Monthly Water Situation Report December 2016

Natural Resources Wales

- **The monthly rainfall total received for Wales during December was 56% of the Long Term Average (LTA, 1961-90). South East, South West and North Wales received 49%, 58% and 60% of the LTA, respectively. All catchments received 45 - 75% of the LTA for December.**
- **At the end of December, soil moisture deficit (SMD) values across Wales were between 0mm (18 out of 23 squares) and 11.3mm (Square 104) for all MORECS squares. Soil was slightly wetter than the long term average for most of the squares (20 out of 23) for December.**
- **For river flows in Wales, all the indicator sites were lower than normal. 12 out of 30 indicator sites which had flow data available were classed as *Exceptionally low* and 11 were classed as *Notably low* for December. The remaining 7 sites were classed as *Below normal*.**
- **The overall reservoir storage across all indicator sites was greater than 90% at the end of December and all reservoirs were within normal operating ranges.**

Rainfall*

The monthly rainfall total received for Wales was 56% of the LTA for December. The percentage of rainfall recorded in catchments compared with the LTA across Wales was between 45% (Usk) and 75% (Lleyn & Eryri). The rainfall total for Wales was 70mm less than the December LTA. For South East, South West and North Wales the rainfall totals were 49%, 58% and 60% of LTA, respectively.

Rainfall Map	National		
Rainfall Charts	National & Areas	South East Wales	North Wales

* using NCIC (National Climate Information Centre) data *(Source: Met Office © Crown Copyright)*

Soil Moisture Deficit/Recharge

The 23 MORECS squares had SMD values between 0mm (18 out of 23 squares) and 11.3 mm (square 104). Soil was slightly wetter than the long term average for most of the squares (20 out of 23). Only three square (square 104, 105 and 114) had values greater than the long term average (drier).

SMD Map	National
SMD Charts	Compare to LTA

River Flows

River flows were lower than normal for all the indicator sites across Wales. 12 sites (out of 30 sites which had flow data) were classed as *Exceptionally low* and 11 were classed as *Notably low*. The remaining 7 sites were classed as *Below normal.*

***South East*:** Flows in the area ranged from 22% (River Lugg at Butts Bridge) to 60% (River Usk at Trostrey Weir) of the December LTA values.

South West: The river flows within this area ranged from 34% (River Ystwyth at Pont Llolwyn) to 70% (River Cleddau at Treffgarne) of the December LTA values.

***North*:** Flows in the area ranged from 32% (River Clwyd at Ruthin Weir and River Ceiriog at Brynkinalt Weir) to 63% (River Dwyfor at Garndolbenmaen) of the December LTA Values.

River Flow Map	National
River Flow Table	% of LTA and compare to previous year
River Flow Charts	South East Wales North Wales South West Wales

Groundwater Levels

Groundwater levels for December at all indicator sites (10 sites) were classed between *Notably low* (Pant-y-Lladron) to *Above normal (*Dodleston). 7 sites were classed as *Below normal* (Fernbank, Greenfield Garage, Pony y Cambwll, Llanfair, Hollybush, Handley and Eastwick) and the remaining site (Broxton) was *Normal*.

Groundwater Map	National
Groundwater Charts	South East Wales North Wales South West Wales

Reservoir Storage

At the end of December most of the indicator reservoirs (14 out of 18) were greater than 90% full and were in normal range for the time of year. However, 3 reservoirs (Aled & Aled Isaf, Llandegfedd and Usk) were between 58-75% full due to maintenance work being carried out on these reservoirs.

Reservoir Charts	South East Wales North Wales South West Wales

All data on Water Situation Reports are provisional, based on spot readings, and are subject to revision.

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Return to Summary

Natural Resources Wales

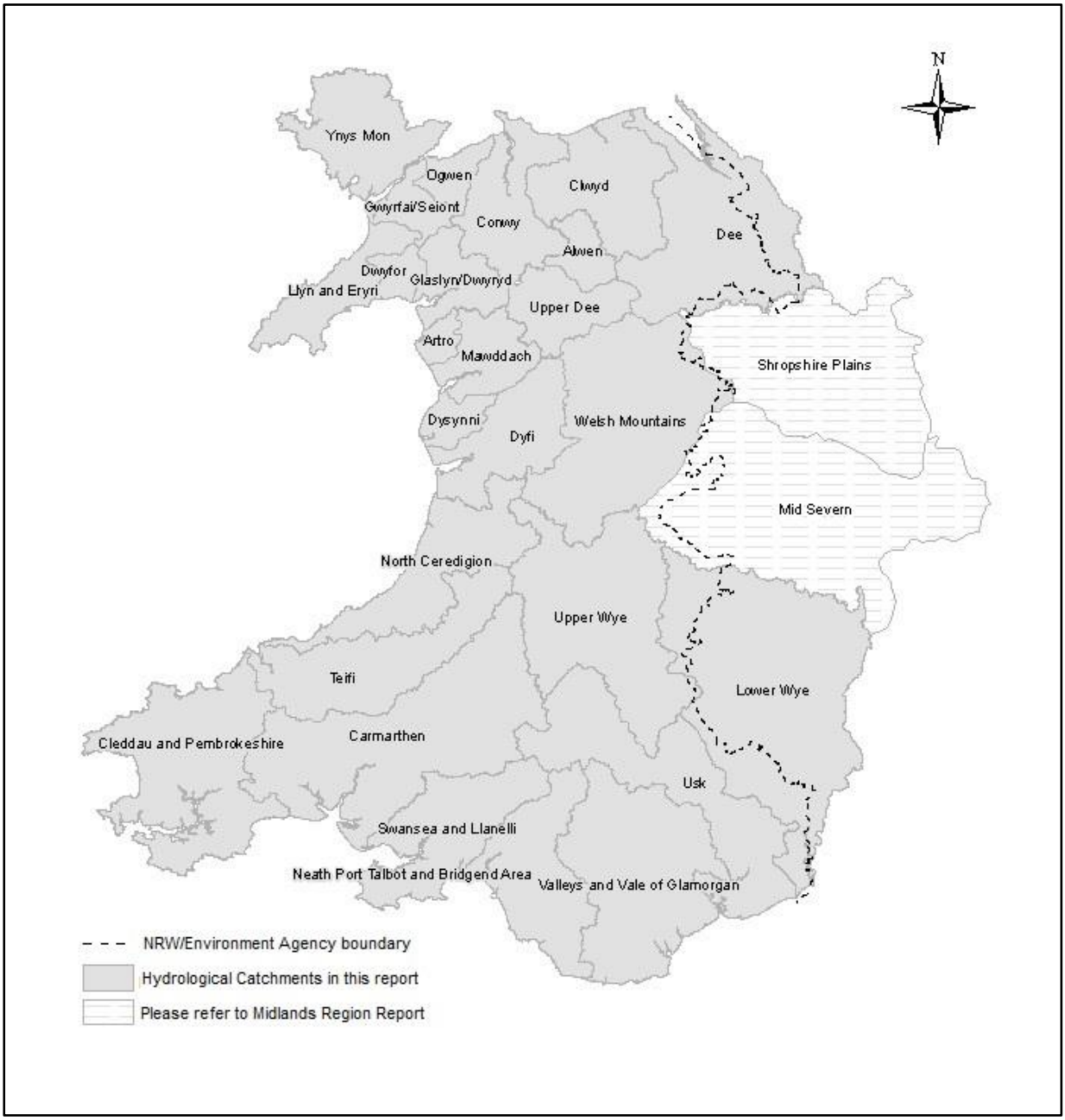


Figure 1: The Natural Resources Wales Water Situation Report features sites in the catchments shown. Parts of the Shropshire Plains and Mid Severn catchments are within Wales. For full information on these catchments, please see the Environment Agency Midlands Water Situation Report.

For areas adjoining Natural Resources Wales, please see the reports for Environment Agency Midlands and North West England:

Environment Agency - Midlands, England Water Situation Report
Environment Agency - North West, England Water Situation Report

Return to Summary

Rainfall

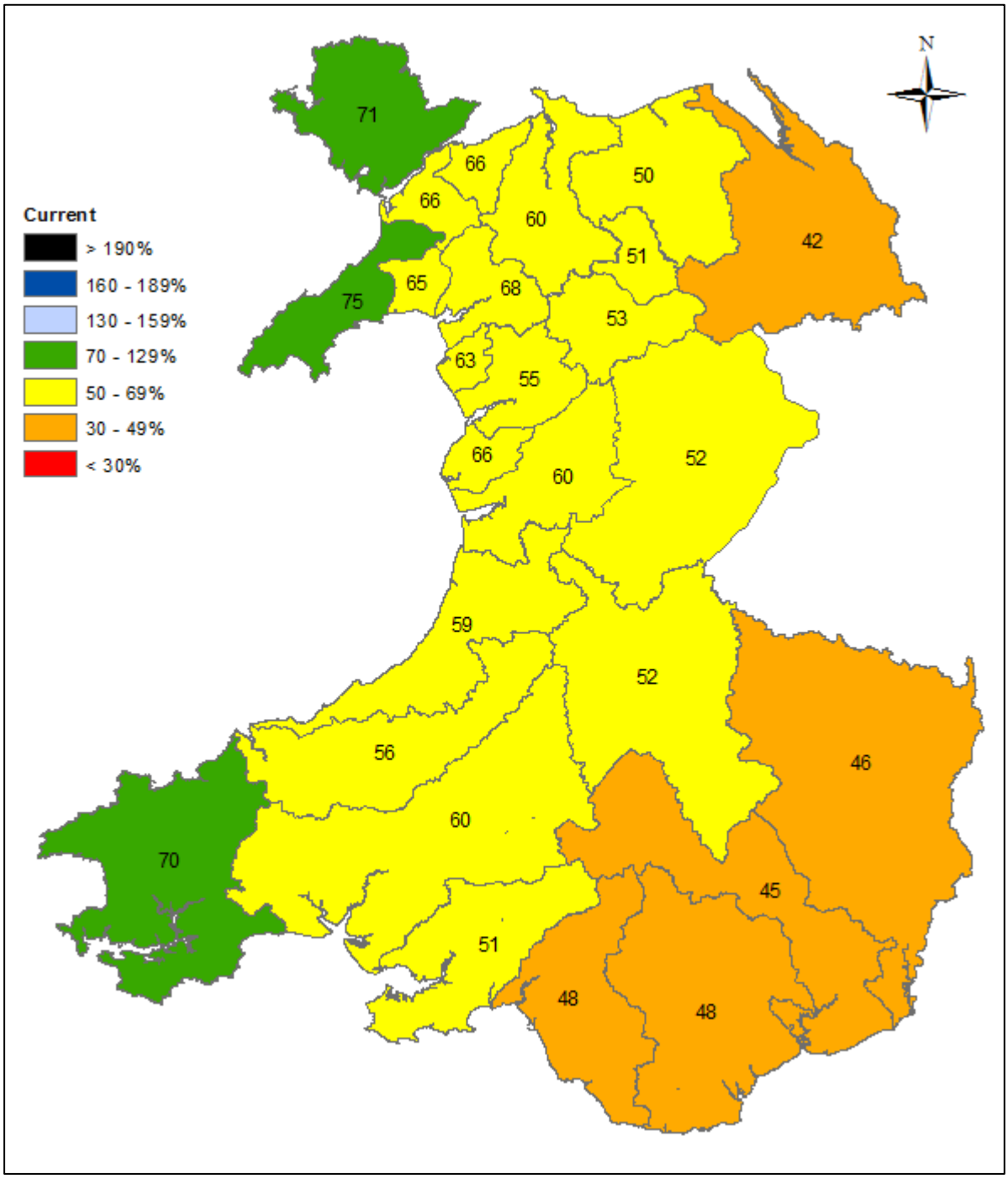
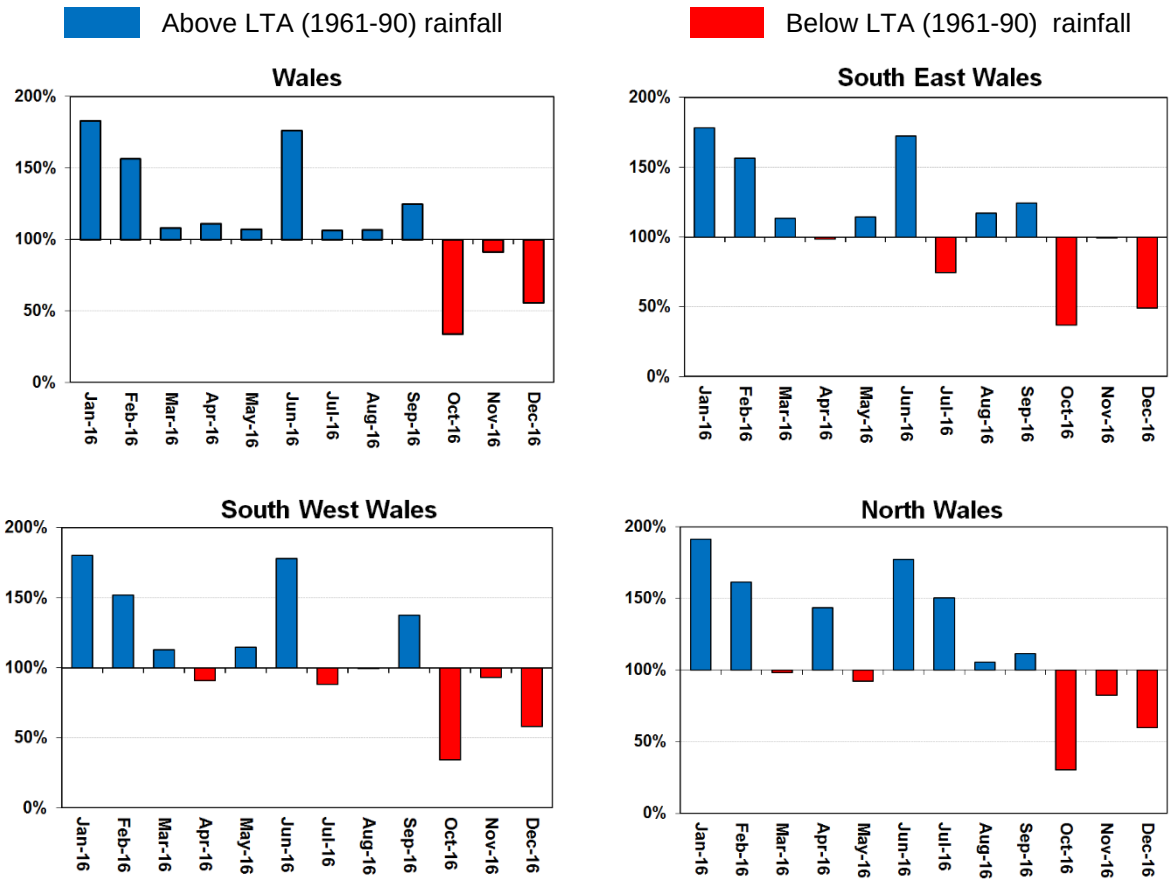


Figure 2: Calculated catchment average December rainfall totals as a percentage of the 1961-90 December long term average for Natural Resources Wales catchments, using NCIC (National Climate Information Centre) data (*Source: Met Office © Crown Copyright).*

Return to Summary

Rainfall Charts

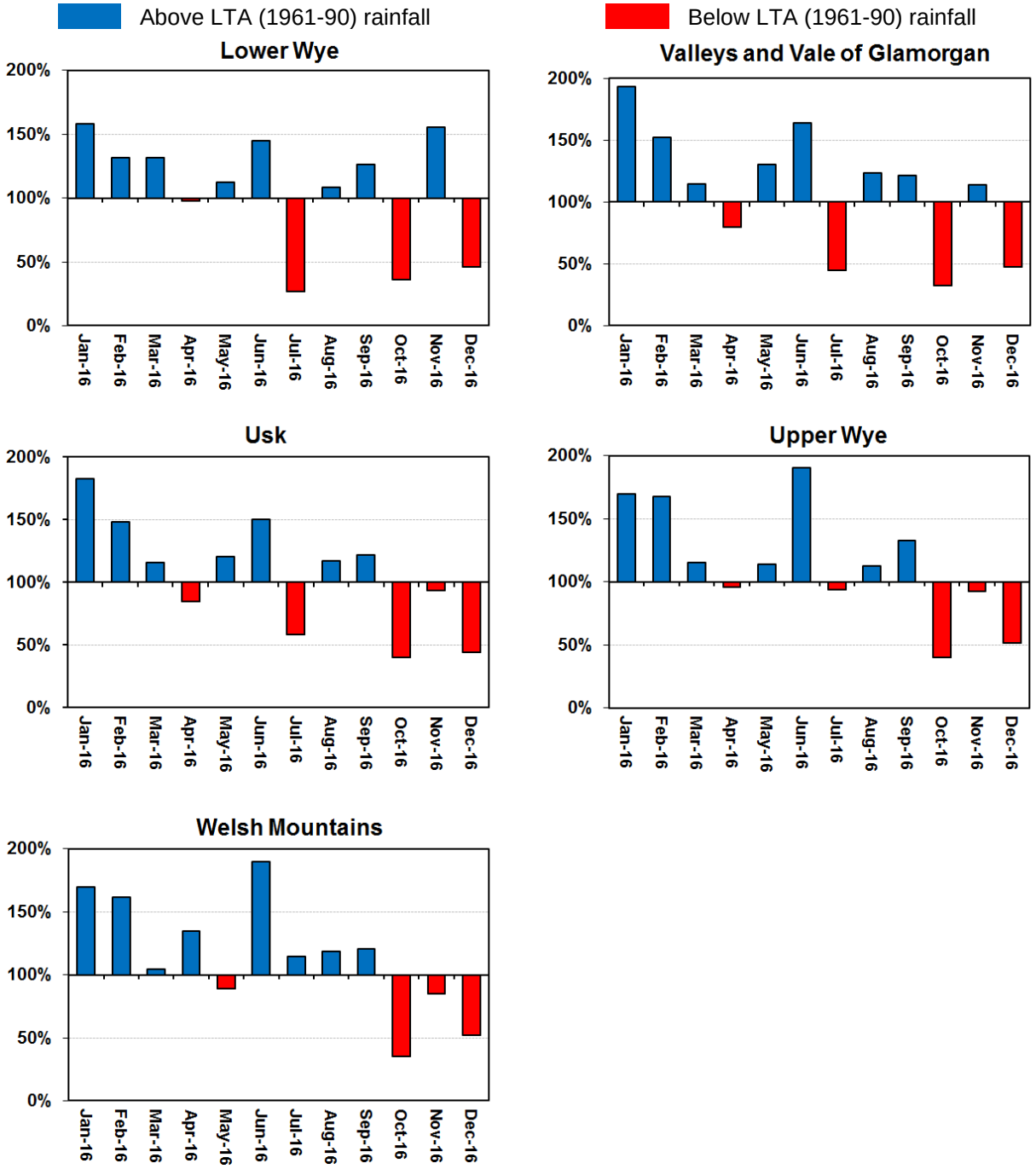
Figure 3: Rainfall Charts: National and Areas



Comparison of monthly rainfall totals to the 1961-90 long term average expressed as percentage for Natural Resources Wales and Areas, using NCIC (National Climate Information Centre) data *(Source: Met Office © Crown Copyright).*

Return to Summary

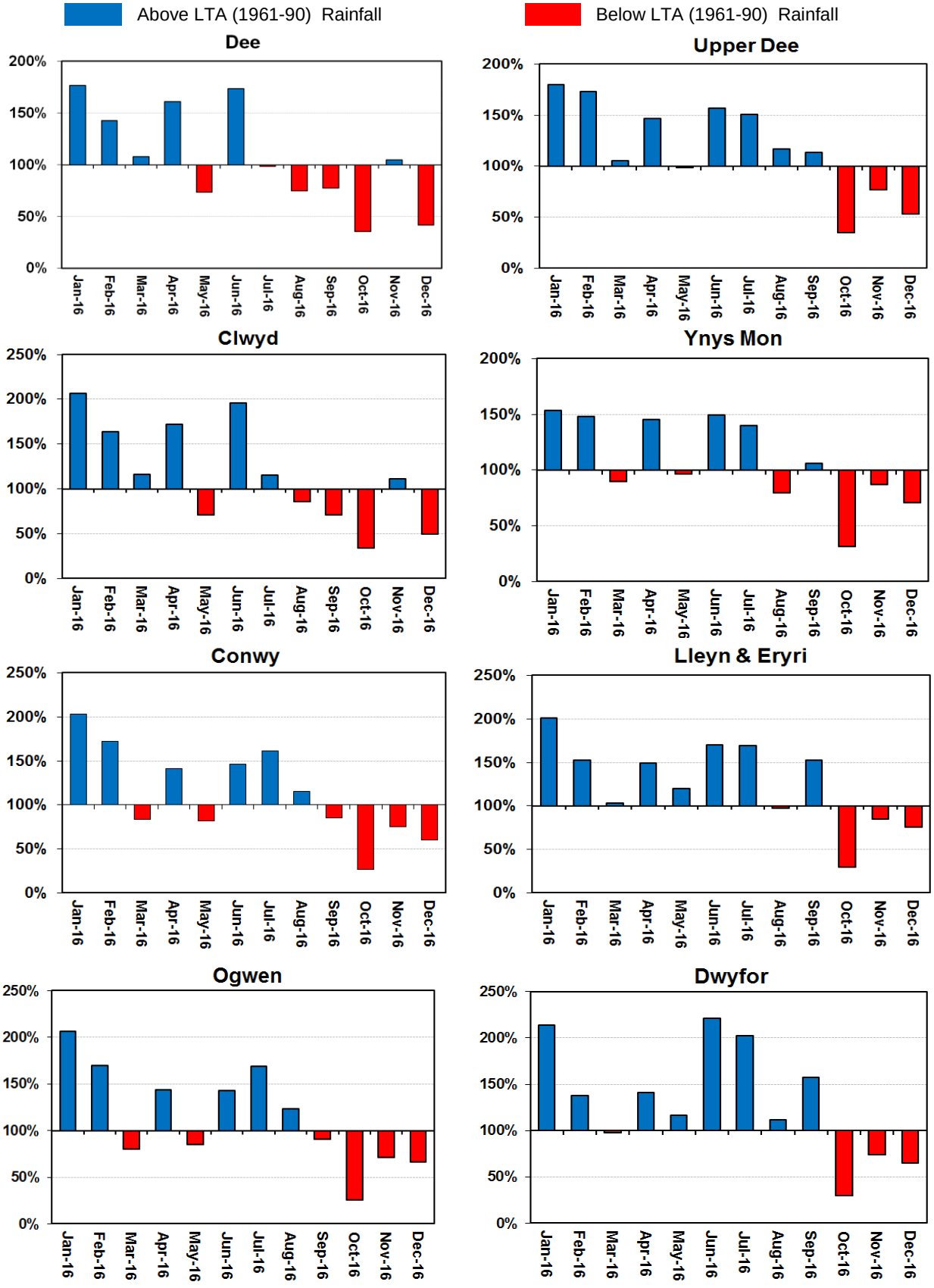
Figure 4: Rainfall Charts: South East Wales



Comparison of monthly rainfall totals to the 1961-90 long term average expressed as percentage for South East Wales, using NCIC (National Climate Information Centre) data *(Source: Met Office © Crown Copyright).*

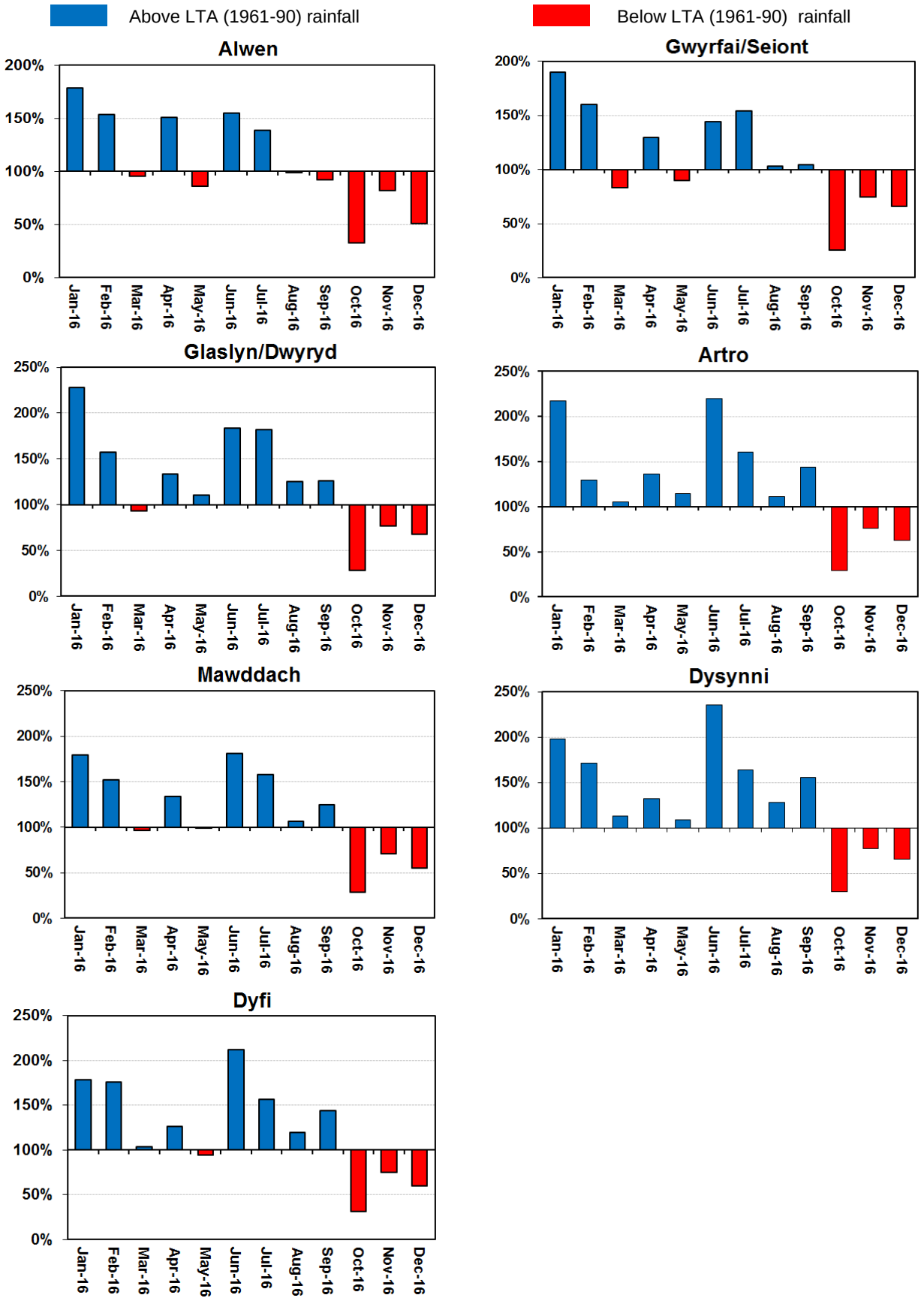
Return to Summary

Figure 5: Rainfall Charts: North Wales



Comparison of monthly rainfall totals to the 1961-90 long term average expressed as percentage for North Wales, using NCIC (National Climate Information Centre) data *(Source: Met Office © Crown Copyright).*

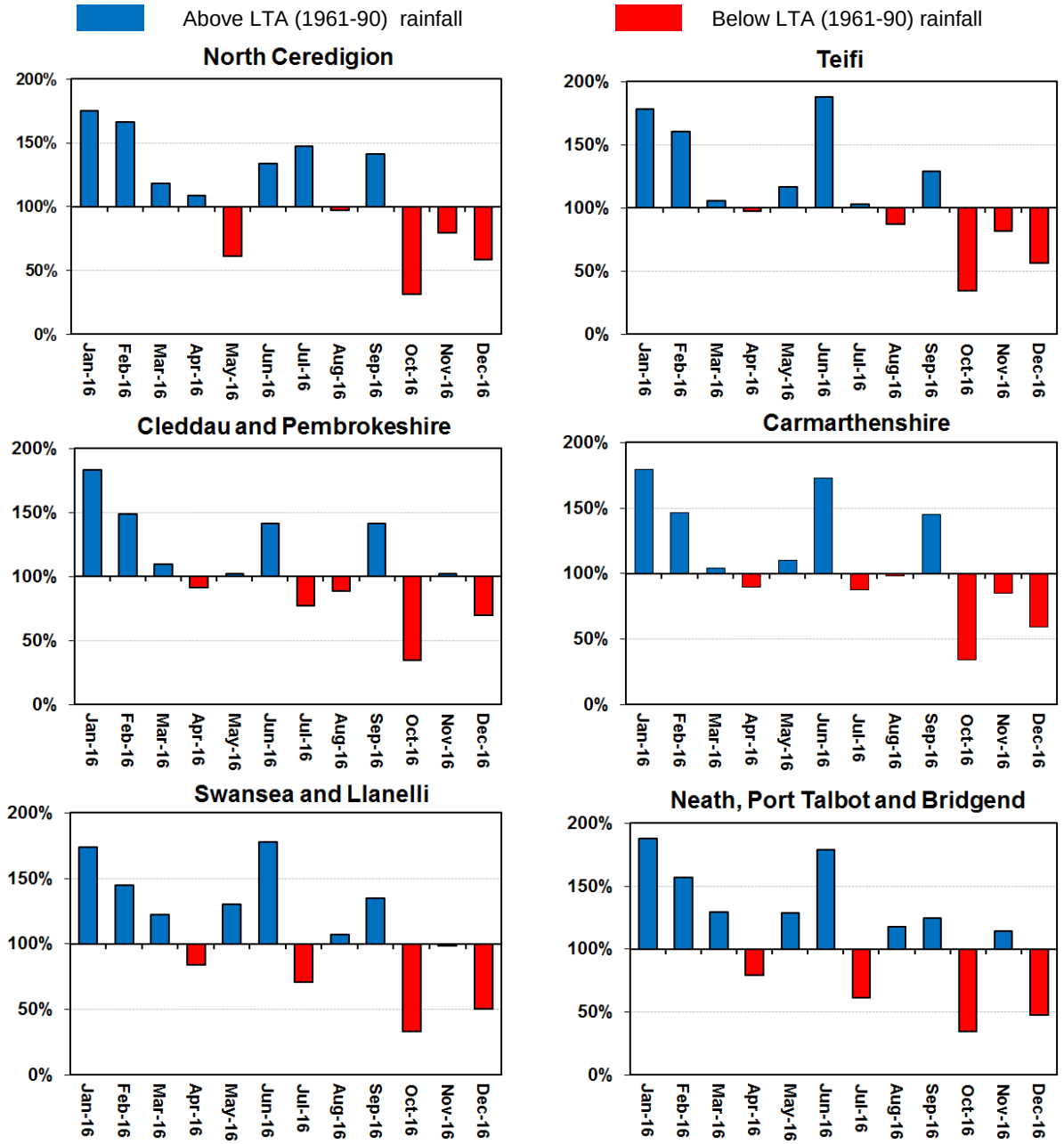
Return to Summary



Comparison of monthly rainfall totals to the 1961-90 long term average expressed as percentage for North Wales, using NCIC (National Climate Information Centre) data *(Source: Met Office © Crown Copyright).*

Return to Summary

Figure 6: Rainfall Charts: South West Wales



Comparison of monthly rainfall totals to the 1961-90 long term average expressed as percentage for South West Wales, using NCIC (National Climate Information Centre) data *(Source: Met Office © Crown Copyright).*

Return to Summary

Soil Moisture Deficit (SMD)

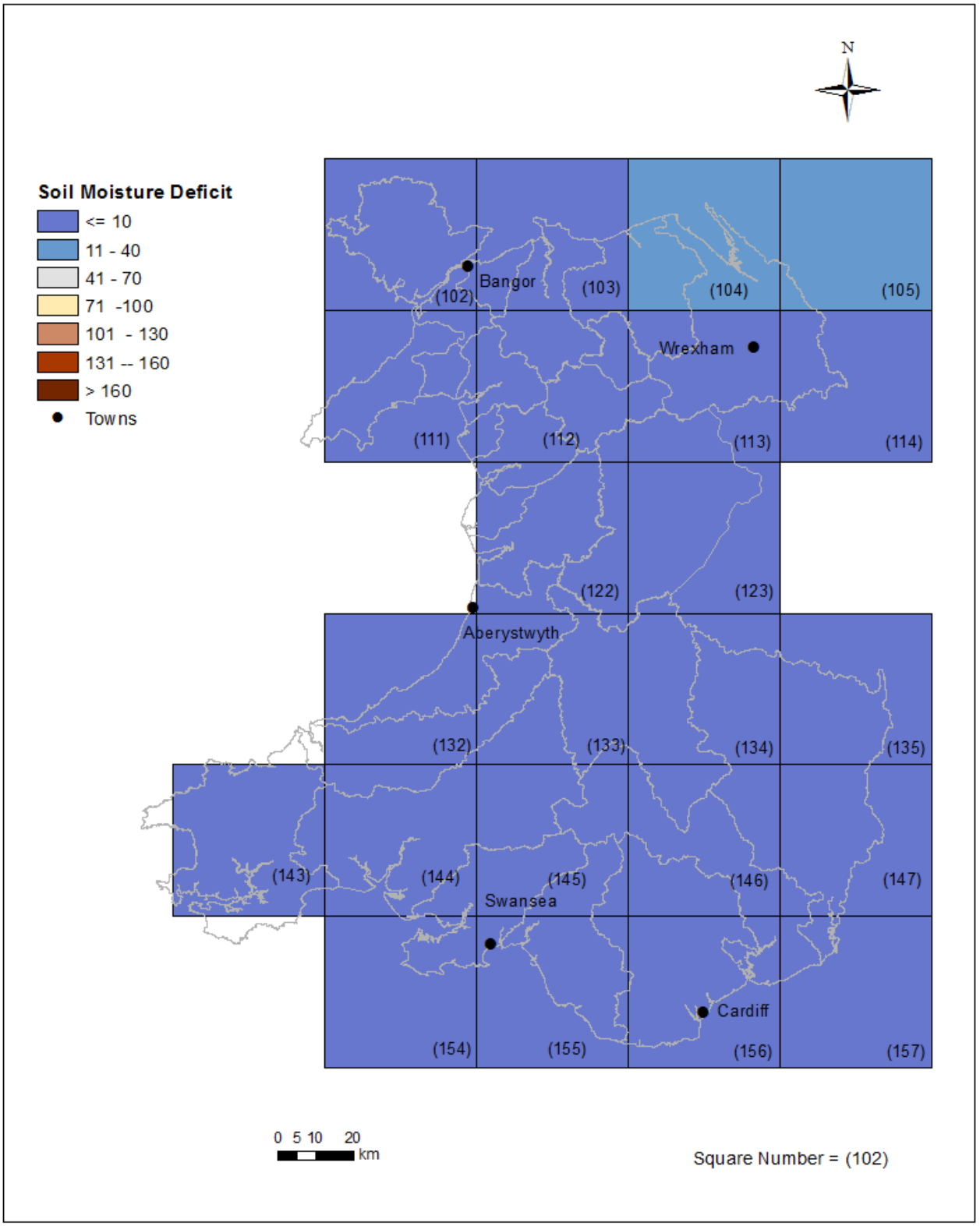


Figure 7: MORECS soil moisture deficits (mm) for December for real land use for Natural Resources Wales *(Source: Met Office © Crown Copyright).*

Return to Summary

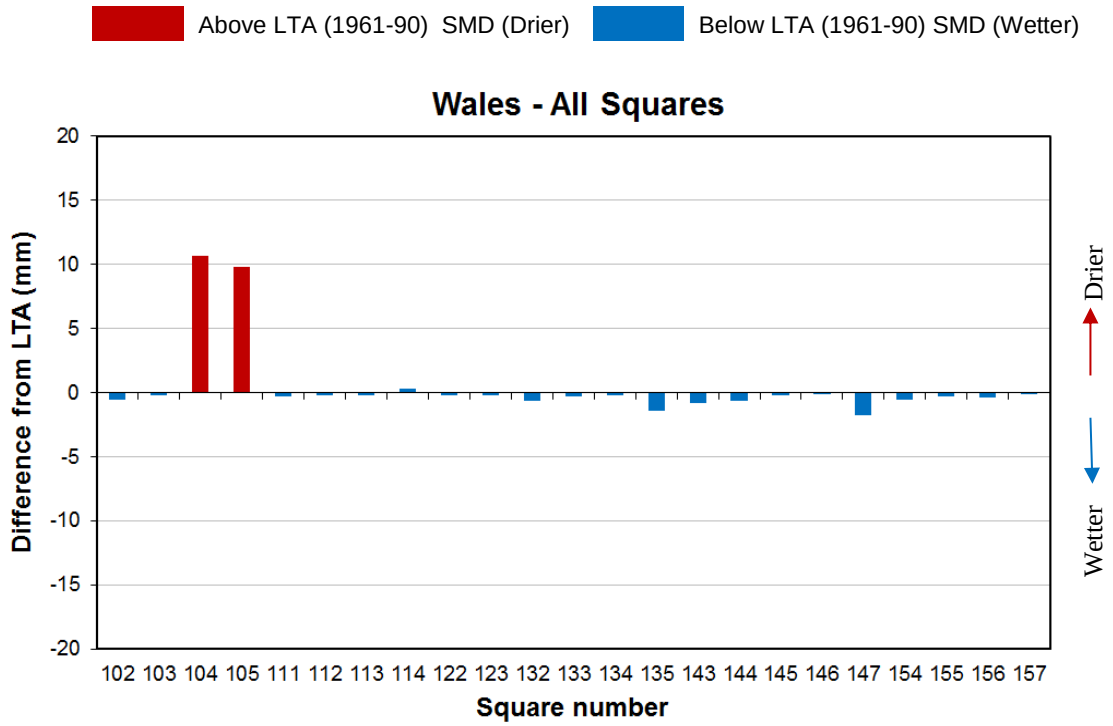


Figure 8: MORECS month end soil moisture deficits difference (mm) from the 1961-90 long term monthly average (LTA) for July for real land use for Natural Resources Wales squares (*Source: Met Office © Crown Copyright*).

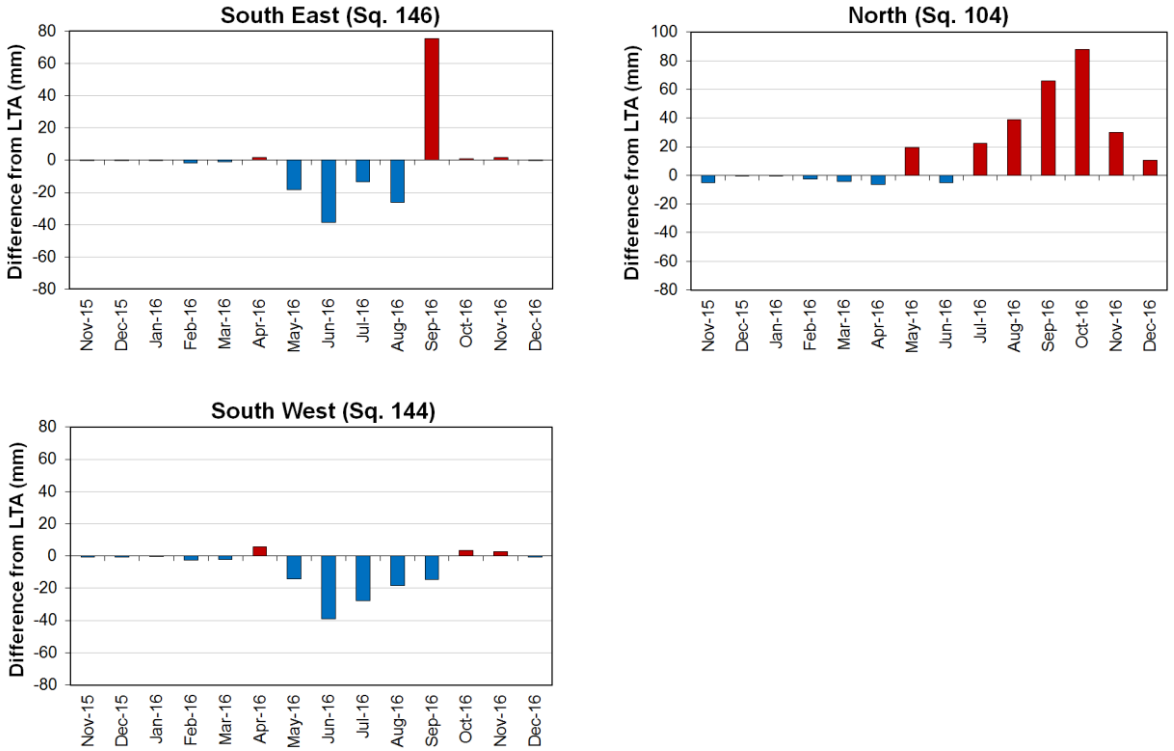


Figure 9: MORECS month end soil moisture deficit difference (mm) from the 1961-90 long term monthly average (LTA) for real land use for South East, North and South West (*Source: Met Office © Crown Copyright*). (Note: no LTA available for Natural Resources Wales)

Return to Summary

River Flow

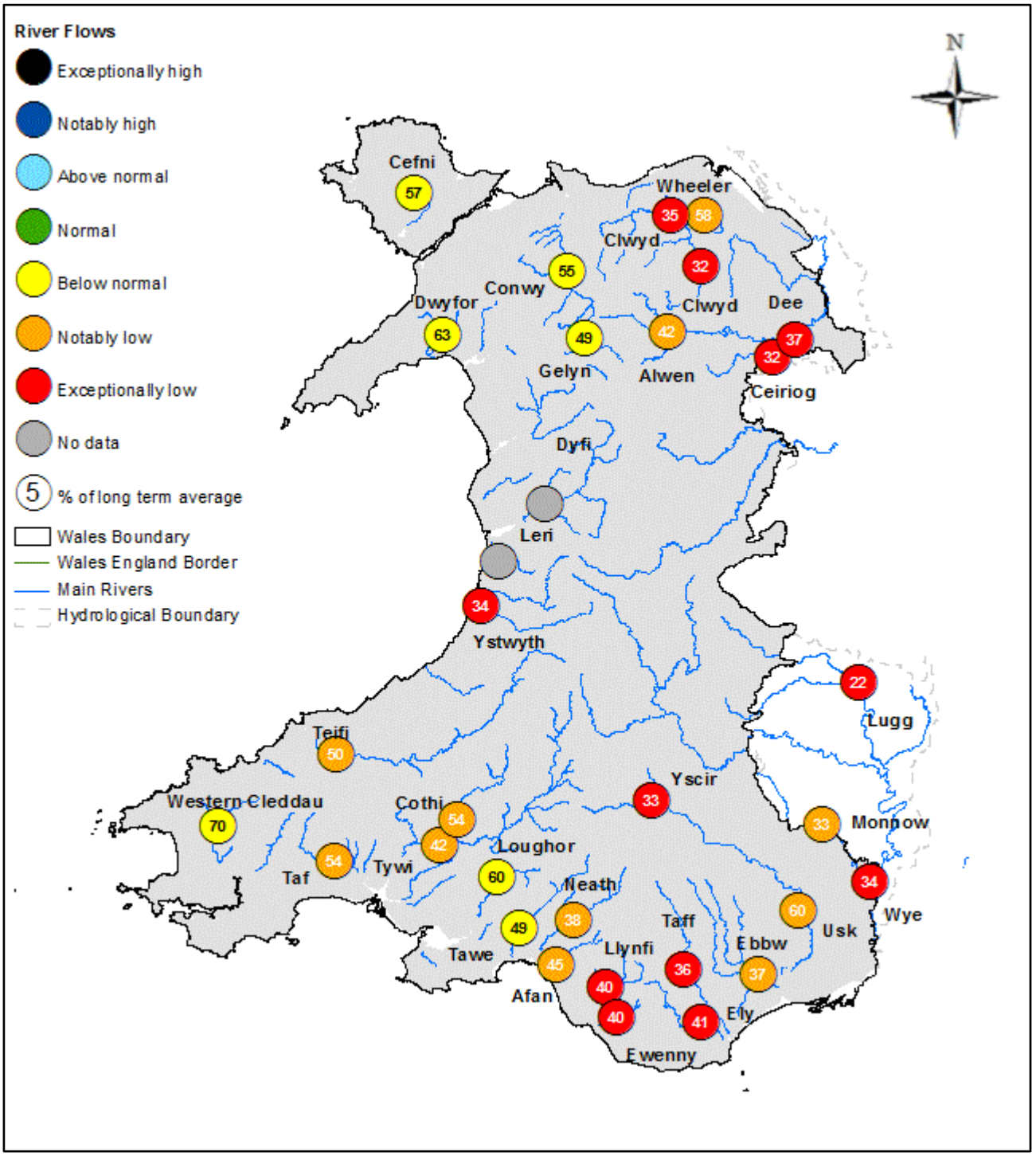


Figure 10: Monthly mean river flow for December, classed relative to analysis of historic December monthly means *(Source: Natural Resources Wales).*

Return to Summary

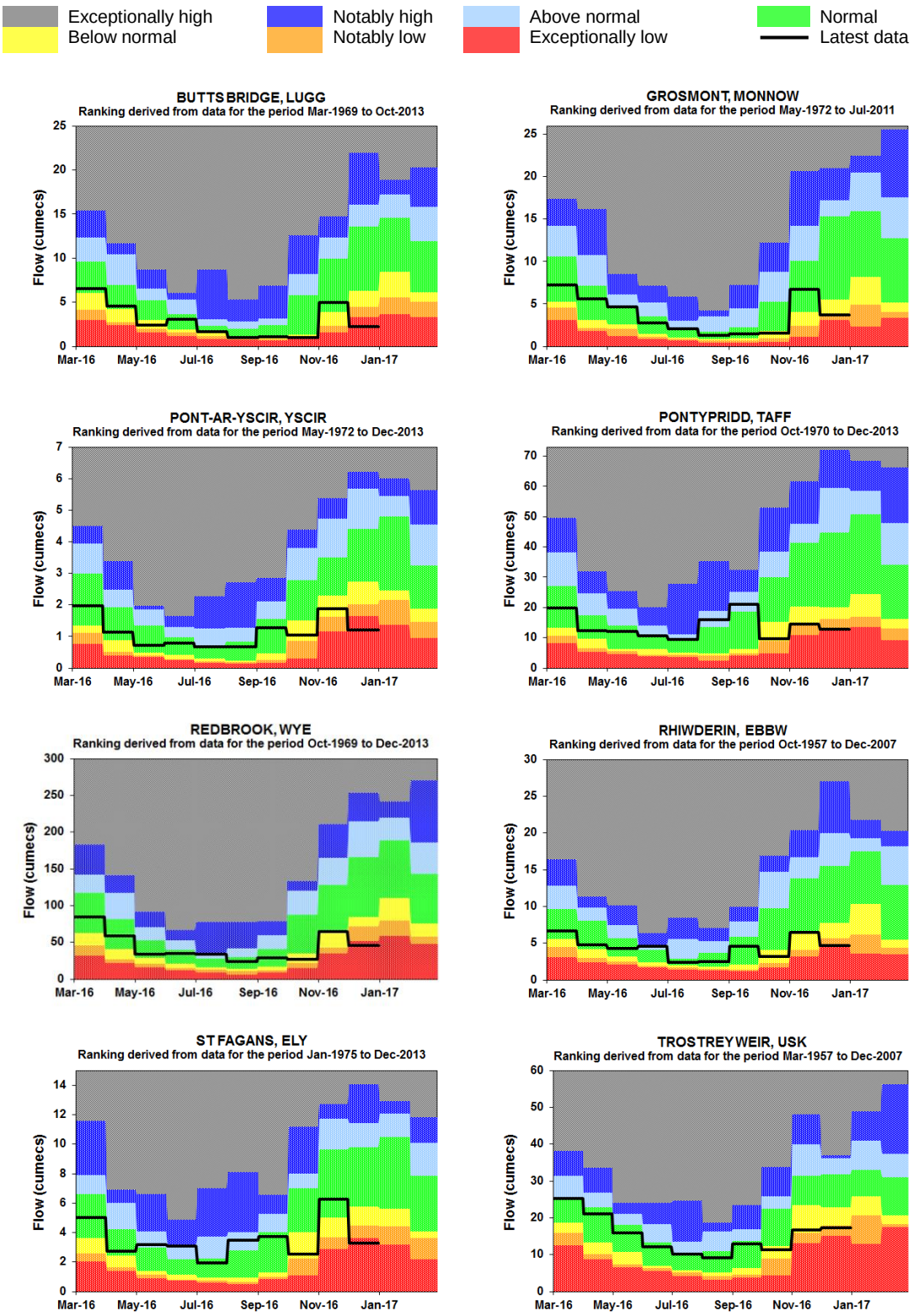
SITE NAME	RIVER	December 2016			December 2015		December LTA		
		Class	% of LTA	Flow (m3/s)	% of LTA	Flow (m3/s)	LTA	Monthly Min (m3/s)	Monthly Max (m3/s)
River Flow Sites : South East Area									
Butts Bridge	Lugg	Exceptionally low	22%	2.28	170%	17.44	10.25	2.96	27.40
Grosmont	Monnow	Notably low	33%	3.68	122%	13.60	11.12	1.45	31.00
Pont ar Yscir	Yscir	Exceptionally low	33%	1.200	187%	6.810	3.65	1.05	6.77
Pontypridd	Taff	Exceptionally low	36%	12.90	240%	86.40	35.94	8.79	77.50
Redbrook	Wye	Exceptionally low	34%	45.50	189%	254.00	134.57	36.50	305.00
Rhiwderin	Ebbw	Notably low	37%	4.72	206%	26.10	12.93	3.34	29.40
St Fagans	Ely	Exceptionally low	41%	3.29	180%	14.40	7.98	2.76	15.70
Trostrey Weir	Usk	Notably low	60%	17.20	411%	118.01	28.68	14.11	94.50
River Flow Sites : North Area									
Bodfari	Wheeler	Notably low	58%	0.63	121%	1.32	1.09	0.34	2.25
Bodffordd	Cefni	Below normal	57%	0.50	315%	2.77	0.88	0.27	1.38
Brynkinalt Weir	Ceiriog	Exceptionally low	32%	1.77	192%	10.70	5.57	1.45	14.50
Cwmlanerch	Conwy	Below normal	55%	17.70	324%	104.00	32.11	7.58	66.80
Cynefail	Gelyn	Below normal	49%	0.57	283%	3.31	1.17	0.36	2.33
Dol y Bont	Leri						2.60	1.11	4.39
Druid	Alwen	Notably low	42%	3.92	276%	25.90	9.37	2.93	19.40
Dyfi bridge	Dyfi						41.16	7.50	88.30
Garndolbenmaen	Dwyfor	Below normal	63%	2.54	262%	10.63	4.05	1.47	6.61
Manley Hall	Dee	Exceptionally low	37%	20.10	240%	129.00	53.66	18.30	105.00
Pont y Cambwll	Clwyd	Exceptionally low	35%	4.33	243%	29.65	12.20	3.83	25.40
Ruthin Weir	Clwyd	Exceptionally low	32%	0.98	217%	6.62	3.05	0.73	6.15
River Flow Sites : South West Area									
Capel Dewi	Tywi	Notably low	42%	30.10	257%	182.00	70.92	18.60	137.00
Clog y Fran	Taf	Notably low	54%	7.53	220%	31.00	14.06	3.90	25.50
Coytrahen	Llynfi	Exceptionally low	40%	1.44	181%	6.50	3.60	0.98	6.71
Felin Mynachdy	Cothi	Notably low	54%	11.30	276%	57.20	20.76	6.03	41.80
Glanteifi	Teifi	Notably low	50%	27.30	242%	132.00	54.57	16.70	105.00
Keepers Lodge	Ewenny	Exceptionally low	40%	1.19	150%	4.52	3.01	1.15	5.99
Marcroft	Afan	Notably low	45%	3.54	178%	14.10	7.94	1.92	13.50
Pont Llolwyn	Ystwyth	Exceptionally low	34%	3.74	209%	23.10	11.07	2.22	22.60
Treffgarne *	Western Cleddau	Below normal	70%	4.690			6.73	2.25	11.51
Resolven	Neath	Notably low	38%	6.15	224%	36.30	16.20	2.90	30.40
Tir-y-Dail	Loughor	Below normal	60%	2.14	234%	8.30	3.54	1.20	6.41
Ynystanglws	Tawe	Below normal	49%	9.59	249%	48.40	19.40	3.93	43.70

Figure 11: Monthly mean river flow for December with comparison against previous year expressed as a percentage of the December long term average and classed relative to analysis of historic December monthly means. *(Source: Natural Resources Wales).* (* For Treffgarne station the LTAs were derived using scaled historical flows (1965-2003) from the downstream station at Prendergast Mill.)

Return to Summary

River Flow Charts

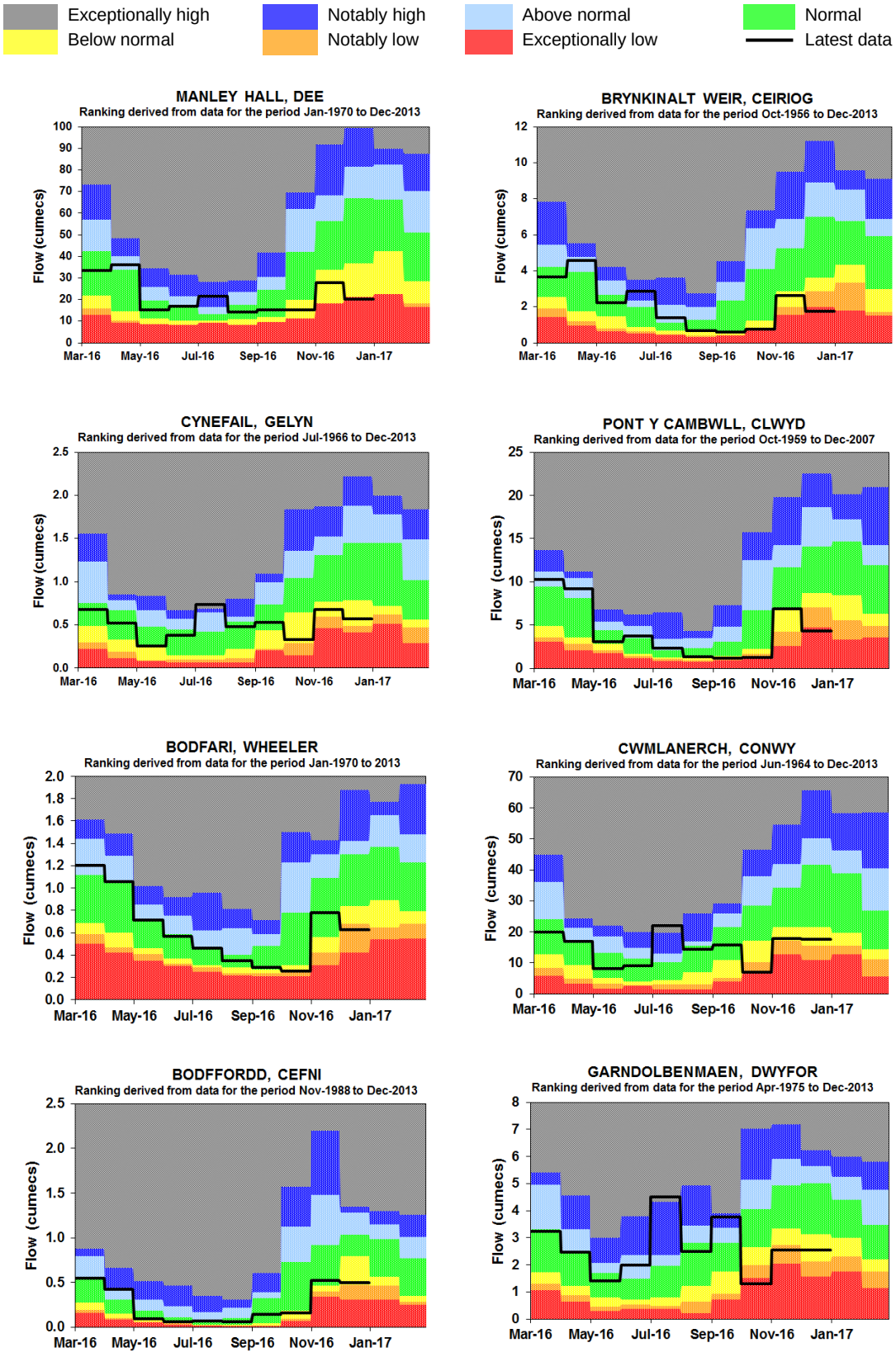
Figure 12: River Flow Charts: South East Wales



Monthly mean river flows for the last 10 months classed relative to the analysis of historic river levels (*Source: Natural Resources Wales*).

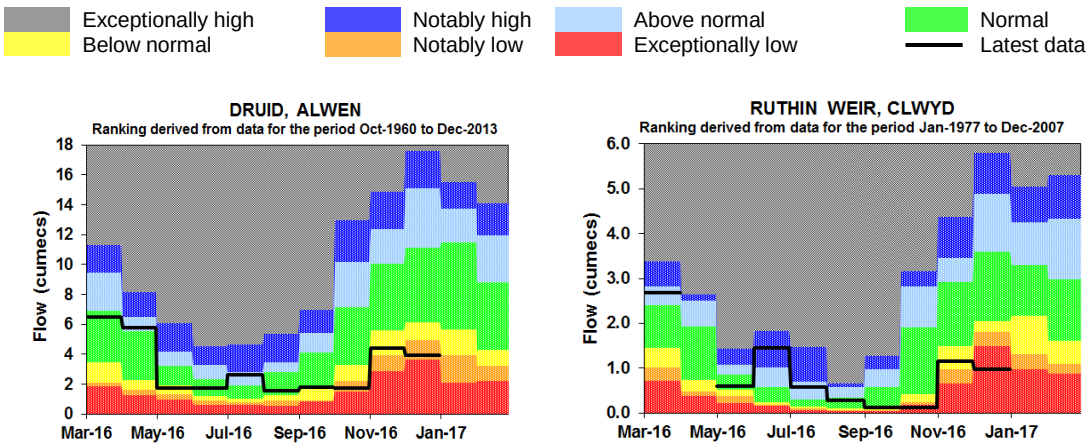
Return to Summary

Figure 13: River Flow Charts: North Wales



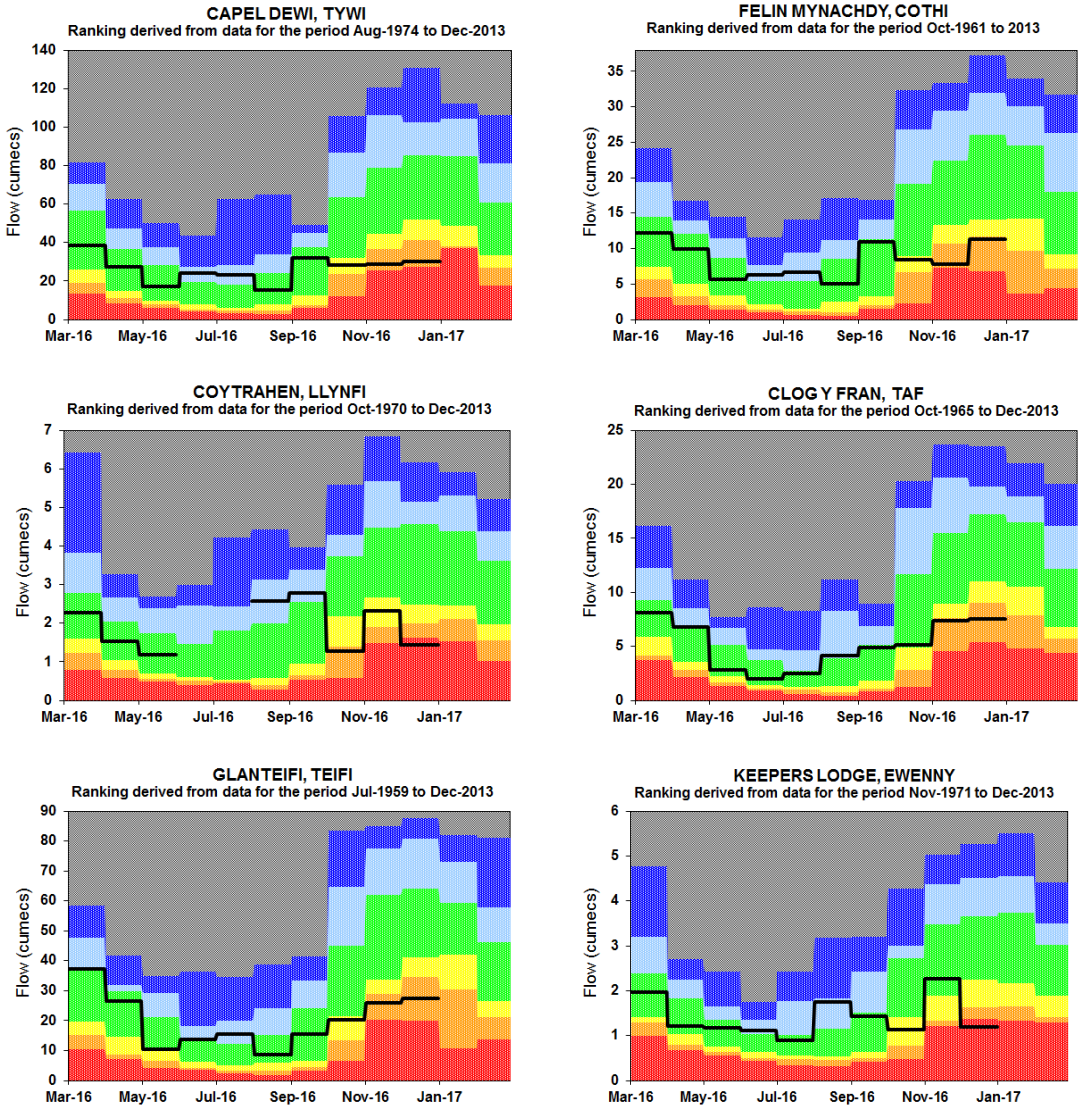
Monthly mean river flows for the last 10 months classed relative to the analysis of historic river levels (*Source: Natural Resources Wales*).

Return to Summary



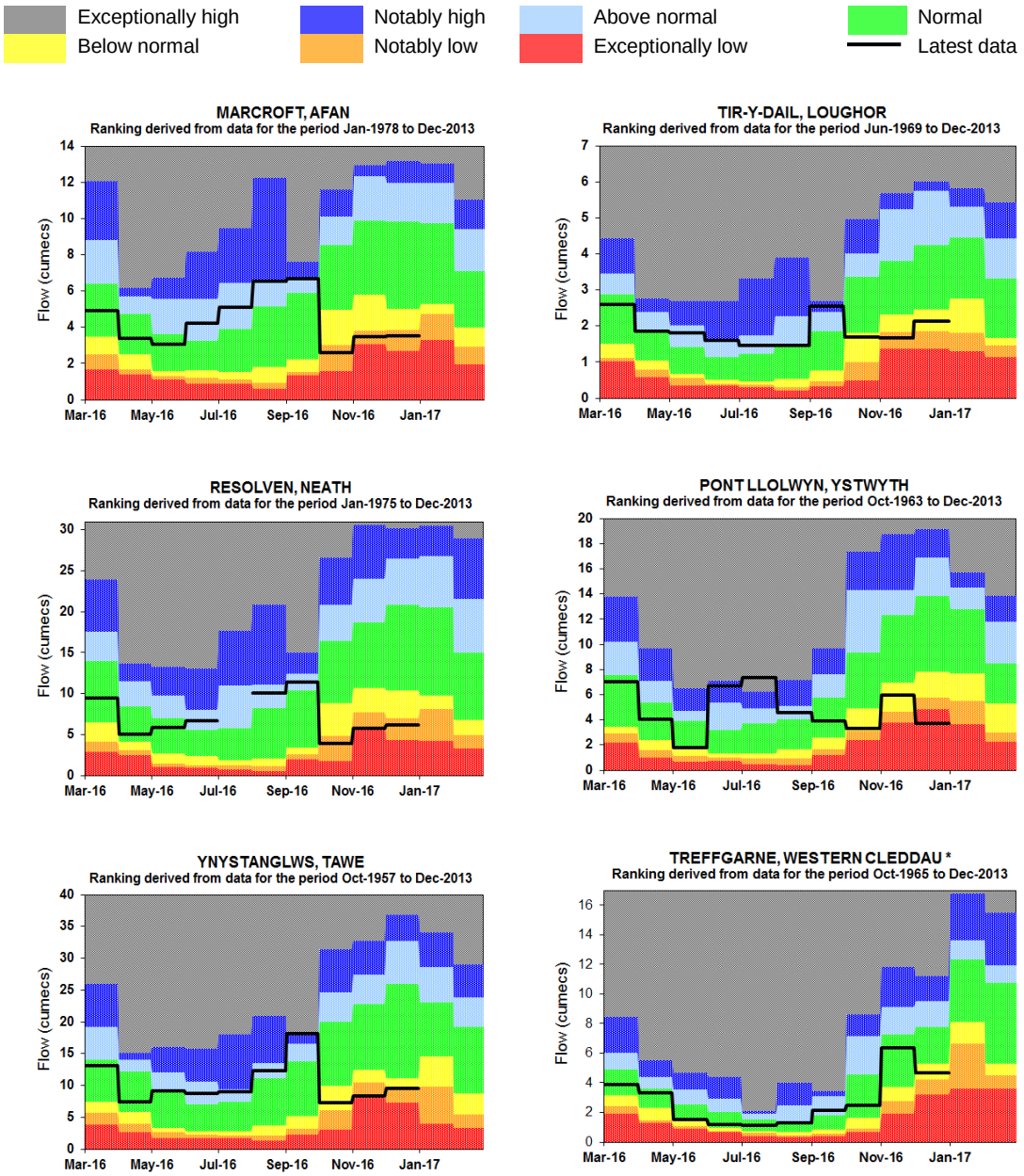
(Please note there was no data available at Ruthin Weir for April 2016

Figure 14: River Flow Charts: South West Wales



(Please note that there was no data for Coytrahen for June and July 2016 due to the river works)

Return to Summary



Monthly mean river flows for the last 10 months classed relative to the analysis of historic river levels. *(Source: Natural Resources Wales).*

(* Please note that for Treffgarne station the ranking bands were derived using scaled historical flows (1965-2003) from the downstream station at Prendergast Mill. There were no data for Resolven for July 2016 due to river works)

Return to Summary

Groundwater Levels

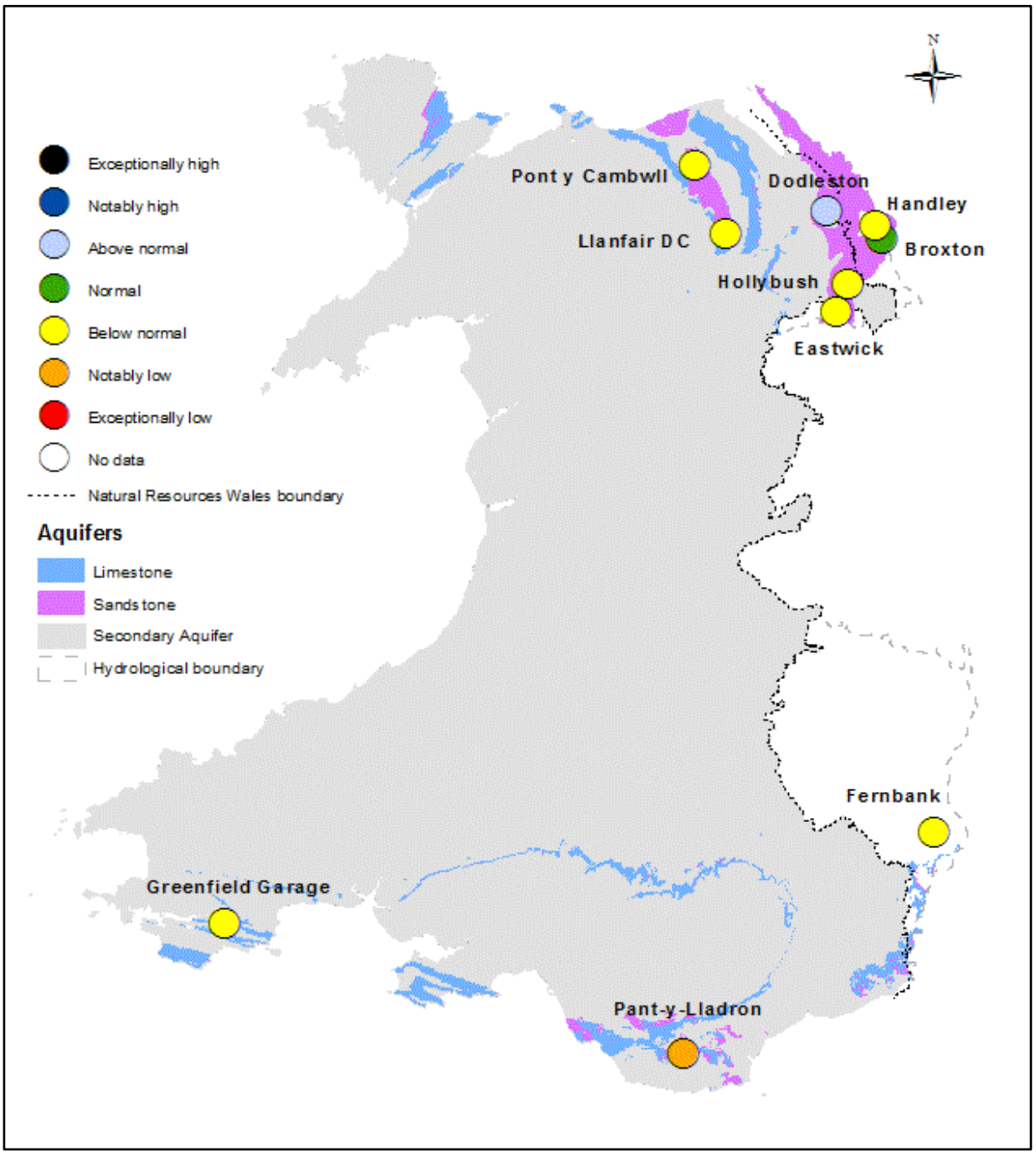
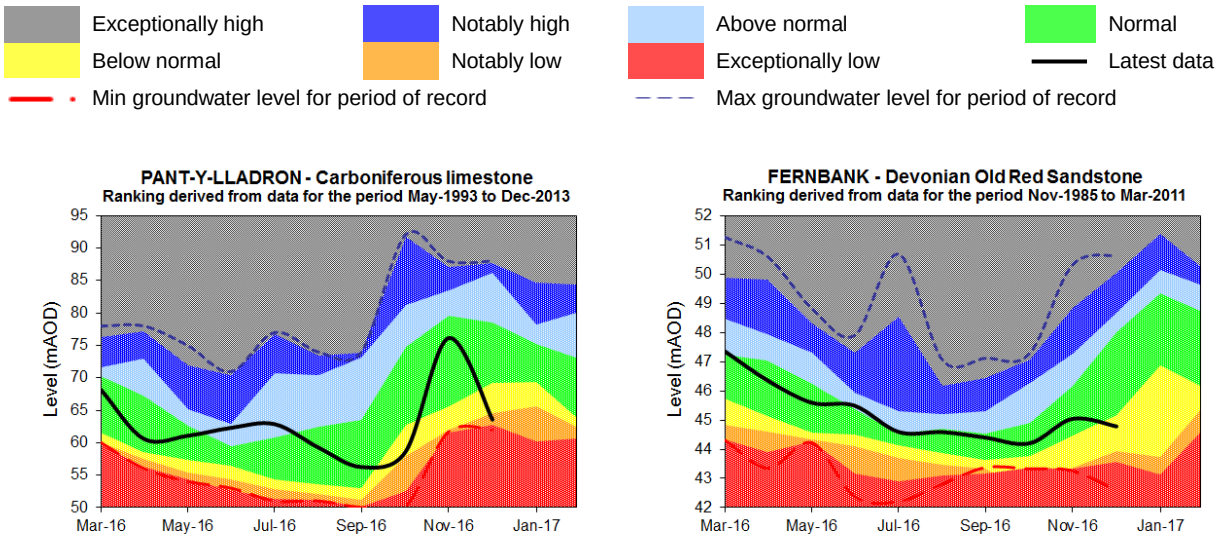


Figure 15: Groundwater levels at the end of month classed relative to an analysis of historic December groundwater levels *(Source: Natural Resources Wales and Environment Agency).*

Return to Summary

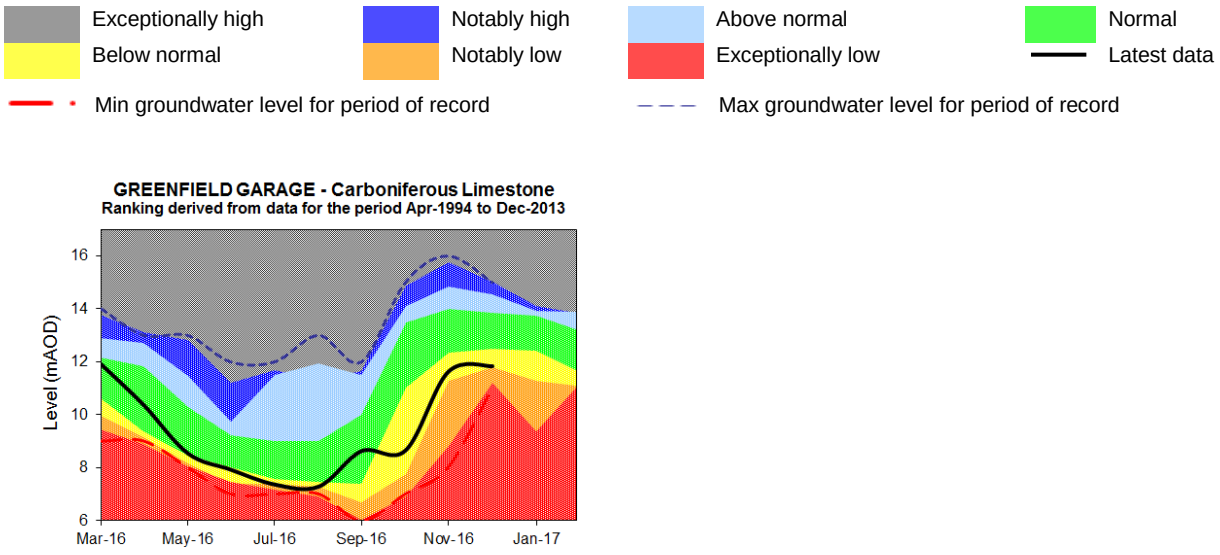
Groundwater charts

Figure 16: Groundwater level charts: South East Wales



End of month groundwater levels for the past 10 months for index sites *(Source: Natural Resources Wales).*

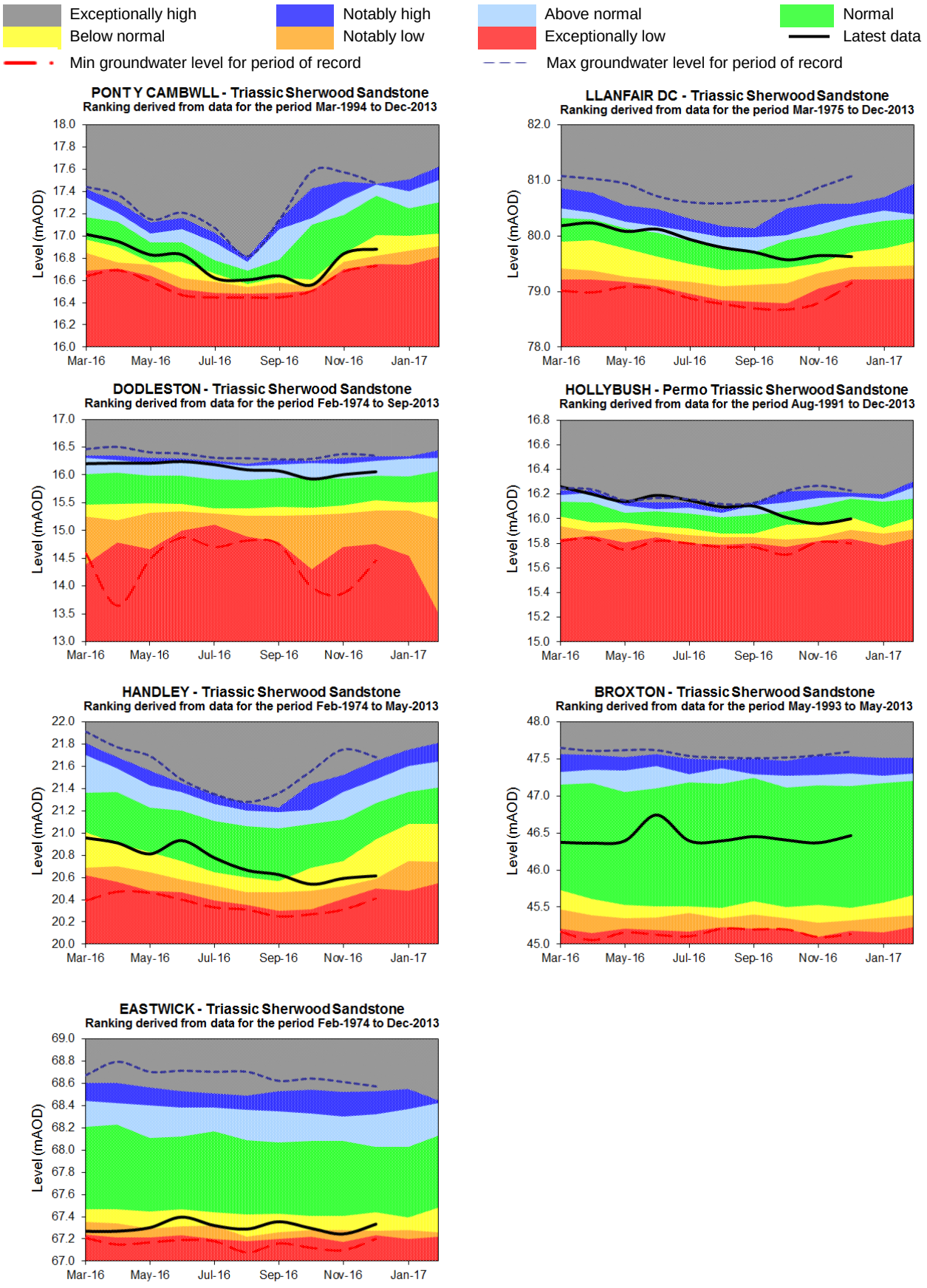
Figure 17: Groundwater level charts: South West Wales



End of month groundwater levels for the past 10 months for index sites *(Source: Natural Resources Wales).*

Return to Summary

Figure 18: Groundwater level charts: North Wales

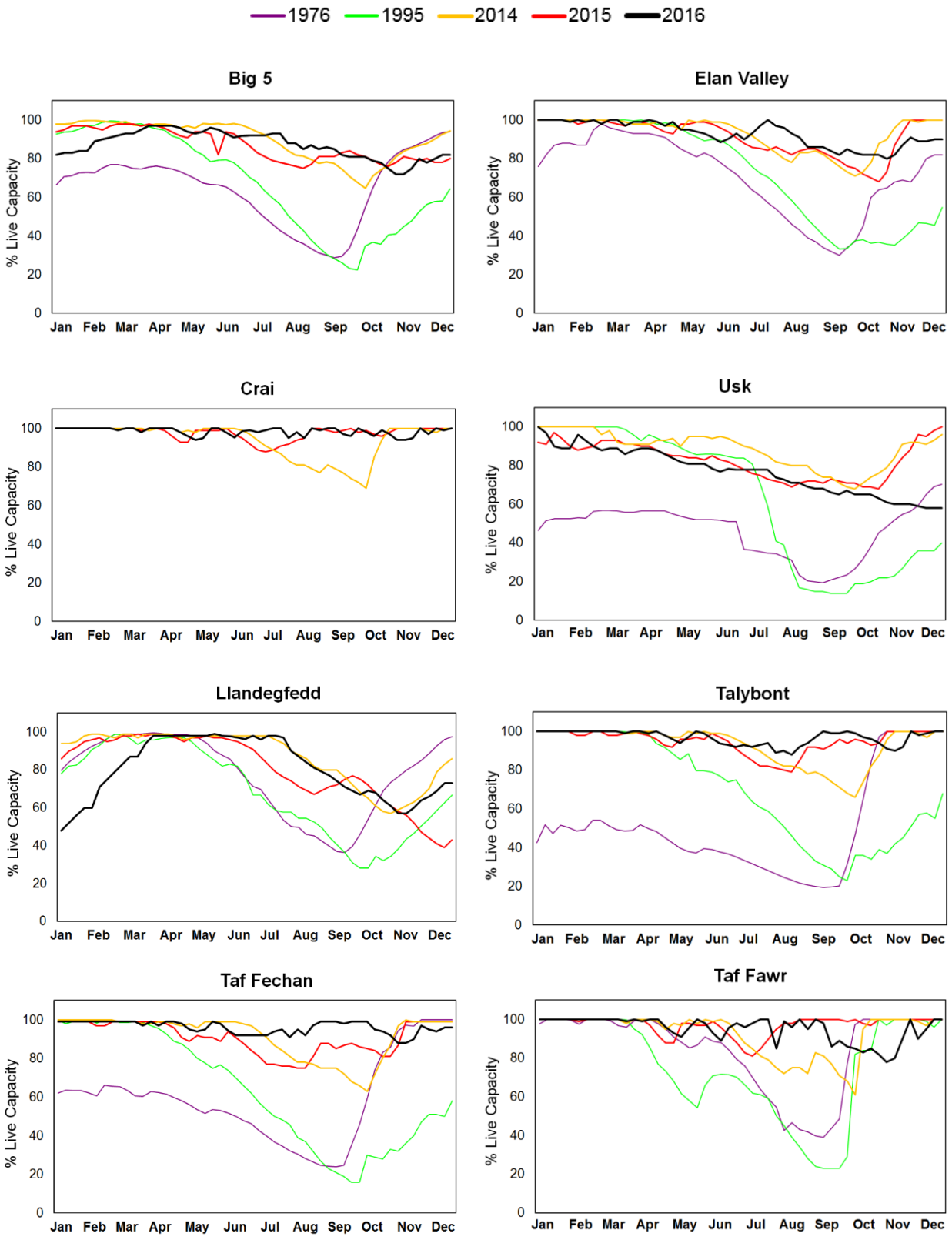


End of month groundwater levels for the past 10 months for index sites *(Source: Natural Resources Wales and Environment Agency)*.

Return to Summary

Reservoir Storage

Figure 19: Reservoir charts: South East Wales

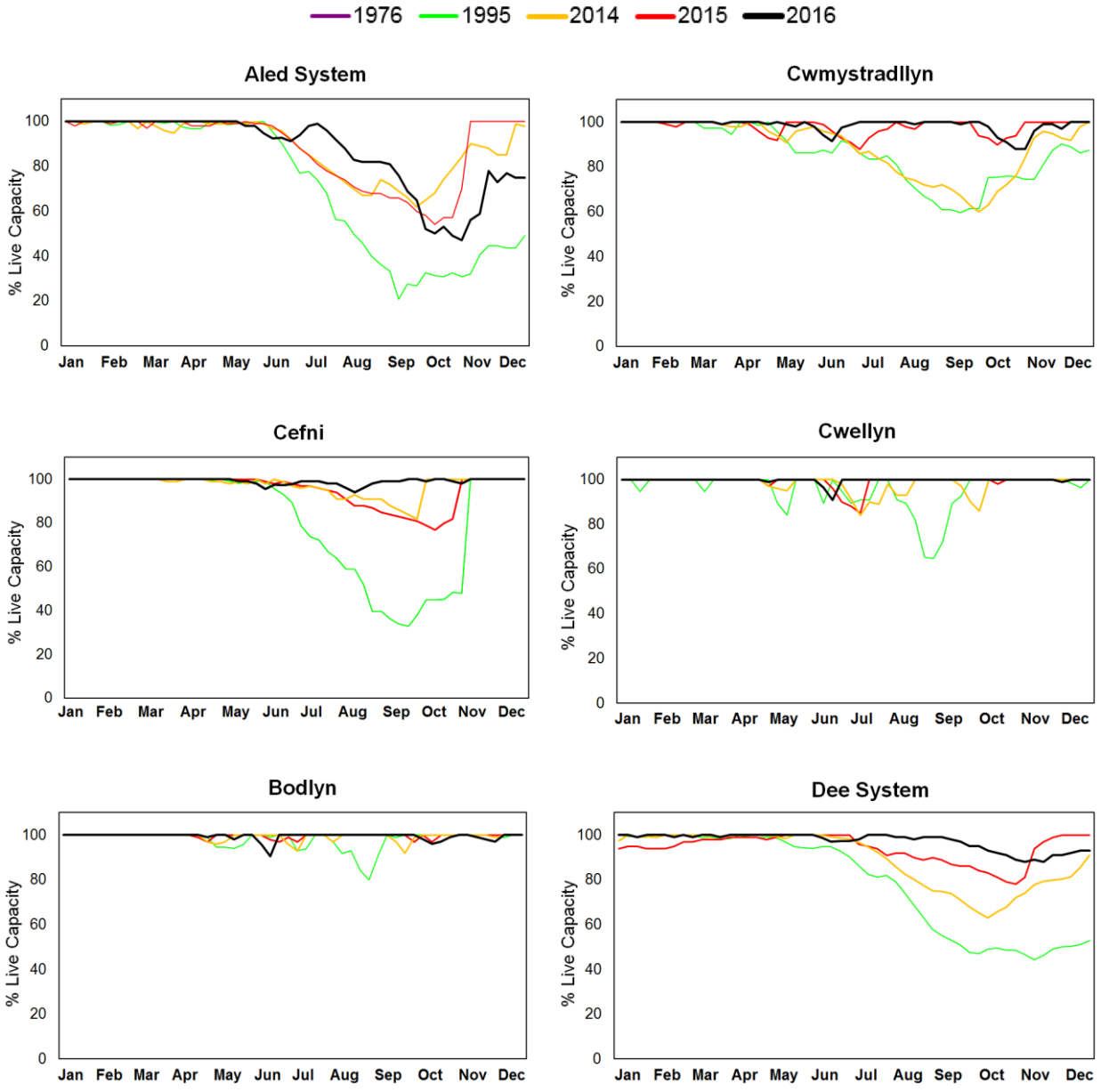


Weekly reservoir stocks for Natural Resources Wales index sites *(Source: Welsh Water)*

(Please note that the reservoirs Llandegfedd stock (64%) and Usk stock (60%) were low at the end of December due to maintainance work being carried out on these reservoirs)

Return to Summary

Figure 20: Reservoirs charts: North Wales

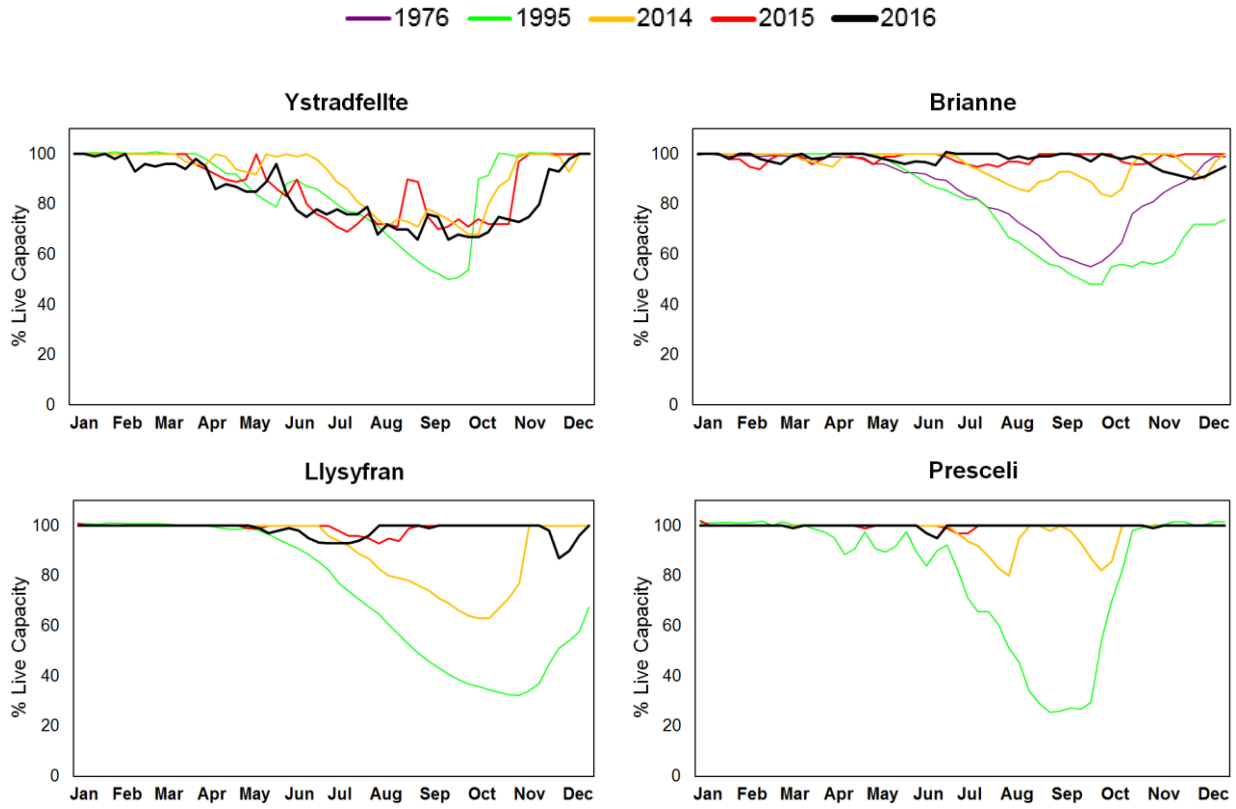


Weekly reservoir stocks for Natural Resources Wales index sites *(Source: Welsh Water).*

(Please note that the reservoir Aled system stock was low (78%) at the end of December due to maintainance work being carried out on this reservoir)

Return to Summary

Figure 21: Reservoirs charts: South West Wales



Weekly reservoir stocks for Natural Resources Wales index sites (*Source: Welsh Water*).
(Please note that the reservoir Ystradfelite stock was low (68%) at the end of December due to maintainance work carried out on this reservoir)

Return to Summary

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).
Effective rainfall	The rainfall available to percolate into the soil or produce river flow. Expressed in depth of water (mm).
Groundwater	The water found in an aquifer
Meteorological Office Rainfall and Evaporation Calculating System (MORECS)	The Met Office provides climate data for grid squares measuring 40km by 40km across the UK using MORECS
Recharge	The process of increasing the water stored in the saturated zone of an aquifer. Expressed in depth of water (mm).
Reservoir live capacity	The reservoir capacity normally usable for storage to meet established reservoir operating requirements. It is the total capacity less that not available because of operating agreements or physical restrictions. Only under abnormal conditions, such as a severe water shortage might this additional water be extracted.
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

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

cumecs	Cubic metres per second ($m^3 s^{-1}$)
mAOD	Metres Above Ordnance Datum (mean sea level at Newlyn Cornwall).