Monthly Water Situation Report

North West England

Summary – September 2016

Table 1. North West England summary of the current water situation.

Parameter	Current status
Rainfall	North West England rainfall was 95% of September's Long Term Average (LTA). Classed as 'Normal' this month.
Soil Moisture Deficit (SMD)	SMD values generally fell across North West England, with a few exceptions where values rose compared to last month.
River Flows	All classed as 'Normal'.
Groundwater Levels	Classed between 'Normal' and 'Exceptionally High'
Reservoir storage	Total North West England reservoir storage decreased from 88% (end of August) to 84% (end of September).

Rainfall

In September, rainfall was classed as 'Normal' for North West England (95% of the LTA for September) and across all of the hydrological areas in the North West. The highest rainfall (when compared to the LTA) was observed in the Kent (110% of the LTA) (Figure 2 and Figure 3), with the lowest in the Douglas, recording 66% of the LTA for September (Figure 2 and Figure 3).The heavy rainfall experienced from November 2015 to February 2016 has resulted in the cumulative rainfall for the last 12 months (the 2015 Hydrological Year) being classed as 'Exceptionally High' across North West England, with the only exception seen in the Cheshire Rivers Group area which was classed as 'Above Normal'.

Soil Moisture Deficit/Recharge

SMD values generally fell across North West England, with a few exceptions where values rose compared to last month. (Figure 4). The highest SMD value for September was recorded in the westerly parts of the Wirral and Weaver catchments for a second consecutive month following two months of slightly below average rainfall (although still classed as 'Normal') in Cheshire Rivers Group; with the cumulative rainfall for the previous three months in Cheshire Rivers Group being classed as 'Below Normal'. Soils reached full saturation in the Esk (Dumfries) catchment by the end of September, with all values again less than 10mm in the northern half of North West England.

River Flows

River flows were all classed as 'Normal' in comparison to the LTA for September (Figure 6). River flows were highest in the Eamont catchment (111% of LTA) and lowest in the Weaver (62% of LTA) (Figure 7).

Groundwater Levels

Groundwater levels for September remained classed between 'Normal' and 'Exceptionally High' (Figure 8) with the only change noted at Bruntwood Hall (which increased from 'Notably High' to 'Exceptionally High') (Figure 9). Levels continued to be classed as 'Exceptionally High' at Brown Bank Lay-by, Priors Heyes and Yew Tree Farm; and 'Notably High' at Skirwith. The levels at Priors Heyes and Yew Tree Farm remain high compared to historic levels because the aquifer is recovering from the effects of historically high abstractions.

Reservoir Storage/Water Resource Zone Stocks

Reservoir stocks for North West England decreased from 88% at the end of August, to 84% at the end of September, with all reservoirs recording lower stocks at the end of September compared to the end of August (Figure 11). At the end of September, for a second month, reservoir stocks were highest at Vyrnwy (97%) and lowest at Haweswater (65%) (Figure 1). Dingle, Earnsdale, Heaton Park Open, Rhodeswood, Rivington and Springs were kept low for maintenance works.

*Go to the **Glossary***

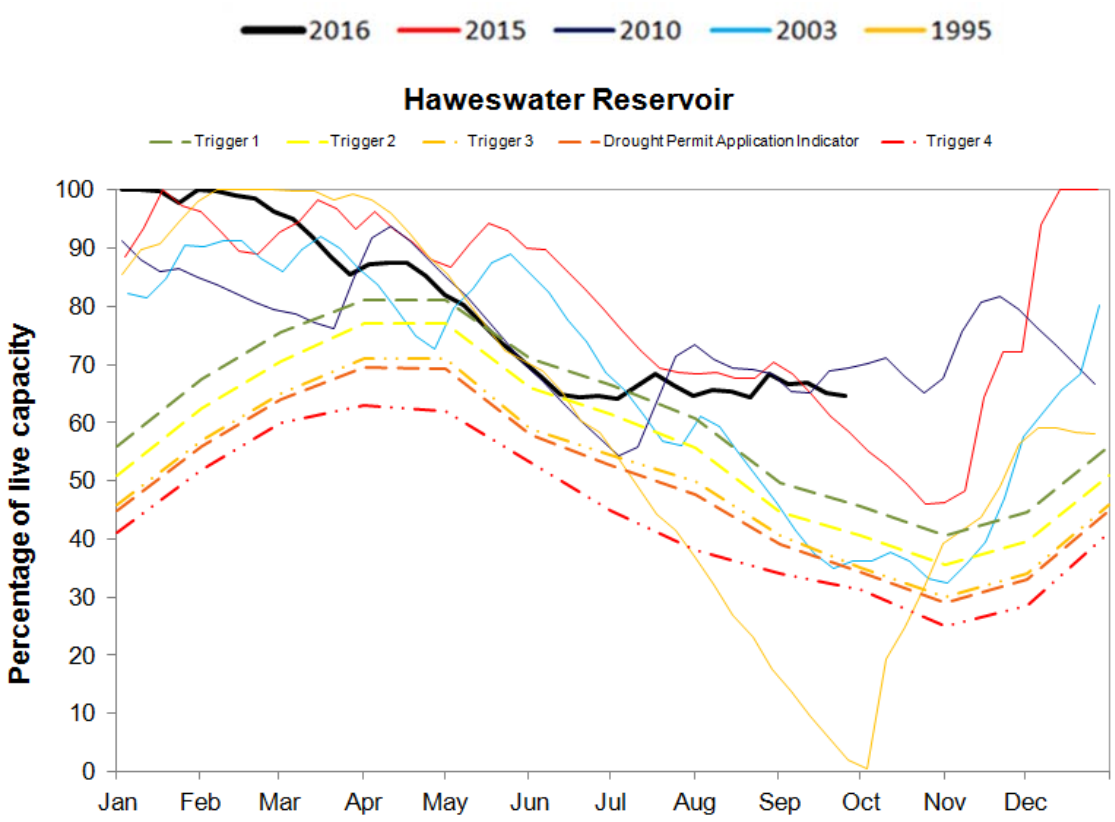
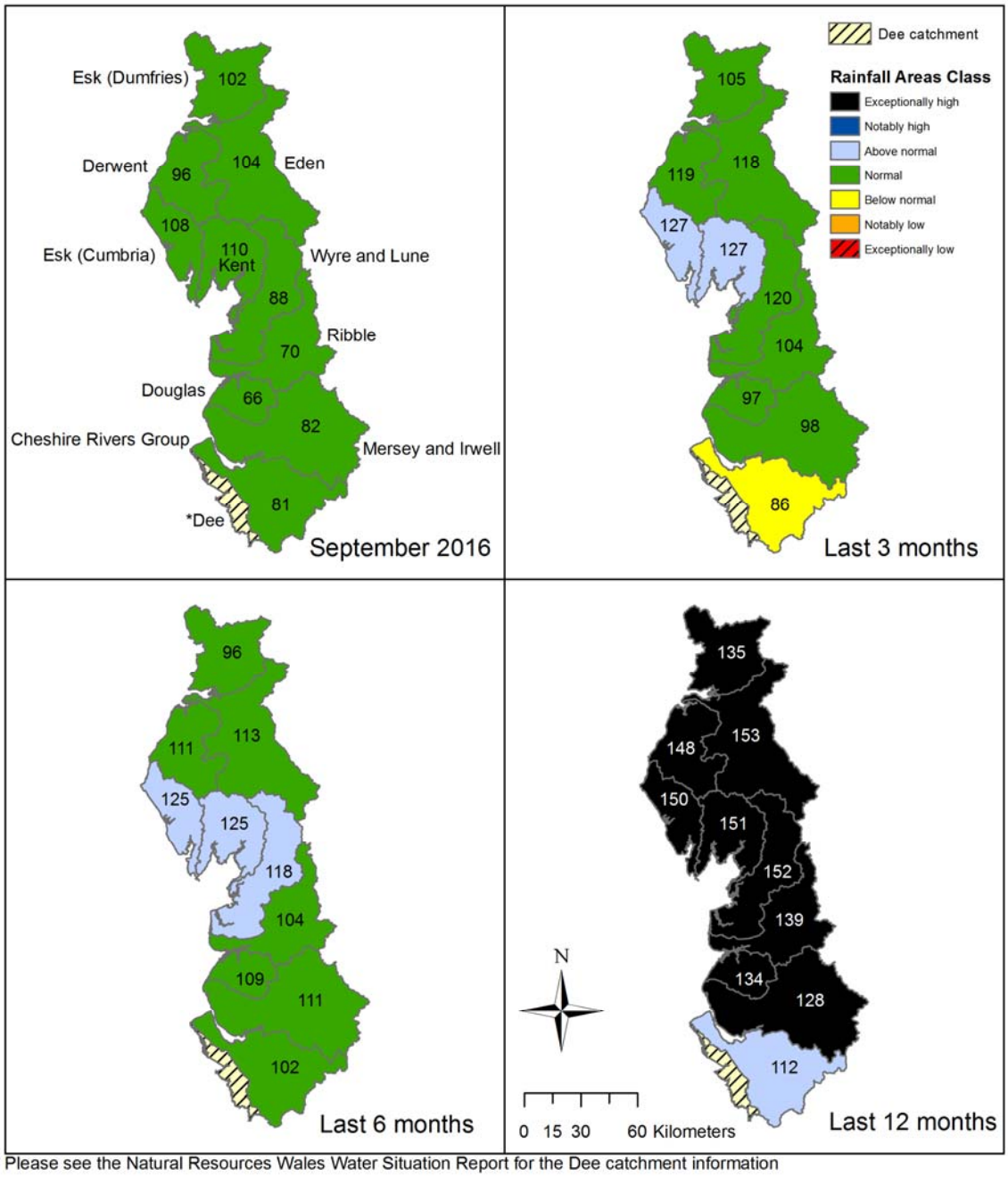


Figure 1: Storage in Haweswater reservoir including the drought triggers for the reservoir and storage for representative years; 1995, 2003, 2010 and 2015.

Picture 1: The River Brock at A6 Upstream gauging Station on 26th September 2016 at 13:38, at a level of 0.40m. The flow at this time was 0.88m^3/s which is equivalent to Q28. Photo taken by Melinda McCarthy, Cumbria and Lancashire (Preston) Hydrometry and Telemetry Team.

Author: Rachel Kewley Contact details: NW England Hydrology

Rainfall



' Please see the Natural Resources Wales Water Situation Report for the Dee catchment information

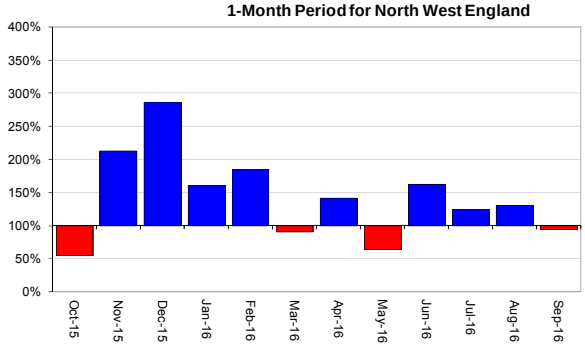
Figure 2. Total rainfall (as a percentage) for hydrological areas across North West England for the current month, the last three months, the last six months, and the last 12 months, classed relative to an analysis of respective historic totals. NCIC (National Climate Information Centre) data based on the Met Office 5km gridded rainfall dataset derived from rain gauges (*Source: Met Office © Crown Copyright 2016).* Provisional data based on Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges.

Rainfall

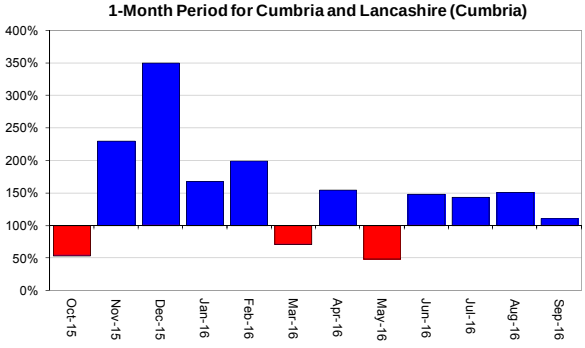
Above average rainfall

Below average rainfall

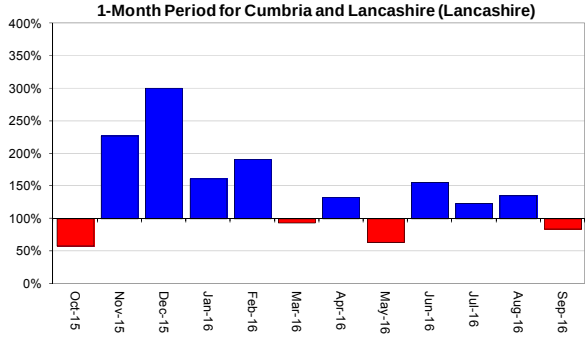
1-Month Period for North West England



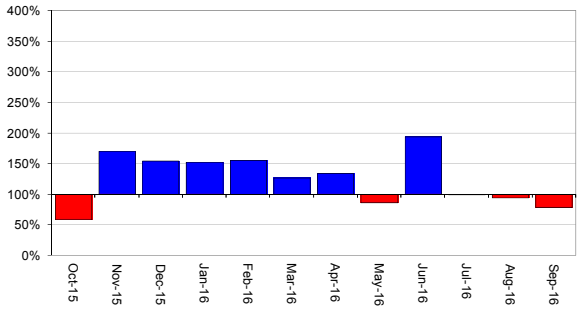
1-Month Period for Cumbria and Lancashire (Cumbria)



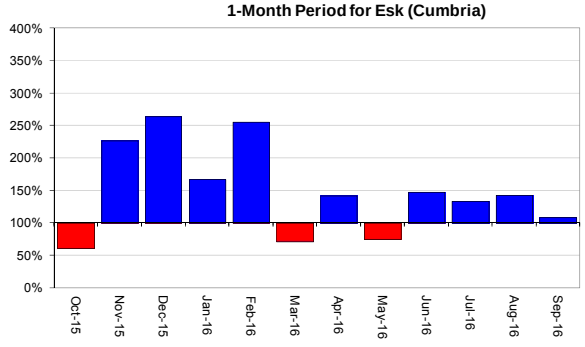
1-Month Period for Cumbria and Lancashire (Lancashire)



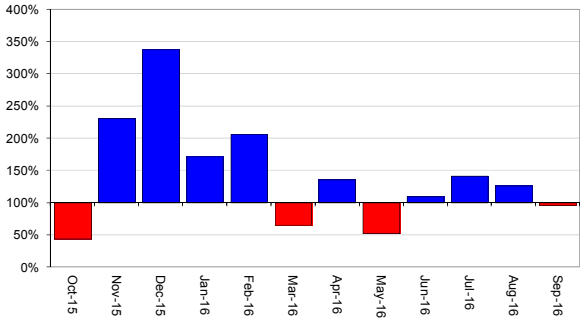
1-Month Period for Greater Manchester, Merseyside and Cheshire



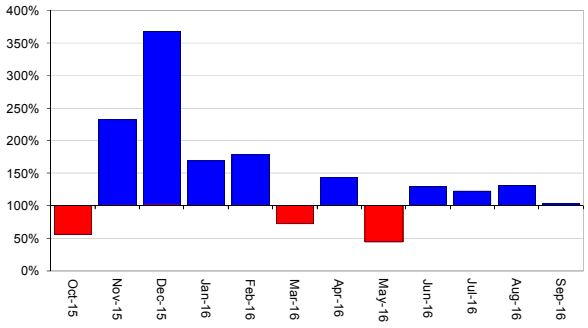
1-Month Period for Esk (Cumbria)



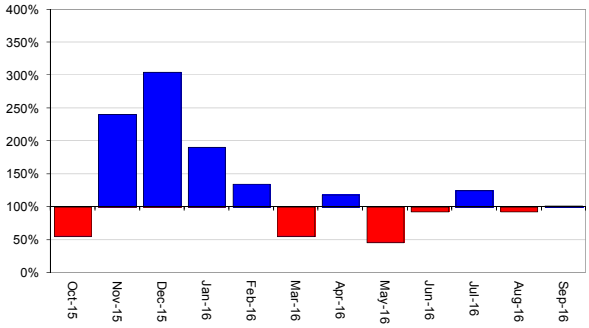
1-Month Period for Derwent (NW)



1-Month Period for Eden



1-Month Period for Esk (Dumfries)



Rainfall

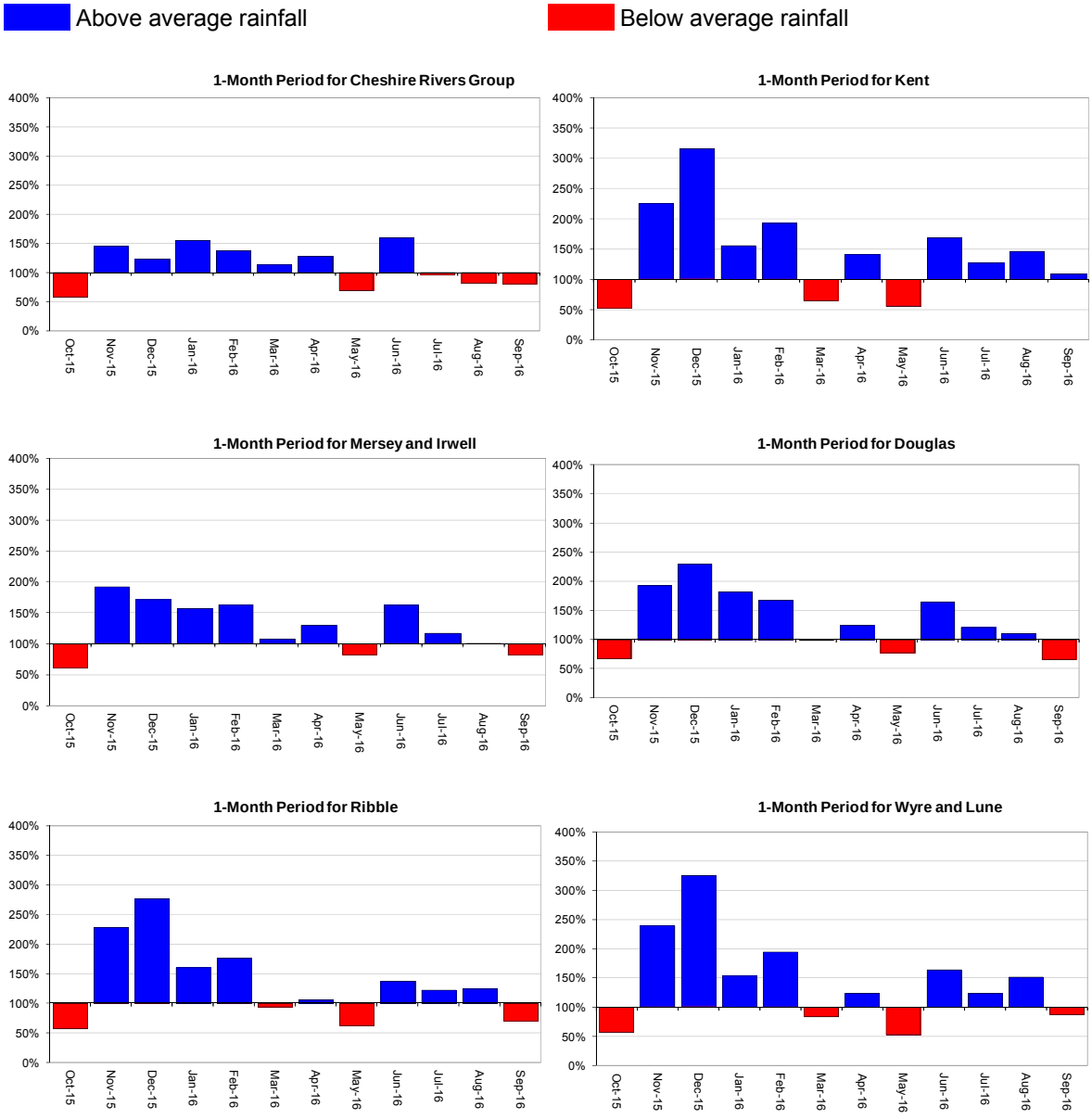


Figure 3: Monthly rainfall totals for the past 12 months expressed as a percentage of the long term average (1961-90), for North West England and its hydrological areas using NCIC (National Climate Information Centre) data *(Source: Met Office © Crown Copyright 2016).*

Soil Moisture Deficit

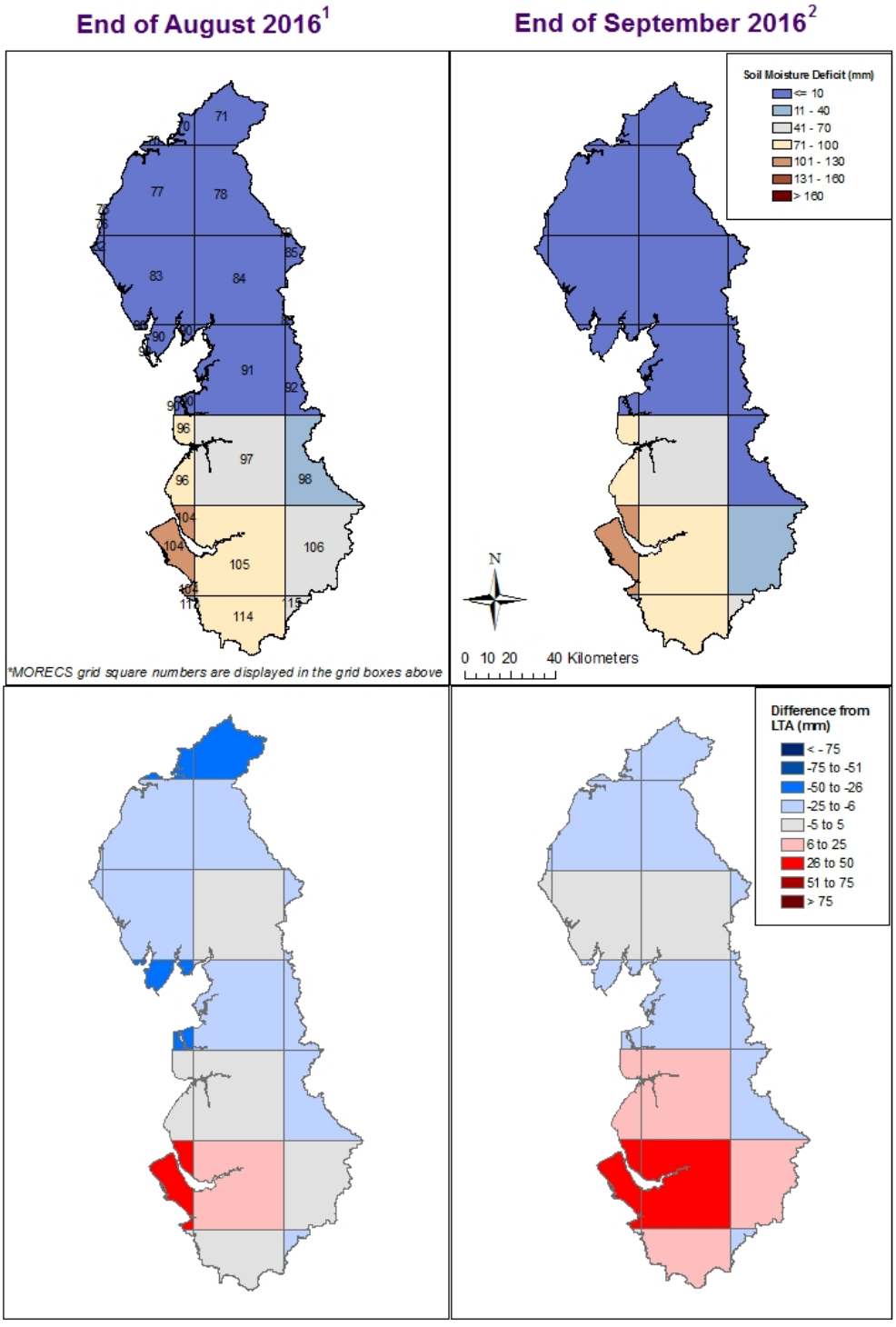


Figure 4: Soil moisture deficits for weeks ending 31st August 2016[1] (left panel) and 28th September 2016[2] (right panel). Top row shows actual soil moisture deficits (mm) and bottom row shows the difference (mm) of the actual from the 1961-90 long term average soil moisture deficits. MORECS data for real land use (*Source: Met Office © Crown Copyright, 2016*).

River Flow

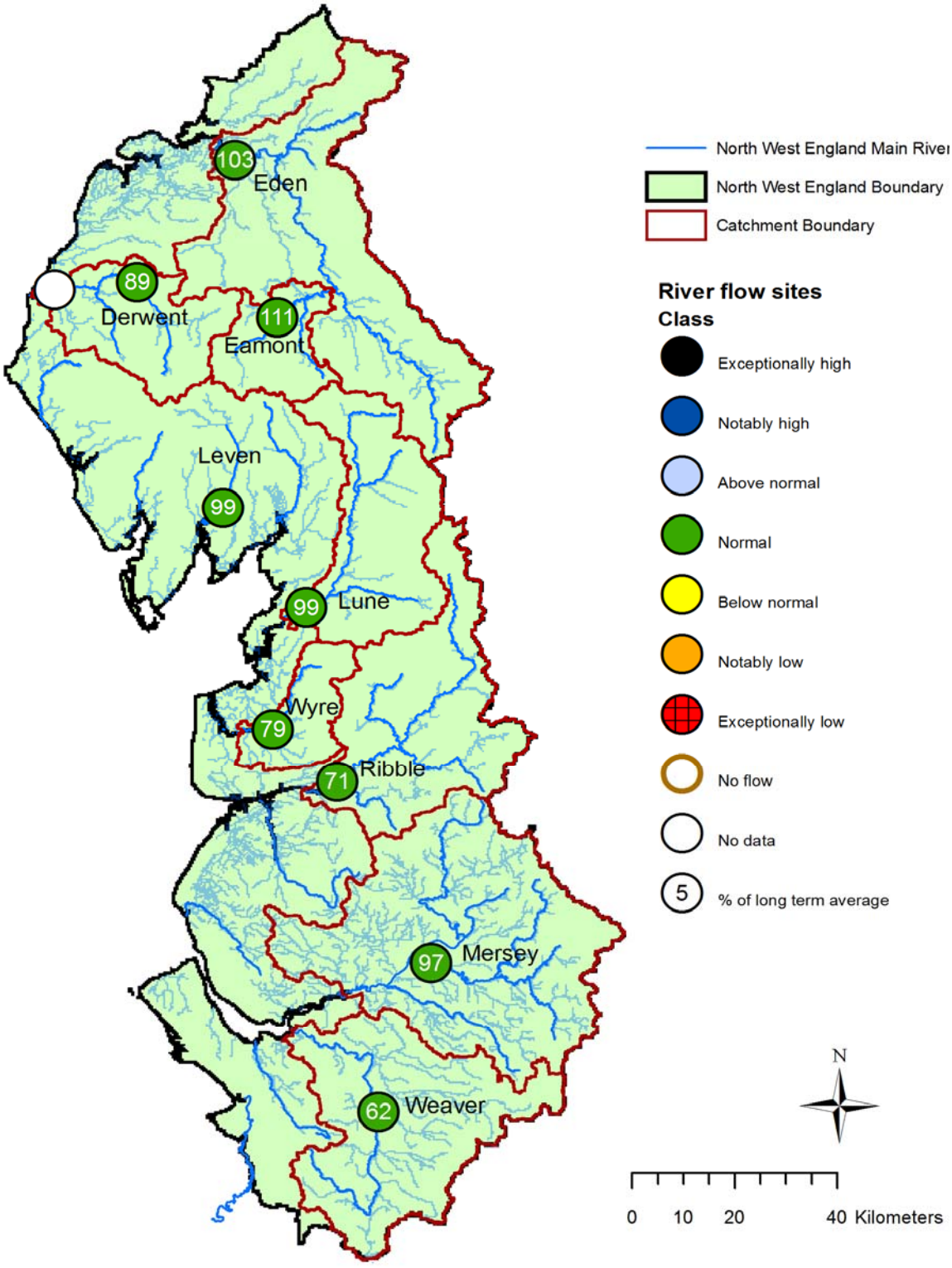
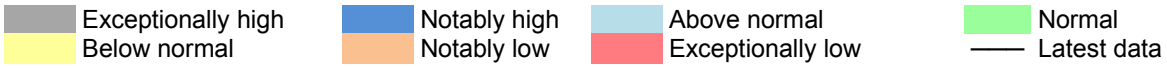
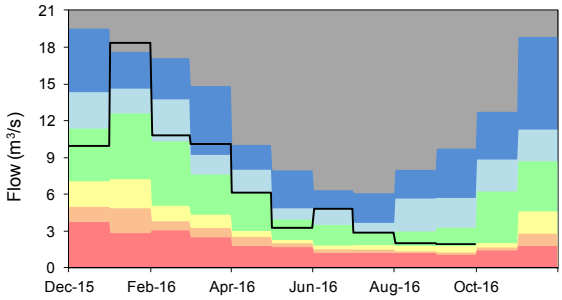


Figure 6: Monthly mean river flow for this month, expressed as a percentage of the month's long term average and classed relative to analysis of historic monthly means *(Source: Environment Agency).*

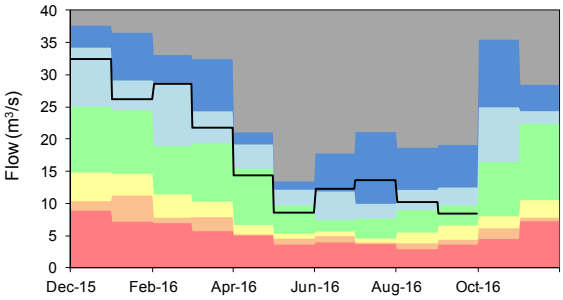
River Flow



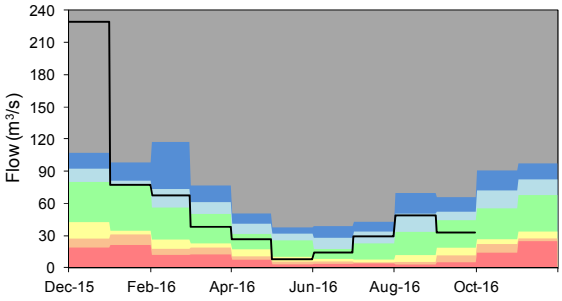
Ashbrook, WEAVER (NW)
Ranking derived from data for the period Oct-1937 to Dec-2012



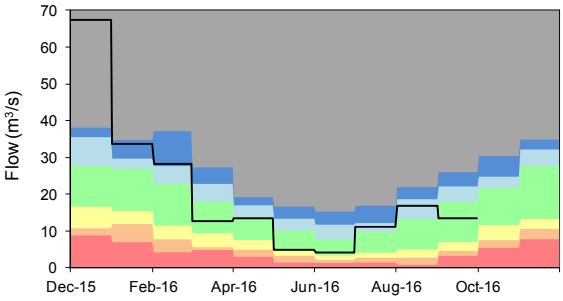
Ashton Weir, MERSEY
Ranking derived from data for the period Jun-1976 to Dec-2012



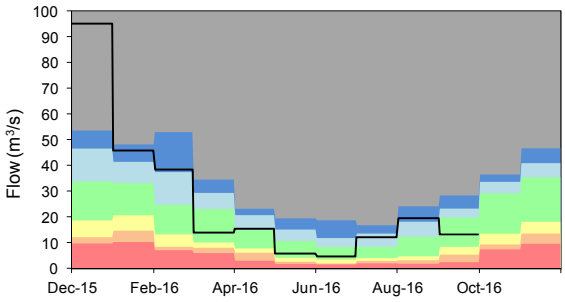
Caton, LUNE
Ranking derived from data for the period Jan-1959 to Dec-2012



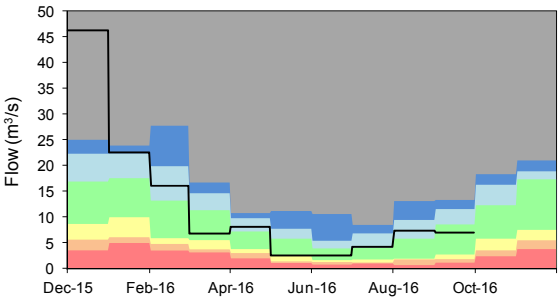
Newby Bridge Fms, LEVEN (NW)
Ranking derived from data for the period Jan-1939 to Dec-2012



Ouse Bridge, DERWENT (NW)
Ranking derived from data for the period Mar-1968 to Dec-2012



Pooley Bridge Upstream, EAMONT
Ranking derived from data for the period Jul-1970 to Dec-2012



River Flow

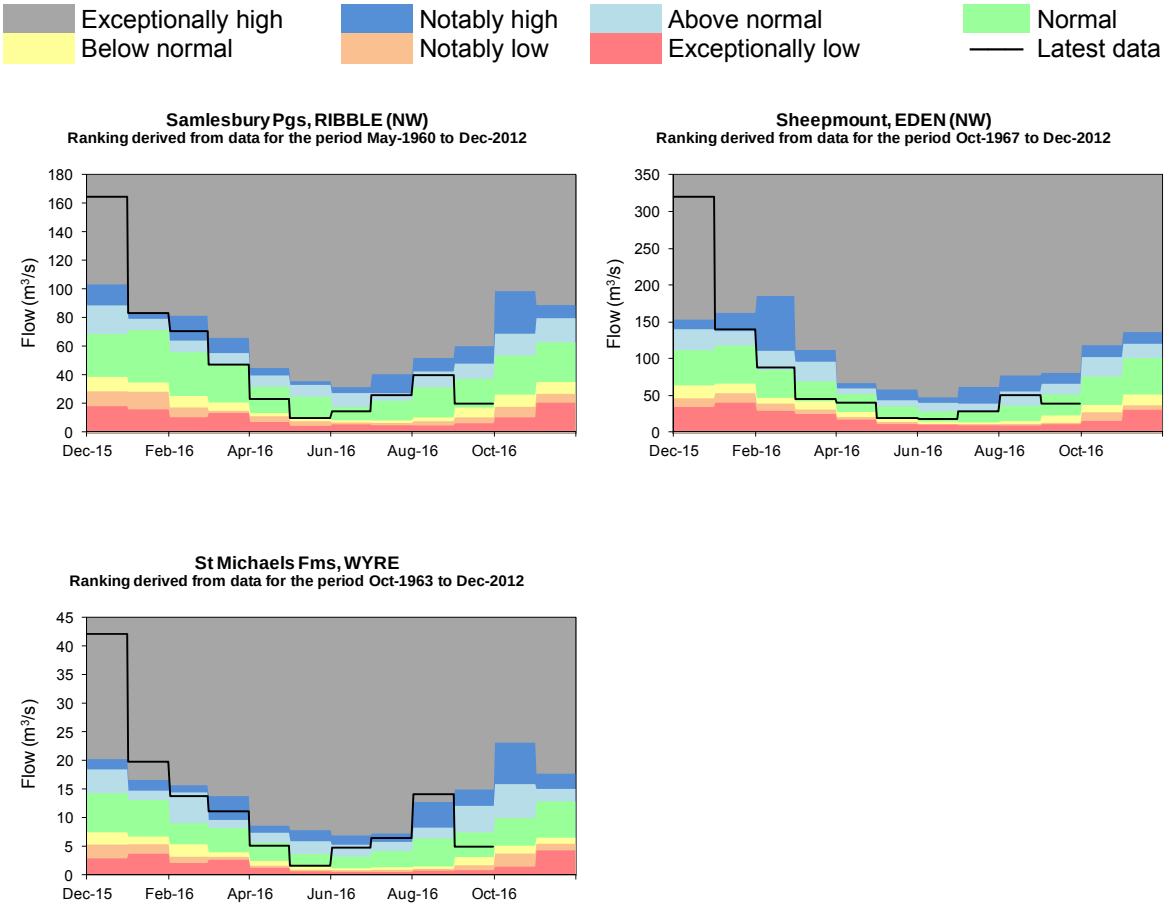


Figure 7: Monthly mean river flows for the past 10 months for sites across North West England (*Source: Environment Agency*). There is no flow record from Camerton following damage caused by the floods in November 2009. The Gauging Station at Ouse Bridge replaces this for the Derwent catchment. Flow for Sheepmount has been estimated due to uncertainty in the current rating following the December 2015 floods.

Groundwater Levels

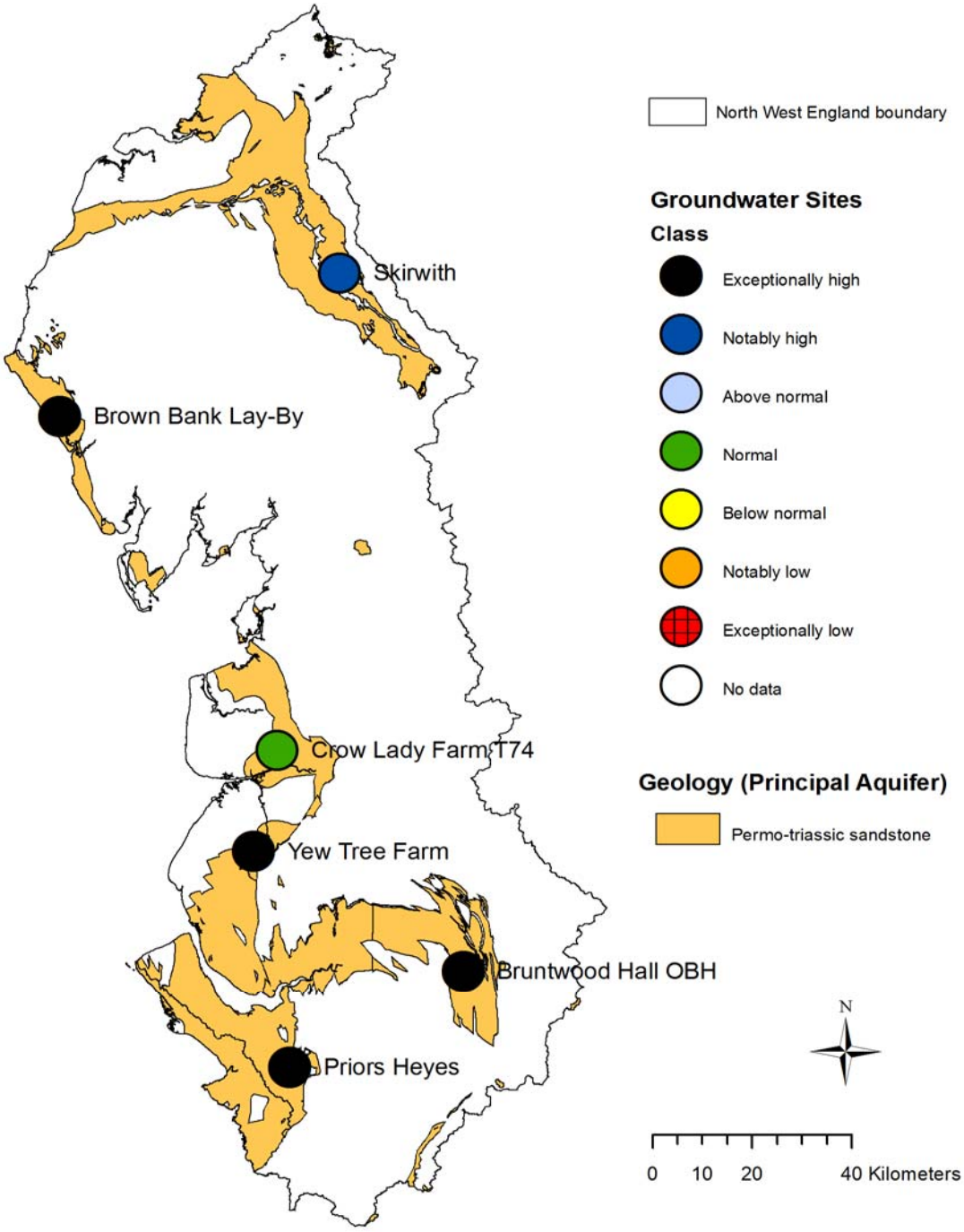


Figure 8: Groundwater levels at the end of the month classed relative to an analysis of historic groundwater levels for the same month *(Source: Environment Agency)*. Geological map reproduced with kind permission from the UK Groundwater Forum, British Geological Survey (BGS) © Natural Environment Research Council (NERC).

Groundwater Levels

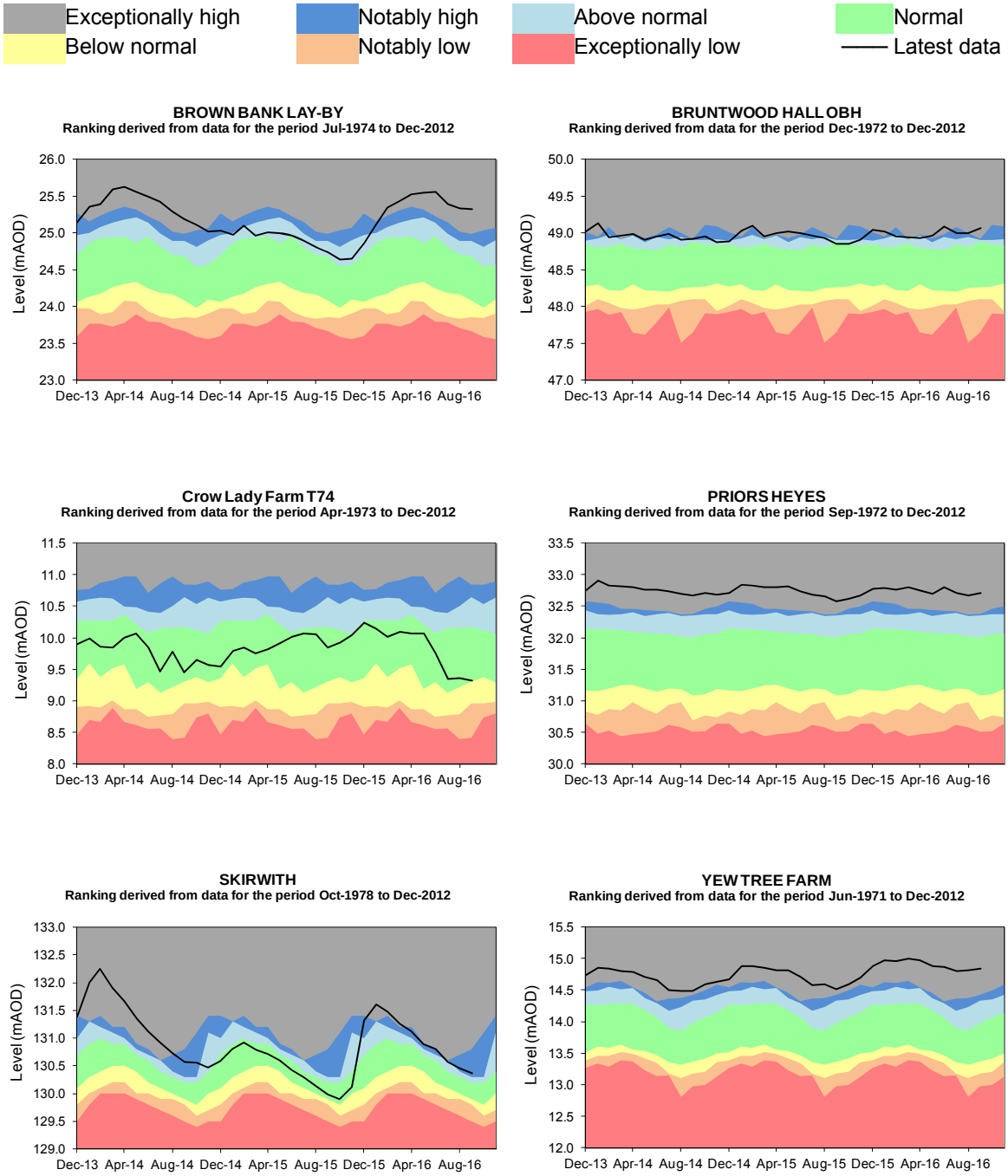


Figure 9: End of month groundwater levels for the past 34 months for North West England groundwater sites *(Source: Environment Agency).*

Reservoir Stocks

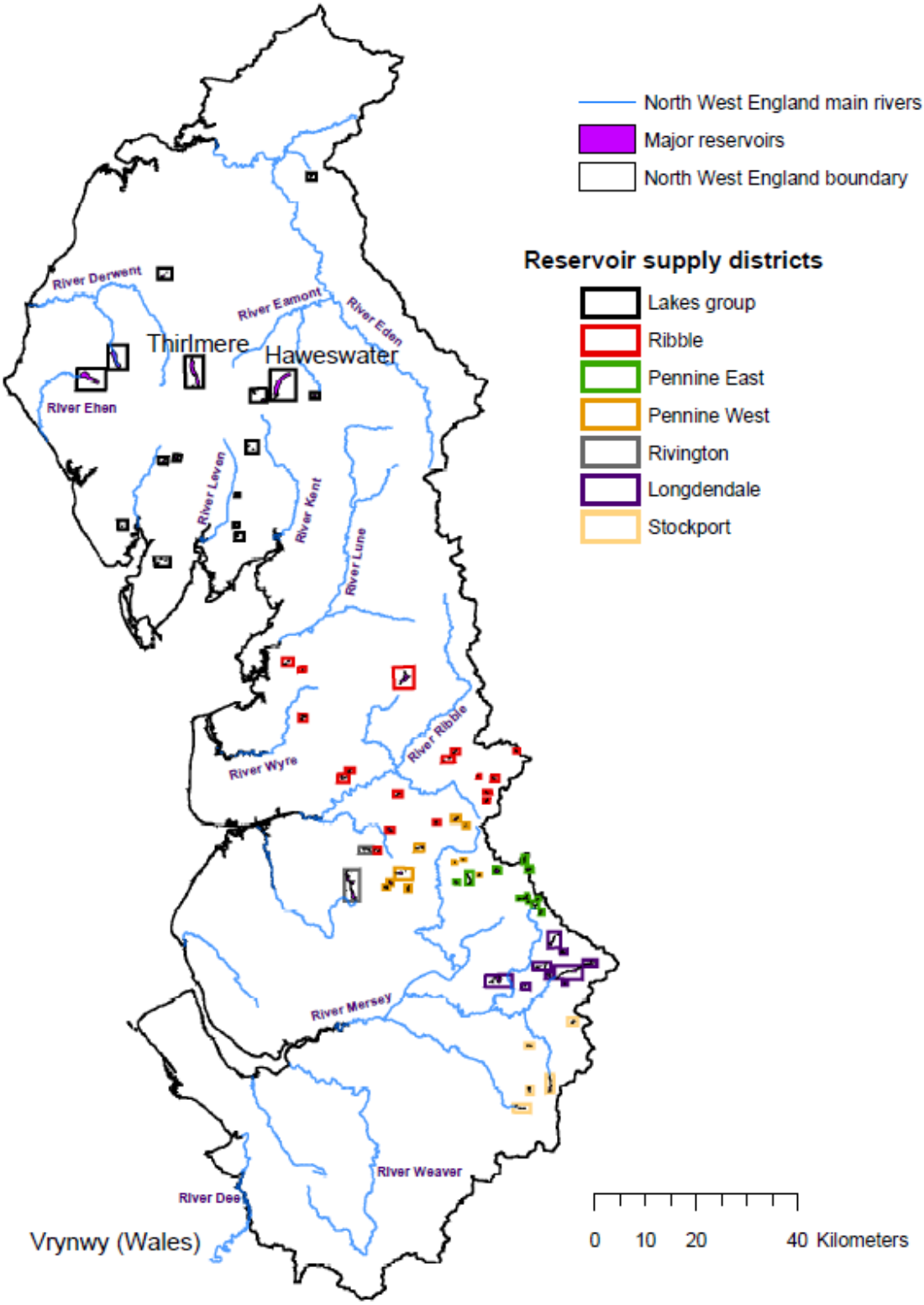
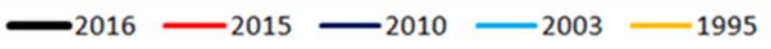
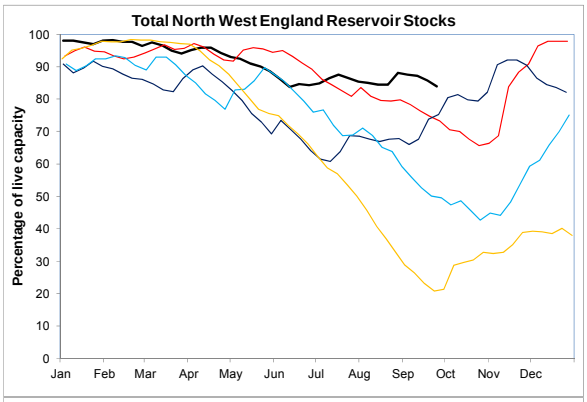
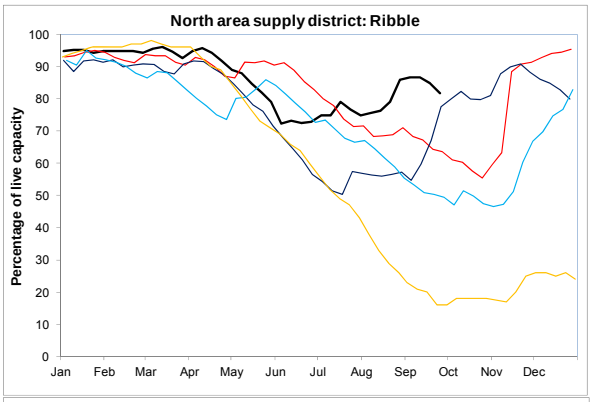


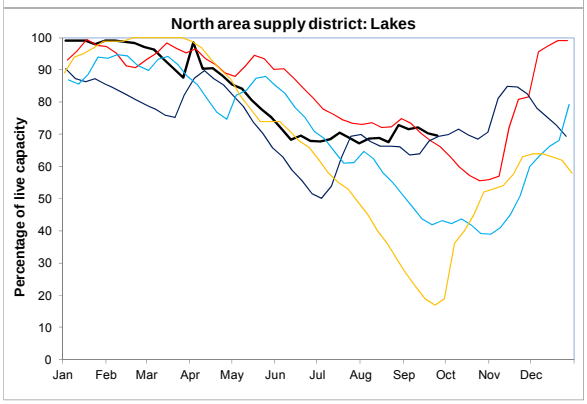
Figure 10: The location of reservoirs that comprise the supply districts across North West England and selected individual reservoirs.

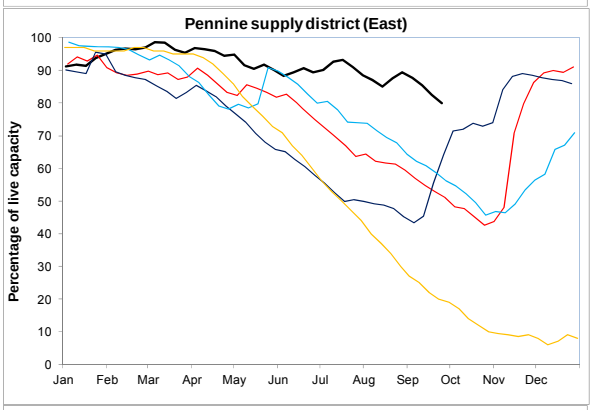
Reservoir Stocks

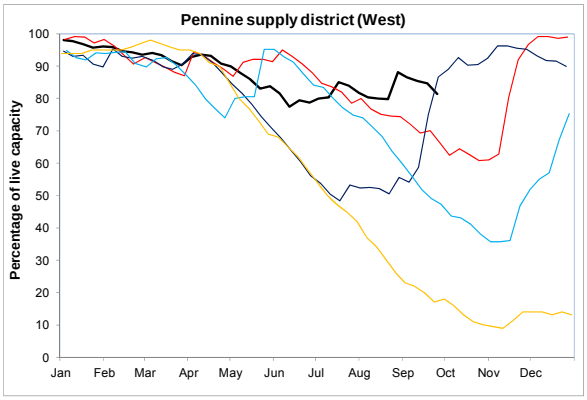


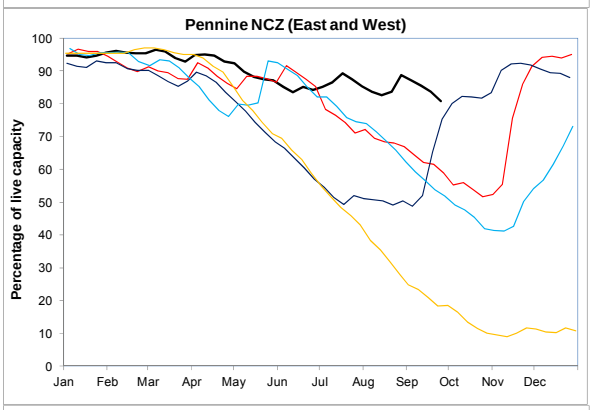


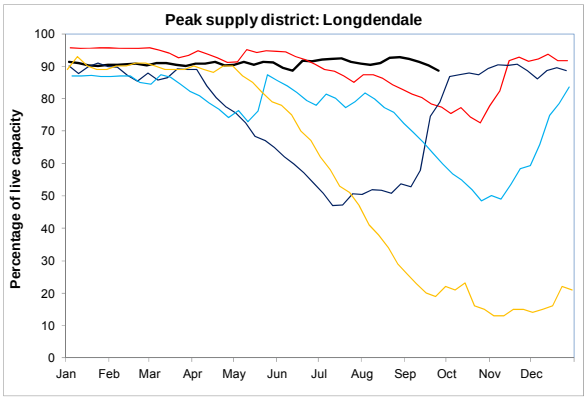


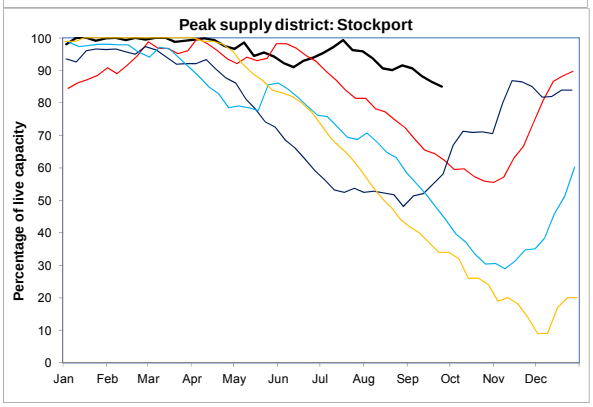












Reservoir Stocks

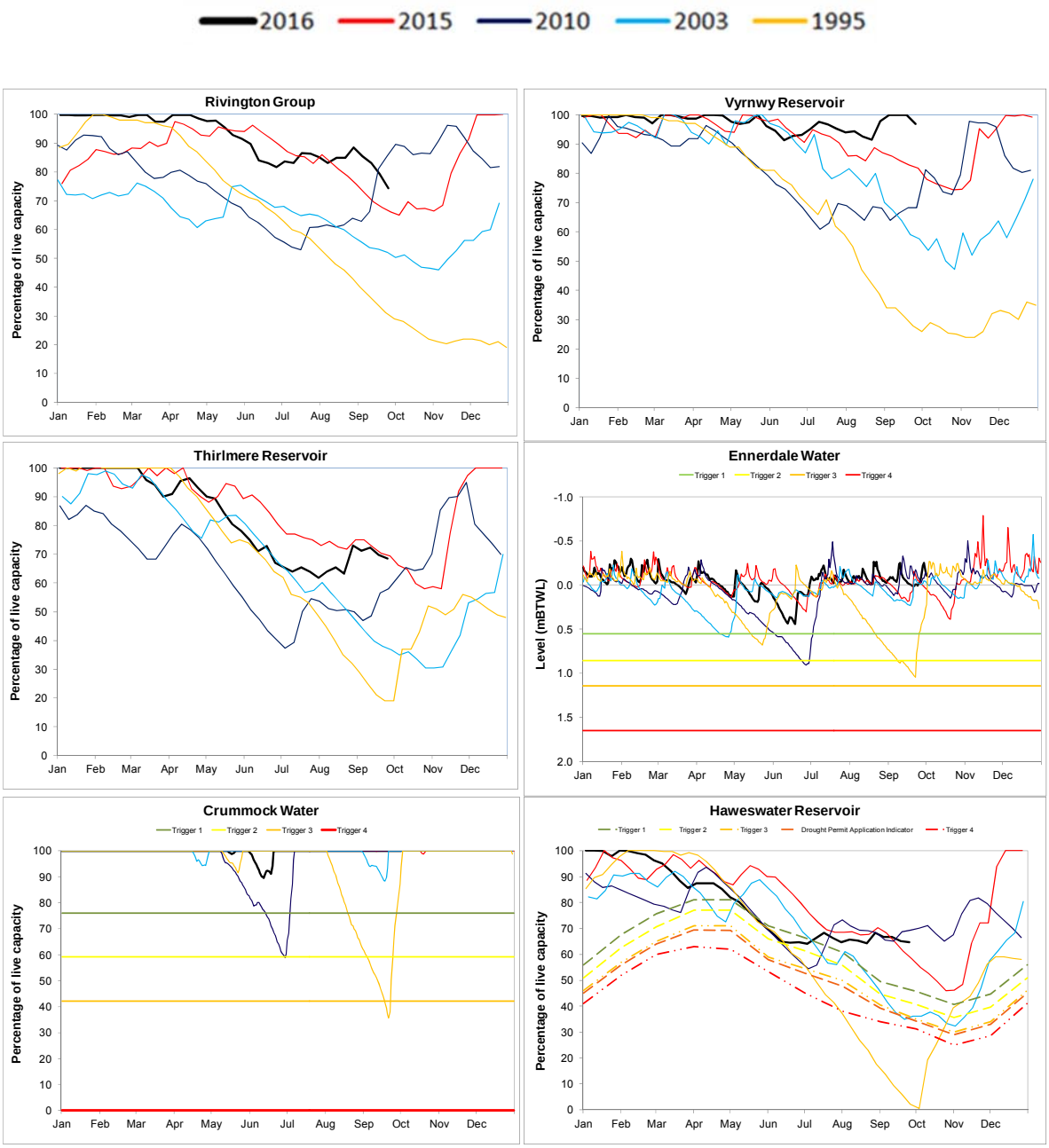


Figure 11: End of month reservoir stocks for supply districts across North West England and selected individual reservoirs for current and representative years; 1995, 2003, 2010 and 2015 *(Source: United Utilities).*

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.
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).
MORECS	Met Office Rainfall and Evaporation Calculation System. This is a generic name for Met. Office services involving the routine calculation of soil moisture and evaporation for Great Britain and uses a grid of 40 x 40 km squares.
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 reservoir capacity normally usable for storage to meet established reservoir operating requirements.
Soil moisture deficit (SMD)	The difference between the amount of water actually in the soil and the amount of water that the soil can hold. Expressed in depth of water (mm).

Categories for rainfall, river flows, groundwater levels

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

Units

mAOD	Metres Above Ordnance Datum (mean sea level at Newlyn Cornwall).
mBTWL	meters Below Top Water Level

Return to Summary