Monthly water situation report

Yorkshire Area

Summary – June 2020

A persistently wet month with well above average rainfall, particularly in the west and north-east. River flows fluctuated in response to rainfall but in the Pennine-fed rivers increased significantly between the start and end of June. The River Derwent remained mostly in summer low flows, while flows in the Hull catchment continued to decline within the normal range. Soils remained dry in central and eastern Yorkshire, but recovered to the normal soil moisture range along the Pennine ridge and in north-east Yorkshire. Groundwater levels decreased in the Chalk and decreased or remained steady in different parts of the Sherwood Sandstone and Corallian Limestone aquifers. Reservoir stocks showed little overall change.

Rainfall

June was predominantly wet and unsettled, with drier periods limited to the 13th-17th and 21st-25th of the month. Over the Pennines, episodes of prolonged and heavy rainfall occurred from the 10th to the 12th and the 26th to the 28th. Also, in the Esk catchment, 50 to 64mm of rain was recorded from the 11th-12th, representing 84% to 108% of the monthly long term average (LTA) at local rain gauges. Localised storms also occurred in the upper Ure, the Calder and Don catchments between the 16th and 20th of the month.

In the east of the area in the Derwent and Hull catchments, there was significant rainfall in the first half of the month. However, in the last few days of June rainfall depths here were generally lower than over the Pennines.

Using the Met Office Had-UK data set, catchment averaged rainfall ranged from 149% to 223% of the LTA, classified in the above normal or notably high range.

Soil Moisture Deficit (SMD)

At the start of June, soils across Yorkshire area were very dry. SMD decreased throughout the area during the first two weeks of the month. In the second half of June the pattern became more variable, reflecting the distribution of rainfall. SMD continued to decrease along the western Pennine ridge, with soils in the normal rather than dry category by month end. After a large decrease in SMD in the second week of June, soils were also classified as normal in the very north-east of the area. In contrast, in central, eastern and southern Yorkshire, SMD increased again in the second half of the month, and at month end soils were classified as dry in these parts, rising to very dry along the lower Aire, lower Ouse, lower Don and bordering the Humber Estuary.

River Flows

In the Pennine-fed rivers, monthly mean flows were in the normal range or higher, generally between 67% and 155% of the LTA. Exceptions were monthly means of only 48% of the LTA on the Rother, and reaching 214% of the LTA on the upper Ure at Kilgram due to a large flow peak from the 28th to the 30th.

The monthly means mask a variable situation over time. At the start of June flows were in the exceptionally or notably low range. Flows rose into the normal range variously between the 6th and 11th of June, increasing further to a flow peak occurring on the 12th or 13th. On most Pennine-fed rivers apart from the Ure, Ouse and Wharfe flows tended to fall back below normal after several days to a week of dry weather. Further rainfall in the last three days of the month led to a significant flow peak on the 29th or 30th, with rivers ending the month in the notably or exceptionally high flow range in the north and west of the area. This late-month rainfall was lower in south Yorkshire, where the month ended with flows in the normal range (Don and Went catchments) or notably low range (Rother catchment).

(Continued on next page).

On the River Derwent, flows were below normal or lower for much of June, apart from a period of higher flows from the 7th to the 16th and briefly from the 28th to the 29th. On its tributary the River Rye, flows rose from a low level into the normal range or above from the 5th June. Summer low flows occurred during the warm dry period from the 22nd to the 26th of June, but the Rye flows rose again in response to rainfall to end the month in the normal range. Some of its upper tributaries remained in summer low flows. Monthly mean flows were 70% of the LTA on the Derwent and 75% of LTA on the Rye.

On the Chalk-fed West Beck in the River Hull catchment, flows fluctuated in early June then declined particularly from the 14th to the 26th, but remained in the normal range. Monthly mean flow was 73% of the LTA. A similar pattern was observed on the adjacent Mires Beck catchment to the west.

Groundwater Levels

Magnesian Limestone

This is the first reading at Brick House Farm since February. The groundwater levels were extremely high in February following a wet winter and dropped over 2.6m for the June reading, but the groundwater levels were still notably high for the time of year.

Millstone Grit

No data available due to site visit restrictions in response to Covid-19.

Sherwood Sandstone

The groundwater level in the Sherwood Sandstone decreased at Riccall Approach where it was within the normal range for the time of year. The level was essentially steady at Great Ouseburn where it was well above average for the time of year.

Corallian Limestone

The groundwater level at Sproxton decreased this month but less rapidly than between March and May, and was below average for the time of year. At East Ness the level remained steady but below average for the time of year.

Chalk

The groundwater level in the northern area of the aquifer, as monitored at Wetwang, decreased and was below average for the time of year. At Dalton Estate in the south of the aquifer, the groundwater level decreased and was in the normal range for the time of year.

Reservoir Storage

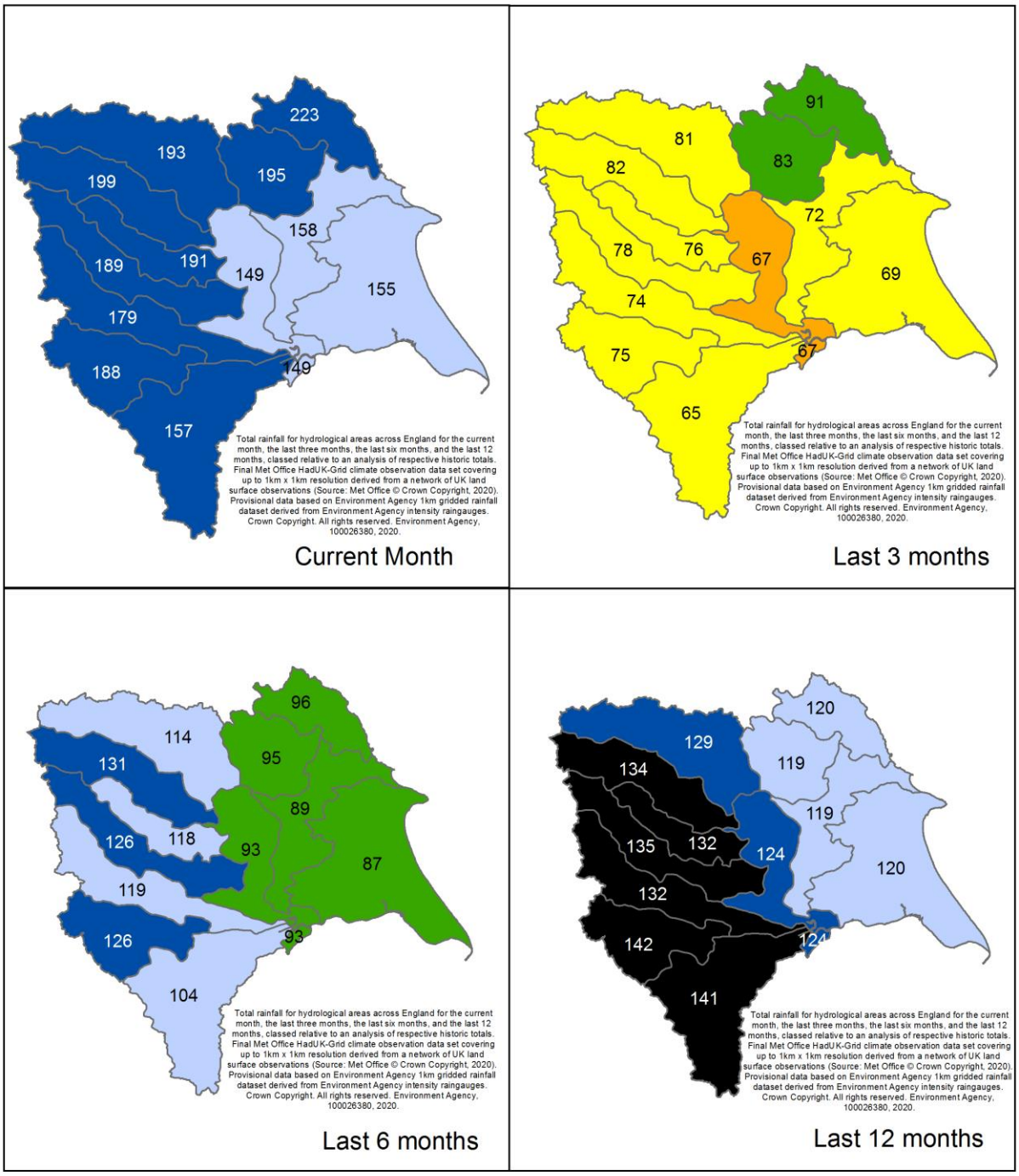
Overall reservoir stocks decreased by more than 2% in the first week of June. They then rose slightly during the three weeks to the 29th of June, ending the month just below 70% of capacity. This was 11.5% below the LTA.

Environmental Impact

In the last week of June between six and ten Hands Off Flow restrictions were in force in response to fluctuating and low flows. Approximately 110 licence holders had been issued with advance warning notifications that flows were low, although they were still able to abstract. The Environment Agency received twelve reports of environmental incidents in June which had been exacerbated by low flow conditions, including reports of blue green algae.

Author: Yorkshire Hydrology

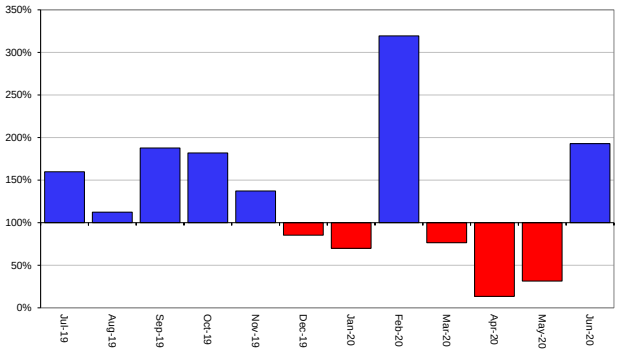
Rainfall



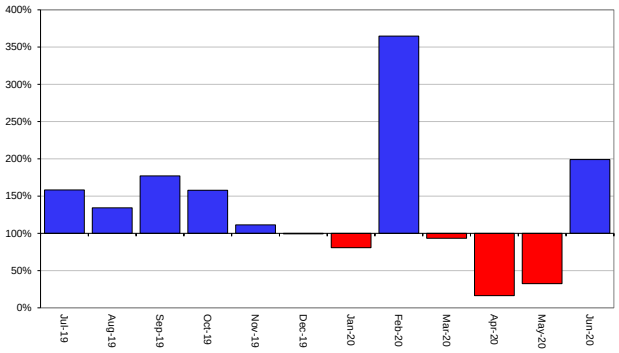
Above average rainfall

Below average rainfall

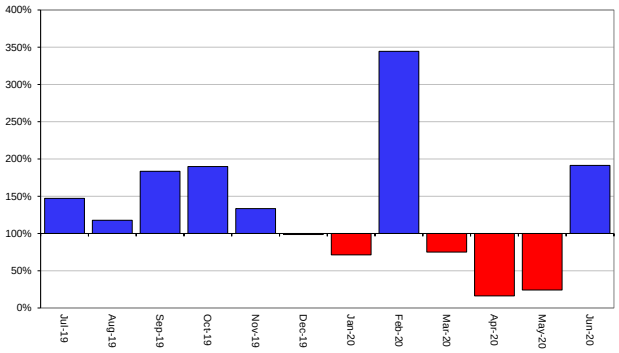
1-Month Period for Swale (NE)



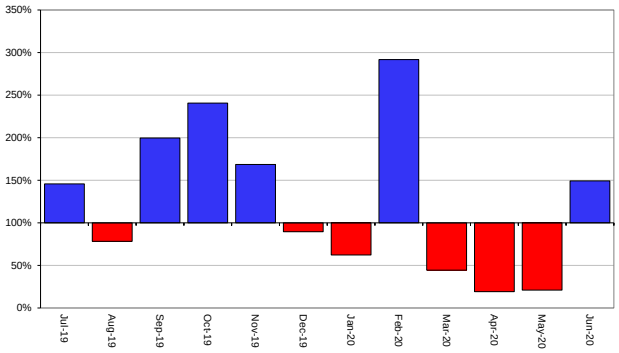
1-Month Period for Ure



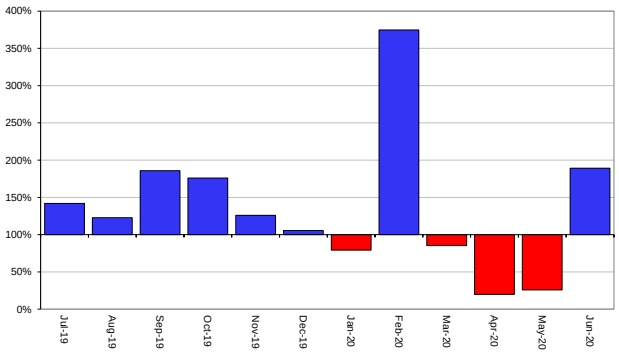
1-Month Period for Nidd



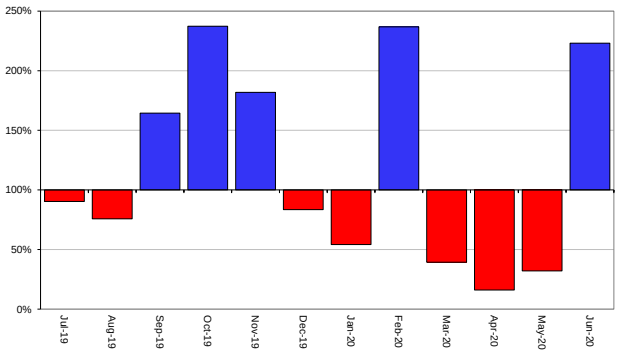
1-Month Period for Ouse



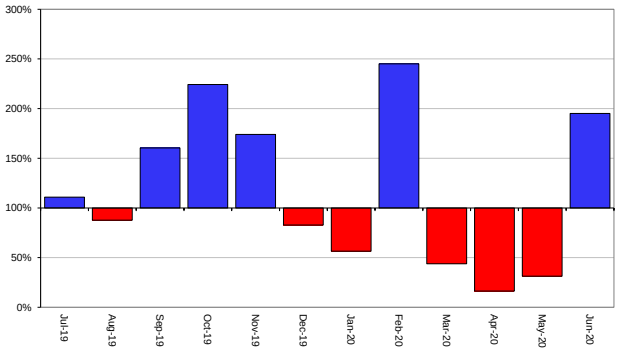
1-Month Period for Wharfe



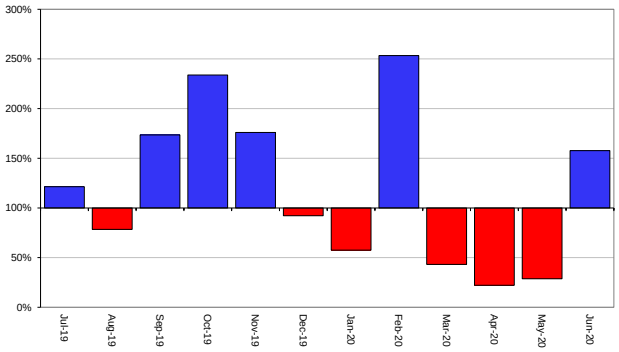
1-Month Period for Dales North Sea Tribs



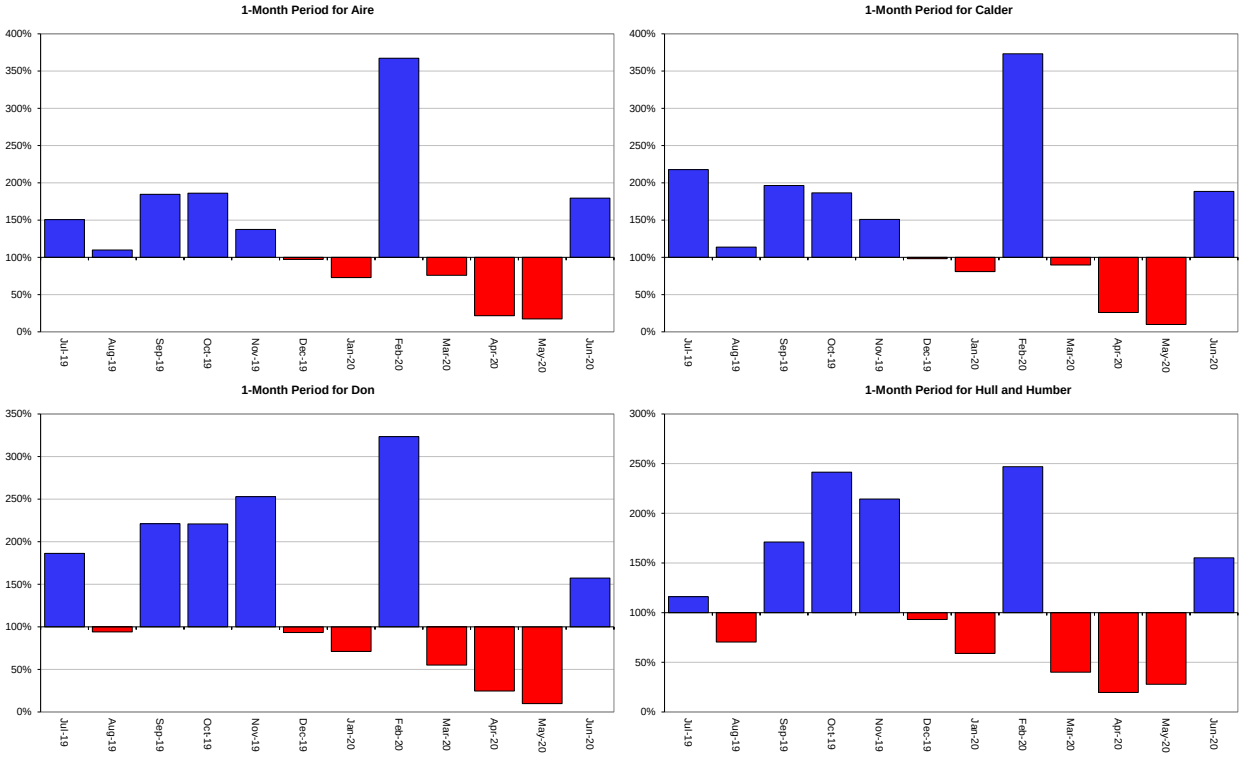
1-Month Period for Rye



1-Month Period for Derwent (NE)



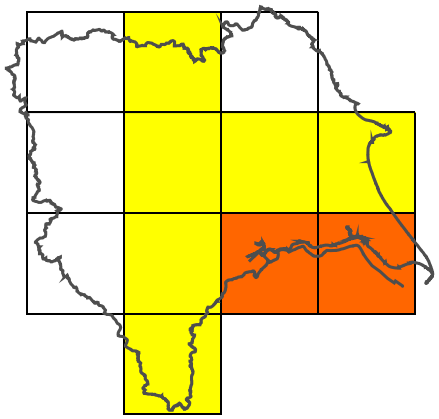
Above average rainfall Below average rainfall



Soil Moisture Deficit

Environment Agency - Yorkshire Area

Monthly MORECS SMD Levels

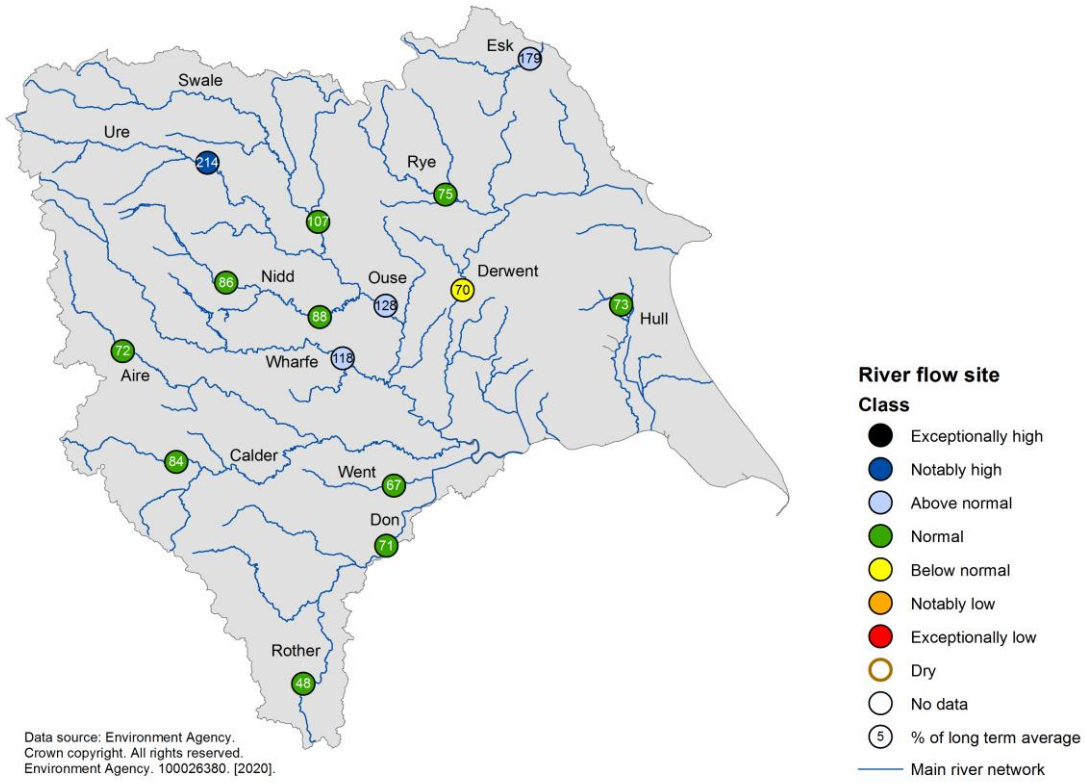


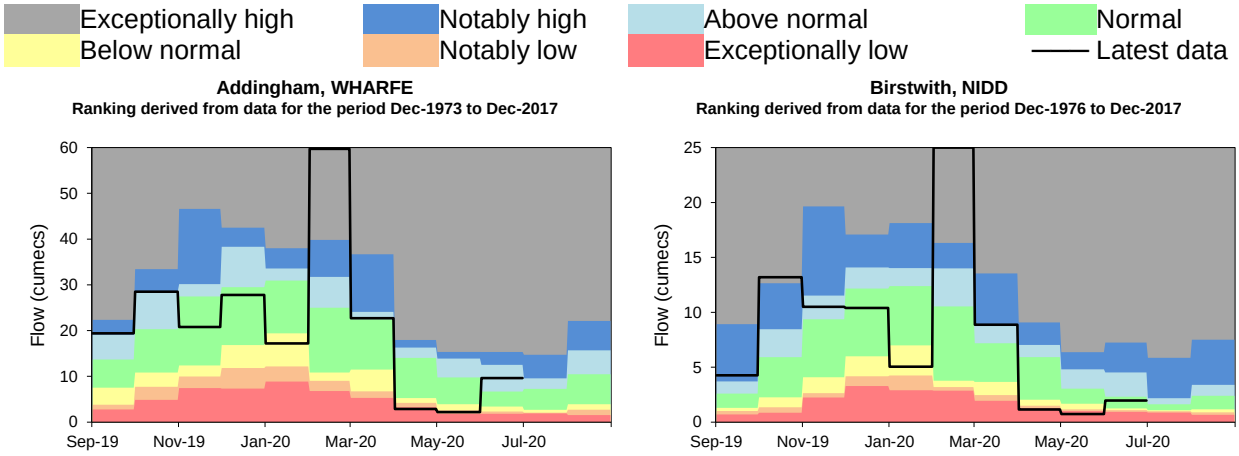
June 2020

SMD Conditions

- Wet
- Normal
- Dry
- Very Dry

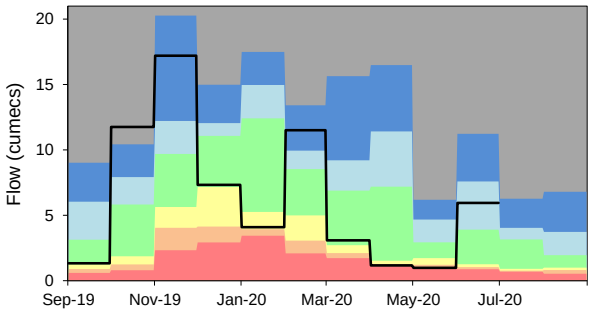
River Flows



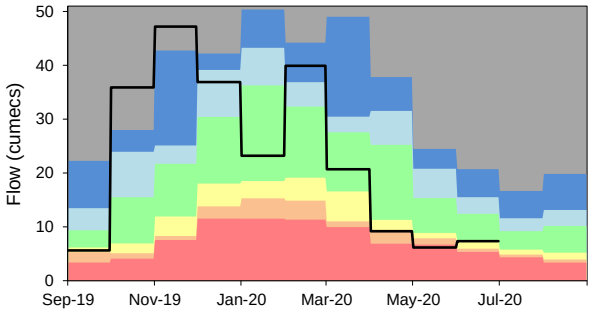


Exceptionally high | Notably high | Above normal | Normal
Below normal | Notably low | Exceptionally low | Latest data

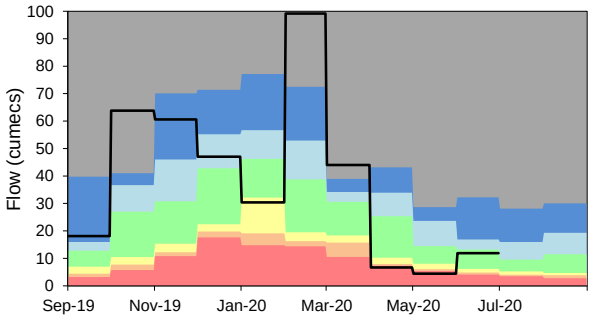
Briggswath, ESK
Ranking derived from data for the period Jan-1993 to Dec-2017



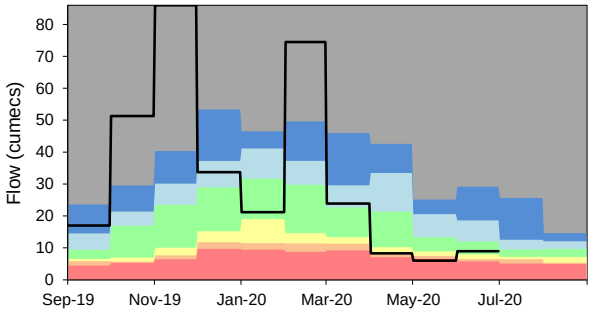
Buttercrambe, DERWENT
Ranking derived from data for the period Sep-1973 to Dec-2017



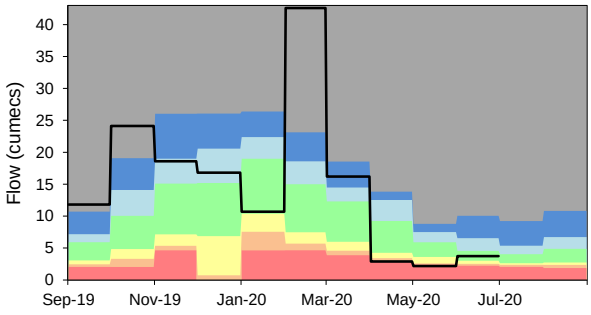
Crakehill Topcliffe, SWALE
Ranking derived from data for the period Jun-1980 to Dec-2017



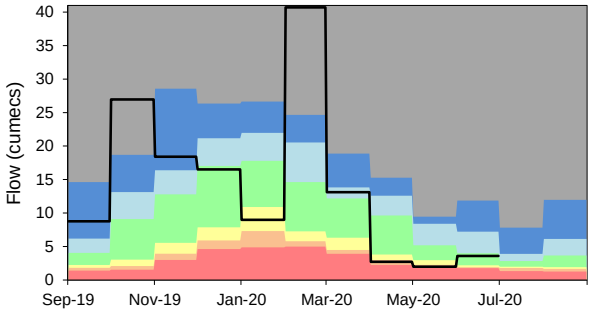
Doncaster, DON
Ranking derived from data for the period Jul-1959 to Dec-2017



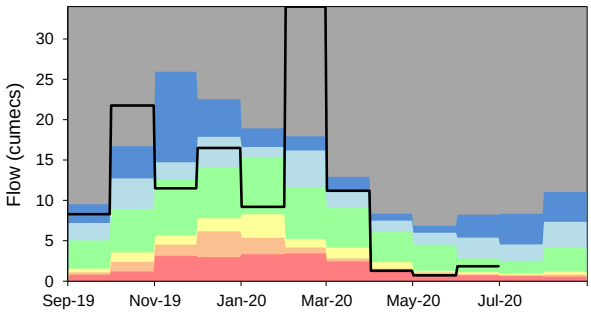
Elland, CALDER
Ranking derived from data for the period Jul-1971 to Dec-2017



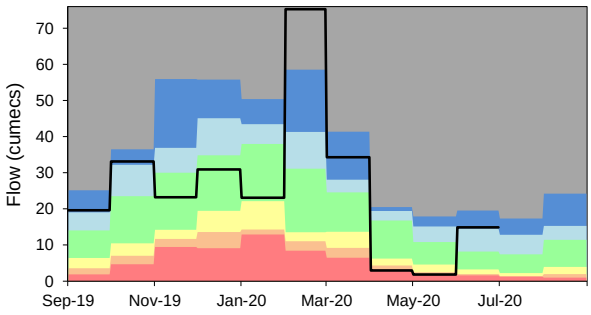
Hunsingore, NIDD
Ranking derived from data for the period Oct-1968 to Dec-2017

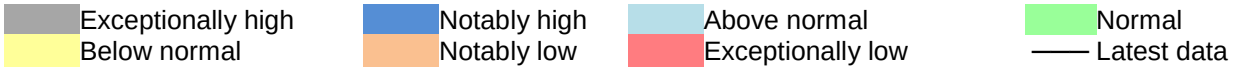


Kildwick, AIRE
Ranking derived from data for the period Aug-1971 to Dec-2017

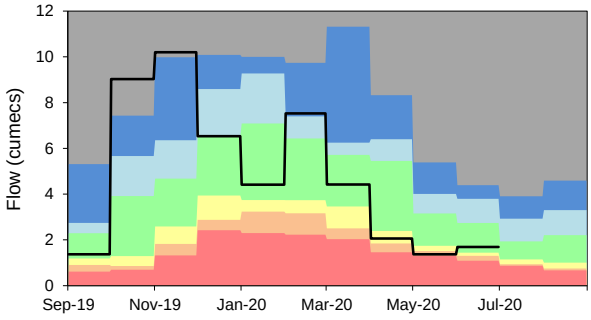


Kilgram Bridge, URE
Ranking derived from data for the period Aug-1971 to Dec-2017

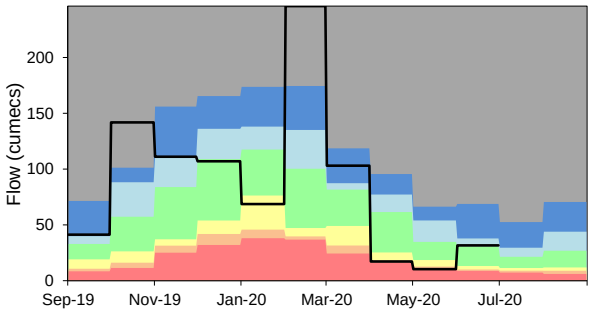




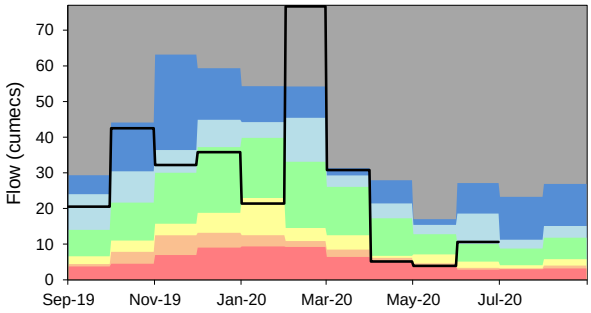
Ness, RYE
Ranking derived from data for the period Sep-1974 to Dec-2017



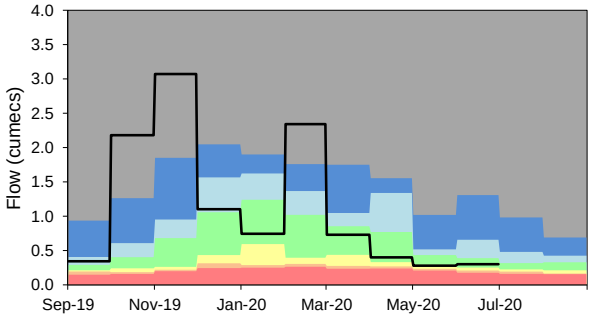
Skelton, OUSE
Ranking derived from data for the period Sep-1969 to Dec-2017



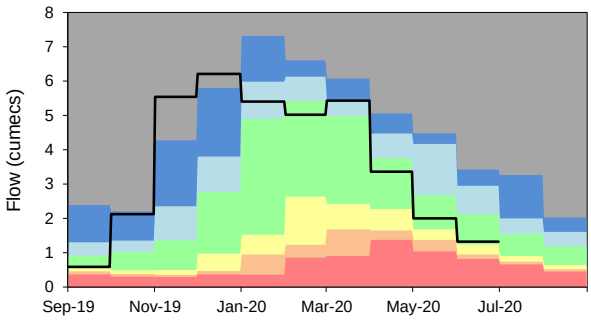
Tadcaster, WHARFE
Ranking derived from data for the period Jul-1991 to Dec-2017



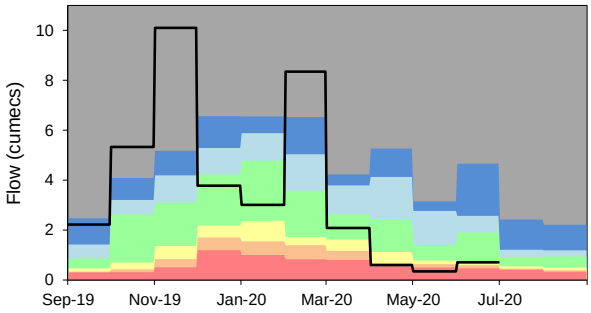
Walden Stubbs, WENT
Ranking derived from data for the period Oct-1979 to Dec-2017



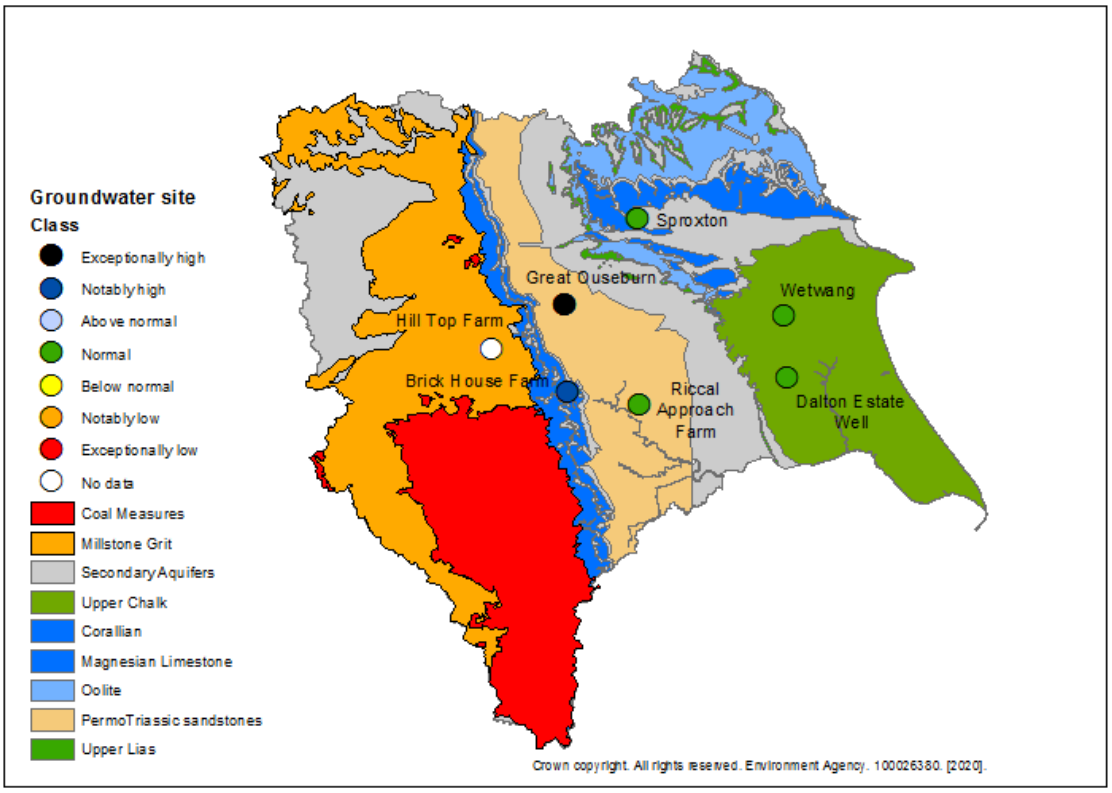
Wansford Snakeholm Lock - West Beck, WEST BECK
Ranking derived from data for the period Nov-1988 to Dec-2017

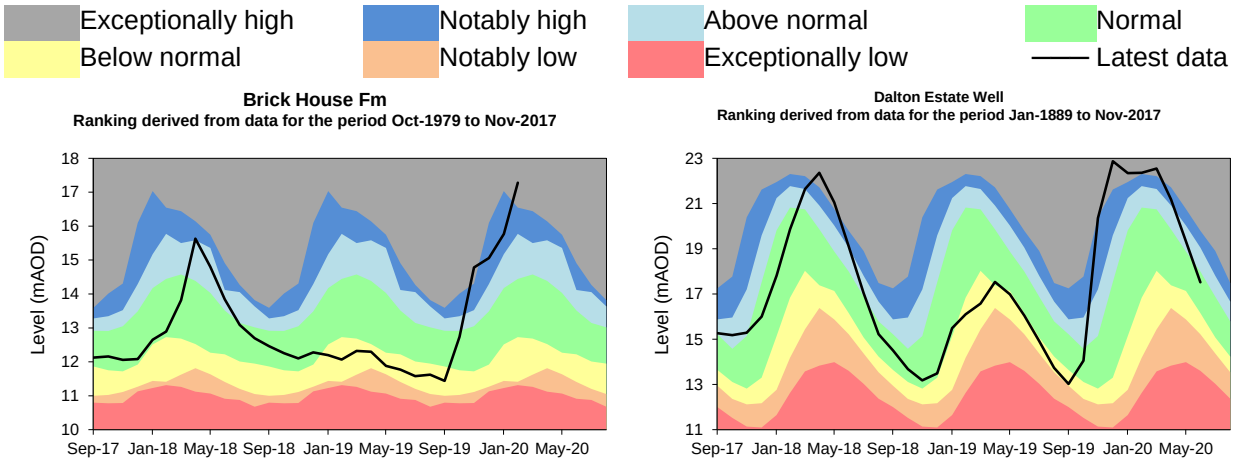


Whittington, ROTHER
Ranking derived from data for the period Nov-1979 to Dec-2017

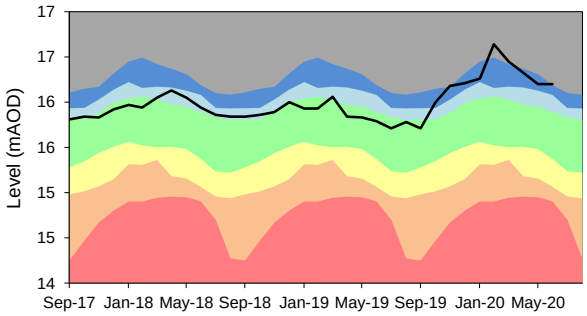


Groundwater Levels

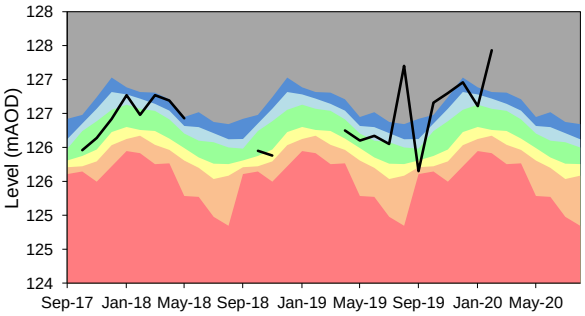




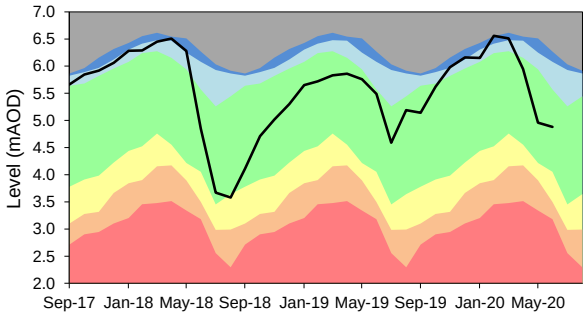
Great Ouseburn
Ranking derived from data for the period Jan-1976 to Nov-2017



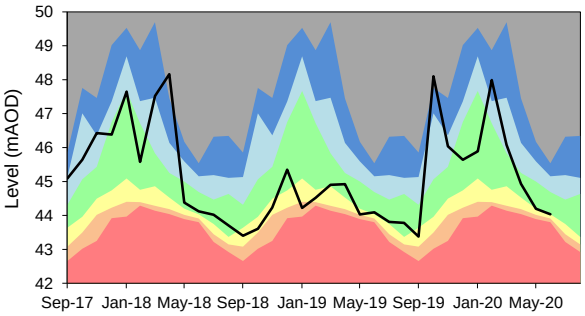
Hill Top Fm
Ranking derived from data for the period Oct-1973 to Nov-2017



Riccall Approach Farm
Ranking derived from data for the period Feb-1977 to Nov-2017



Sproxton
Ranking derived from data for the period May-1975 to Nov-2017



Wetwang
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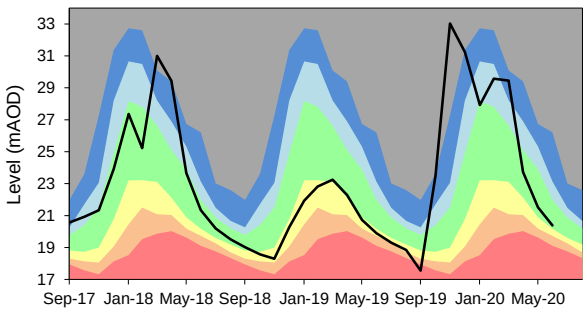
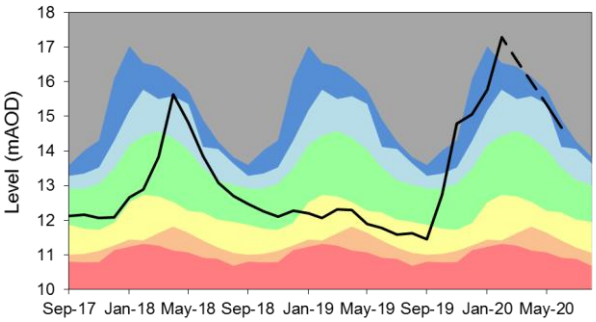
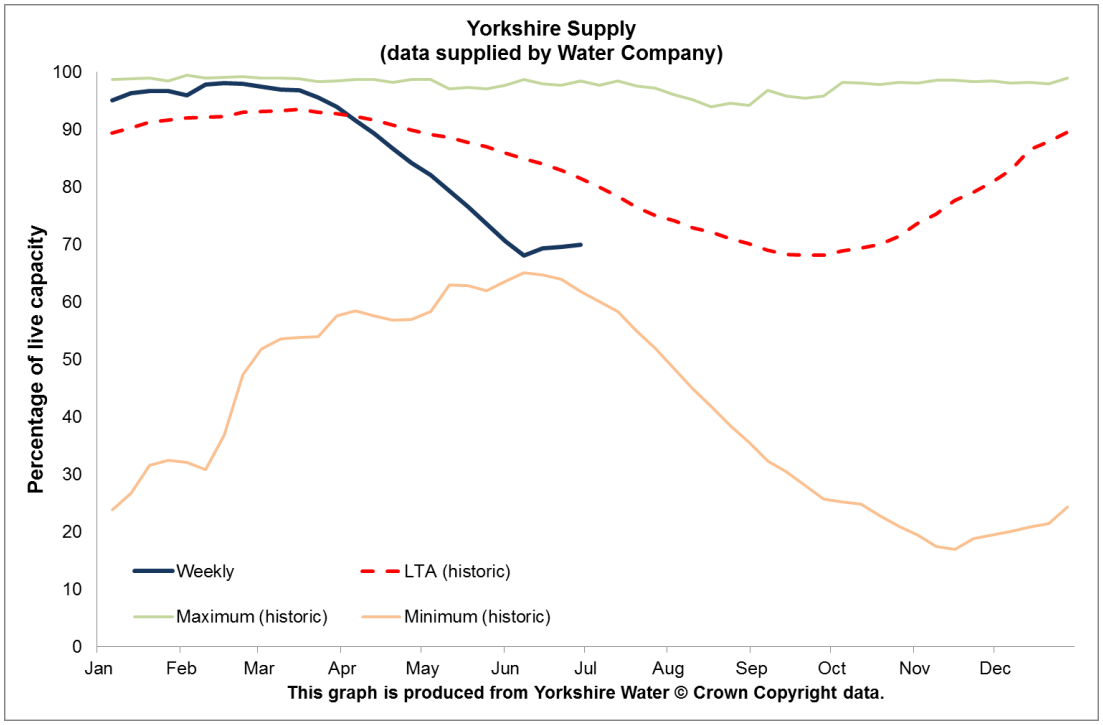


Brick House Fm
Ranking derived from data for the period Oct-1979 to Nov-2017



Reservoir Stocks – Data from Water Company



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