Monthly water situation report

Yorkshire Area

Summary – August 2020

The first half of August was dry in most of Yorkshire's catchments, with high temperatures in the second week. Above average monthly rainfall totals were achieved overall due to significant rainfall between the 15th and 29th associated with a series of frontal weather systems. River flows increased in response and monthly mean flows in most catchments were above normal or notably high, whilst in the normal range in the Went catchment and in the Chalk-fed River Hull catchment. The rainfall caused large reductions in soil moisture deficit over central and eastern Yorkshire, with the Pennine ridge remaining wet at both the start and end of the month. Groundwater levels generally decreased although they were classed as normal or higher. Reservoir stocks increased strongly in the second half of the month.

Rainfall

Overall, August was a month of above average rainfall, with monthly totals ranging from 129% to 190% of the long term average (LTA) across Yorkshire's catchments using the Met Office Had-UK gridded data set. Catchment rainfall totals were classified in the above normal or notably high range, apart from in the Aire catchment where rainfall was in the normal range for August.

The temporal distribution of rain through the month was very uneven. In most catchments the first two weeks were dry, and 91% to 97% of August's recorded rain fell between the 15th and 29th in the second half of the month. In the upper Ure and Swale catchments, this proportion reduced to 70% to 88%, due to heavier rain also occurring on the 4th and 5th.

Particularly wet periods in the second half of the month were the 15th-16th, the 21st associated with Storm Ellen, the 24th-25th associated with Storm Francis, and the 27th-28th. More settled conditions returned over the last two days of the month.

Soil Moisture Deficit (SMD)

Along the western Pennine ridge, soils were classified as wet at the start of August and throughout the latter part of the month, although in the north-west and south-west of the area soils dried out temporarily into the normal category after the first ten days of the month.

Elsewhere, in the first two weeks of August SMD reached its maximum previously modelled value across the southern, central and eastern parts of Yorkshire. Soils were classified as very dry in these areas, and dry in the far north-east of the area. During the next two weeks, rainfall caused SMD to decrease by a total of 40mm to 60mm in many areas, with soils moving from very dry to dry, and in the north and very south of Yorkshire into the 'normal' category. Heavy rain towards the end of the month produced further significant reduction in SMD.

At month end, soil moisture across much of central and eastern Yorkshire was classified as normal. Soils in the north-east of the area were wet after 80mm to 100mm of rain fell in six days, while only in the lower Ouse-lower Don area did soils remain dry.

River Flows

In the Pennine-fed rivers, flows were generally in the normal range for the first half of the month. A short period of above normal flows occurred for a few days following a peak on the 5th or 6th on the northern catchments of the Ure, Swale, Ouse and Wharfe, but not from the Aire southwards. In the Don catchment, flows were subdued in the borderline normal to below normal range until mid-month, and in the Rother were exceptionally low.

In the second half of August, the Pennine river flows were responsive to rainfall and rose into the normal flow range for the time of year or above. On most rivers the flow rose further into the notably high range or above from around the 22nd to the 29th or 30th. Flows fluctuated rapidly, with three successive peaks on the 22nd or 23rd, 25th or 26th (highest on most catchments) and 29th at many sites. A more localised storm over the Don and Rother catchment caused a brief, sharp flow peak on these rivers on the 16th or 17th.

On the River Derwent, flows were steady and in the below normal range until the 16th, increasing to normal for the time of year from the 17th. Flows rose more significantly on the 26th, into the exceptionally high range, with a double peak on the 27th and 30th. A similar pattern was observed on its tributary the River Rye, although with earlier peaks on this more responsive catchment.

On the Chalk-fed West Beck in the River Hull catchment, flows were in the normal range and declining slightly until the 12th of the month. Subsequent slightly higher flows showed small fluctuations and then increased more strongly into the above normal range on the 28th and 29th, falling back into the normal range from the 30th. On the River Foulness, flows were below normal and declining during the first half of the month. Flows then increased into the normal range, rising strongly from the 25th to a peak on the 29th.

For the majority of catchments, monthly mean flows were between 126% and 224% of the LTA, classified as above normal or notably high for the time of year. The Esk at Briggswath recorded a monthly mean flow in excess of 300% of the LTA, strongly influenced by high flow peaks at the end of the month. On the Chalk-fed West Beck and on the River Went, which is also influenced by groundwater sources, monthly mean flows were below the LTA at 79% and 87% respectively, classified within the normal range.

Groundwater Levels

There was no August dip reading for Great Ouseburn, Riccall Approach Farm and Hill Top Farm. Great Ouseburn and Riccall Approach Farm have telemetry installed so the telemetry data was taken for these boreholes but there is no data for Hill Top Farm.

Magnesian Limestone

The groundwater levels were extremely high in February following a wet winter and had dropped for the June, July and August readings but the groundwater levels remained notably high for the time of year.

Millstone Grit

No data available.

Sherwood Sandstone

The groundwater levels at Great Ouseburn had only slightly decreased since the winter period and were exceptionally high for the time year. At Riccall Approach Farm, the groundwater levels rapidly decreased during the dry period from March to May but rebounded in June. In August, the levels increased and were normal for the time of year.

Corallian Limestone

The groundwater levels at Sproxton rapidly decreased between March and May but the rate of decrease slowed down in June, and in July the groundwater levels did not change. In August the groundwater levels slightly decreased and were normal for the time of year.

Chalk

The groundwater levels in the chalk were normal for the time of year. The north of the aquifer, as monitored at Wetwang, was at the lower end of the normal band but the rate of decline was expected for the time of year. In the south of the aquifer, as monitored at Dalton Estate, the groundwater levels were comfortably within the normal band for the time of year.

Reservoir Storage

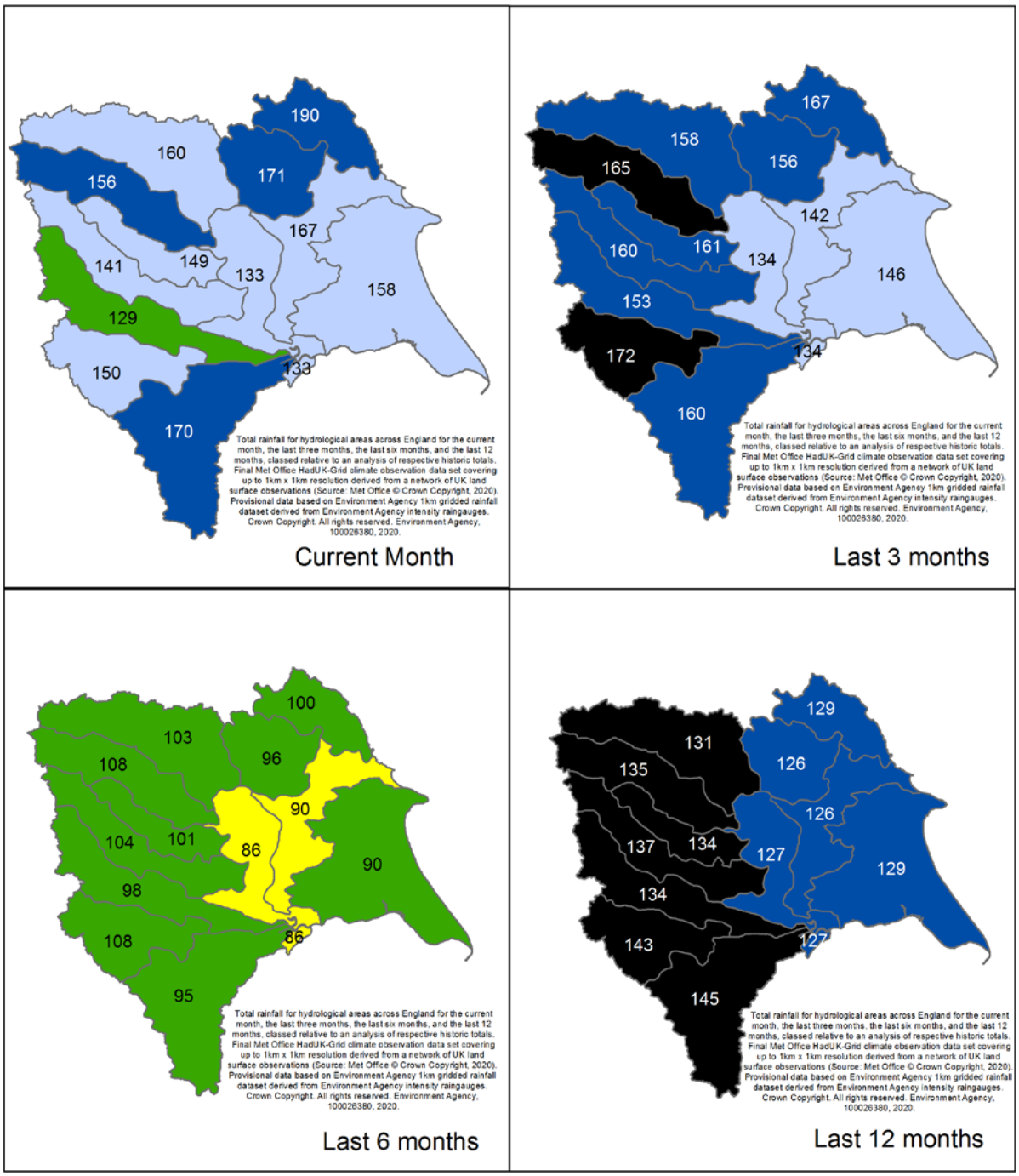
Overall reservoir stocks declined by just over 2% per week in the first two weeks of the month. They then increased in response to rainfall during the second half of August, including an almost 10% increase from the 24th to the 31st. At the month end, Yorkshire supply stocks were over 90% full, more than 21% above the LTA and 2.5% lower than the maximum recorded for the time of year, based on data from 1990 to 2019.

Environmental Impact

August saw a total of 5 abstraction licences that had their Hands off Flow (HoF) in force and were unable to abstract water. By the end of the month, 118 advance warning notifications had also been issued although these licences were still able to continue abstracting.

Author: Yorkshire Hydrology

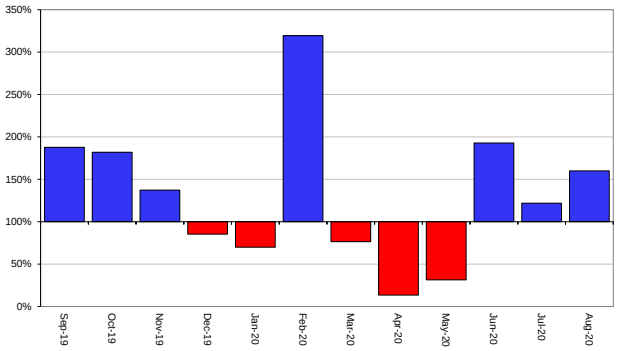
Rainfall



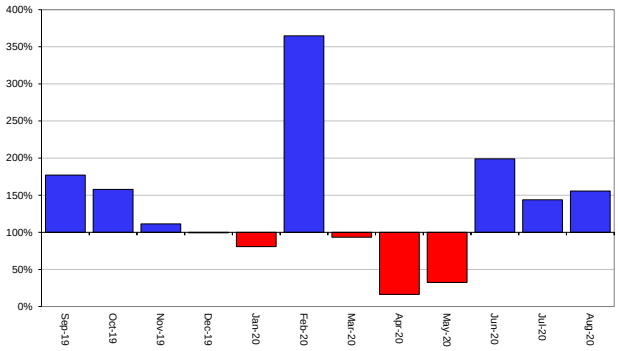
Above average rainfall

Below average rainfall

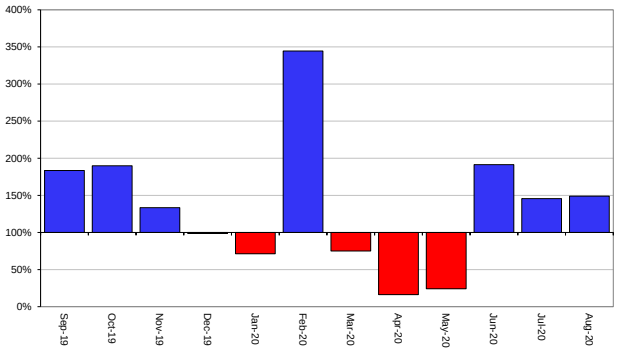
1-Month Period for Swale (NE)



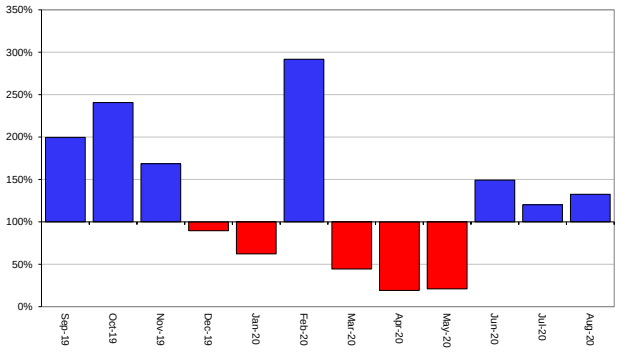
1-Month Period for Ure



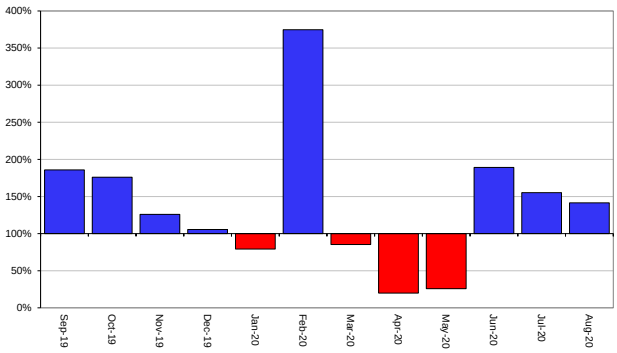
1-Month Period for Nidd



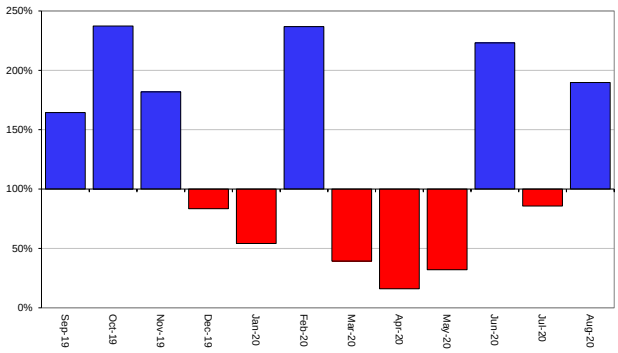
1-Month Period for Ouse



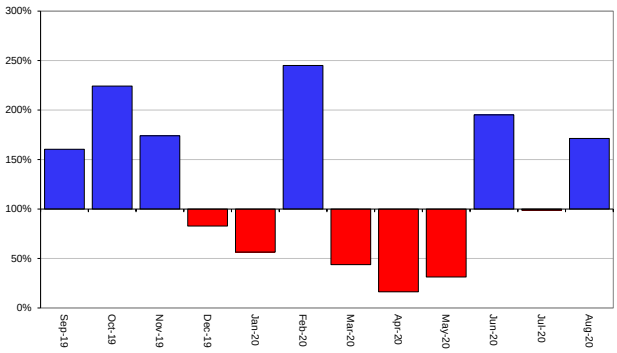
1-Month Period for Wharfe



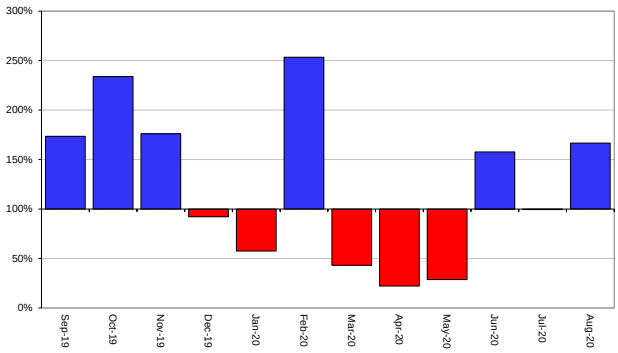
1-Month Period for Dales North Sea Tribs



1-Month Period for Rye

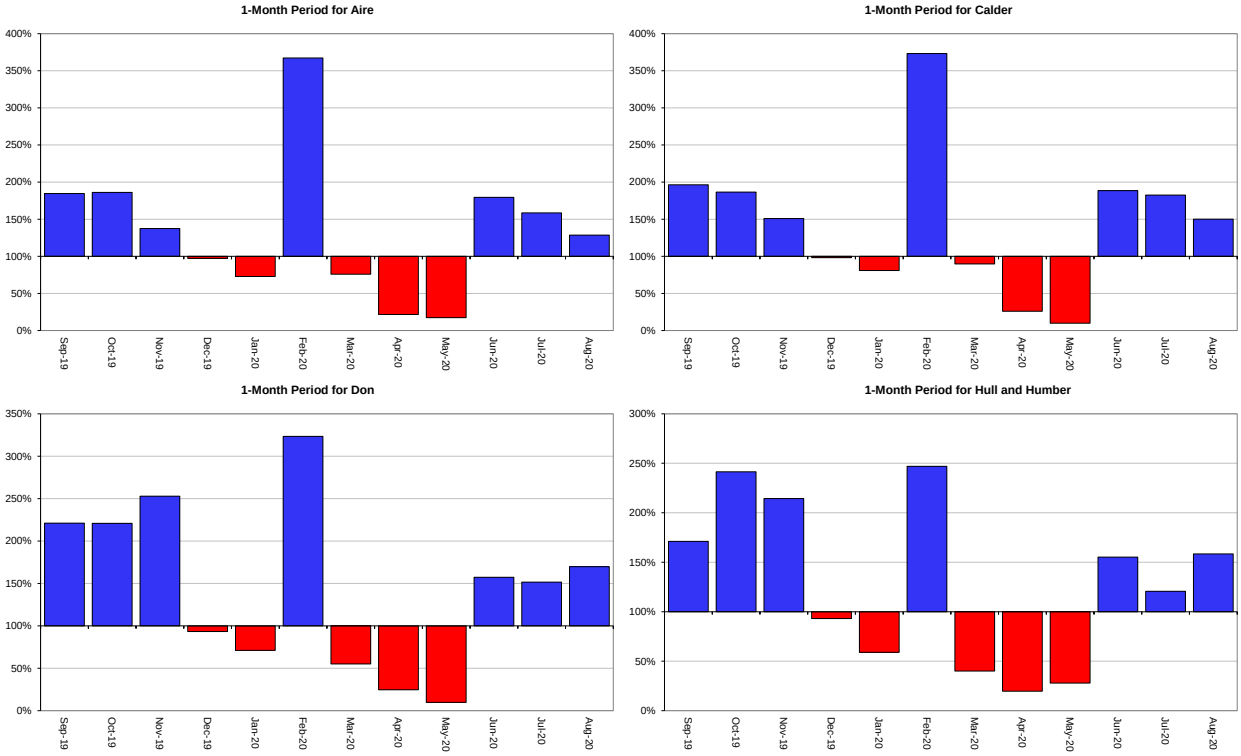


1-Month Period for Derwent (NE)



Above average rainfall

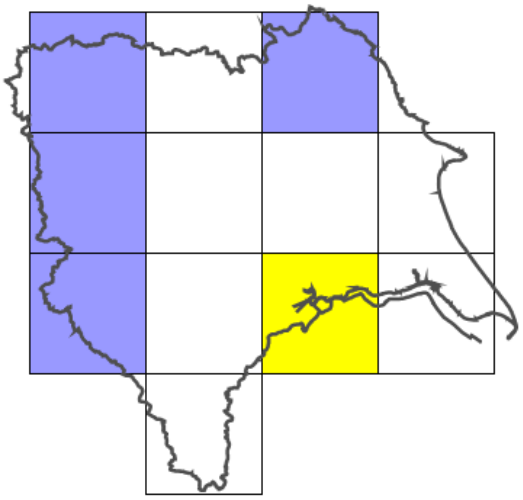
Below average rainfall



Soil Moisture Deficit

Environment Agency - Yorkshire Area

Monthly MORECS SMD Levels

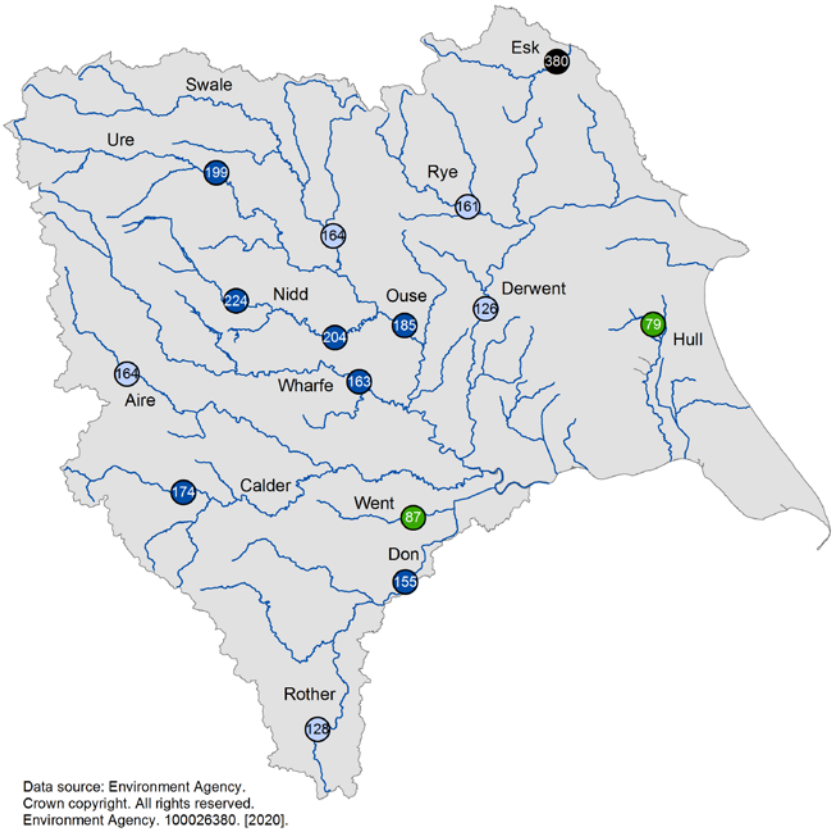


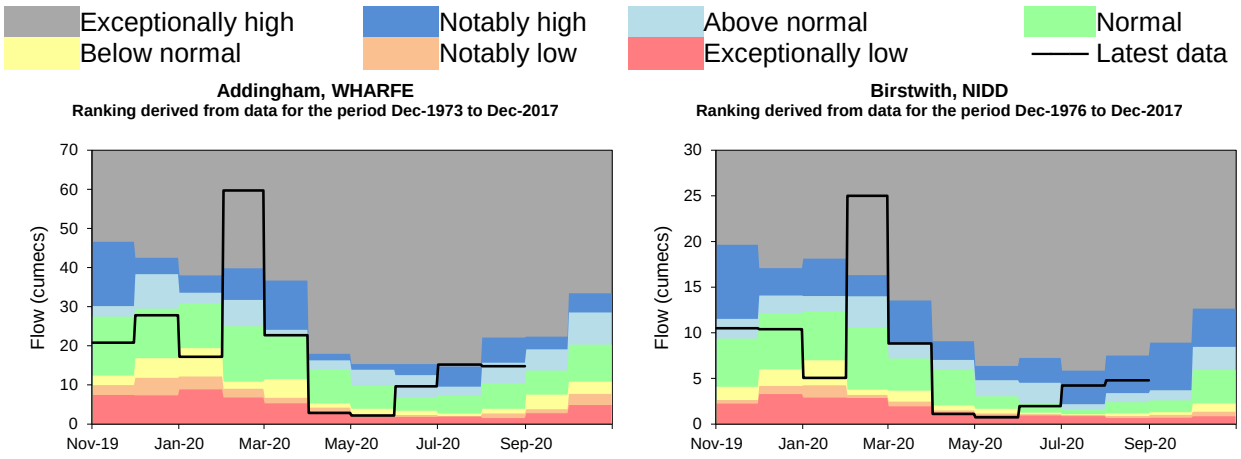
August 2020

SMD Conditions

- Wet
- Normal
- Dry
- Very Dry

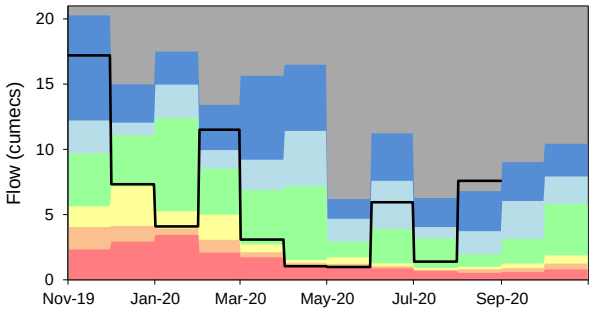
River Flow



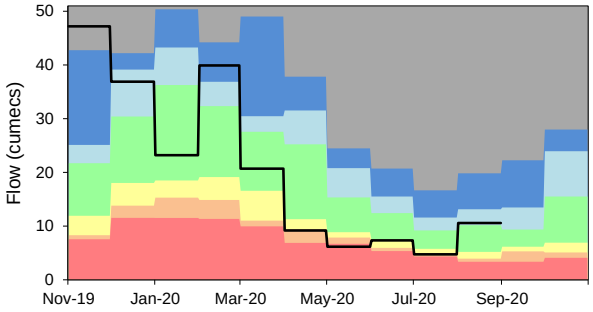


Exceptionally high | Notably high | Above normal | Normal
Below normal | Notably low | Exceptionally low | Latest data

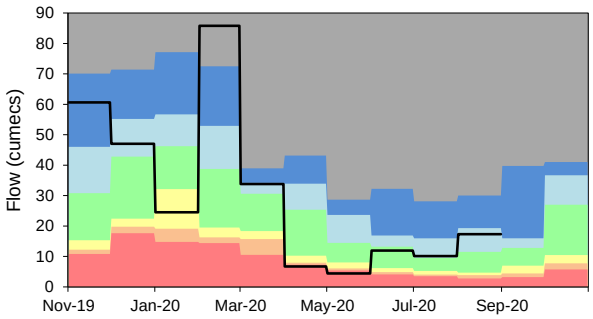
Briggswath, ESK
Ranking derived from data for the period Jan-1993 to Dec-2017



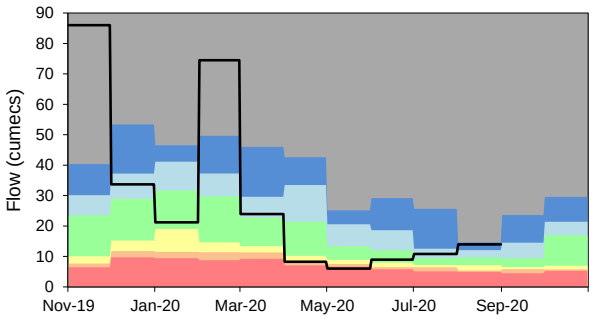
Buttercrambe, DERWENT
Ranking derived from data for the period Sep-1973 to Dec-2017



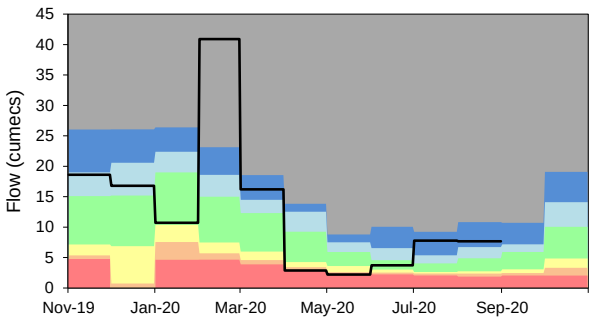
Crakehill Topcliffe, SWALE
Ranking derived from data for the period Jun-1980 to Dec-2017



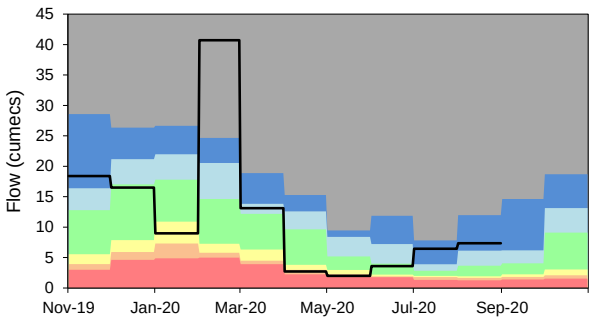
Doncaster, DON
Ranking derived from data for the period Jul-1959 to Dec-2017



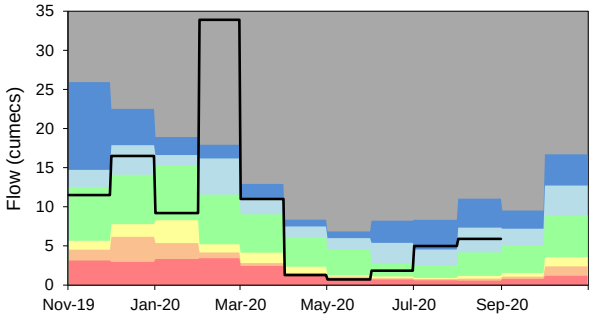
Elland, CALDER
Ranking derived from data for the period Jul-1971 to Dec-2017



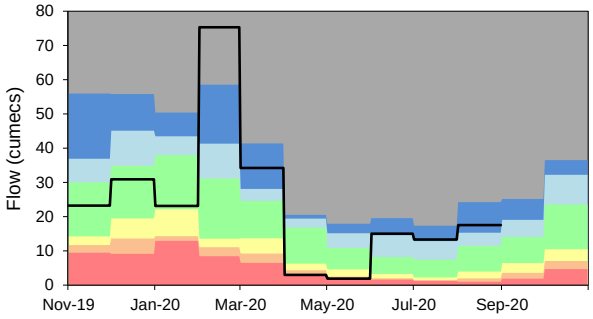
Hunsingore, NIDD
Ranking derived from data for the period Oct-1968 to Dec-2017



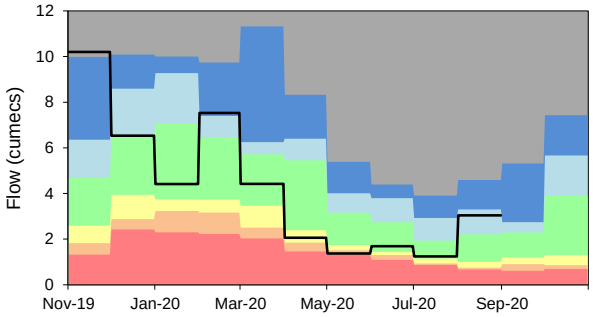
Kildwick, AIRE
Ranking derived from data for the period Aug-1971 to Dec-2017



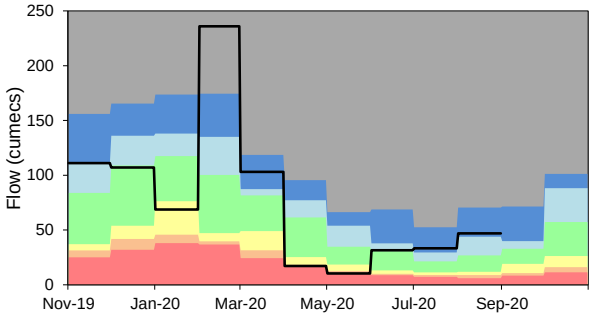
Kilgram Bridge, URE
Ranking derived from data for the period Aug-1971 to Dec-2017



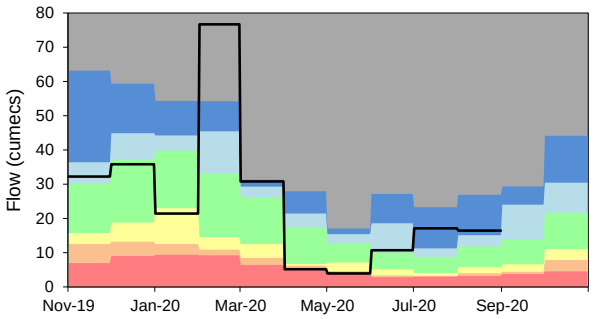
Ness, RYE
Ranking derived from data for the period Sep-1974 to Dec-2017



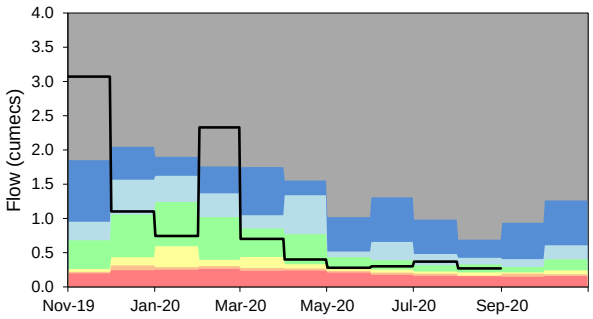
Skelton, OUSE
Ranking derived from data for the period Sep-1969 to Dec-2017



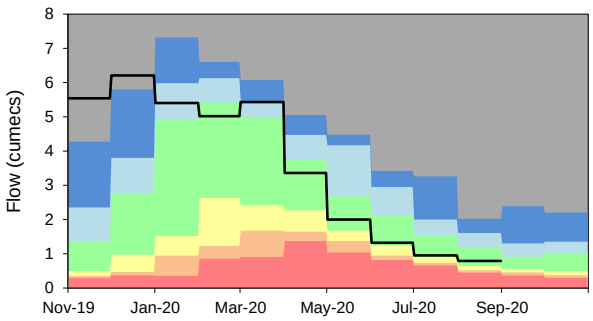
Tadcaster, WHARFE
Ranking derived from data for the period Jul-1991 to Dec-2017



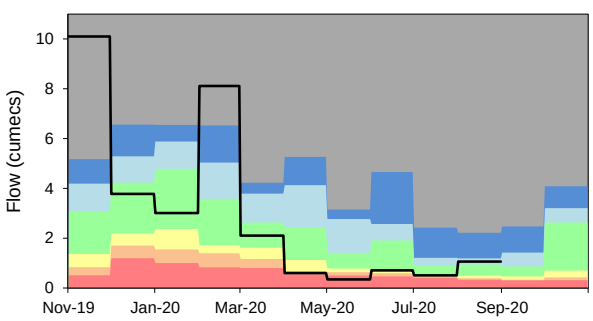
Walden Stubbs, WENT
Ranking derived from data for the period Oct-1979 to Dec-2017



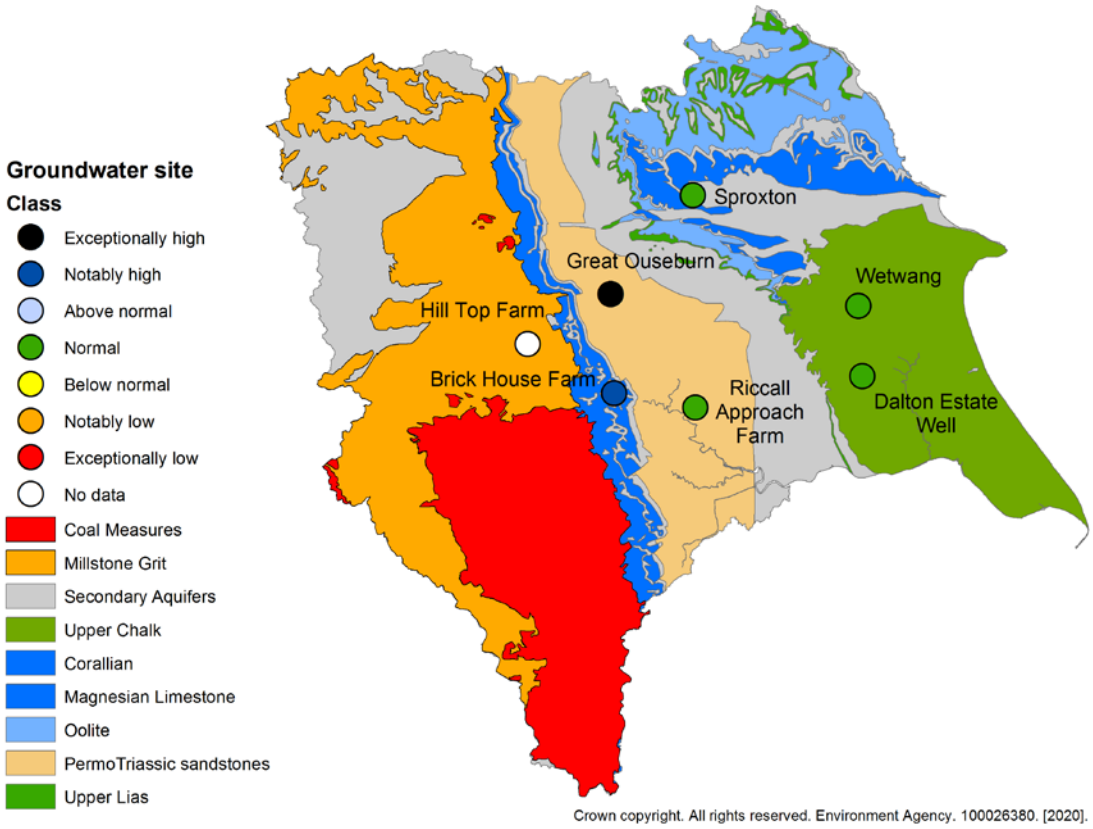
Wansford Snakeholm Lock - West Beck, WEST BECK
Ranking derived from data for the period Nov-1988 to Dec-2017

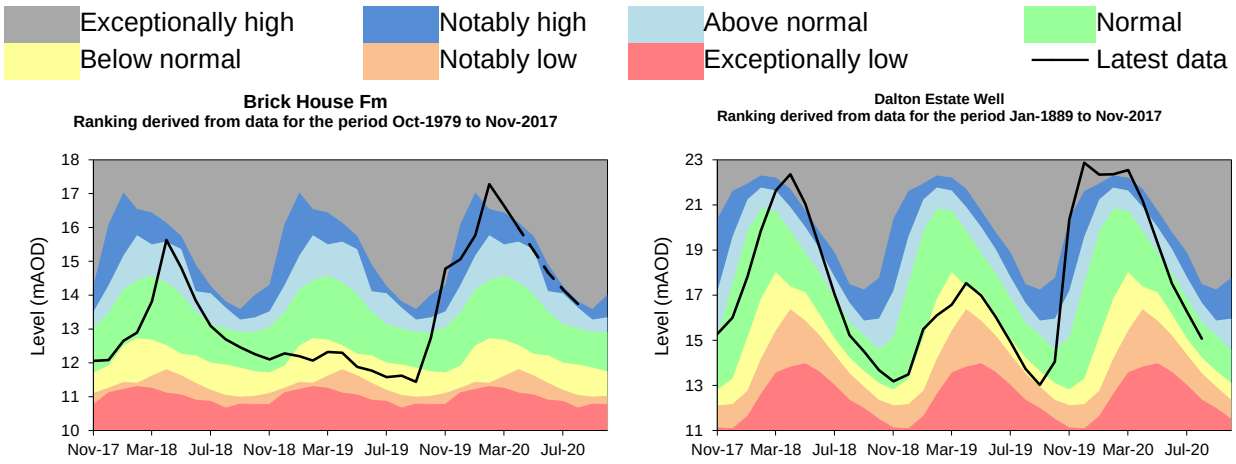


Whittington, ROTHER
Ranking derived from data for the period Nov-1979 to Dec-2017

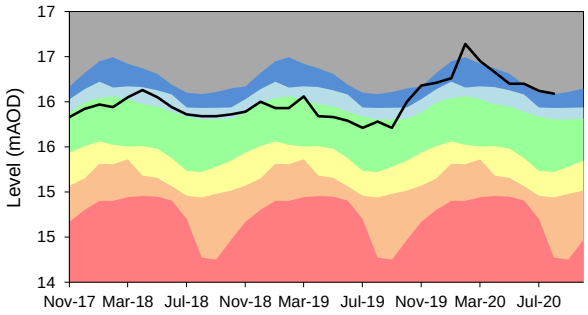


Groundwater Levels

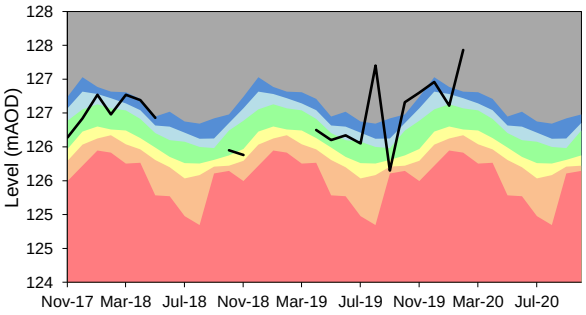




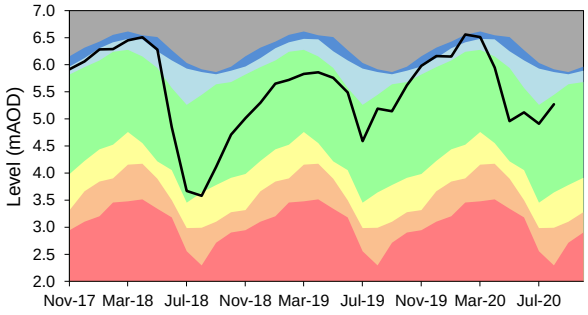
Great Ouseburn
Ranking derived from data for the period Jan-1976 to Nov-2017



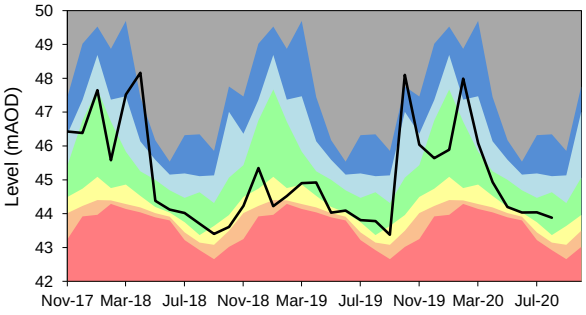
Hill Top Fm
Ranking derived from data for the period Oct-1973 to Nov-2017



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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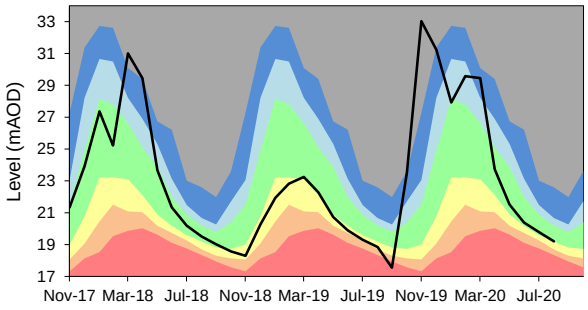
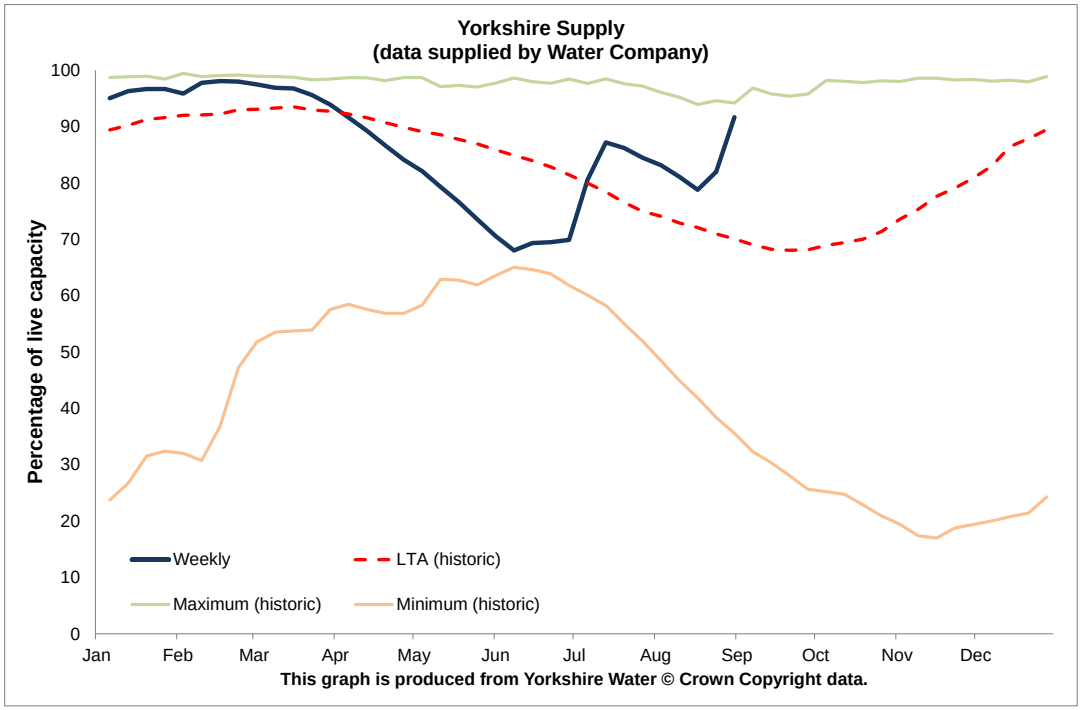


Reservoir Stocks – Data from Water Company



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