NRFA & NGLA 30th Anniversary

Hydrometric Data: The Long View

Measuring Authority
Coal-Face to Archive

22nd October 2013
CEH Wallingford

Richard Brown, Head of Hydrology
Interaction with NRFA

Mutual Benefits

Reflections
Service Level Agreement
Interaction with NRFA
Mutual Benefits
Reflections
“According to this, the gauging station ought to be about here!!”

Liaison Visits and Data Audits
Hydrological Summary for the United Kingdom

General

Synoptic patterns across most of the country during September were typically autumnal but monthly rainfall totals were generally modest, mostly 50-80% of average, contributing to significant rainfall deficiencies in the June-September timeframe. There were a few notable storm events and some isolated flood alerts, mostly in mid-month, but with recoveries then re-established, rainfall rates in many catchments were seasonally depressed, especially in October. Reservoir replenishment since May has been below average and late-September stocks were notably below average in a number of, mostly southern, improvements. For England & Wales as a whole reservoir stocks remain healthy (almost substantially below the record levels of September 2013) but spatial variations are considerable. Seasonally moderated stocks characteristic parts of southern England and eastern Scotland. Despite groundwater recession now extending for at least seven months in the most responsive aquifers, groundwater levels generally remain close to the early autumn average. Whilst the overall water resource situation is healthy, the notably high soil moisture deficits at month-end (reflecting similar conditions in 2009 and 2011) across much of Lowland imply a significant delay in the seasonal recovery of river flows and any over the coming three months, it is unlikely that soils will approach an A type management. There is an increased likelihood of low late-summer flows of the 2013/14 aquifer recharge season.

Rainfall

After a dry and warm start to September, cyclonic conditions brought locally torrential downpours later in the month. In the W, 24-hour rainfall totals of 62 mm at Durham and 71 mm at Seamer in Yorkshire were reported, and more extensive heavy rainfall occurred around mid-month. Driven by a vigorous jet stream, a sequence of active frontal systems crossed the UK from the 19th-22nd in north-west Scotland. Chances have persisted in the form of showers and thunderstorms. Persistent fronts occur on Scandinavia, restricted the eastern penetration of further low pressure systems and dry, weather. Persistent showers and precipitation were largely restricted to fog in many locations. Many regions registered September rainfall totals within the 70-80% range but parts of Wales and eastern England (Leicestershire and the East Midlands) were notable dry - precipitation totals fall below 20mm in parts of Hampshire and Lincolnshire. Convective systems contributed to the few areas registering substantially above average September rainfall (e.g. parts of north-east England). For much of the country, September was the fourth successive month registering below average rainfall and, at the national scale, the June-September period was the driest since 2005. Particularly notable rainfall deficiencies characterise parts of north and southern England (in Anglian region it was the driest 21 years). Rainfall deficiencies for 2013 thus far are moderate across much of the UK but water year (October-September) rainfall totals are close to the long-term average.

Groundwater

As much of Britain, deficits in soil moisture have been, in many areas, many weeks in contrast to average levels, and continued into the start of last year. Groundwater levels, a very high level generally in the first half of last year, has now dropped to levels below that of winter. Levels will continue to recover, with some notable re-inflows in February, April and in May. Magnesian limestone and other northern regions to the north generally in

River Flows

River flows were below average throughout 2013, with the exception of the month of March.

Key

- *Drought conditions* are highlighted for the month of March. The percentage of the catchment area experiencing drought conditions is shown.

- *Potential drought conditions* are highlighted for the month of April. The percentage of the catchment area experiencing potential drought conditions is shown.

- *Moderate drought conditions* are highlighted for the month of May. The percentage of the catchment area experiencing moderate drought conditions is shown.

- *Severe drought conditions* are highlighted for the month of June. The percentage of the catchment area experiencing severe drought conditions is shown.

- *Extreme drought conditions* are highlighted for the month of July. The percentage of the catchment area experiencing extreme drought conditions is shown.

- *Recoverable drought conditions* are highlighted for the month of August. The percentage of the catchment area experiencing recoverable drought conditions is shown.

- *Recovery from drought conditions* are highlighted for the month of September. The percentage of the catchment area experiencing recovery from drought conditions is shown.
Web Access

Most popular part!

NRFA

SEPA

x55k access in 2012
Flood Risk Management

National Flood Risk Assessment (2011)

- 125,000 properties
- 1 in 13 businesses
- 1 in 22 homes
Flood Hazard Maps for Scotland

- Dumfries example
- Q200
- Good match with more expensive model
- CEH Flow grid improved across Scotland by using real data from Gauging Stations
- Upstream gauging station high value
- Good flood history
SEPA Gauging Stations

www.sepa.org.uk/data/river_levels/index
or
www.riverlevels.mobi
Groundwater Levels

Knowhead borehole, Fife
Groundwater level daily means
1997-2013

72 sites
(33 SEPA)
Earliest 1976
2013 Resources

Hydrometry/Hydrology
49 out of 125 staff
£2.3M out of £7.3M
The Long View

William Newsam McLean  MA, CEng, (Captain, RE) 1874-1968

River Dee
Cairnton,
Woodend
1929

River Garry
1913
Underpinning Data - Then
Underpinning Data - Now

358 licences in past 6 years
Average 416 kW
The Long View

Richard Brown  HRPB and SEPA 1980-20??

Some Reflections…..
Garry Old and New
Revisit, Review, Renew
Loggers
Change
Acoustic Doppler Current Profiler
- Fixed Instruments

Argonaut SW

Argonaut SL
Radar level sensor
RQ-30 for Non-contact Flow Measurement

Acoustic Doppler surface velocity sensor

Radar water level sensor
ADCP Flow Measurement
ADCP Boat Deployment

StreamPro

RioGrande

S5

Q-Boat
Remote controlled ARC-boat
Boat Gauging Changes!

River Ness, 1930

Sills of Clyde, 2013

Strathmore River, 1983

Innovative ADCP (Pentamaran?), 2011
Construction Challenges
Challenges ......

More Stringent Legislation
- H&S, CAR etc
Flow Measurement Challenges
Resourcefulness!
Rising to Challenges = Team Building
Changing Rainfall

Rainfall Amount (mm)
Annual Average
1961 - 1990

Wetter Winters
1961-2004
Mind the Gap!

“We’re in trouble.”
Bridging the Gap

Water Resources

Flood

Hydrometry
Hydrometric Data
– the Long View
– the Last Laugh?