

Circulation

No.154
August 2022

The Newsletter of the British Hydrological Society

Contents

Travel Grants

BHS2022 14th National Hydrology Symposium

BHS Governance Review

Lynmouth: 70 years on

BHS YouTube channel

News from members

Hydrological Bulletin : May – July 2022

Copy deadline for Circulation No. 154 27th October 2022

BHS Annual General Meeting

will be held during the BHS2022 Symposium at Lancaster University at 11.50-12.30 Tuesday, 30th September. For those members who cannot be at the symposium, please note that there will be a NS-Team link for joining remotely.
Meeting ID: 325 850 919 049
Passcode: hZQBR5t



See you there!

Circulation **is published quarterly. It is free to members of the British Hydrological Society and costs £25 to nonmembers on annual subscription. Articles published reflect the views of the authors and do not represent official BHS policy.**

- **Membership enquiries: Moira Doherty, BHS Secretary, Institution of Civil Engineers, 1-7 Great George Street, London SW1P 3AA. Tel: 0207 665 2234 Email: bhs@ice.org.uk**
- **Editor: Celia Kirby Tel: 01544 230053 Email celia.kirby@btinternet.com**
- **Web pages: http://www.hydrology.org.uk/**

Circulation **is indexed in** *Geosystems' Hydrotitles* **&** *GeoArchive* **and** *NISC HydroROM*.

President's Perspective

Droughts and floods – extreme weather all over the world

I write this PP having just returned from a camping trip to the Alps. When we arrived it was 36degC at 8pm in the evening, and that stayed the maximum temperature (or hotter) for at least the next week, with it barely cooling down in the evening enough for us to sleep. It was apparent to me driving through France that Europe is going through a severe drought – the worst for 500 years is being reported. This is not just bad for water supplies, but energy generation – with still conditions reducing wind power generation, and low river levels in France causing restrictions on the operation of nuclear power stations generating energy. At the same time as many of the major rivers in Europe have dried up, the UK has drought restrictions including hosepipe bans implemented in many areas, and China is suffering a record-shattering heatwave, there are also record-breaking floods in other parts of the world like Death Valley and Kentucky in the US, South Korea and Pakistan. So, what is happening to our weather and how do we manage this apparent increase in variability?

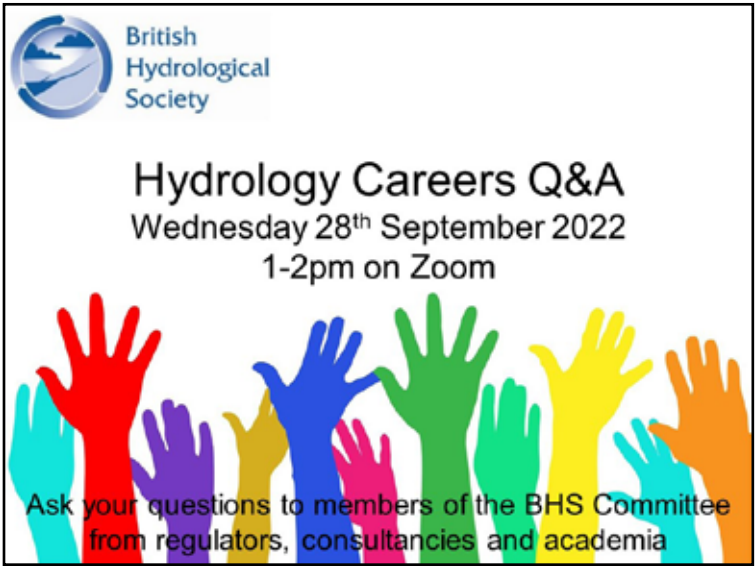
The deadly heatwaves that have fuelled blazes and caused transport disruptions in Europe, the US and China and caused flooding in other places have one thing in common: a peculiar shape in the jet stream dubbed "wavenumber 5". The jet stream is the leading driver of weather in Europe. It can generate heatwaves, and droughts, when it forms into a U-bend shape, called an "omega block" because it resembles the shape of the Greek letter omega. In July and early August 2022 (as well as last year, summer 2021), a global pattern of five big waves circled the world, leading to simultaneous heatwaves across continents and coincident floods where low pressure centres occurred. This pattern, known as wavenumber 5, can persist for weeks, causing hot areas to stay hot for a long time, and connected wet areas to be very wet.

A growing body of research is trying to answer the question of how exactly the jet stream is being changed by global warming and what this means for future weather patterns. Temperatures have already risen by about 1.2°C since pre-industrial times due to human activity. The jet stream itself appears to be changing its behaviour over the long term and slowing down in summer – which can make the "omega block" pattern more likely; with the rapid warming of the Arctic region the likely cause of this slowdown. There is a general decrease in the winds in summer. The reason the jet stream exists is the temperature difference between the cold Arctic and warmer tropics, but because the Arctic is warming much faster than the rest of the planet, there is less temperature difference between those air masses now – and when the jet weakens you get a wavier

pattern with more stationary highs and lows. As global average temperatures increase, climate models show that heatwaves will get hotter but it could be years before we understand the influence on the jet stream and the effects of these changes on extreme weather.

In the meantime, one thing is for sure. Hydrologists are very much in demand and will be for the foreseeable future: as we try to manage extremes of droughts and floods together, we need to develop a much more joined up approach to tackling both. I look forward to discussing these issues and more with everyone at our BHS2022 Symposium in Lancaster in just a few weeks' time.

Hayley Fowler
BHS President



If you are interested in a career in hydrology, ask our experts for advice on Wednesday 28th September from 1–2pm. There will be short introductions from our BHS Committee members whose careers span a wide variety of sectors, from academia to industry followed by a careers advice Q&A where we'll be throwing the floor open to you.

Panelists include:

- Dr Elizabeth Lewis (Lecturer in Computational Hydrology, Deputy Director of Research & Innovation, Newcastle University)
- Dr Chris Skinner (Senior Hydrologist, Environment Agency)
- Dr Adam Comerford (National Hydrology Manager, Canal and River Trust)

Register here: https://www.eventbrite.co.uk/e/british-hydrological-society-careers-qa-2022-tickets-404161185987

Travel Grants

Dear BHS Members,

As global travel restrictions continue to ease and more conferences and workshops start to occur in person, many of you may be thinking about international travel once more. This note is a reminder that BHS Travel Grants are available for international events, with the Exeter Fund also being available for international events that are organised by the International Association of Hydrological Sciences (IAHS).

These awards can cover up to £500 toward your attendance at events (£300 for events in Europe, and £500 toward events in the rest of the world), and can cover travel, accommodation, registration, and personal subsistence (not including alcohol).
Preference will be given to early career professionals who have not previously been awarded a travel grant in the previous 3 years.

Please note, for the purpose of reviewing applications (since we're all volunteers!) there are deadlines for major conference events in place – the next major (non-domestic) hydrology-related event will be the Fall Meeting of the American Geophysical Union in Chicago, December 2022 – as a result, the deadline for travel grant applications to this will be the end of September – full details on the cut-off dates are:

Deadline 31st January (for conferences taking place March - June)
Deadline 31st May (for conferences taking place July - October)
Deadline 30th September (for conferences taking place in November – February)

It is expected (as a condition of grant) that you provide a written summary of either an interesting session/workshop you've attended, or any research you've presented at the event for publication in Circulation.

If you have any queries, please do not hesitate to get in touch with me directly.

Very best wishes

Dr Scott J.
Honorary Treasurer, BHS
bhs-treasurer@outlook.com

BHS Governance Review

The British Hydrological Society is the learned society for the UK's hydrological community and currently has close to 1000 members. Like many other similar learned societies, the BHS is a registered charity (no. 327488) and as a charity it has obligations and requirements under charity law, as laid out by the Charity Commission for England and Wales. Our key document is the Society's Statutes, which outlines the Society's purpose and the way it is governed: such is its importance, changes to this document can only be made with the approval of the membership.

The running of any charity is split between two tasks – management and governance. Management is the organisation and delivery of the day-to-day activities of the organisation and is performed by volunteers and/or staff. Governance is ensuring that the organisation is meeting its legal requirements, is financially sound, and that its activities are in line with the organisation's purpose. The management of the BHS is provided predominantly through all members of the Main Committee and with support from the Institute of Civil Engineers (ICE), whilst the governance is provided by the elected trustees who take on legal responsibility for this task.

The trustees recently completed an internal review of the Society's systems of governance to ensure that we are meeting our basic legal requirements. We also wanted to use it to make recommendations to meet recognised best practice and for this we followed the structure provided by the Charity Governance Code, recommended by the Charity Commission, which looks at seven key areas:

1. Organisational purpose
2. Leadership
3. Integrity
4. Decision-making, risk and control
5. Board effectiveness
6. Equality, diversity and inclusion
7. Openness and accountability

The review found that the Society is governed effectively at present and has been previously, but that this is reliant on informal processes and goodwill. Whilst this is positive in the sense that we have been attracting good and trustworthy trustees, it does present a risk in the future if things were ever to go wrong. The introduction of formal policies and processes could also make both the governance and the

management of the Society more efficient and effective, and make sure we are achieving best practice.

The review made 13 core recommendations that our Governance Task Group will be aiming to implement by September 2023:

Recommendation 1 – Change the charitable status of the Society to a Charitable Incorporated Organisation.

Recommendation 2 – Restructure the Society to create greater separation between governance and management.

Recommendation 3 – Create an Induction Pack and Code of Conduct for Trustees to improve clarity, communication, and accountability of their roles and responsibilities.

Recommendation 4 – Consider requiring incoming Presidents to introduce a strategy for their term.

Recommendation 5 – Review processes of governance around regional committees.

Recommendation 6 – Introduce and maintain a risk management plan.

Recommendation 7 – Review safeguarding procedures.

Recommendation 8 – Review procedures around reviewing affiliations with external partners.

Recommendation 9 – Review processes around GDPR and data.

Recommendation 10 – Increase transparency of governance and increase Trustee nominations.

Recommendation 11 – Create and enact EDI policies and strategies.

Recommendation 12 – Introduce a formal complaints procedure.

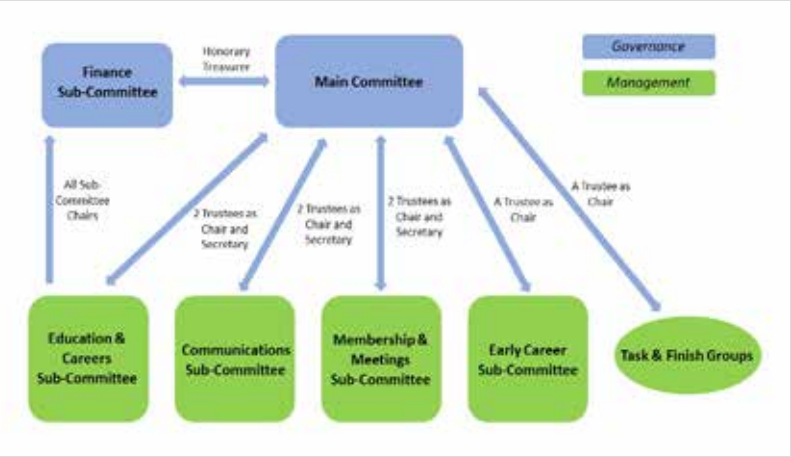
Recommendation 13 – Periodically review governance using the Charity Governance Code checklist.

Whilst most of these firmly fall within the internal governance procedures overseen by the trustees, recommendations 1 and 2 require changes to the Statutes and would need the approval of the membership. Besides that requirement, it would be wrong to make such changes without consulting the membership and seeking their approval. These represent big changes and we hope to co-design them with the membership so that the Society is best placed to serve them into the future.

A change in the Charity status to a Charitable Incorporated Organisation (CIO) from an Unincorporated Association would create

the Society as a legal entity in itself. The CIO status was created in 2013 with organisations such as BHS in mind and whilst functionally there would be very little change to the Society, it would, for example, allow the Society to employ staff if it ever wished to do so. Importantly, it reduces much of the personal risk that Trustees take on when they volunteer for those roles.

An example of how the Society could be re-structured is shown in the Figure Whereas currently the Society has seven Trustees described as Ordinary Members, with no clearly defined roles, this structure would give each trustee a specific role. The formalisation of sub-committees, with greater autonomy from the Main Committee, would then create new non-trustee volunteering opportunities. This would improve our capacity for the management of activities and present opportunities for members to be involved and gain experience in the running of the Society. Hopefully, this would also inspire a few to go on to be trustees in the future.



We are at the very beginning of this journey and nothing has yet been decided. Indeed, the purpose of this article is to make you aware that this is on the horizon. We have set ourselves a provisional, and possibly optimistic, deadline of September 2023 (ready for the Society's 40th Anniversary celebrations) to implement the recommendations, alongside a new, redesigned website, and we will have extensive consultation with the membership throughout. The consultation will be formally launched at the 2022 Symposium in Lancaster, however if you have any comments you would like to froward please email the Honorary Secretary – bhshonsec@gmail.com

Governance Task Group
Chris Skinner,
Hayley Fowler,
Lucy Barker,
Giuseppe Di Dieco

Lynmouth—70 Years on

John C. Rodda, Harvey J.E. Rodda and Suzi Kemp
Hydro-GIS Ltd

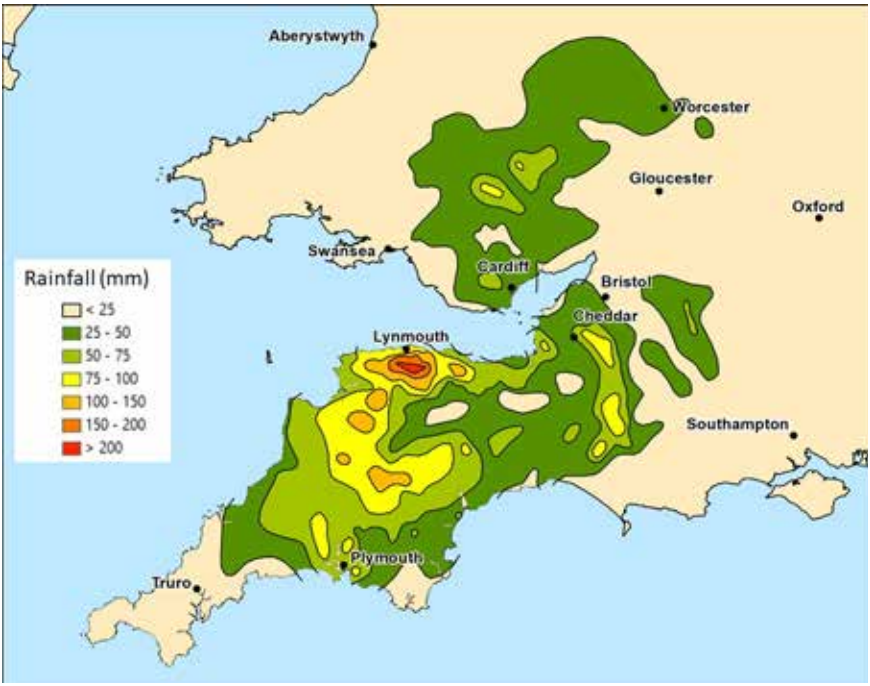
As the UK and Commonwealth celebrated the Queen's Platinum Jubilee, there is another 70th anniversary worth remembering for hydrologists. Floods from time to time play a disrupting influence on life across the world: the 15th August flood at Lynmouth and its surroundings in 1952 was a very notable UK event. Sadly 34 people lost their lives, 143 buildings and 28 bridges were destroyed or severely damaged, and 94 vehicles were wrecked. An estimated 200,000 tonnes of boulders and other debris were deposited by the flood. The lower course of the river was changed and the harbour silted up.

A relief fund raised more than £1 million (over £38 million today).

The flood has been described in numerous papers and reports, including the official report to the Institute of Civil Engineers by Dobbie and Wolf[1] and in the Meteorological Magazine paper by Bleasedale and Douglas[2] After receiving over the average monthly total of rain for the first half August, the soils of the small steep impermeable catchments of the East and West Lyn and surrounding areas of Exmoor were at or above field capacity. A small depression originating in the Bay of Biscay brought an area of continuous rain on 15th, with cells of extreme convectional rainfall. This moved north across Plymouth towards the Bristol Channel where the highland of Exmoor contributed to an abrupt uplift of the air mass. The rainfall as shown in the map exceeded 100 mm in 24 hours over a wide area. At Longstone Barrow in the centre of the area a fall of 228 mm was recorded by an observer who made two visits to the gauge which had been set up some two years before. The steep relief of the West and East Lyn catchments with elevations falling from 500 m to sea level in just 8 km contributed to the rapid response and severity of the flood. Many bridges were blocked with debris forming temporary dams which then failed catastrophically producing surges of water and moved boulders with a mass of up to 50 tonnes.

Not many people may remember the storm but one of us (JCR) has vivid memories of the event as it also happened to be his birthday. He remembers when the rain started, and that as the afternoon of the 15th August unfolded its intensity increased. He was staying on his uncle's farm near Cheddar some 70 km east of Lynmouth, but also in an area affected by the extreme fall. A lot of time was spent armed with brooms and buckets trying to stop surface runoff flowing through farmhouse. Milking time had to be postponed. Mopping up the next day, the radio was all about the flood at Lynmouth and the newspapers were full of it over the following days.

Hydrometeorological and geomorphological factors combine to make many small catchments in the South-West of England very vulnerable to flooding: Boscastle is a recent example. Fortunately in 1952 this part of Devon had a good number of standard rain gauges and dedicated observers, but no recording gauges and no flow gauges on the rivers. The fall on 15th August 1952 is one of at least



The distribution of rainfall on 15th August 1952.

seven storms where over 200 mm in 24 hours has been recorded in this region in the past 150 years, the others being Bruton, 1917, Cannington 1924, Martinstown 1955, Camelford 1957, Otterham 2004, and Ottery St Mary 2008*.

An assessment of the peak flood flows in the East and West Lyn rivers were made during a field visit to the affected area by Dobbie and Wolf[1], two weeks after the event. They surveyed the levels of debris or 'wrack lines' from the flood at various cross section locations on the rivers. Using these surveys and standard hydrodynamic equations they produced an estimate of the peak river flow. They estimated 252 cumecs for the West Lyn and 436 cumecs for the East Lyn. To put these values in context, the highest flow on record in the River Thames at Kingston, draining 9948 km², is 800 cumecs from the November 1894 flood.

Today assessments of flood flows are made using hydrological modelling. The current standard approach for estimating flood flows is to use software packages from the Flood Estimation Handbook (FEH)[3]. Normally for a flood study the design flood for a given return period (e.g. 1-in-100 year) is estimated, but using the current software, the event hydrograph can also be simulated from an observed input of rainfall. To shed new light on the Lynmouth flood, estimates were made of the peak flood flows using these rainfalls, FEH web service and the ReFH2 software.

The rainfall for the 15th

* estimated as much of the fall was in the form of hail which could not be measured by rain gauges.

August was taken from a detailed assessment of the storm by Bleasedale and Douglas[2], who used observations from standard and recording rain gauges, and eyewitness accounts of when the rain started, stopped, and indications of the intensity. They estimated the average 24-hour fall in the West and East Lyn catchments respectively as 149 mm and 141 mm, and identified that 75% fell between 15:30 and 22:30, while the remaining 25% was attributed to the period from 09:00–15:30 and from 22:30 until 09:00 on 16th August.

Using these rainfall amounts distributed on an hourly timestep over 24 hours, rainfall-runoff modelling was undertaken using the ReFH2 software. The peak flow for the West Lyn was estimated at 124 cumecs and the East Lyn at 310 cumecs. The West Lyn peaked slightly earlier at 23:00 on 15th whereas the East Lyn peaked at midnight. The combined peak flow of 421 cumecs was also at midnight.

The predicted flows for both rivers are considerably less than the estimates from Dobbie and Wolf[1] based on the wrack lines. One reason for this difference is that the FEH software predicts the flow based on the volume of water, but as was clear from the photos of the damage there was a mass of debris brought down by both rivers so this would have added to the volume of material and made the wrack line much higher than if it was just caused by the water alone. In addition the Lynmouth flood was characterised by surges of water caused by bridges being blocked with debris, then bursting. This would have caused locally higher flows at particular points in time than could be simulated in the more continuous flood hydrograph. It is also of interest that by using standard RefH2 simulation for design flood estimation, the 100-year flow for the East and West Lyn are considerably lower at 47 and 119 cumecs respectively.

Should similar meteorological conditions occur over the south west in the future, with the effect of climate change it is likely that rainfalls will be greater and river flows correspondingly larger than those in the Lynmouth event. There are a number of small basins which are probable targets for such events with the prospect of loss of life, damage and disruption, particularly if the holiday season is underway.

[1] DOBBIE, C, H. & WOLF, P, O. 1953 The Lynmouth Flood of August 1952 *Proc. Instit. Civil Engineers* **2**, 522–588.

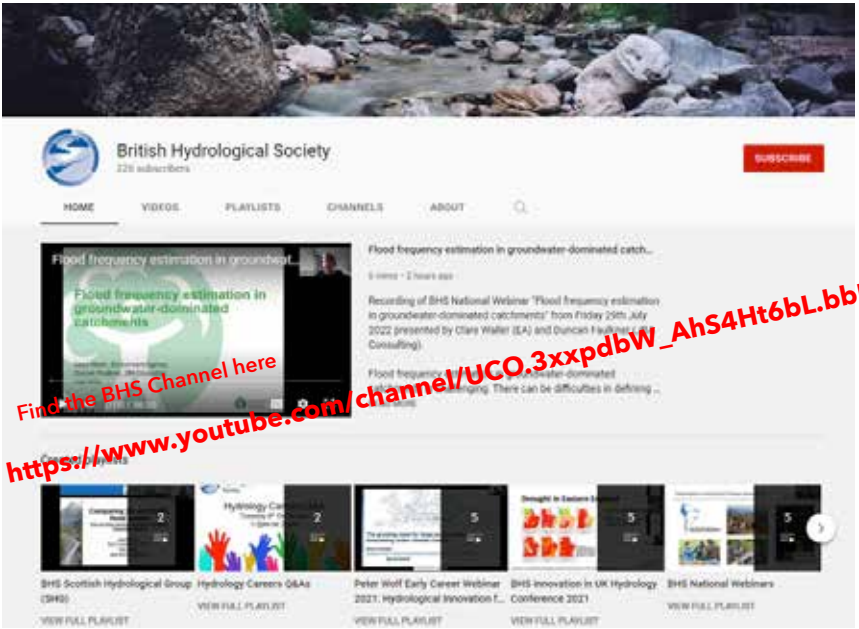
[2] BLEASEDALE, A. DOUGLAS, C. K. M. 1952 Storm over Exmoor on August 15,1952 (*Meteorol. Mag*. **81**, 353–367)

[3] UK Centre for Ecology and Hydrology. *Flood Estimation Handbook* Webservice https://fehweb.ceh.ac.uk/

For more details on the Lynmouth flood see the story map article on www.hydro-gis.co.uk/news

"……drought so great that men passed over the Thames dryshod between Westminster and Lambeth, and over the Medway between Strood and Rochester".

p. 53 Baker: Record of the Seasons



We now have 30 YouTube videos on the BHS YouTube channel!

Recent national and regional webinars include:

- Flood frequency estimation in groundwater-dominated catchments - Clare Waller (EA) & Duncan Faulkner (JBA Consulting)
- The UK Flood Hydrology Roadmap - Next Steps - Hayley Fowler (BHS, Newcastle University), Mark Franklin (SEPA) and Helen Harfoot (EA)
- BHS Scottish Hydrological Group: Mollusc of the Glen - Peter Cosgrove (Alba Ecology)
- BHS Pennines: Mine water heating in Great Britain – from research to construction of heat networks - Gareth Farr (The Coal Authority) and Dr Alison Monaghan (British Geological Survey)

These 30 videos have been viewed a total of 6,370 times, with the three most popular videos being 'Hydrometry for a Climate Emergency' (Nick Everard), 'Anthropogenic intensification of short-duration rainfall extremes' (Hayley Fowler) and 'The Future of Hydrological Forecasting' (Chris White). You can also view all the talks from the 2021 Virtual Peter Wolf Symposium and the Virtual BHS Innovation in UK Hydrology Conference.

We will continue to add future BHS webinars to the channel. You can subscribe to the channel to be notified when a new video has been added by clicking 'Subscribe'.

News from Members

Water Resource Associates have recently issued their quarterly Bulletin. Recent activities include work on flooding in Iffley, Oxford, water quality modelling for Bangladesh rivers and participation in a project involving the SAGIS model used by the water industry and regulators setting policies on disharges of pollution to rivers.
Paul Whitehead is also running a new course on surface water quality and management.

The Environment Agency have updated our flood estimation guidelines. If you would like a copy, please contact the Environment Agency national customer contact centre enquiries@environment-agency.gov.uk and ask for reference LIT 11832 "Flood Estimation Guidelines". We are in the process of updating the flood estimation report template and review spreadsheet that accompany these guidelines and are aiming to release these in the autumn.

Clare Waller

Letter to the Editor

The very interesting letter concerning snowmelt contributions to floods (*Circulation No. 153*) omits any mention of the contribution of water released from frozen ground. I would like to draw attention to two examples.

The widespread severe flooding of March 1947 came after a long period of extremely cold weather in February with widespread hard frosts and heavy snow, which lasted for several weeks. When warmer weather accompanied by rain arrived, the combination of water released by snowmelt and from frozen ground exacerbated the quantity of flood run-off over large parts of southern and eastern England. Conditions were replicated on a more limited scale, but with significant effect in flooding on the River Usk in late December 1979. I was involved in a post-event analyst carried out for the Welsh Water Authority by Sir M MacDonald & Partners. Cold weather with continuous overnight frosts occurred over the highland of the Brecon Beacons which feed the upper Usk. The frosts were followed by a period of heavy snow. This was followed by an incursion of warm air with heavy rain: I recall quantities of 150mm of rainfall recorded on a tipping-bucket rain gauge chart in the Brecon Beacons over a period of up to 30 hours, during which temperatures at the same observation station rose by about 10 deg C. Properties and the main bridge in Brecon itself were severely damaged, and some people living in sheltered accommodation on the floodplain had to be rescued by helicopter. Over the watershed to the South Wale Valleys, very high food flows into several reservoirs were recorded.

Yours sincerely
James Dent

UK Hydrological Bulletin: May – July 2022

Across most of the UK, the period s of temperature, rainfall and river flows. Drought conditions developed and intensified through the spring and early summer with substantial and extensive impacts on water resources, runoff, agriculture, fire risk and ecology. The 2022 drought's intensity clearly underlines the UK's vulnerability to climate change.

May-July temperatures were provisionally the 3nd highest on record for the UK (in the Met Office series from 1884) and, for England &Wales, rainfall was 35% below average with the greatest deficiencies in eastern and southern England. Importantly also, the rainfall deficiency extends back substantially; the January–July rainfall for England &Wales (see Fig.1) is the second lowest since 1949. The late spring and early summer witnessed a general exaggeration in the NW/SE rainfall gradient across the UK and the drought impacts, though spatially variable, were generally most severe in the English Lowlands.

By late July flows in a number of index rivers (including some in eastern Scotland) were similar to those recorded during the extreme drought of 1976. Correspondingly, reservoir stocks and groundwater levels (some slow-responding index wells aside) generally declined substantially throughout the review period. High evaporative demands contributed to exceptional soil moisture deficits, arid landscapes — with associated wildfire risk — and substantial agricultural stress. Dwindling reservoir stocks evidenced the pressure on water resources and substantial contractions in the stream network, together with the reduced dilution available for sewage effluents, added to the ecological stress. A fragile water resources outlook heralded the introduction of hosepipe bans in early August

.

May was 5th warmest on record for England & Wales and rainfall was modestly above average for the UK as a whole. Regional and local variations were, however, very marked. Parts of western Scotland registered more than twice the monthly average whilst a few localities, mostly in East Anglia and South Wales, recorded less than half. An unsettled mid-month brought locally heavy showers to many areas and surface flooding was common particularly across southern England; a Flood Warning was issued for Swanage on the 15th following a thunderstorm. The third and fourth weeks were unsettled particularly in western Scotland where many rivers including the Helmsdale and Carron were in spate. To the south, with evaporation losses rising, recessions became established and monthly runoff totals were considerably below average. Towards month-end flows in some responsive rivers approached the minimum on record for the time of year. In south Wales the May runoff for the Yscir was the lowest in a 50-year series and for England & Wales as a whole, month-end outflows were only moderately above the late-May minimum. Rapidly increasing soil moisture deficits heralded the end of the aquifer recharge season across most of the country and, generally, the seasonal decline in groundwater levels was well established. Particularly low levels were reported in the more-

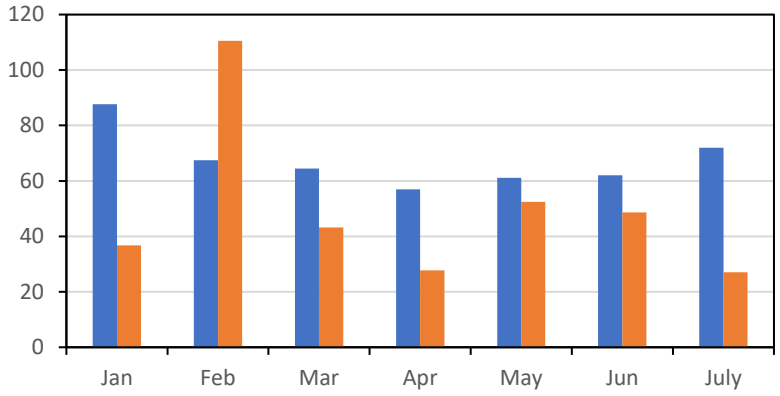


Fig. 1 2022 monthly rainfall totals (mm) for England & Wales (blue) and the long-term monthly average (orange)

fissured aquifer units (e.g. in the limestones of South Wales). Reservoir stocks also declined substantially – particularly in Wales – and in Hampshire stocks in Ardingly reservoir were the lowest on record for the end of May.

June rainfall was around 15% below average at the national scale but with substantial regional, and more local, contrasts. Generalising, above average totals predominated in the west of the UK whilst in eastern Scotland, East Anglia and the South East some catchments received less than a third of the average rainfall. Intense local downpours during the first week brought localised flash flooding (e.g in Criccieth, north Wales on the 3rd) and triggered 6 Flood Alerts in the Midlands on the 5th. In northern Scotland, Achnagart recorded a 24-hour rainfall total of 48 mm on the 11/12th. But, apart from spates late in the month, in Northern Ireland particularly, river flows were generally in decline and index rivers registering their lowest June runoff on record included the Waveney (Norfolk), Taw (Devon) and Yscir (south Wales). In Scotland, flows in many eastern rivers were also depressed during the fourth week. Estimated June runoff from England & Waleswas close to that of 1990 but, in a series from 1961, only 1976 has registered a lower runoff for the month. The drought's increasing severity was also underlined by notably low groundwater levels in faster-responding aquifer units (e.g. south Wales and southern Scotland) and reservoir stocks declined substantially. Overall end-of-month stocks (in a series from 1988) for Wales were the lowest on record for the time of year. Rapid increases in soil moisture deficits triggered increases in crop and garden watering and fish rescues (e.g. in the Teme, Worcestershire) served to emphasis the drought's ecological threat. By month-end, drought conditions – which also extended across much of western Europe – were well entrenched and set to intensify.

July was a remarkable month in hydrometeorological terms, provisionally ranking among the six warmest months for England & Wales in the Met Office series from 1884. A simple aridity index – combining the ranking of the July

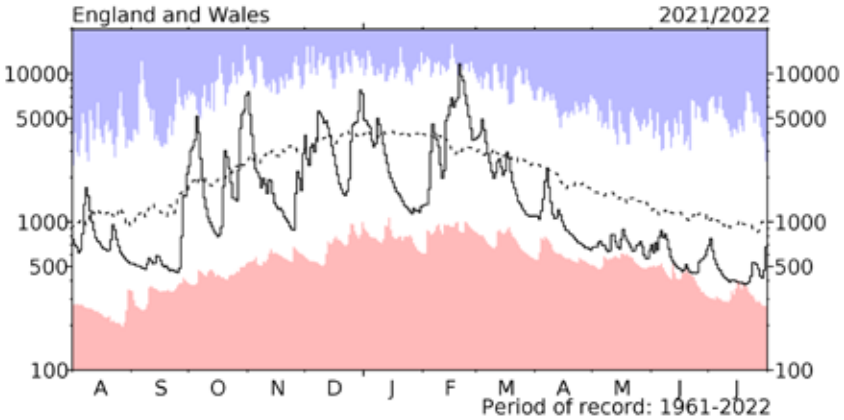


Fig. 2 Daily outflows (m^3s^{-1}) from England & Wales (black trace); the blue and pink envelopes show the long-term daily max. and min.

monthly average temperature with its rainfall ranking – indicates July 2022 to be the most arid on record for England & Wales. On the 19th, a temperature of 40.3 C was recorded at Coningsby (Lincs) establishing a new record for the UK. Regional rainfall totals were also exceptional; a few areas in northern Scotland reported above average rainfall and, on the 23rd, a storm total of 64 mm was recorded at Magilligan in Northern Ireland; significant flooding occurred in Londonderry and Strabane. By contrast, very arid conditions typified most of southern Britain. The South- East, Southern and East Anglian regions each registered their driest July on record, with some localities registering monthly totals of less than 2mm. During the fourth week parallel Atlantic fronts brought significant rainfall to parts of northern Scotland

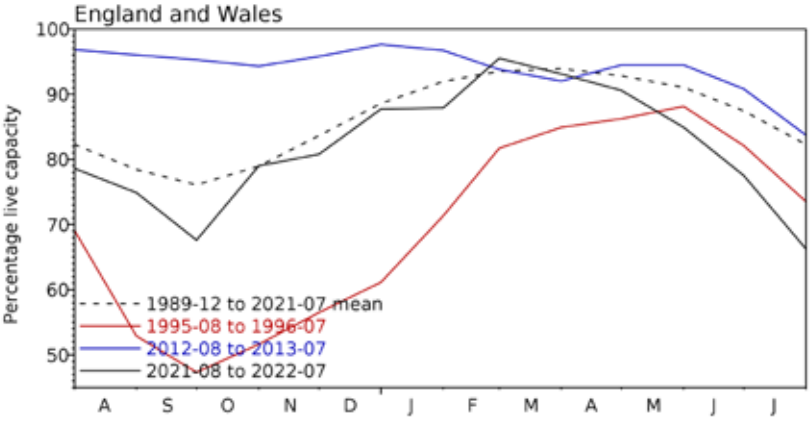


Fig. 3 End of month overall reservoir stocks (% of capacity) for England &

and Northern Ireland where 64.4 mm was recorded at Magilligan, triggering flooding in Londonderry and Strabane.

Exceptional evaporative demands ensured that soil moisture deficits were close to their maximum in many areas and, in much of England & Wales, river flow recessions continued unabated. Whilst substantial groundwater recharge in February provided some residual benefit to groundwater-fed streams, month-end flows in a number of index rivers, including the Lugg (Herefordshire), Gt Stour (Kent), Welland (Lincs), Tweed (Scottish Borders) and Yorkshire Ouse, were similar to those recorded at the same time during the extreme drought of 1976.

Across the country, many headwater streams were dry – with an associated loss of aquatic habitat – and reservoir replenishment was meagre. At month-end stocks in a substantial number of impoundments were 25-35% below the average for late July and a number of major reservoirs including Washburn (Yorkshire) Wimbleball (Somerset) Colliford (Cornwall) and Brianne (Wales) were at their lowest on record for the time of year (in a series from 1988). The introduction of hosepipe bans in August served to confirm the fragility of the water resources outlook.

Terry Marsh
12/8/2022

This photo is courtesy of Dr Elizabeth Lewis, Newcastle University, who kindly sent me a wonderful archive of 'watery' photos to use as apprpriate.- Editor




© Elizabeth Lewis