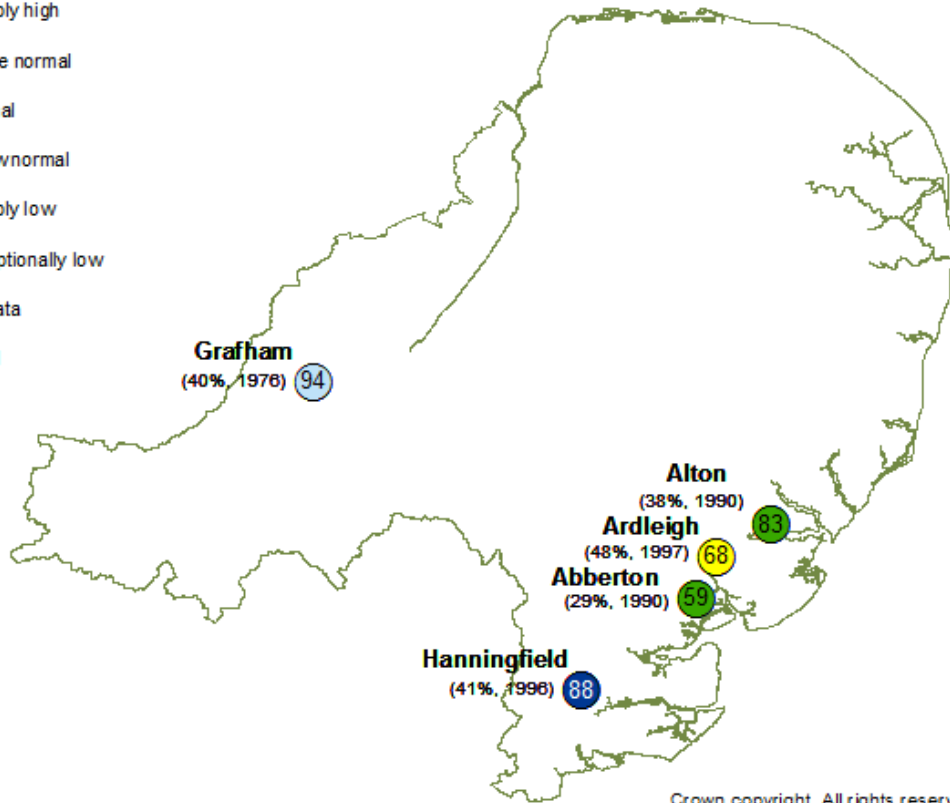


# Reservoir Stocks

October 2021

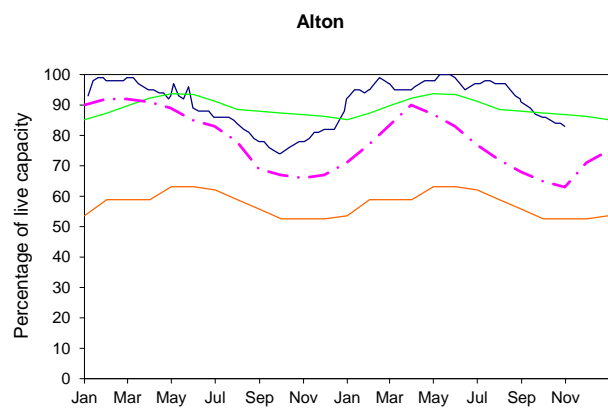
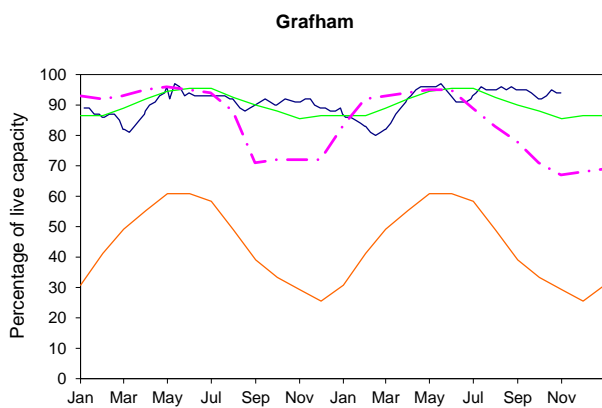
End of month reservoir levels expressed as percentage full.

- Exceptionally high
- Notably high
- Above normal
- Normal
- Below normal
- Notably low
- Exceptionally low
- No data
- 90 % full

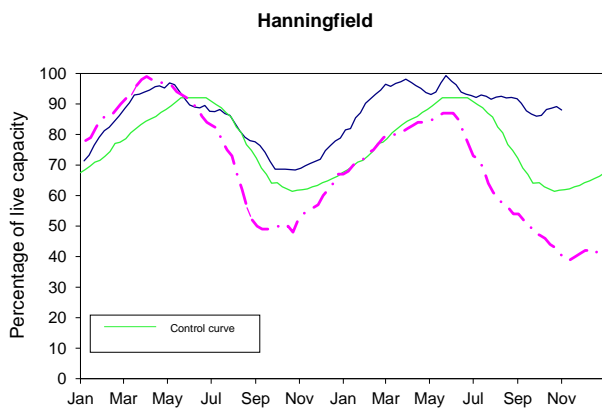
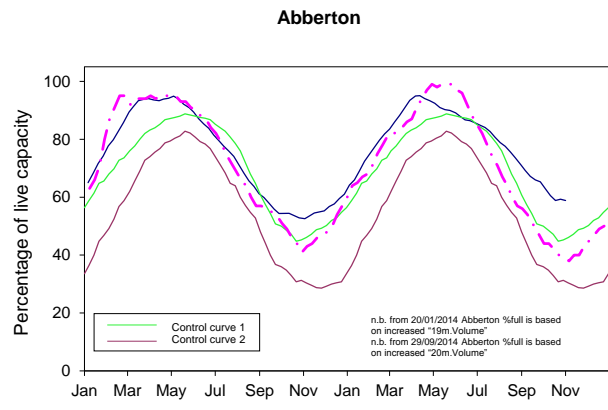
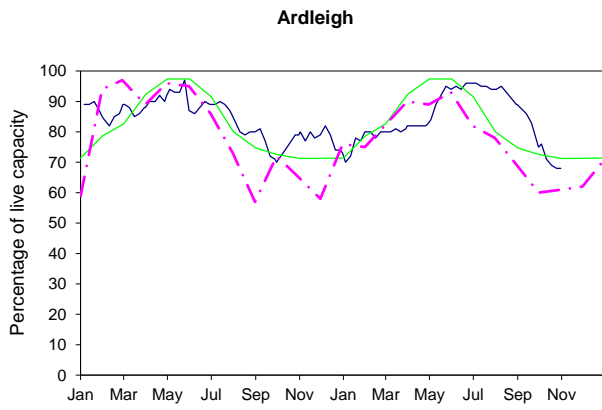


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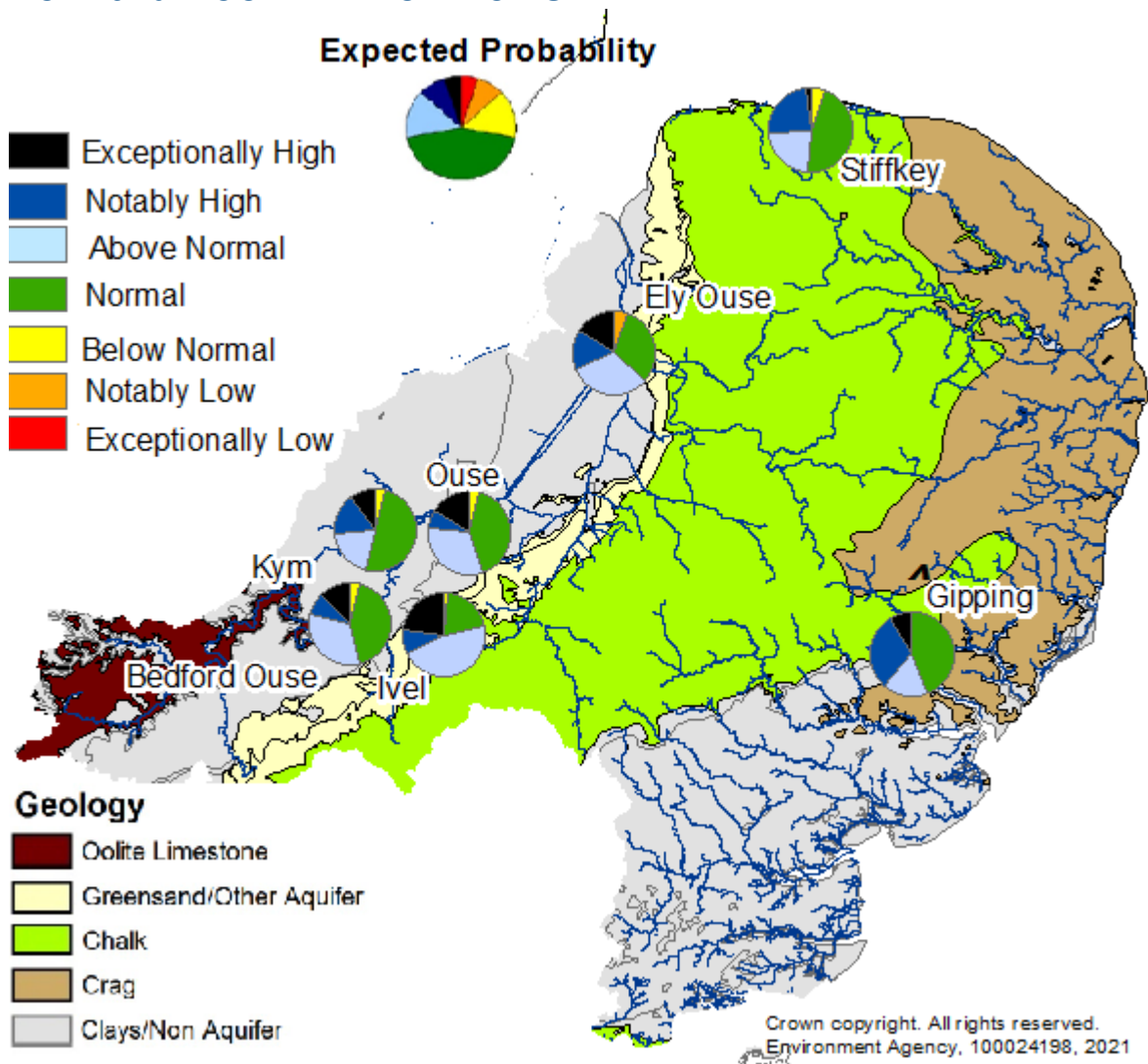
— 2020-2021      — Normal Operating Curve      — Drought Alert Curve      - - - 1995-1996



— 2020-2021      — Normal Operating Curve      — Drought Alert Curve      - - - 1995-1996



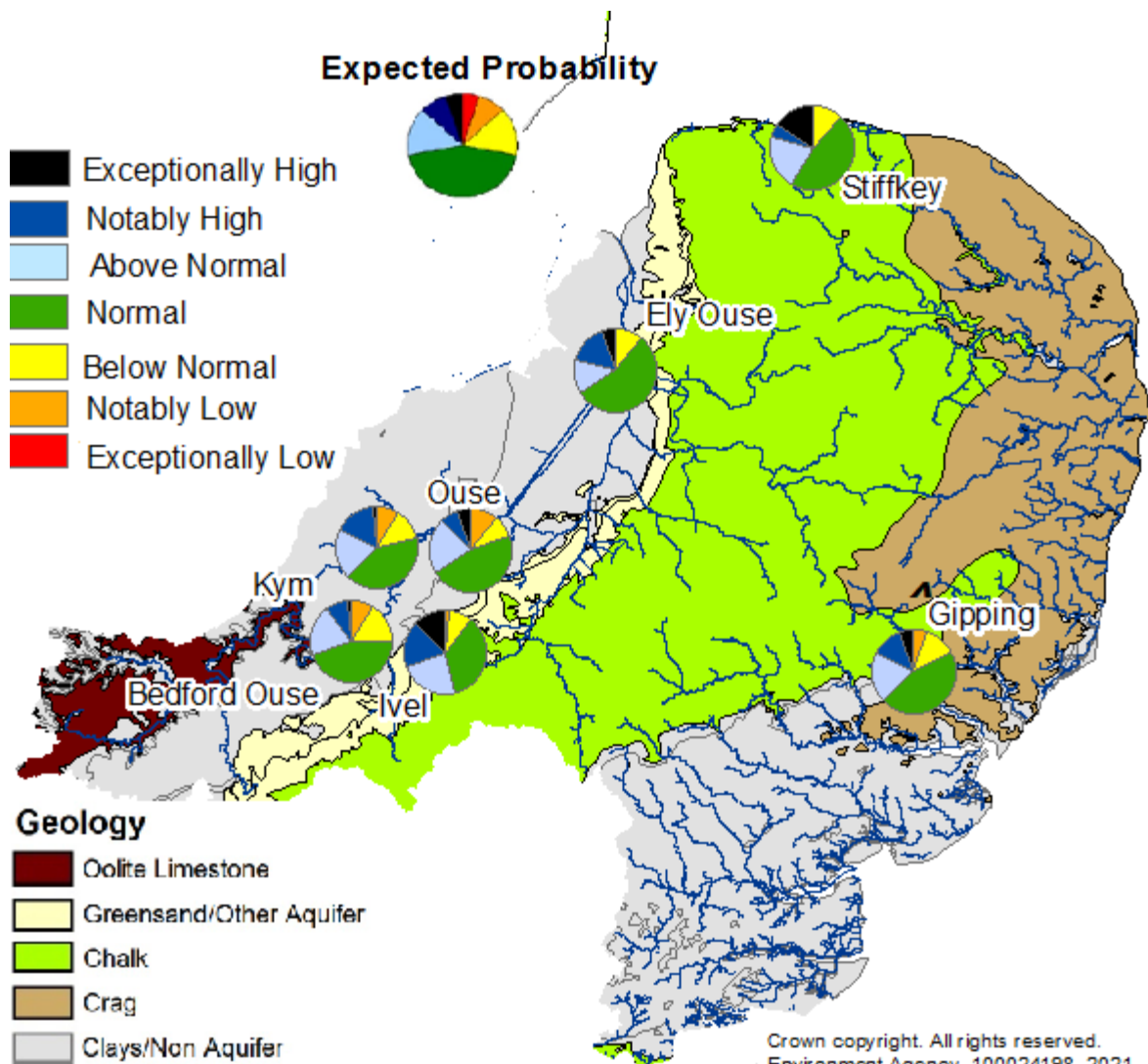
# Forward Look – River Flows



Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those which would typically occur 15% of the time. Normal levels are those which would typically occur 44% of the time within the historic record.

**Probabilistic ensemble projections of river flows at key indicator sites in December 2021.** Pie charts indicate probability, based on climatology, of the surface water flow at each site being e.g. exceptionally low for the time of year. (Source: [Centre for Ecology and Hydrology](#), Environment Agency) Geological map reproduced with kind permission from UK Groundwater Forum, BGS © NERC. Crown copyright. All rights reserved. Environment Agency, 100026380, 2021.

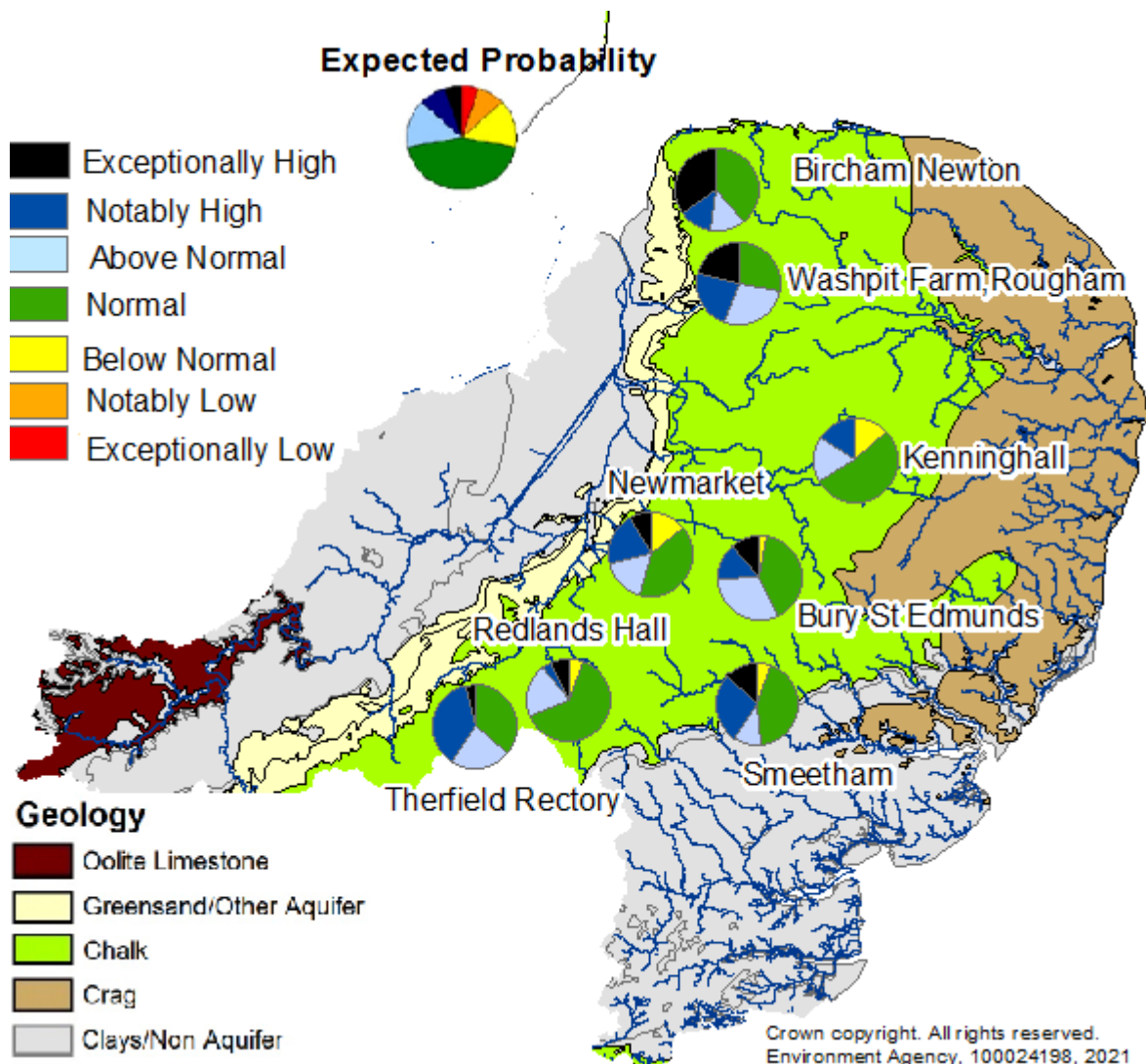
<sup>^</sup> "Naturalised" flows are projected for these sites'



Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those which would typically occur 15% of the time. Normal levels are those which would typically occur 44% of the time within the historic record.

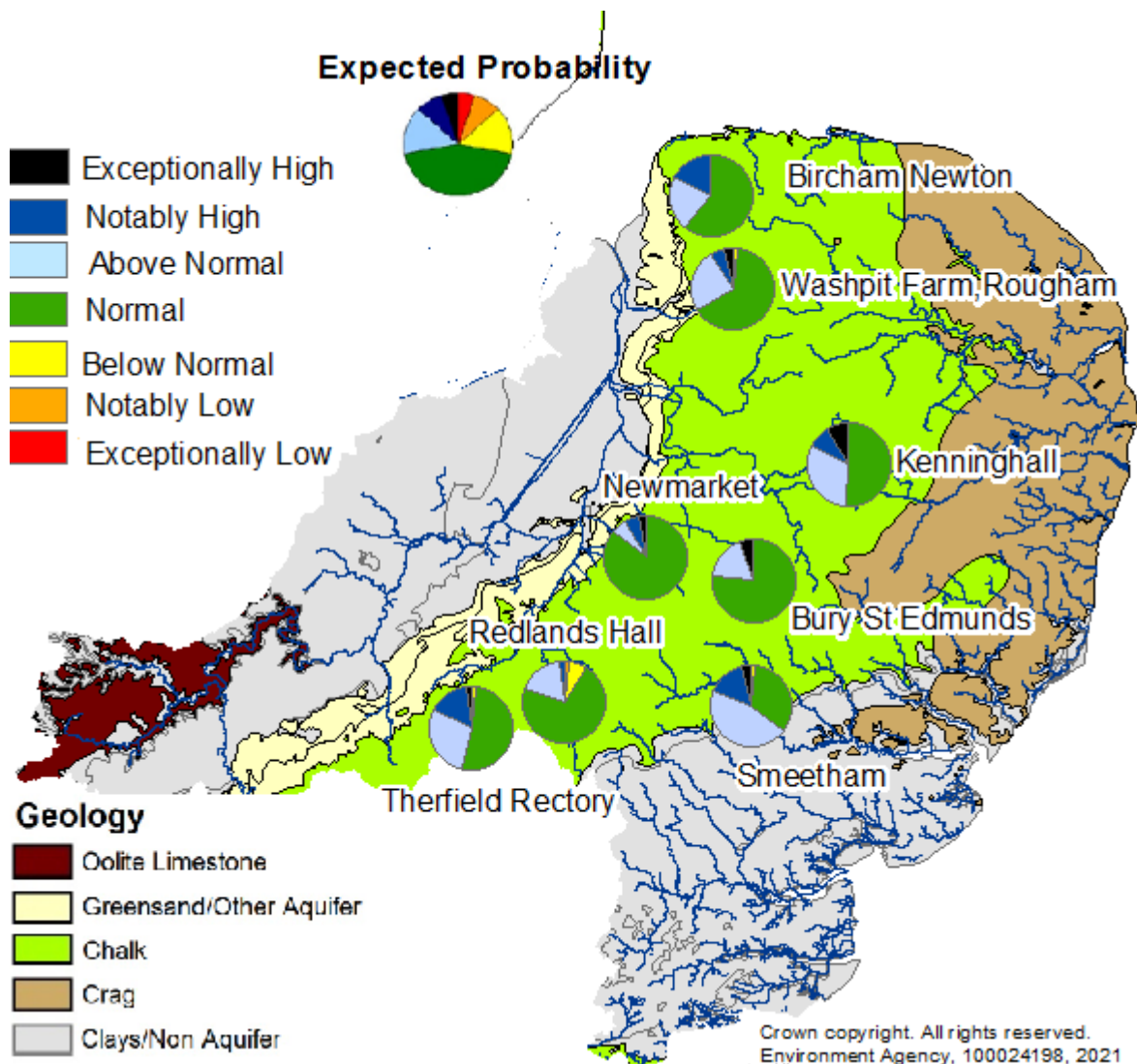
**Probabilistic ensemble projections of river flows at key indicator sites in March 2022.** Pie charts indicate probability, based on climatology, of the surface water flow at each site being e.g. exceptionally low for the time of year. (Source: [Centre for Ecology and Hydrology](#), Environment Agency) Geological map reproduced with kind permission from UK Groundwater Forum, BGS © NERC. Crown copyright. All rights reserved. Environment Agency, 100026380, 2021

## Forward Look - Groundwater



Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those which would typically occur 15% of the time. Normal levels are those which would typically occur 44% of the time within the historic record.

**Probabilistic ensemble projections of groundwater levels at key indicator sites for end of March 2022.** Pie charts indicate probability, based on climatology, of the groundwater level at each site being e.g. exceptionally low for the time of year. (Source: Environment Agency) Geological map reproduced with kind permission from UK Groundwater Forum, BGS © NERC. Crown copyright. All rights reserved. Environment Agency, 100026380, 2021.



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**Probabilistic ensemble projections of groundwater levels at key indicator sites for end of September 2022.** Pie charts indicate probability, based on climatology, of the groundwater level at each site being e.g. exceptionally low for the time of year. (Source: Environment Agency) Geological map reproduced with kind permission from UK Groundwater Forum, BGS © NERC. Crown copyright. All rights reserved. Environment Agency, 100026380, 2021.

## Glossary

### Term

### Definition

Aquifer	A geological formation able to store and transmit water.
Areal average rainfall	The estimated average depth of rainfall over a defined area. Expressed in depth of water (mm).
Artesian	The condition where the groundwater level is above ground surface but is prevented from rising to this level by an overlying continuous low permeability layer, such as clay.
Artesian borehole	Borehole where the level of groundwater is above the top of the borehole and groundwater flows out of the borehole when unsealed.
Cumecs	Cubic metres per second (m <sup>3</sup> s <sup>-1</sup> )
Effective rainfall	The rainfall available to percolate into the soil or produce river flow. Expressed in depth of water (mm).
Flood Alert/Flood Warning	Three levels of warnings may be issued by the Environment Agency. Flood Alerts indicate flooding is possible. Flood Warnings indicate flooding is expected. Severe Flood Warnings indicate severe flooding.
Groundwater	The water found in an aquifer.
Groundwater level	The water level measured in the aquifer at a borehole, which may include the impacts of artificial influences.
Long term average (LTA)	The arithmetic mean calculated from the historic record, usually based on the period 1961-1990. However, the period used may vary by parameter being reported on (see figure captions for details).
mAOD	Metres Above Ordnance Datum (mean sea level at Newlyn Cornwall).
MORECS	Met Office Rainfall and Evaporation Calculation System. Met Office service providing real time calculation of evapotranspiration, soil moisture deficit and effective rainfall on a 40 x 40 km grid.
Naturalised flow	River flow with the impacts of artificial influences removed. Artificial influences may include abstractions, discharges, transfers, augmentation and impoundments.
NCIC	National Climate Information Centre. NCIC area monthly rainfall totals are derived using the Met Office 5 km gridded dataset, which uses rain gauge observations.
Recharge	The process of increasing the water stored in the saturated zone of an aquifer. Expressed in depth of water (mm).
Reservoir gross capacity	The total capacity of a reservoir.
Reservoir live capacity	The capacity of the reservoir that is normally usable for storage to meet established reservoir operating requirements. This excludes any capacity not available for use (e.g. storage held back for emergency services, operating agreements or physical restrictions). May also be referred to as 'net' or 'deployable' capacity.
River Flow	The flow in the river measured at a gauging station which includes the upstream impact of artificial influences.
Soil moisture deficit (SMD)	The difference between the amount of water actually in the soil and the amount of water the soil can hold. Expressed in depth of water (mm).

## Categories

Exceptionally high	Value likely to fall within this band 5% of the time within the historic record.
Notably high	Value likely to fall within this band 8% of the time within the historic record.
Above normal	Value likely to fall within this band 15% of the time within the historic record.
Normal	Value likely to fall within this band 44% of the time within the historic record.
Below normal	Value likely to fall within this band 15% of the time within the historic record.
Notably low	Value likely to fall within this band 8% of the time within the historic record.
Exceptionally low	Value likely to fall within this band 5% of the time within the historic record.