Monthly water situation report

East of England

Summary – March 2017

March continues the dry period experienced in East Anglia since July 2016; only November has seen above average rainfall. The driest parts of the area are the East Suffolk and Essex catchments, followed by the Cam and Lark catchments. Soil moisture deficit has increased to above normal conditions as a result of the rainfall deficit. River flows are below normal in the Ely Ouse and North-west Norfolk catchments, with the river Cam showing notably low conditions. Groundwater recharge continues at the majority of sites, but at a slower rate than in previous years, causing the majority of sites to be classified as below normal.

Rainfall

East Anglia received an average of 33 mm of rainfall, 71% of the long term average during March. This continues a predominantly dry period which started 9 months ago in July 2016, with only November seeing above average rainfall. South Essex is particularly dry, with only 19 mm of rainfall, 47% of long term average in March. This has made the total rainfall in the last 9 months the 2nd driest since record began, with just 61% of average rainfall.

Soil Moisture Deficit/Recharge

Soil Moisture Deficit (SMD) has increased to above normal conditions, reaching an average value of 22 mm in the area. This is in response to the reduced rainfall, increase in temperature and beginning of the growing season.

River Flows

River flows have fallen at 13 sites due to the below average rainfall; only the rivers in the north Norfolk have shown a flow increase during March. The rivers in the Ely Ouse and NW Norfolk catchments are below normal due to the reduced recharge experienced in the chalk, following lower than average effective rainfall over the winter period. The exception to this is the River Wissey, where flows were maintained by the previous recharge experienced in June 2016.

Groundwater Levels

Groundwater recharge continues at the majority of sites. Only 4 sites have stopped recharging: the Upper Ouse Limestone, the Ivel Greensand, and the Lark and Ivel Chalks. Despite the recharge, 11 of the 18 sites are classified as below normal due to the below average effective rainfall over the recharge period.

Reservoir Storage

The levels of the 5 reported reservoirs in the area were sustained or increased during March and all are close or above their operating curves.

Forward Look

Probabilistic ensemble projections for river flows at key sites

June 2017: There is an increased probability of flows being below the normal range at most groundwater fed rivers this June, but there is a reduced probability of exceptionally low flows with exception of the Ely Ouse at Denver, the River Ouse at Offord and the River Stiffkey.

September 2017: There is an increased probability of flows being below the normal range at most groundwater fed rivers this September, but there is a reduced probability of notably low flows with exception of the Ely Ouse at Denver and the River Stiffkey.

Probabilistic ensemble projections for groundwater levels in key aquifers

September 2017: Therfield Rectory is showing an increased likelihood of exceptionally low levels, whilst Redlands shows an increased likelihood of notably low levels. The rest of the area shows an increased likelihood of normal or below normal levels in September.

March 2018: The forecast models are currently showing a spread of results across each site, however there is a slightly increased likelihood of levels being below the normal range expected next March.

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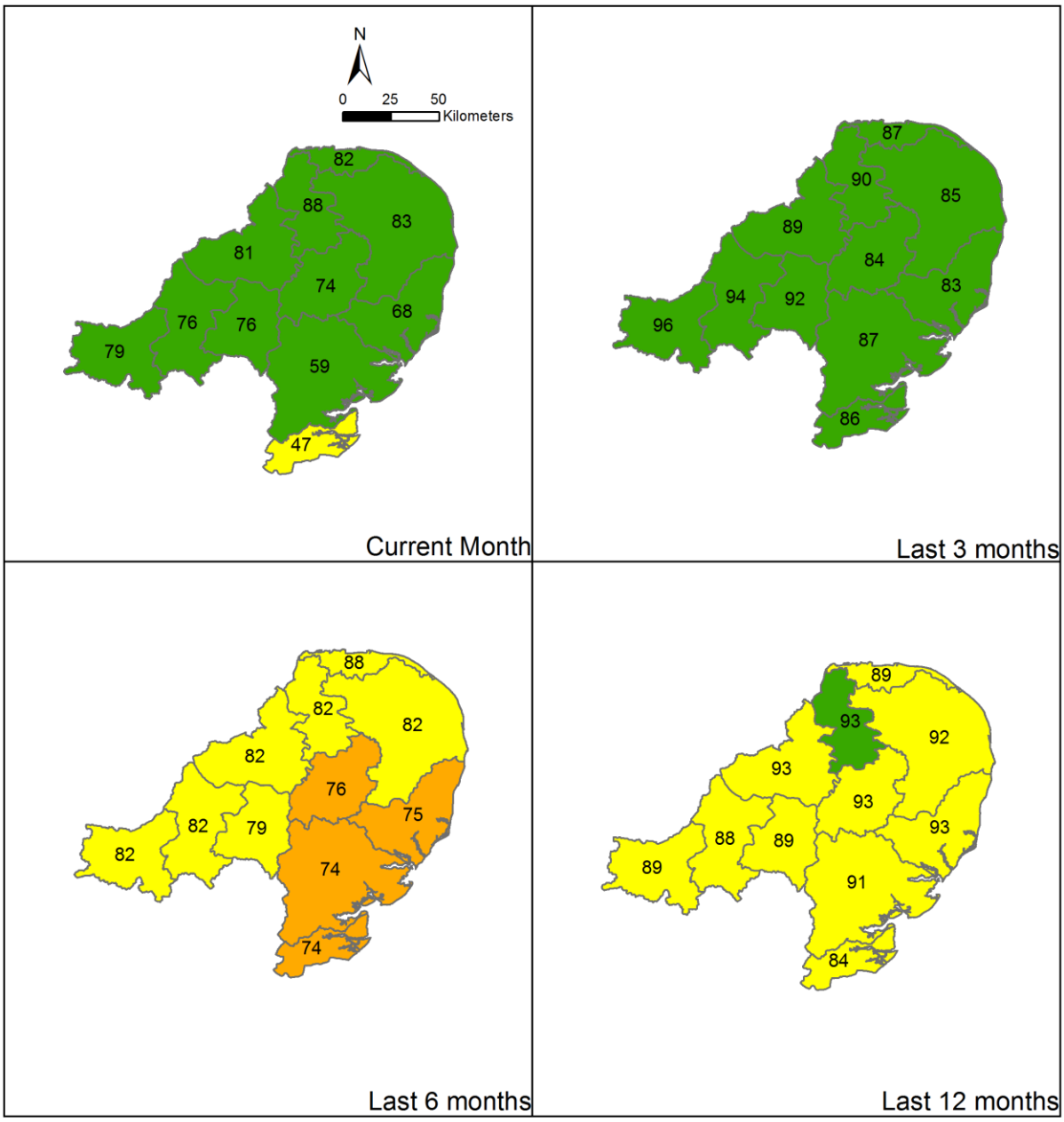
Rainfall

March 2017



Exceptionally high	Rainfall expressed as percentage of 1961-1990 Long Term Average for the specified duration. Classes derived from data for the period 1910 to 2012 based on NCIC dataset (Met Office © Crown Copyright)
Notably high	
Above normal	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 NCIC (National Climate Information Centre) data based on the Met Office 5km gridded rainfall dataset derived from rain gauges (Source: Met Office © Crown Copyright, 2017). Provisional data based on Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. Crown copyright. All rights reserved. Environment Agency, 100026380, 2017.
Normal	
Below normal	
Notably low	
Exceptionally low	

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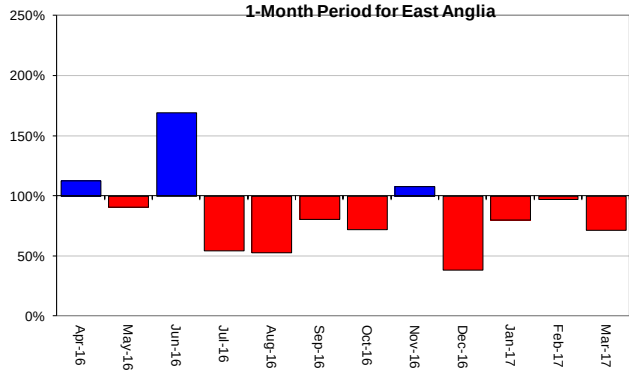
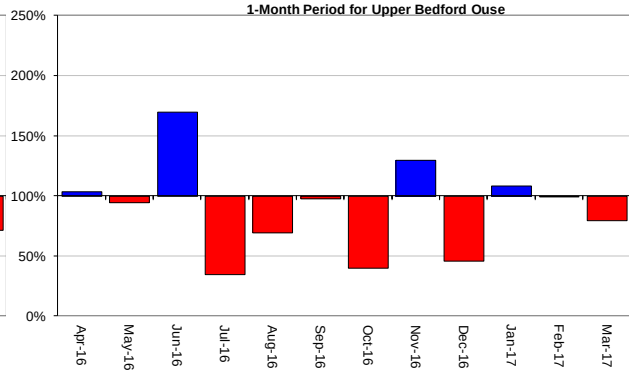
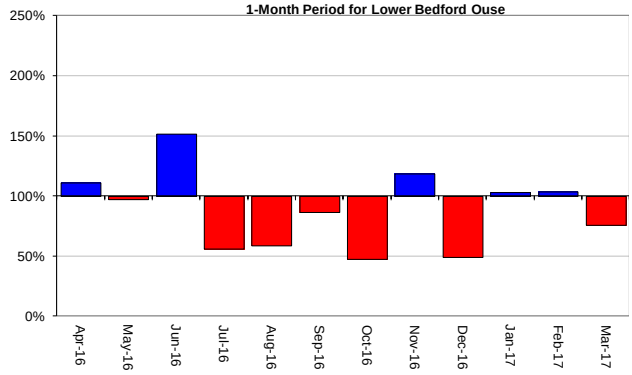
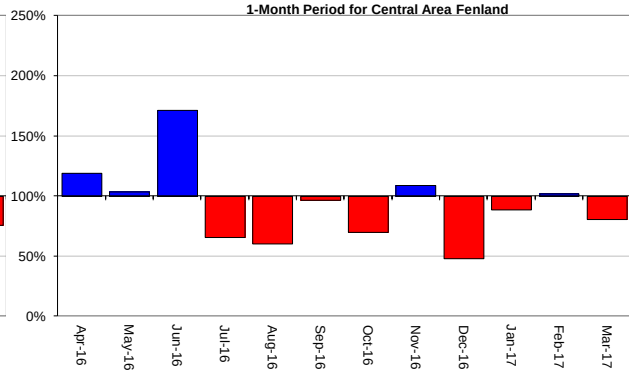
Above average rainfall

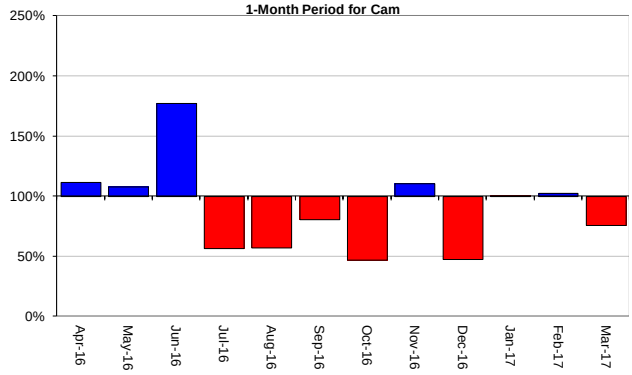
Below average rainfall

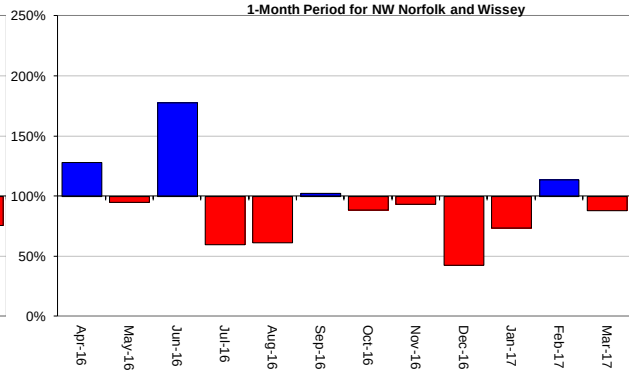


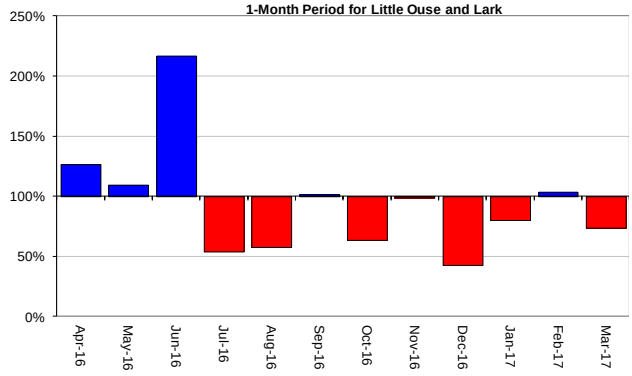


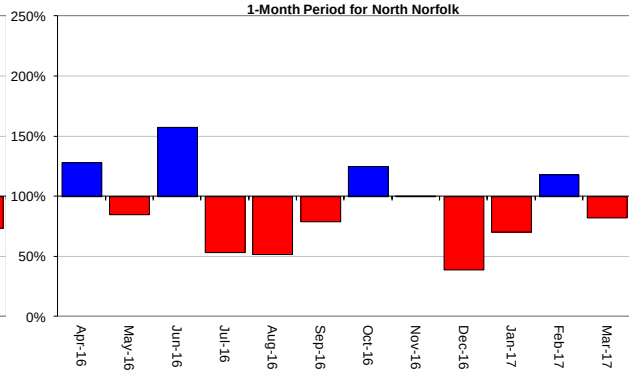












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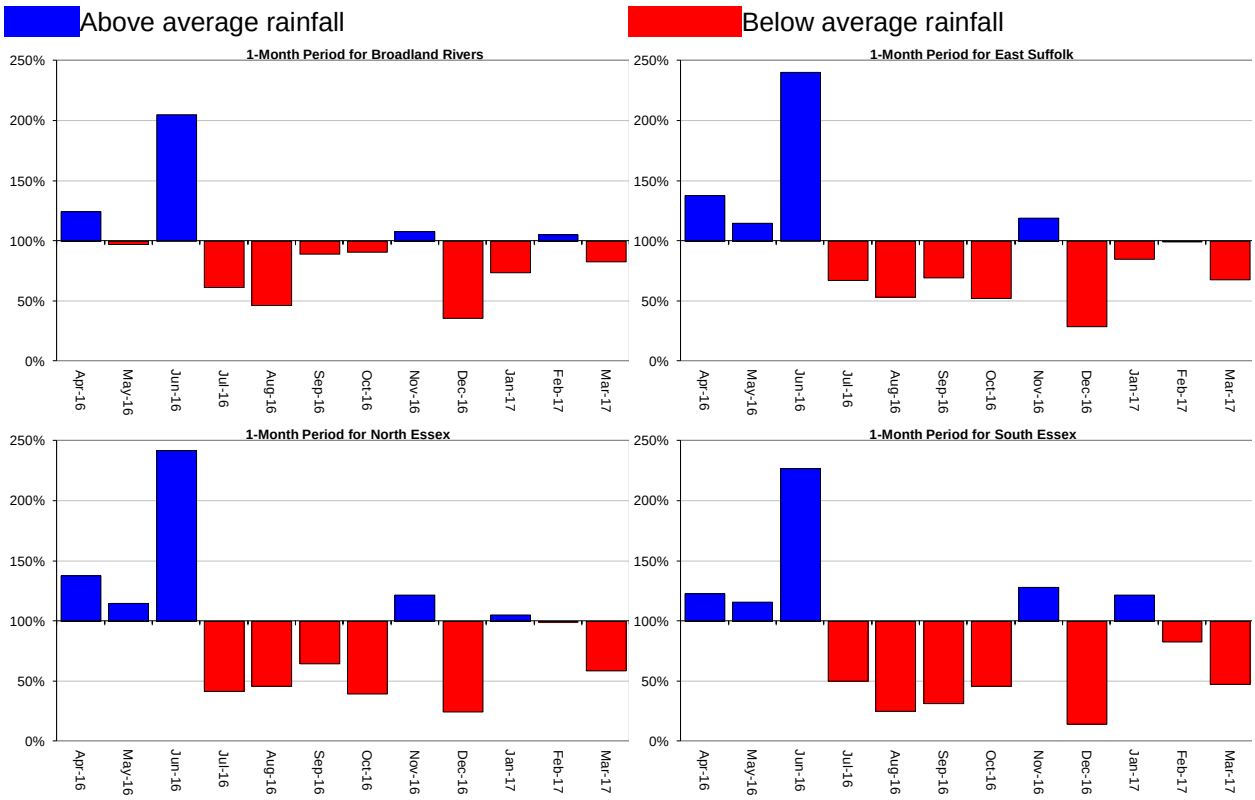

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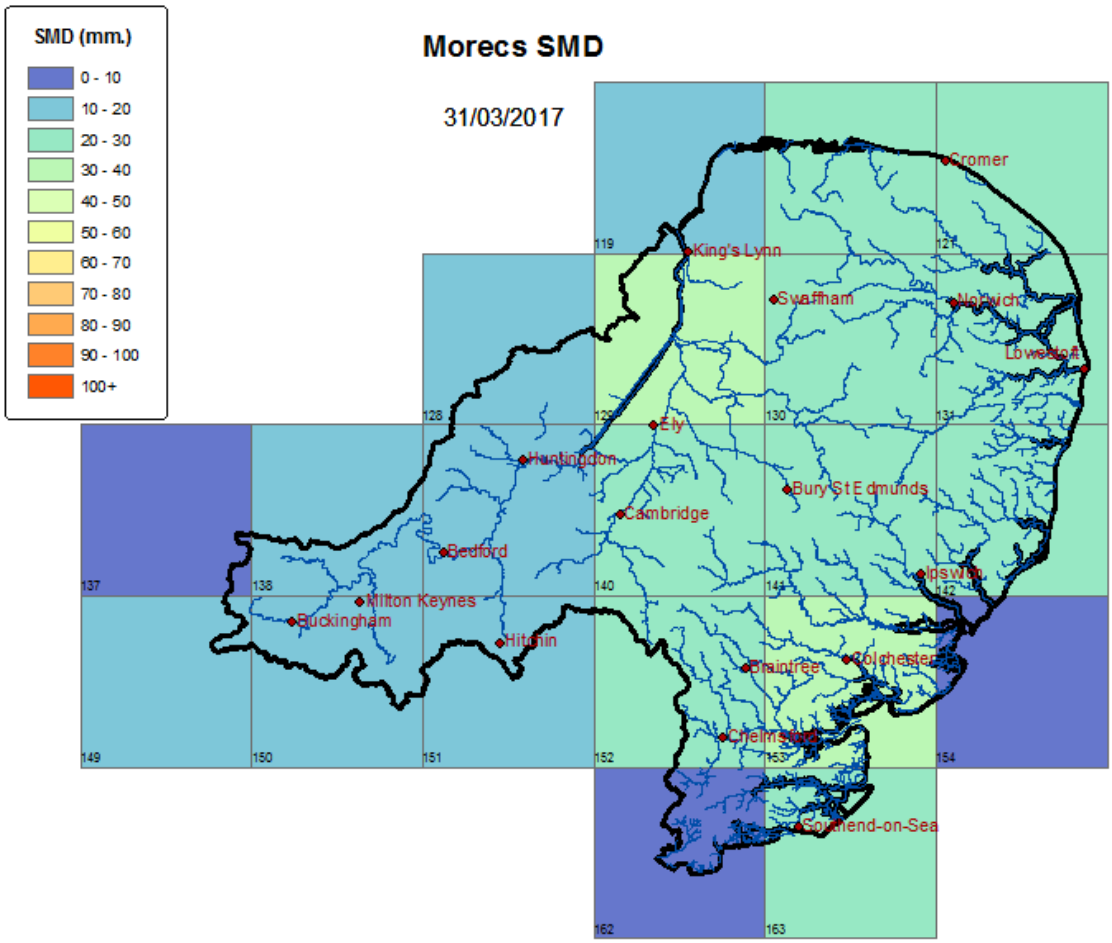
Soil Moisture Deficit

Data based on MORECS dataset (Met Office © Crown Copyright)

——2015-16 – – –2014-15

Exceptionally high | Notably high | Above normal | Normal

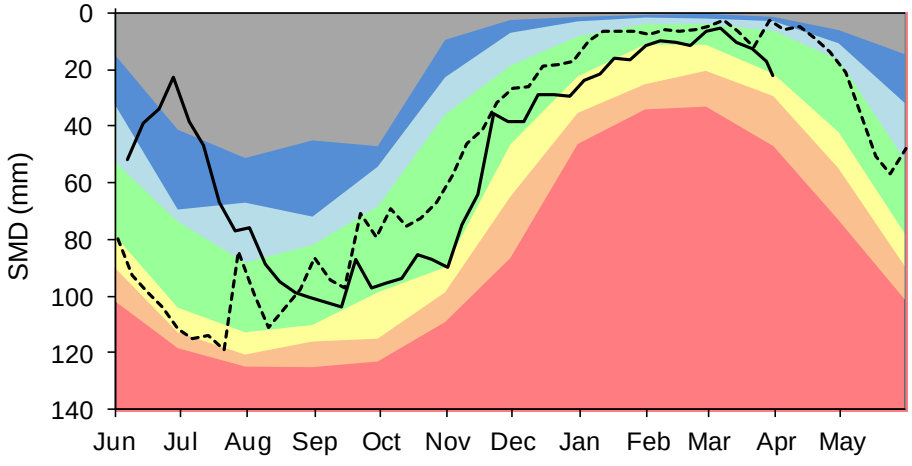
Below normal | Notably low | Exceptionally low | —— Latest data



Data based on MORECS (Met Office © Crown Copyright)

East Anglia

Ranking derived from data for the period Jan-1961 to Dec-2012



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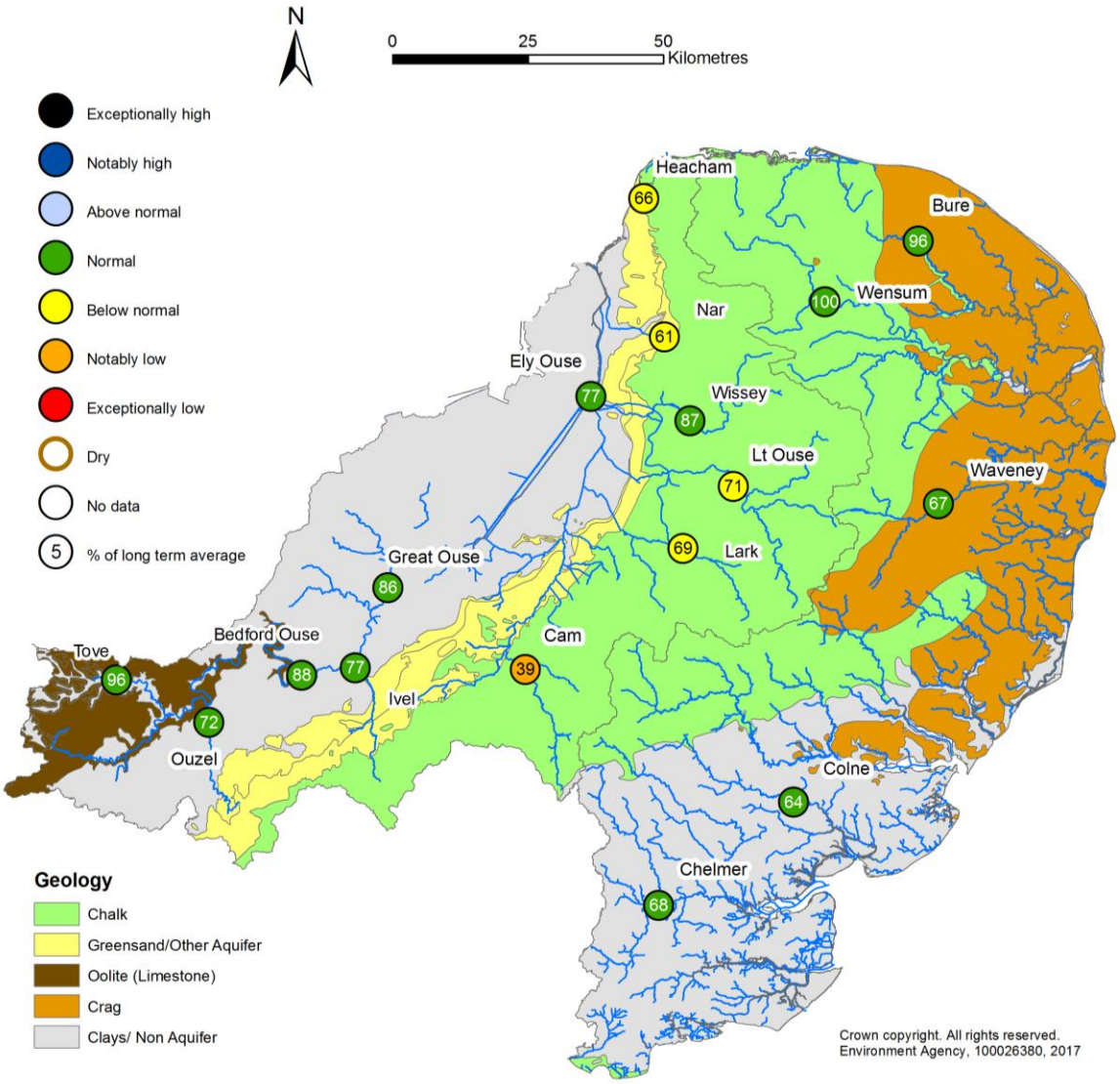
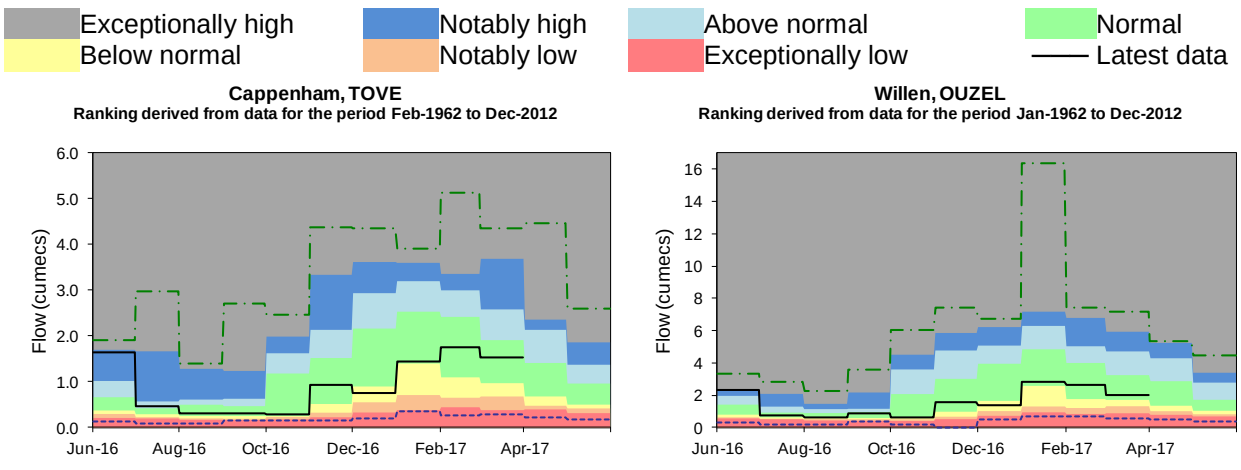
River Flow March 2017





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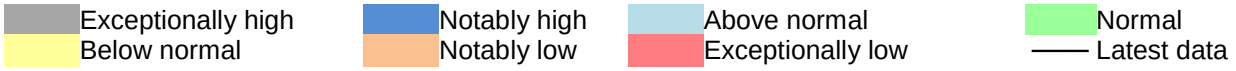
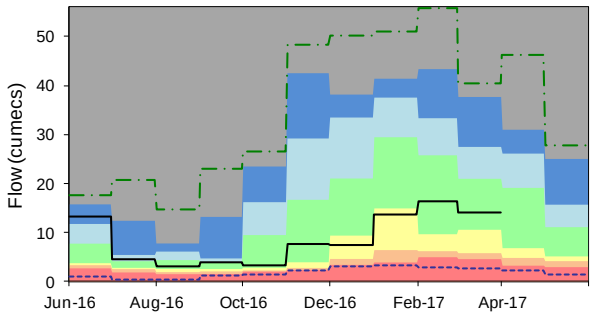
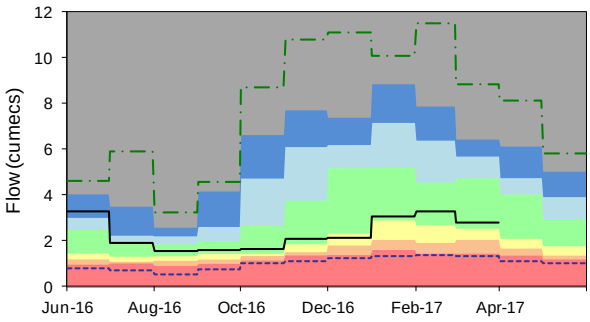


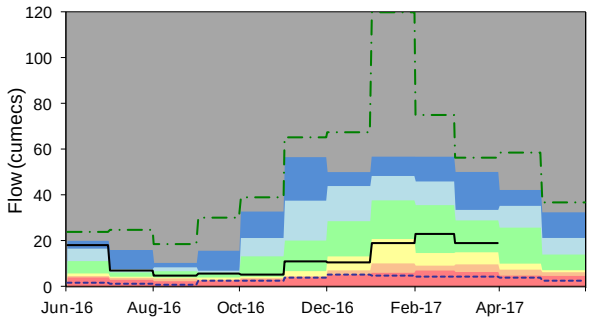
Roxton, OUSE (AN)
Ranking derived from data for the period Oct-1972 to Dec-2012



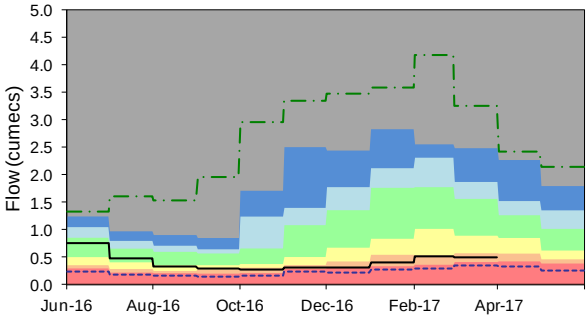
Blunham, IVEL
Ranking derived from data for the period Aug-1959 to Dec-2012



Offord(Gross Flows), OUSE (AN)
Ranking derived from data for the period Jan-1970 to Dec-2012



Dernford, CAM (AN)
Ranking derived from data for the period Feb-1949 to Dec-2012



Temple, LARK
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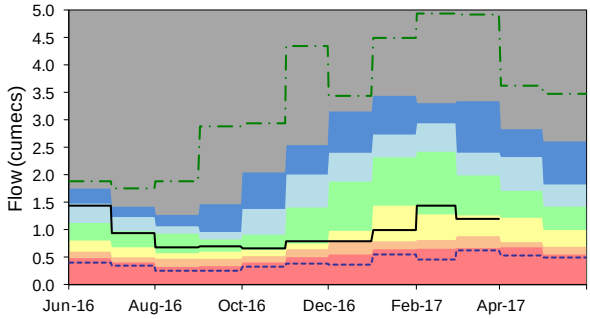
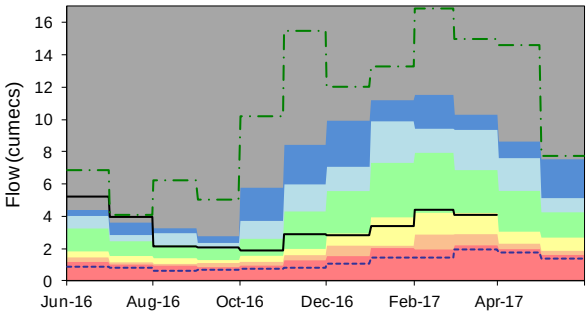
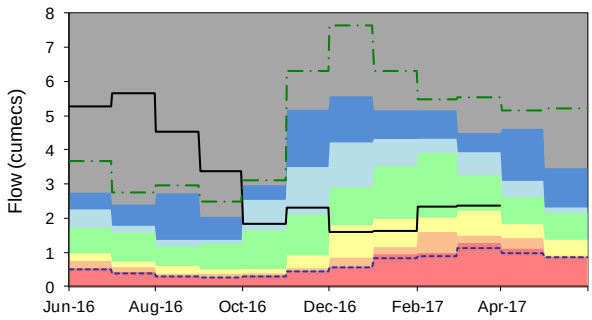


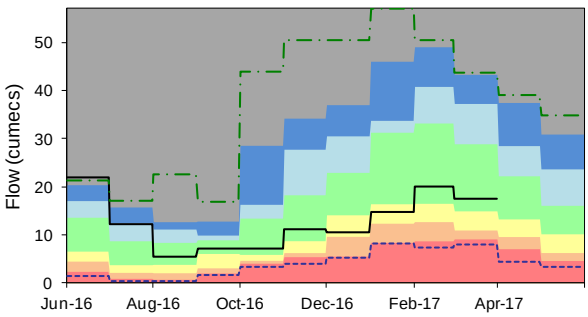
Abbey Heath, LITTLE OUSE
Ranking derived from data for the period Jun-1968 to Dec-2012



Northwold Total, WISSEY
Ranking derived from data for the period Jul-1983 to Dec-2012



Denver Ely Ouse, OUSE (AN)
Ranking derived from data for the period Nov-1971 to Dec-2012



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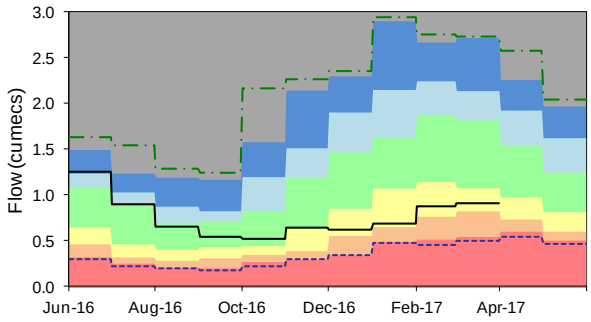
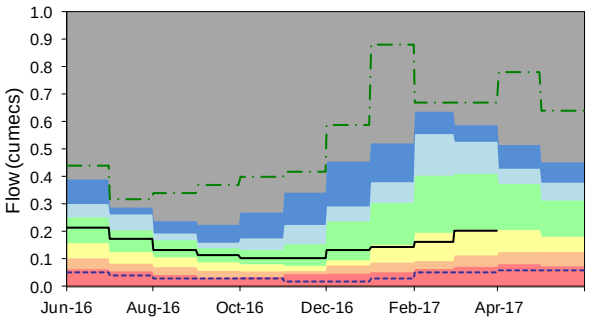
Exceptionally high | Notably high | Above normal | Normal
Below normal | Notably low | Exceptionally low | Latest data

Marham, NAR
Ranking derived from data for the period Apr-1982 to Dec-2012



Heacham, HEACHEM
Ranking derived from data for the period Nov-1965 to Dec-2012



Ingworth, BURE
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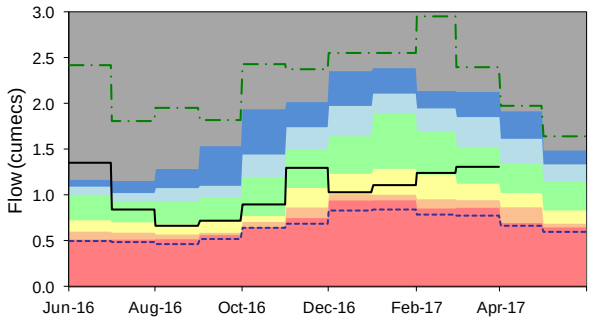
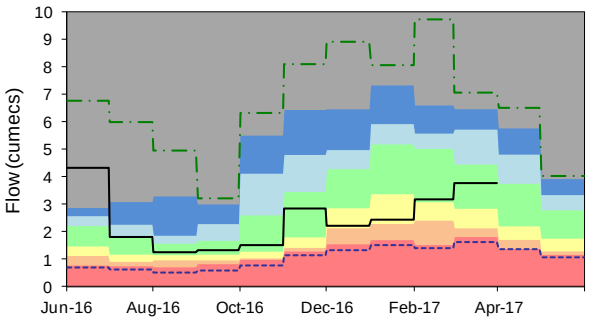
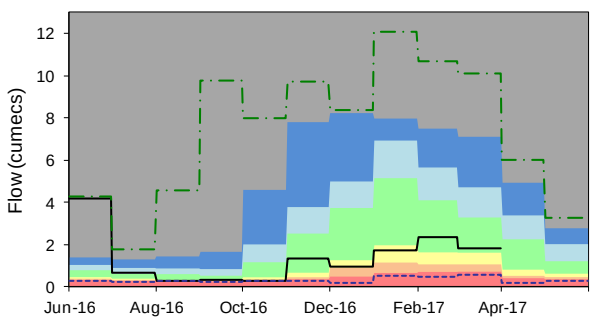


Swanton Morley Total Flow, WENSUM
Ranking derived from data for the period Oct-1969 to Dec-2012



Needham Weir Total, WAVENEY LOWER
Ranking derived from data for the period Dec-1963 to Dec-2012



Lexden, COLNE (AN)
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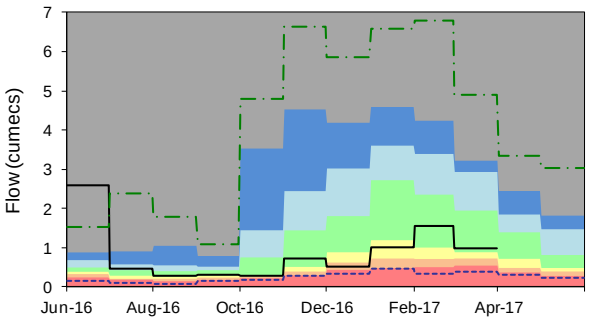
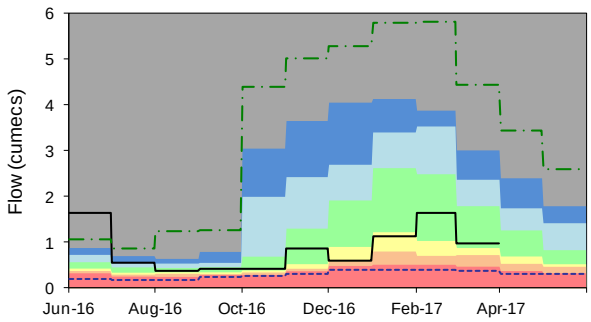


Springfield, CHELMER
Ranking derived from data for the period Nov-1965 to Dec-2012



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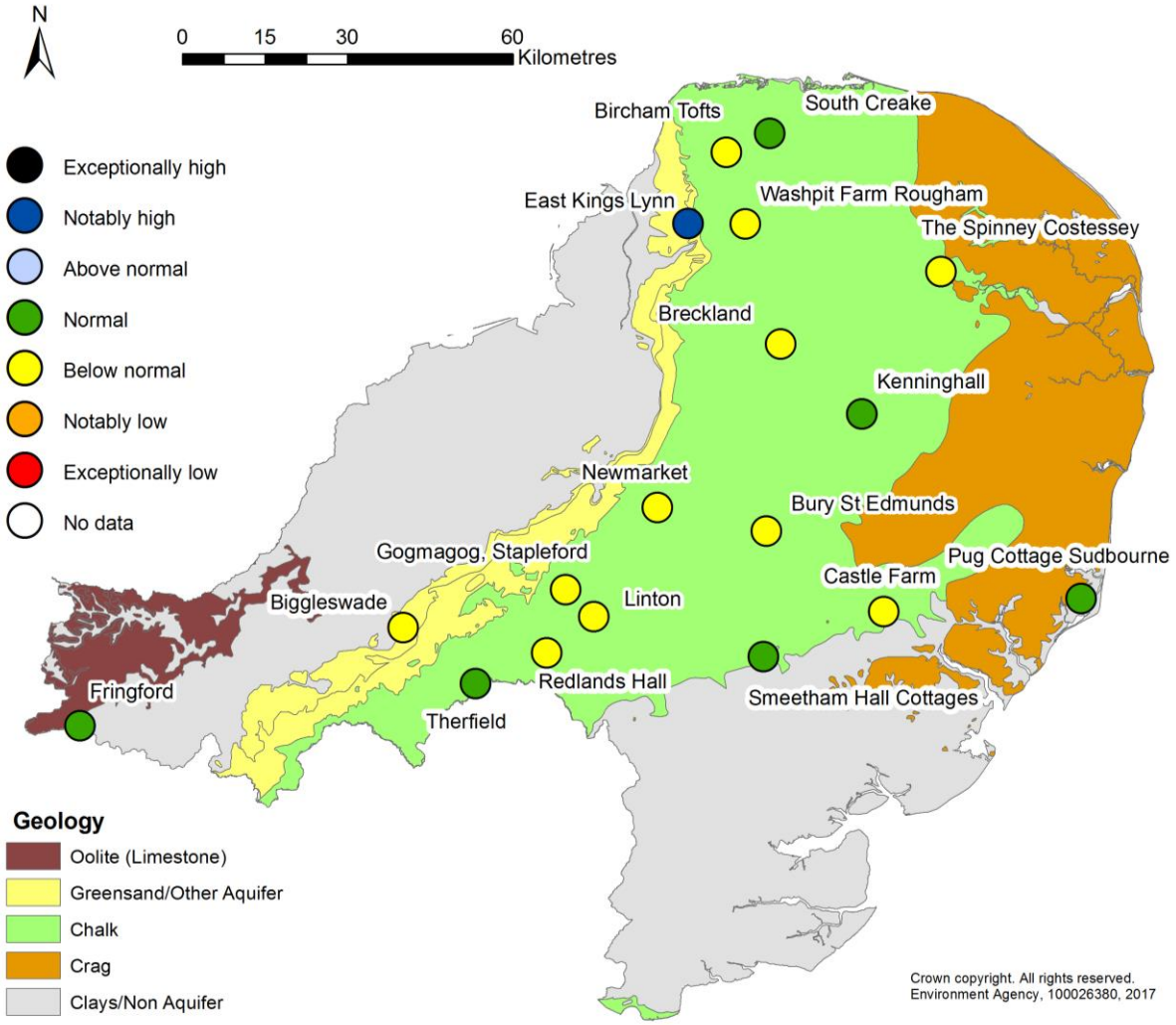
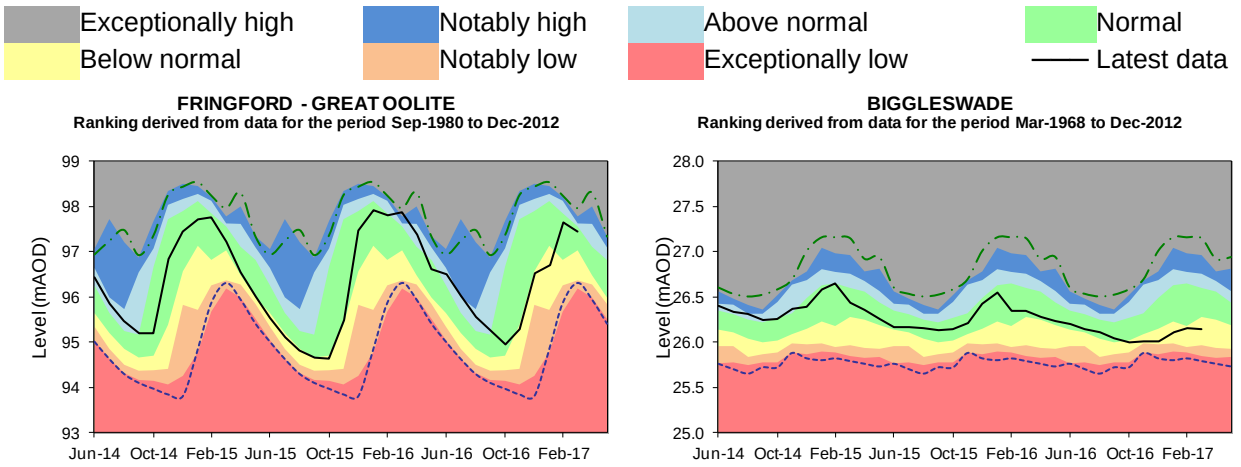
Groundwater Levels March 2017





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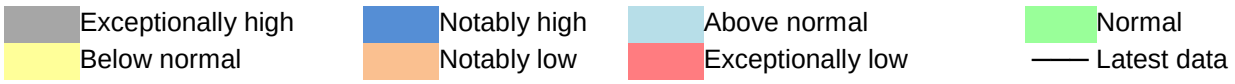
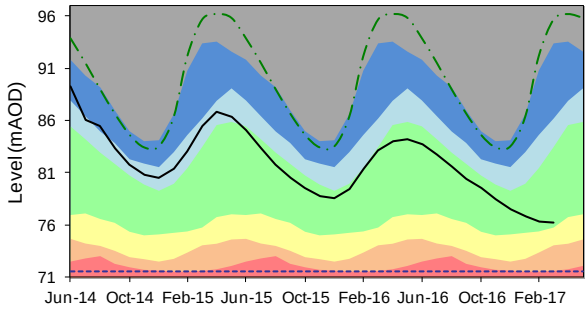
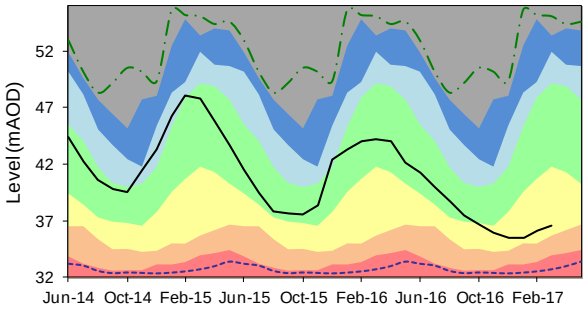


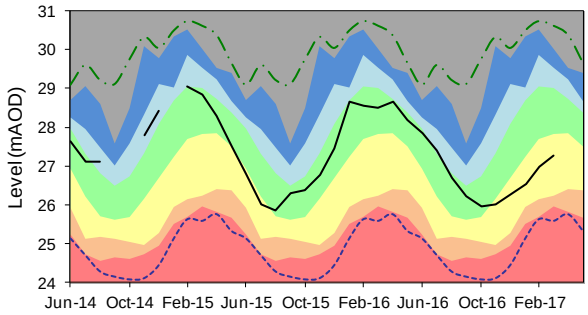
THERFIELD RECTORY
Ranking derived from data for the period Jan-1883 to Dec-2012



REDLANDS HALL
Ranking derived from data for the period Aug-1963 to Dec-2012



LINTON
Ranking derived from data for the period Jan-1980 to Dec-2012



GOG MAGOG
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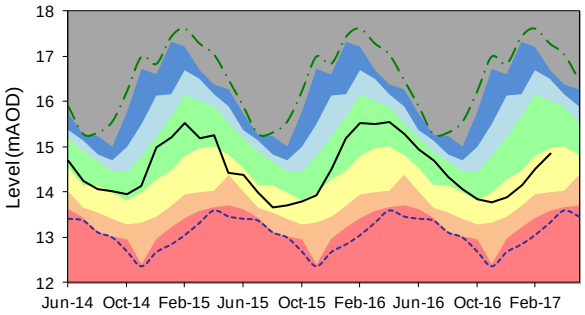
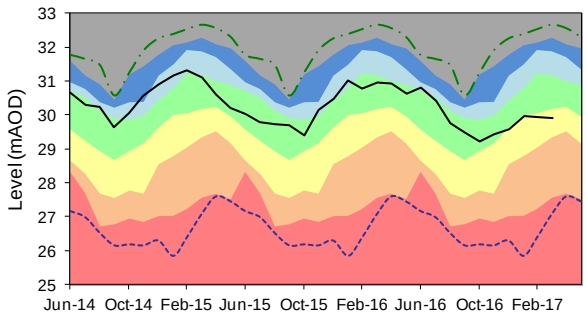
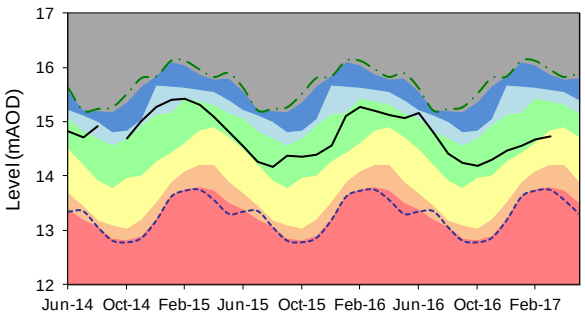


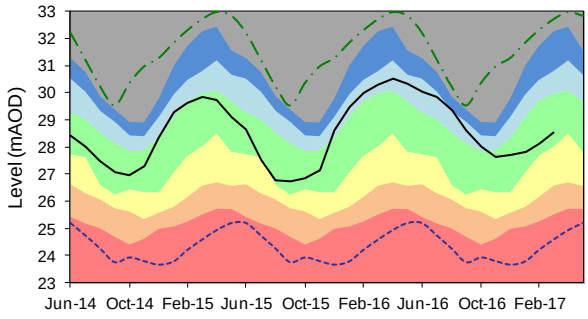
BURY ST EDMUNDS
Ranking derived from data for the period May-1983 to Dec-2012



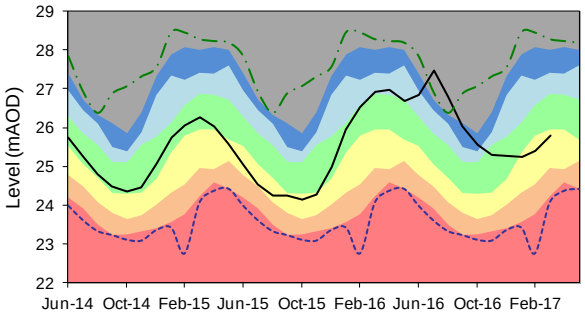
NEWMARKET
Ranking derived from data for the period Feb-1983 to Dec-2012



KENNINGHALL
Ranking derived from data for the period Aug-1973 to Dec-2012



BRECKLAND
Ranking derived from data for the period Jan-1971 to Dec-2012



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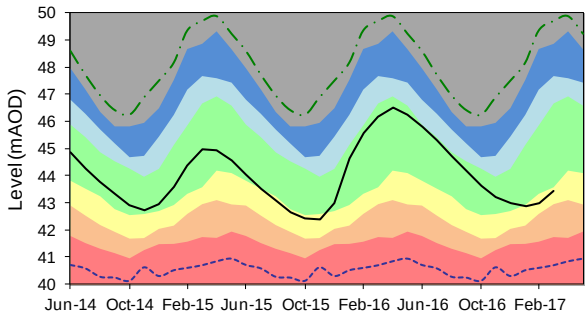
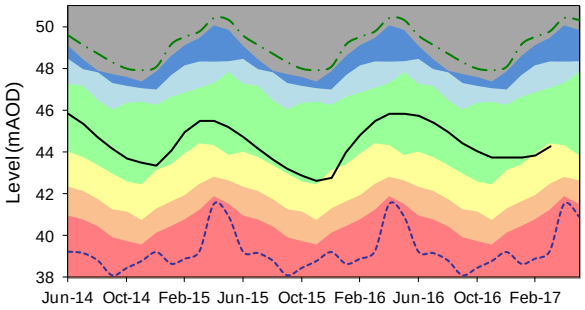
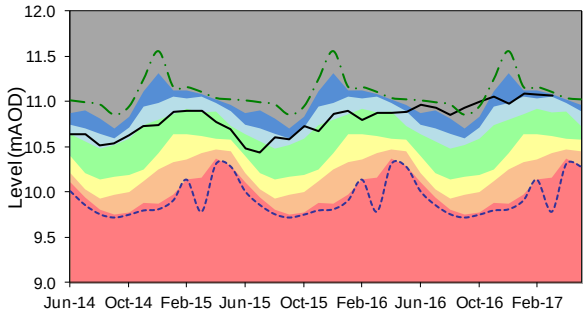
WASHPIT FARM ROUGHAM
Ranking derived from data for the period May-1950 to Dec-2012



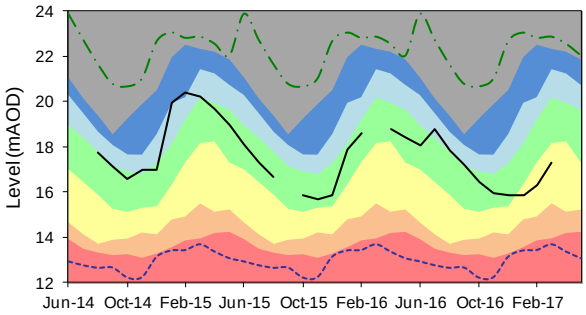
BIRCHAM TOFTS
Ranking derived from data for the period Sep-1971 to Dec-2012



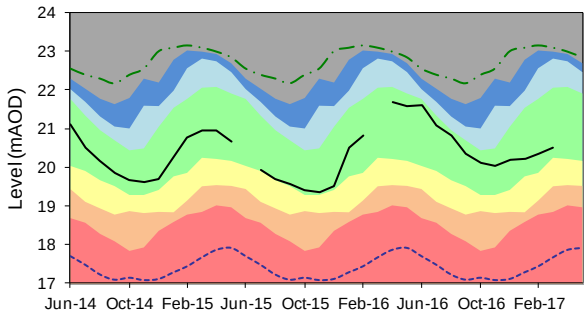
EAST KINGS LYNN
Ranking derived from data for the period Jan-1987 to Dec-2012



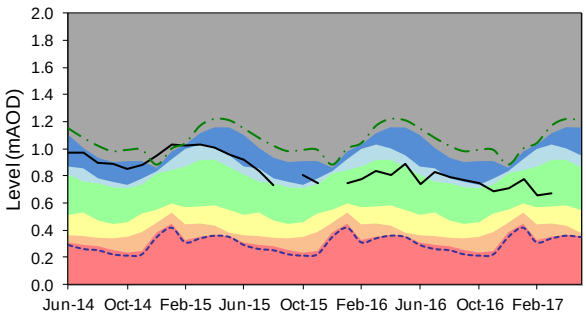
CASTLE FARM
Ranking derived from data for the period Mar-1967 to Dec-2012



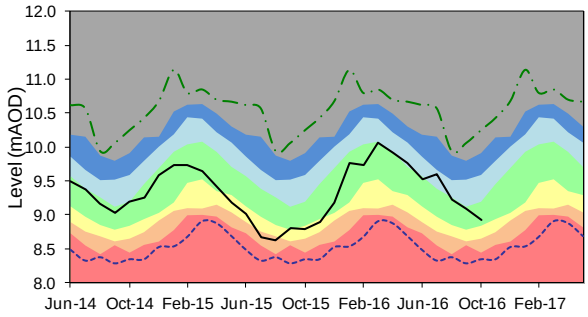
OLD PRIMARY SCHOOL, South Creake
Ranking derived from data for the period Sep-1952 to Dec-2012



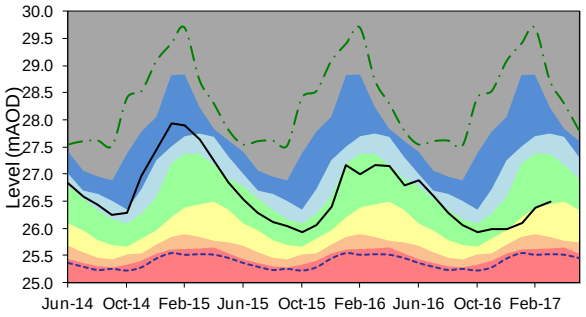
PUG COTTAGE
Ranking derived from data for the period Feb-1991 to Dec-2012



THE SPINNEY
Ranking derived from data for the period Nov-1952 to Dec-2012



SMEETHAM HALL COTT.
Ranking derived from data for the period Jan-1964 to Dec-2012



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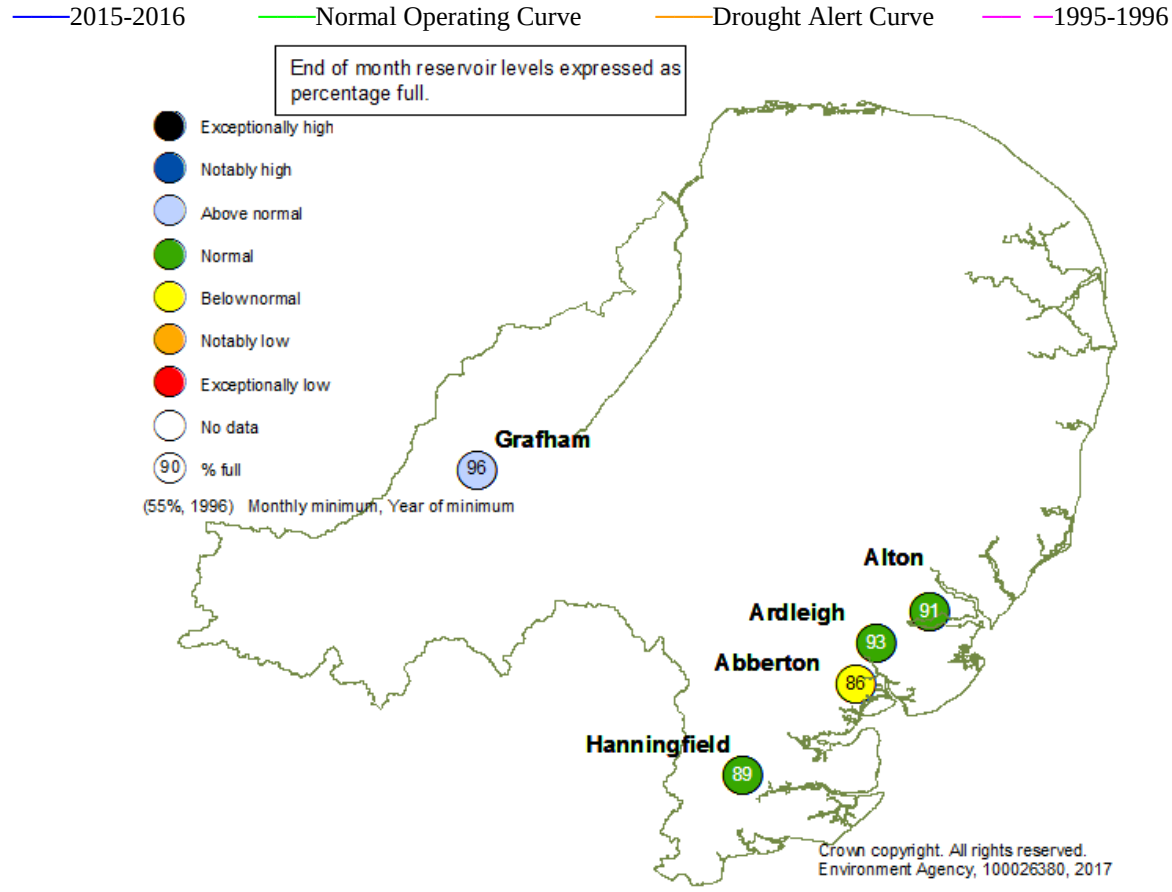
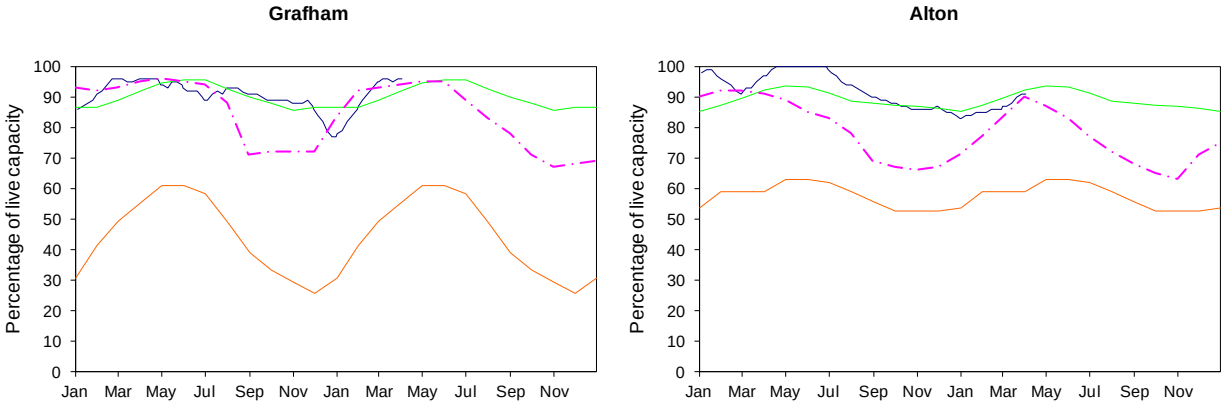
Reservoir Stocks March 2017





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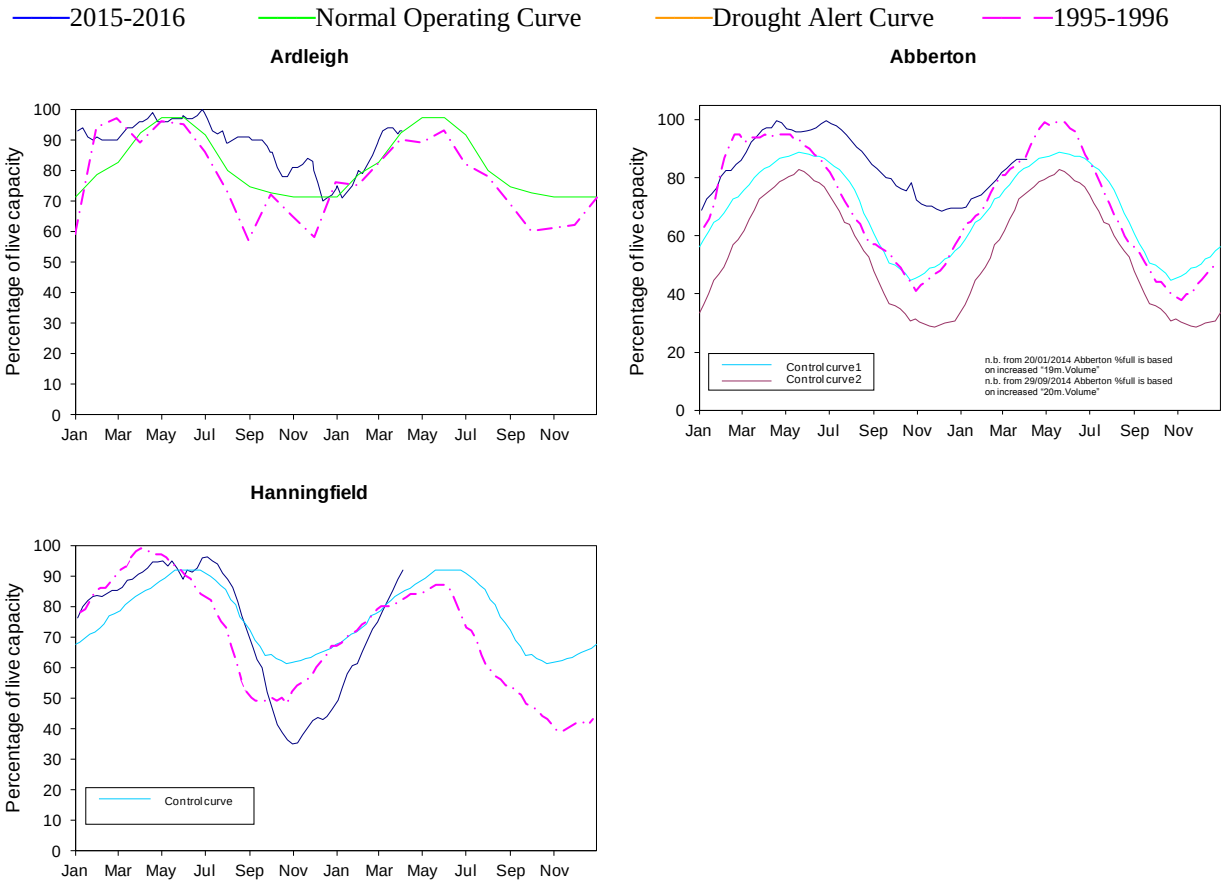

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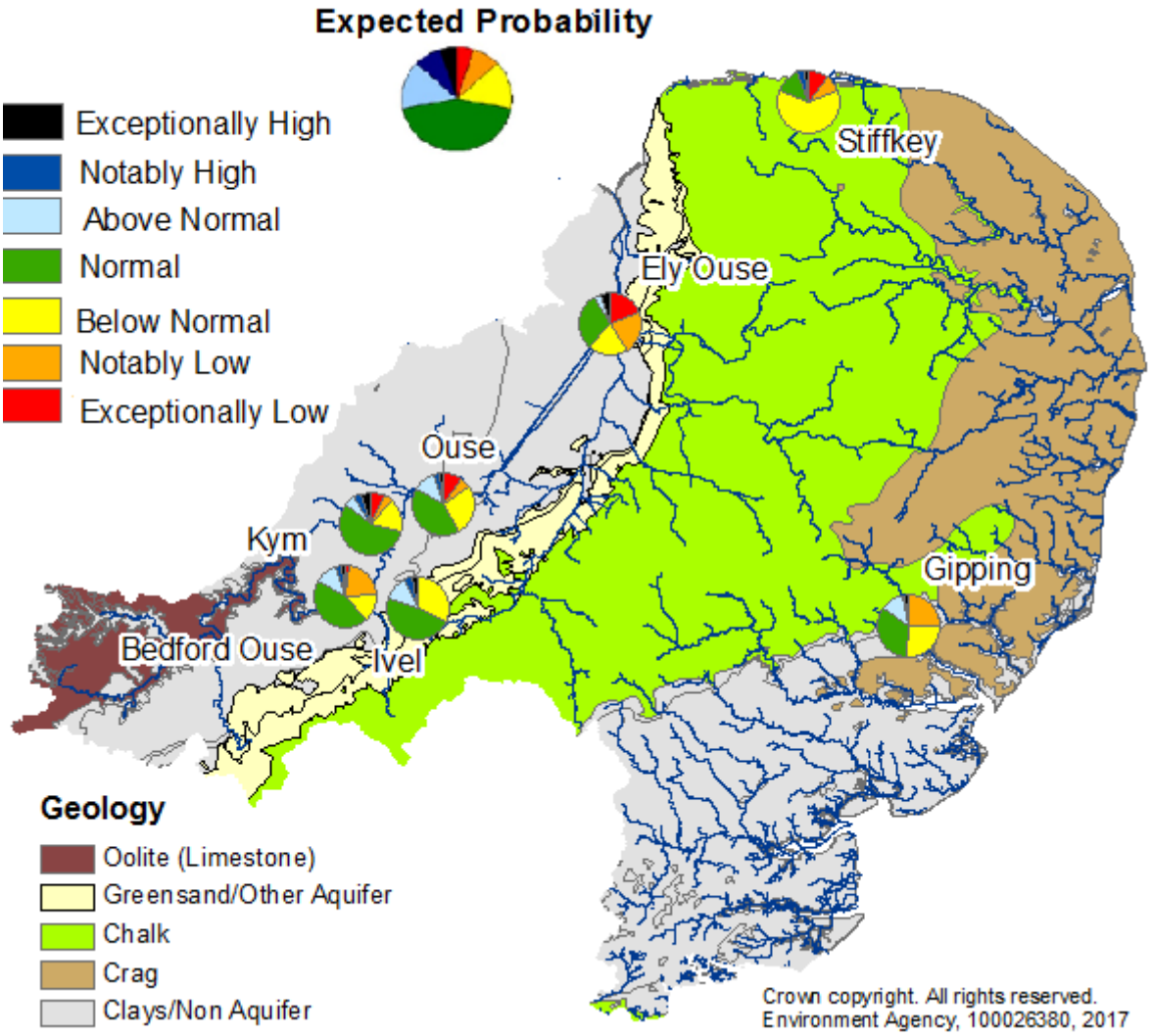
Forward Look – River Flows



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 June 2017. 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, 2017.

^ *"Naturalised" flows are projected for these sites'*

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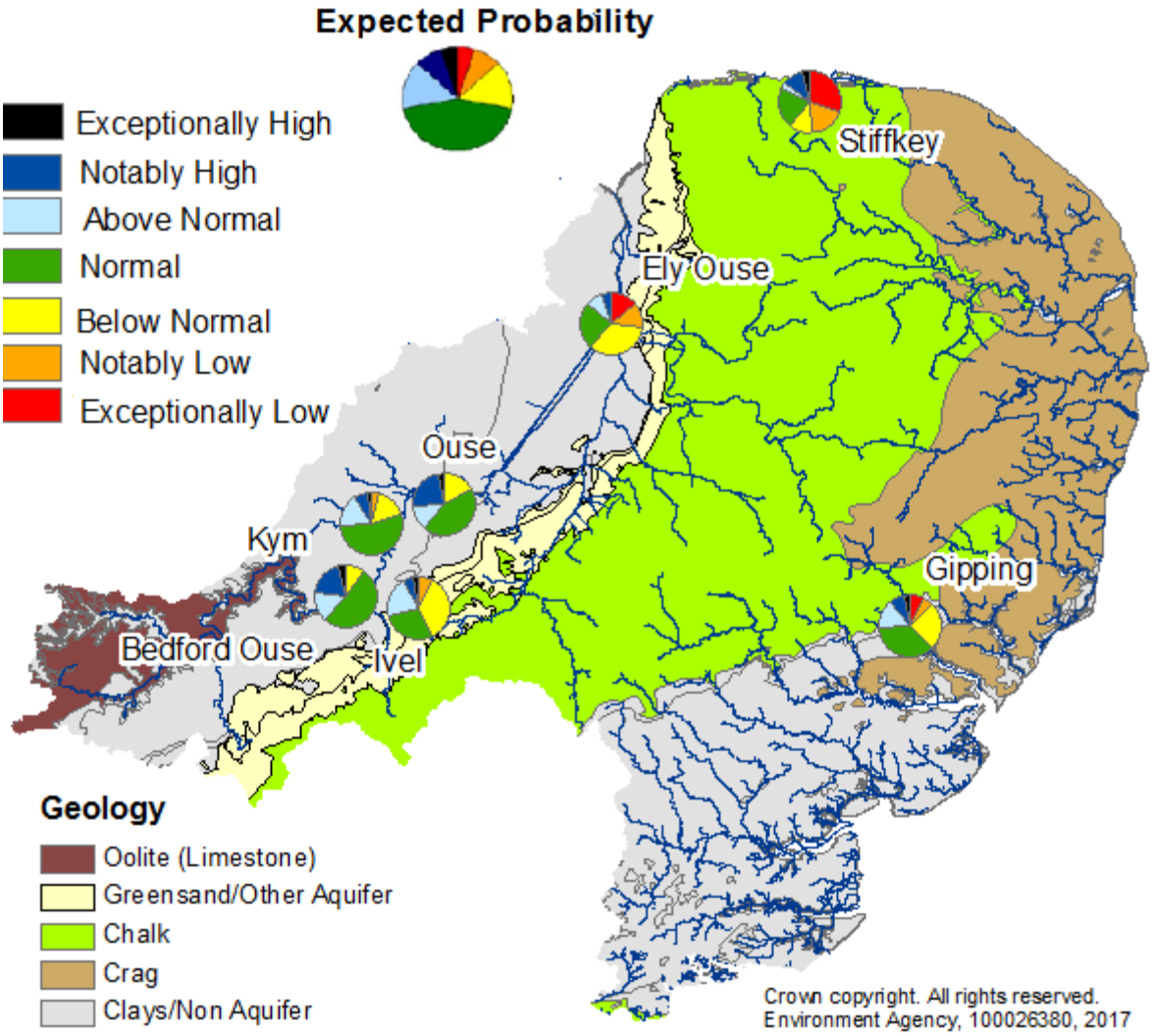

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Probabilistic ensemble projections of river flows at key indicator sites in September 2017. Pie charts indicate probability, based on climatology, of the surface water flow at each site being e.g. exceptionally low for the time of year. (Source: Centre 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, 2017.

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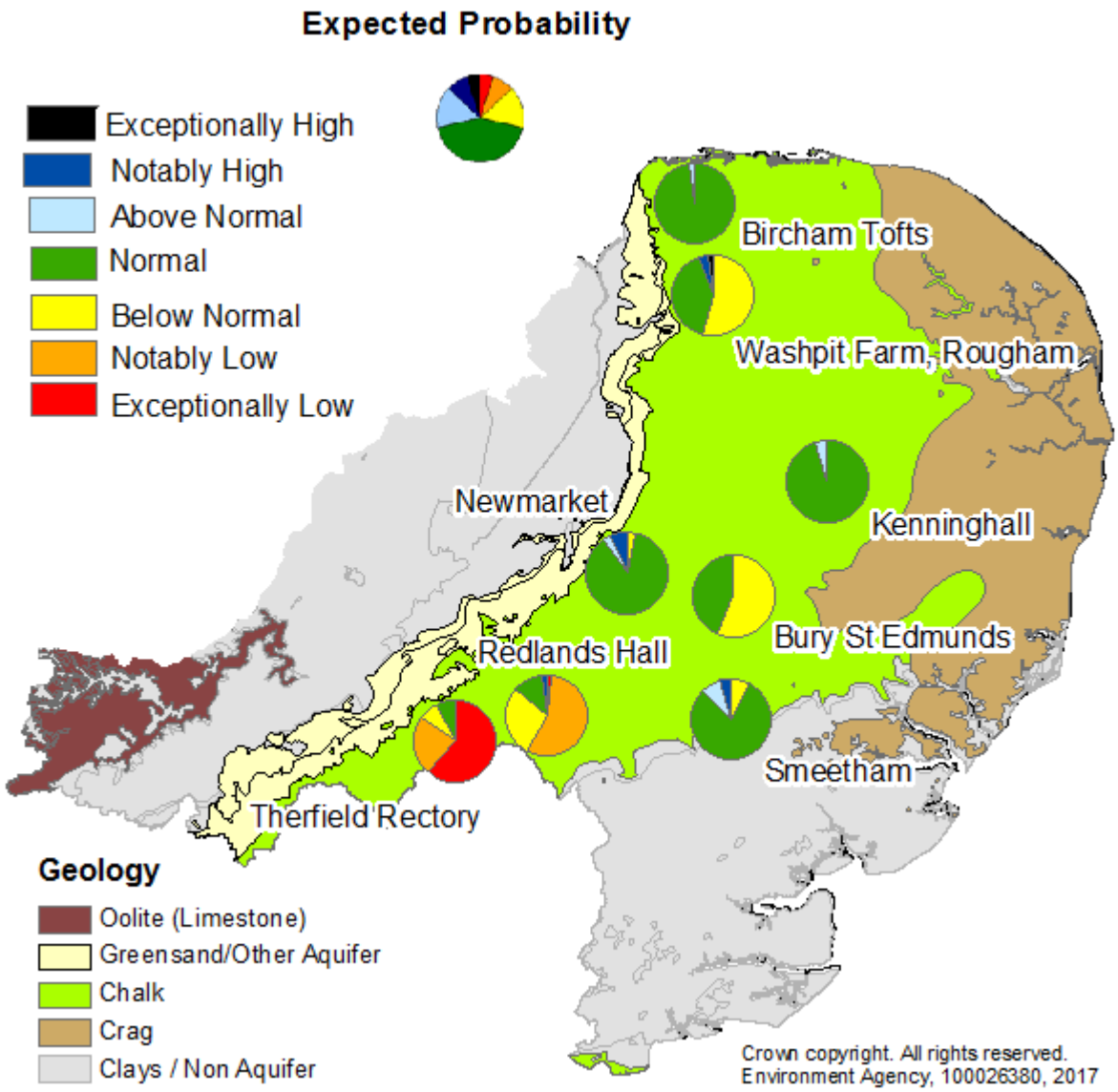
Forward Look - Groundwater



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Probabilistic ensemble projections of groundwater levels at key indicator sites for end of September 2017. 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, 2017.

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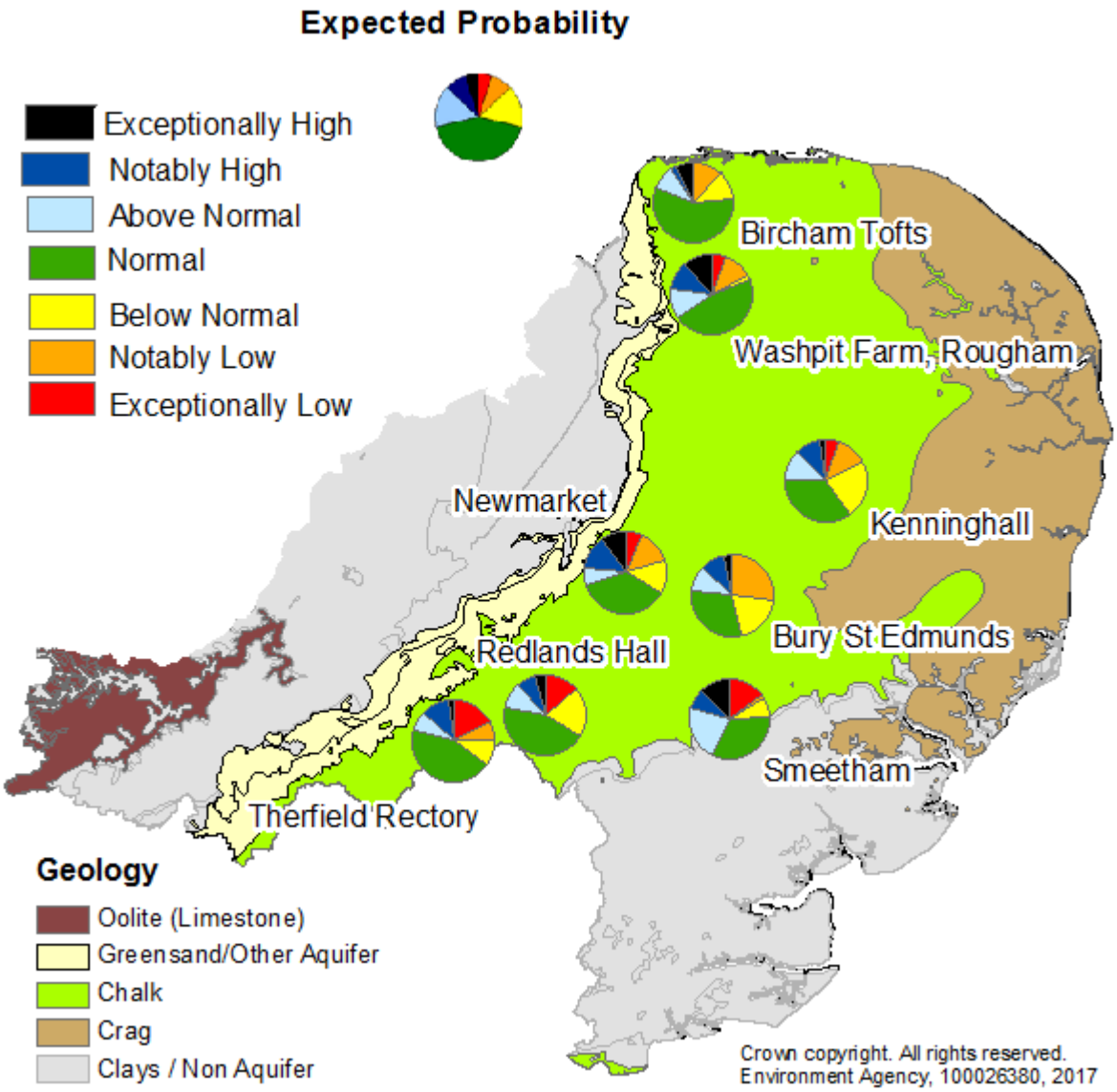

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Probabilistic ensemble projections of groundwater levels at key indicator sites for end of March 2018. Pie charts indicate probability, based on climatology, of the groundwater level at each site being e.g. exceptionally low for the time of year. (Source: Environment Agency) Geological map reproduced with kind permission from UK Groundwater Forum, BGS © NERC. Crown copyright. All rights reserved. Environment Agency, 100026380, 2017.

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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^3s^{-1})
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.
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.
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
Notably high	Value likely to fall within this band 8% of the time
Above normal	Value likely to fall within this band 15% of the time
Normal	Value likely to fall within this band 44% of the time
Below normal	Value likely to fall within this band 15% of the time
Notably low	Value likely to fall within this band 8% of the time
Exceptionally low	Value likely to fall within this band 5% of the time

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