Welcome! – Day 1

Thank you for joining us for the Floodplain Flow Measurement Workshop

The workshop will begin at **09:30**

Organising committee

- Andrew Black (University of Dundee)
- Ali Rudd (UKCEH)
- Simon Moulds (The University of Edinburgh)
- Anna Rose Klaptocz (UKCEH)
- Nick Everard (UKCEH)
- Kirstie Murphy (JBA consulting)
- Louise Ander (BGS)
- Gemma Coxon (University of Bristol)

Day 1: Floodplain Flow Measurement Workshop

Start	Finish	Topic	Speaker
09:00	09:30	In-person: arrival & refreshments	
Session 1: Chair – Kirstie Murphy, JBA Consulting			
09:30	9:35	Welcome, housekeeping	Simon Moulds, University of Edinburgh
09:35	09:45	Introduction to FFM workshop	Andrew Black, University of Dundee/FDRI
09:45	09:50	Introduction FDRI	Louise Ander, BGS/FDRI
09:50	10:10	Surface alpha variations and experience with velocimetry methods on wide floodplains	Olly Baldwyn, Environment Agency (EA)
10:10	10:30	Floodplain flow measurement: why is it important for flood forecast modelling?	Jackie Spencer, EA
10:30	10:50	Assessing flood volumes as a tool for understanding flood event development	Richard Maxted, EA
10:50	11:10	BREAK (20 mins)	

Day 1: Floodplain Flow Measurement Workshop

Start	Finish	Topic	Speaker
10:50	11:10	BREAK (20 mins)	
Session 2: Chair – Louise Ander, BGS/FDRI			
11:10	11:30	Peak Flows at the National River Flow Archive	**Steve Turner**, UKCEH
11:30	11:45	Measuring floodplain flows: How? Why? Whyever not...?	**Nick Everard**, UKCEH
11:45	12:00	Experiences with measuring water flow remotely using uncrewed aerial vehicles (UAVs) fitted with Surface Velocity Radar (SVR), Laser Doppler, and ADCP sensors	**Peter Chinkin**, Thurngroup
12:00	12:20	Using hydraulic modelling to estimate floodplain flows at a historical and present day gauging station on the River Tweed	**David Cameron**, JBA
12:20	12:35	The standardisation of methods and techniques in floodplain flow measurement	**Rod Wilkinson**, formerly Severn Trent
12:35	12:45	Summing up, future directions	**Andrew Black**
12:45	18:15	In-person: Packed lunch and field visit to Upper Tweed Catchment	

FDRI

Share your feedback, learn about FDRI & stay in touch

Event evaluation
Please give us your feedback!

Visit our website

Sign up to the newsletter

About BHS

www.hydrology.org.uk
bhs@ice.org.uk

British Hydrologi
Society

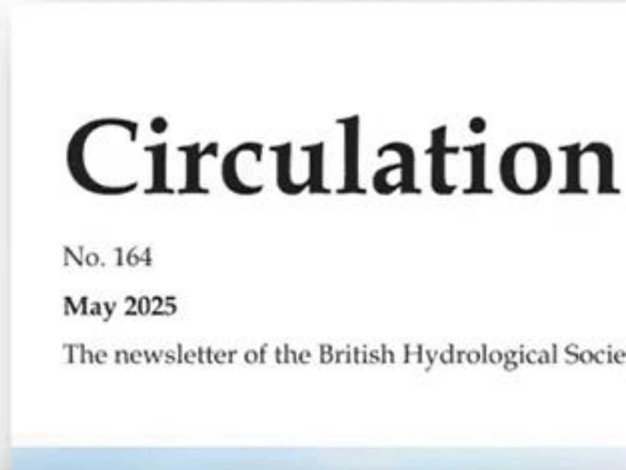
Mission Statement

- To encourage interest, scholarship and good practice in scientific and applied aspects of hydrology;
- To foster involvement in national & international hydrology.

What does the BHS do?

- Events, Conferences & Webinars (Such as Symposia, Peter Wolf)
- Travel Grants for Conferences and training
  - Awards are £300 (UK), £500 (Europe), £800 (RoW)
  - Full details on BHS website
- Studentship Award Scheme (with JBA), up to £3000 towards Master's fees
- Quarterly magazine with news and updates from the UK Hydrological community

Individual BHS membership - £45/year
Early Career / Retired - £15/year

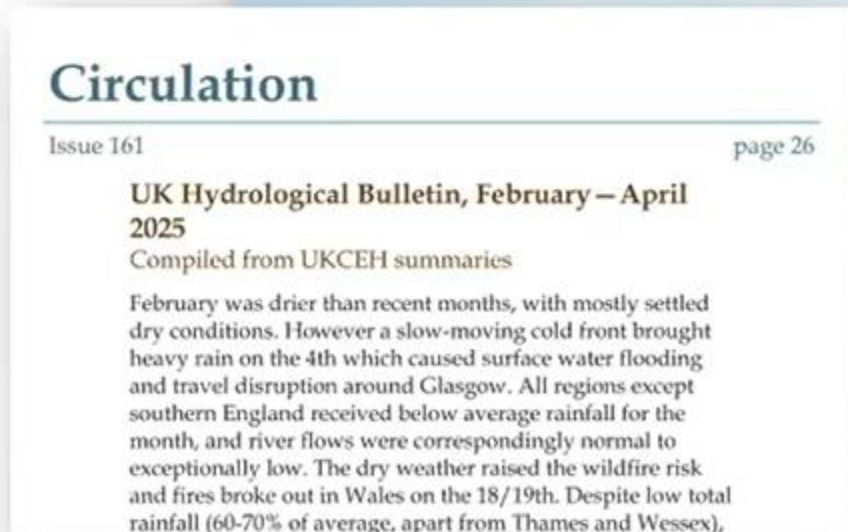


Circulation

No. 164

May 2025

The newsletter of the British Hydrological Socie



Circulation

Issue 161 page 26

UK Hydrological Bulletin, February – April 2025

Compiled from UKCEH summaries

February was drier than recent months, with mostly settled dry conditions. However a slow-moving cold front brought heavy rain on the 4th which caused surface water flooding and travel disruption around Glasgow. All regions except southern England received below average rainfall for the month, and river flows were correspondingly normal to exceptionally low. The dry weather raised the wildfire risk and fires broke out in Wales on the 18/19th. Despite low total rainfall (60-70% of average, apart from Thames and Wessex), British Hydrological Society

Upcoming events

17 June 2026 Drought hydrology: 50 years since 1976 - a national one day meeting in London at ICE - One Great George St. The meeting will explore the 1976 drought, what's changed since, the challenges that remain and possible future solutions

2-4 September 2026 16th National Hydrology Symposium (BHS2026)
Reimagining Hydrology for a Changing World - at the University of Leeds. Please see the website BHS2026 for info on themes that will be included. We'd love people to submit abstracts as detailed on the website before Friday 3rd April and we will love to see you there!

FDRI

February - Professional Development Month for Hydrologists - A series of lunchtime webinars 1-2pm which will describe options for hydrologists to gain chartership. On 18th it's ICE and on 25th it will be Royal Geographical Society.

Welcome to our workshop: Floodplain Flow Measurement

Andrew Black

University of Dundee/FDRI

The velocity-area method: flows measured within channel, but rarely on floodplain

$$Q = \sum_{i=1}^{n}(w_i\, d_i\, v_i)$$

Incised channels:

- Scope for even the highest floods to be contained within the banks

Peak Flows at the National River Flow Archive

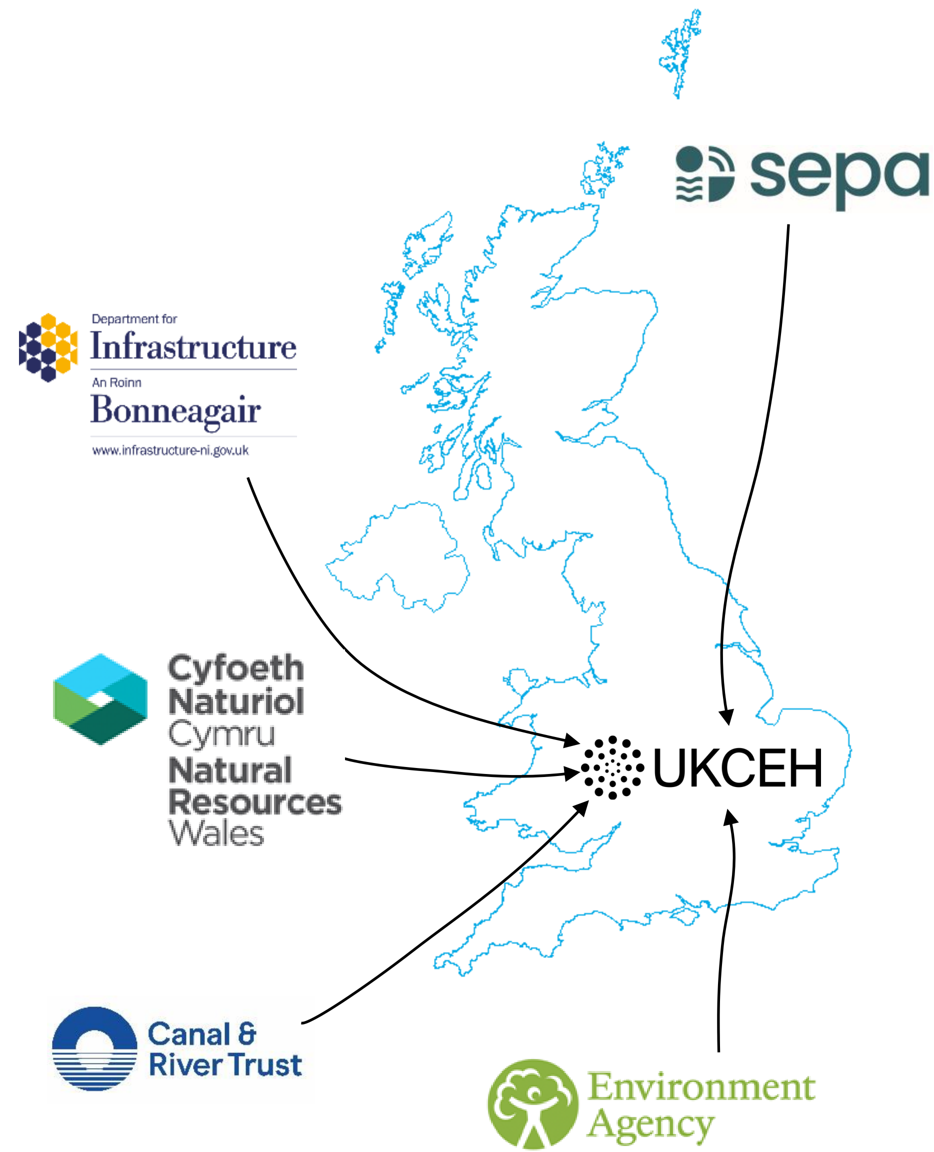
- Steve Turner + NRFA Team

11/02/2026

UKCEH Our planet. Decoded. | National River Flow Archive

What is the NRFA

- Primary national archive of UK hydrometric data
- Collates data from all the UK Measuring Authorities
- Ease of access: data made freely and openly available to all
- Enables national-scale hydrological analysis (e.g. water resources assessments)
- Promotes best practice & consistency (centralised support for Measuring Authorities)

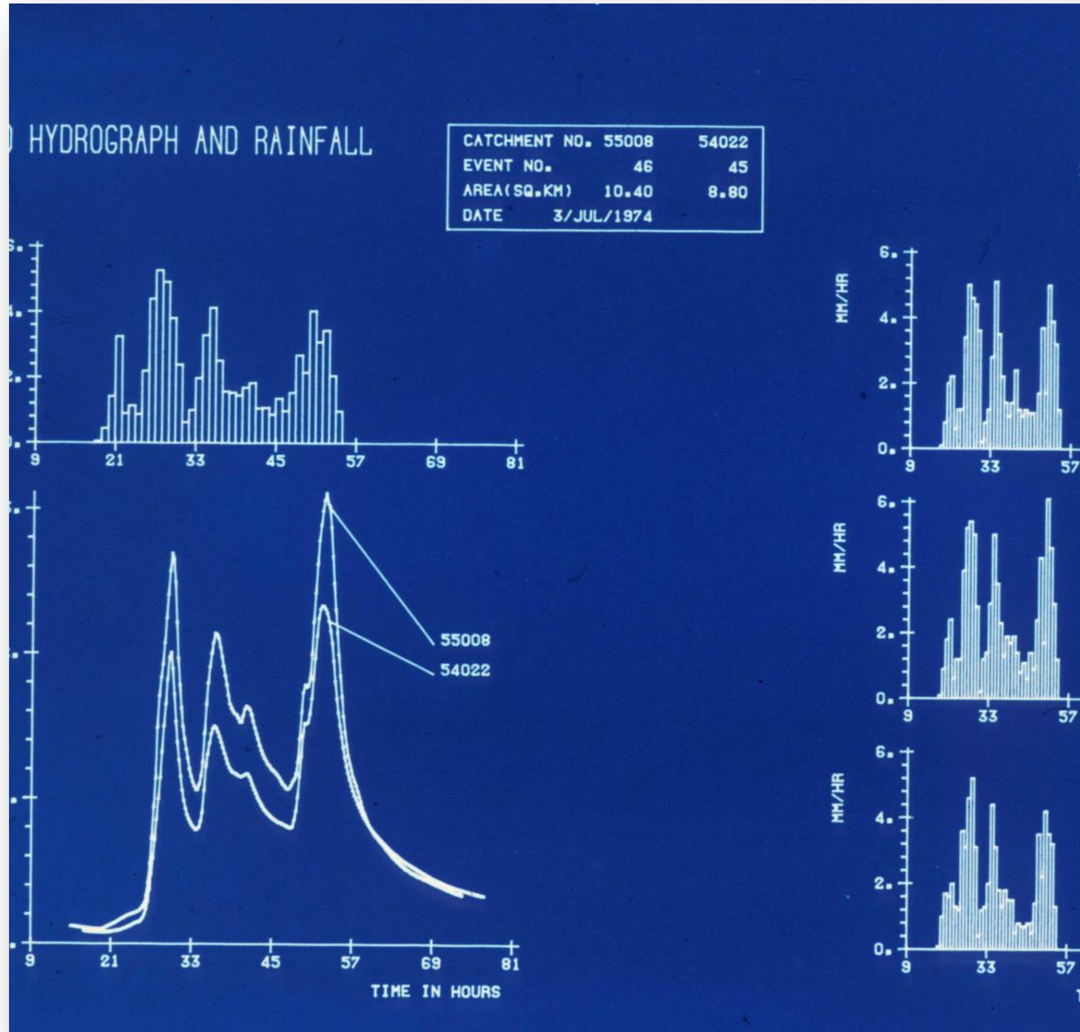


- A (potted) history of UK peak flow data

1975 Flood Studies Report

•Instantaneous flood peaks for over 550 gauging stations were published in Volume IV for the FSR (NERC, 1975) along with tabulated catchment characteristics and flood statistics.

- 550 stations
- End date Sept 1969
- Set the standard
- Charts, microfilm, punch



- A (potted) history of UK peak flow data

1978 Water Data Unit

- New stations added with minimum record length.
- End date Sept 1973

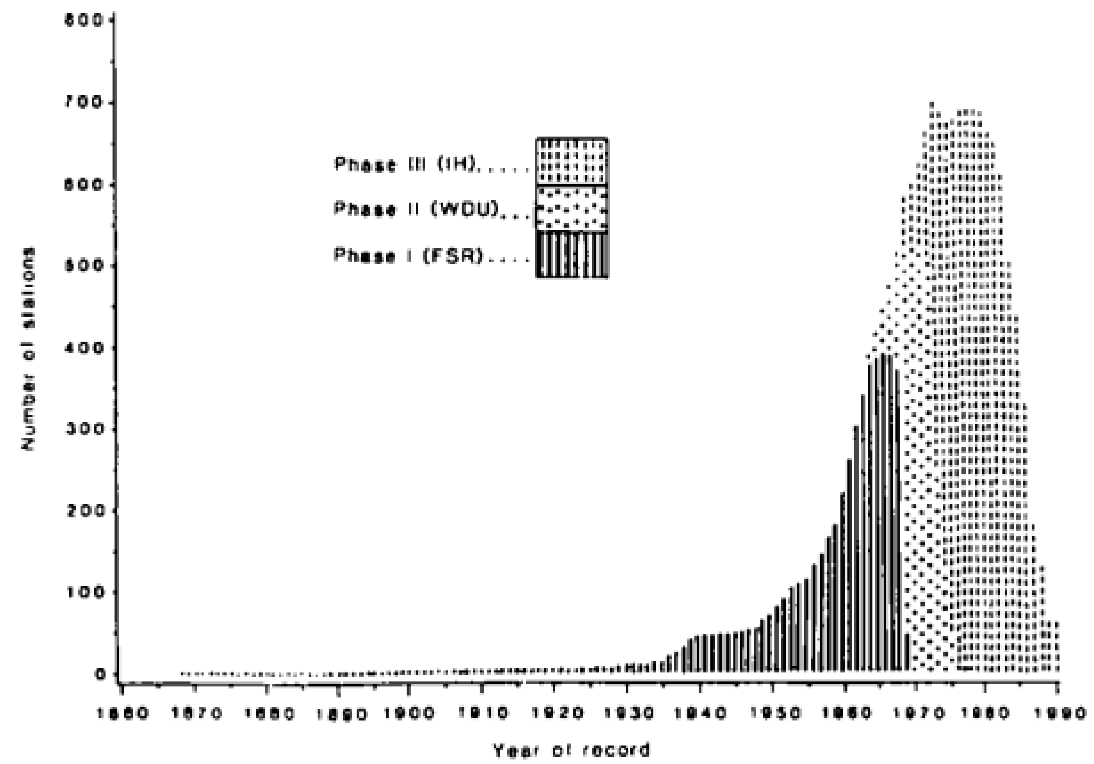
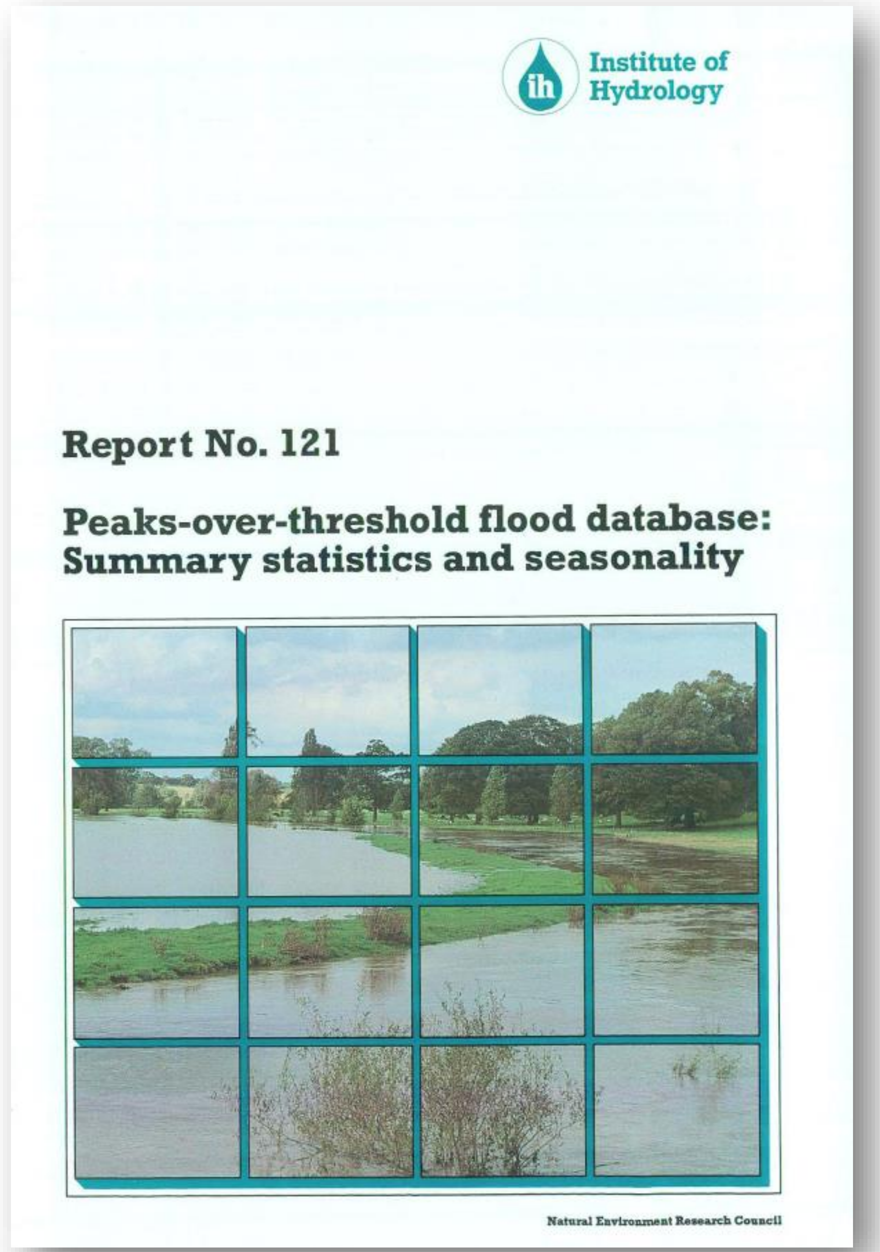


Figure 1.1 Growth of the peaks-over-threshold database

- A (potted) history of UK peak flow data

1993 Report No. 121

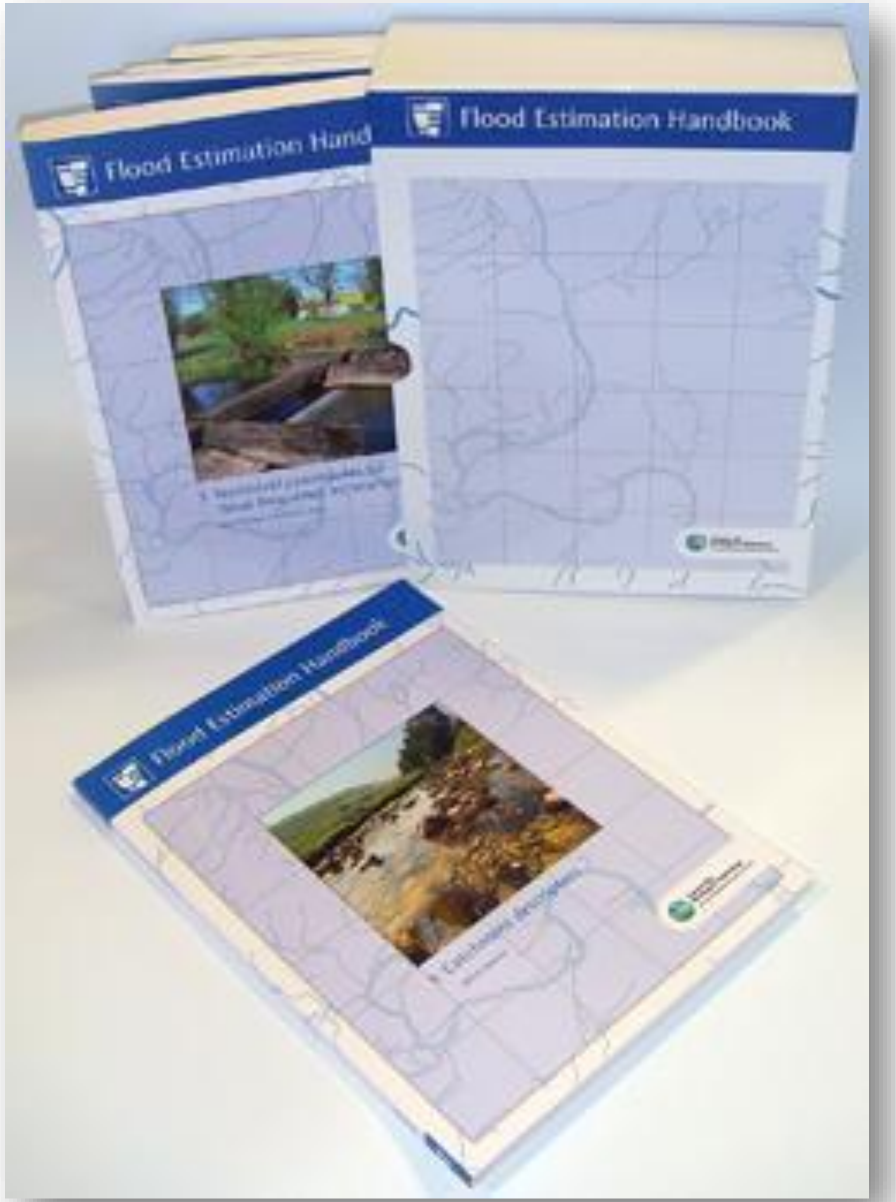
- IH Report 121 consolidated over 77,000 peaks from 857 stations into the UK's first systematic peaks-over-threshold database, establishing extraction rules and statistical methods still foundational to modern peak-flow analysis.



- A (potted) history of UK peak flow data

1999 Flood Estimation Handbook

- (with CD-ROM!)
- A set of methods and associated data to enable recognised standard national methods for rainfall and flood estimation, and rainfall-runoff modelling. They are based on calibration to large hydro-meteorological datasets from gauged locations across the UK

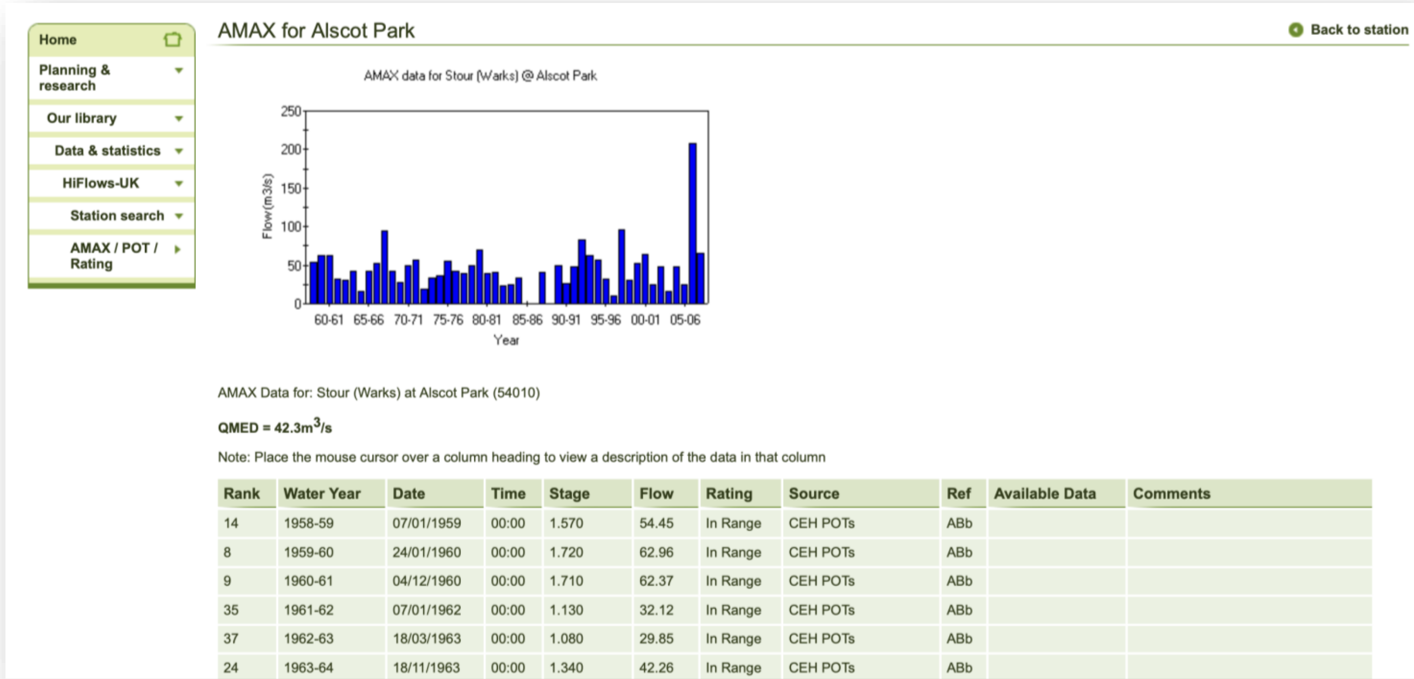


- A (potted) history of UK peak flow data

2005 HiFlows-UK

•National Peak Flow data was maintained by the HiFlows-UK project, with data published via the Environment Agency website.

- 959 stations
- End date Sept 2015
- Website and WINFAP-FEH releases



AMAX Data for: Stour (Warks) at Alscot Park (54010)

QMED = 42.3m^3/s

Note: Place the mouse cursor over a column heading to view a description of the data in that column

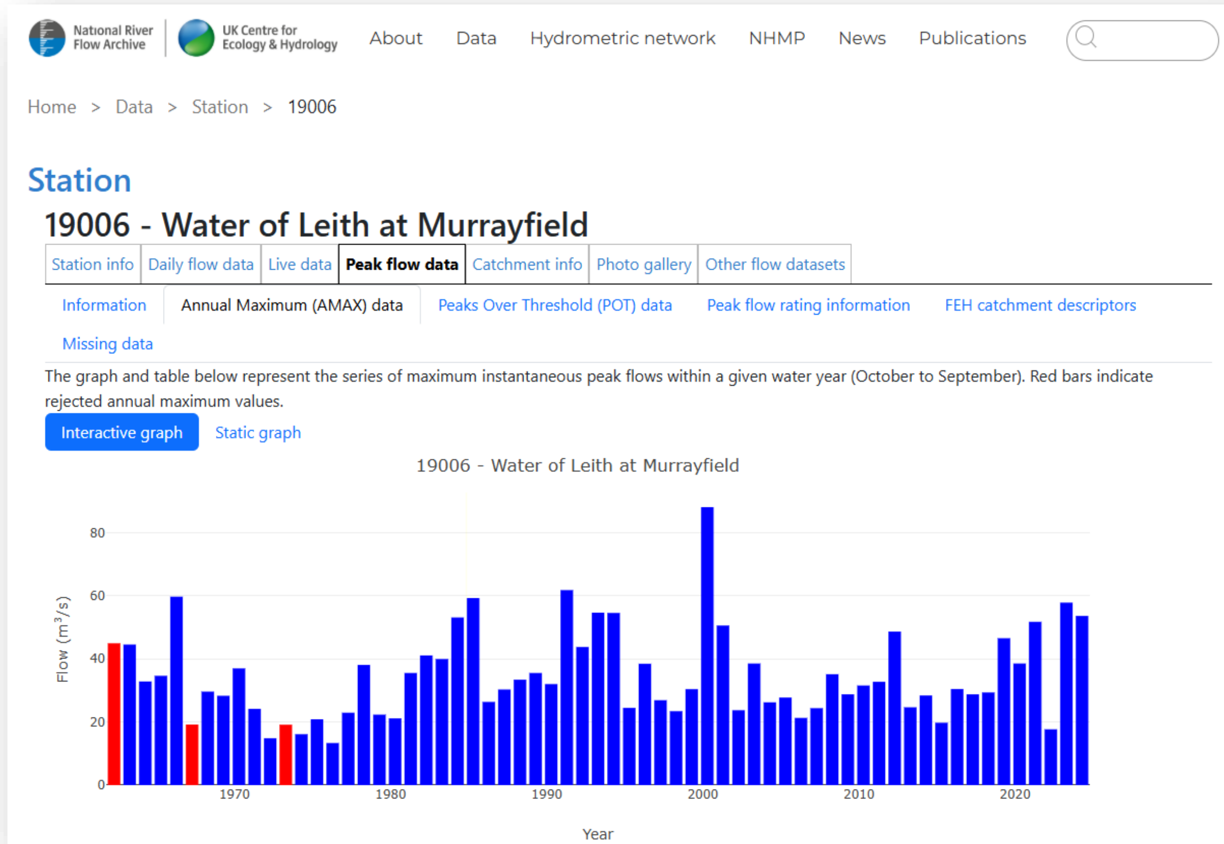
Rank	Water Year	Date	Time	Stage	Flow	Rating	Source	Ref	Available Data	Comments
14	1958-59	07/01/1959	00:00	1.570	54.45	In Range	CEH POTs	ABb		
8	1959-60	24/01/1960	00:00	1.720	62.96	In Range	CEH POTs	ABb		
9	1960-61	04/12/1960	00:00	1.710	62.37	In Range	CEH POTs	ABb		
35	1961-62	07/01/1962	00:00	1.130	32.12	In Range	CEH POTs	ABb		
37	1962-63	18/03/1963	00:00	1.080	29.85	In Range	CEH POTs	ABb		
24	1963-64	18/11/1963	00:00	1.340	42.26	In Range	CEH POTs	ABb		

- A (potted) history of UK peak flow data

2014 NRFA Peak Flow Dataset

•Since 2014, the NRFA has been the national home of UK peak flow data, integrating AMAX and POT records into a consistent, annually updated dataset that supports flood estimation across the UK.

- (Currently) 926 stations
- Structured programme of updates



NRFA Peak Flow Dataset

- **926**

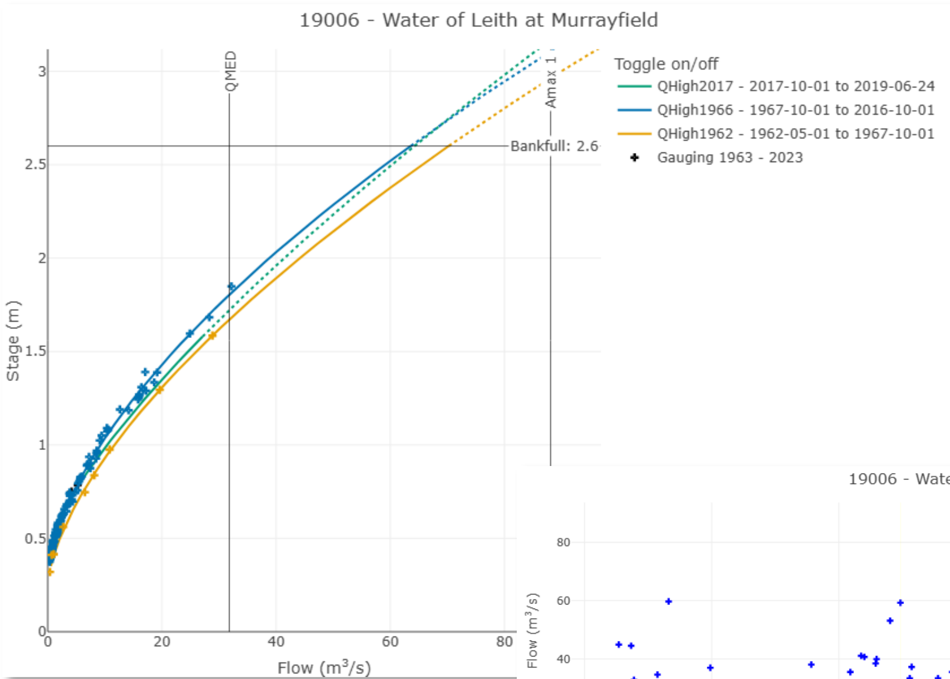
  Stations covering the entire UK hydrometric network

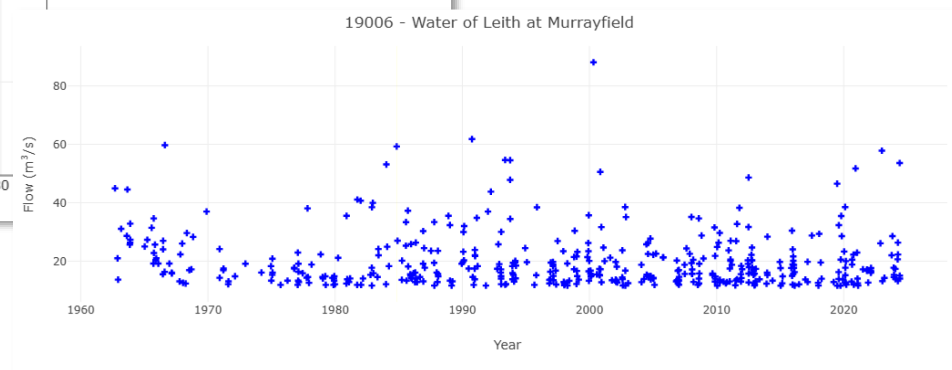
- **279,082**

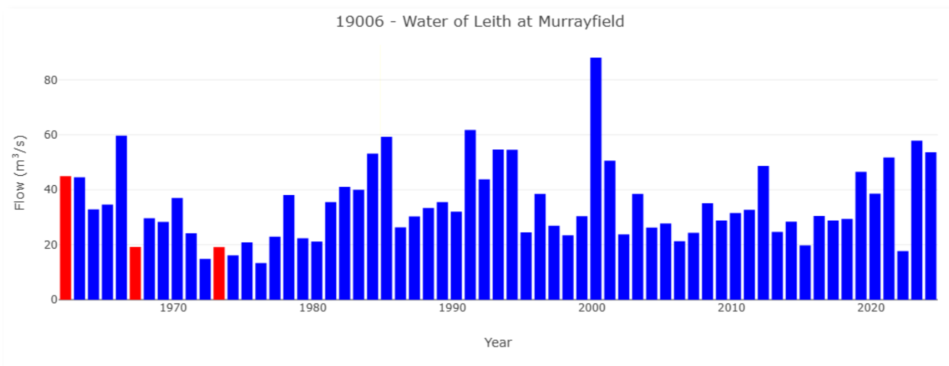
  Peak flow events within the dataset

- **15,589**

  Downloads of WINFAP files 2017-2025







Metadata

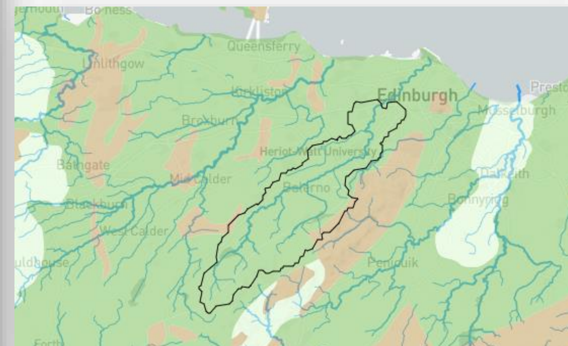
19006 - Water of Leith at Murrayfield

Catchment description
Catchment with mix of lowlands-uplands headwaters in the Pentland Hills. Bedroc permeable with predominantly superficia deposits. Lower part of the catchment ha undergone urban development…

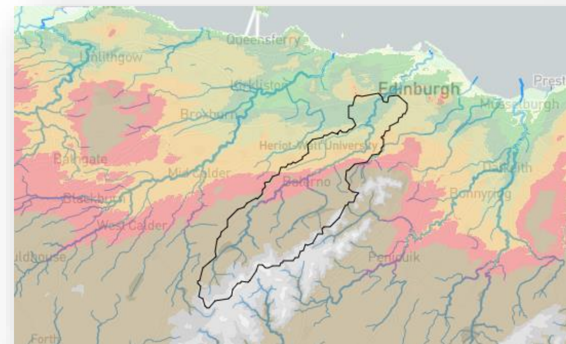
General description
Velocity area station in a straight even reach 50m upstream of a road bridge; section about 14m wide. The banks are steep to 2.5m…

Hydrometric description
There are two single arch road bridges 50m downstream and it is hypothesised that one or both are the main control during floods. These bridges have been constant through the period of record…

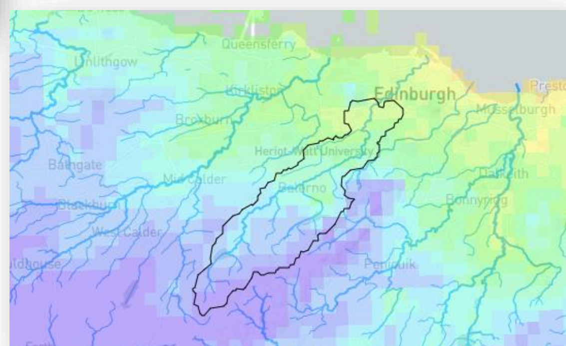
Geology



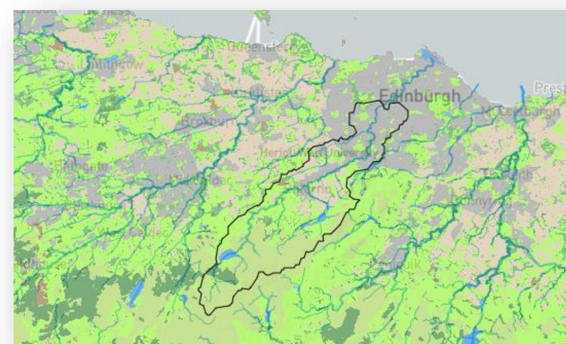
Elevation



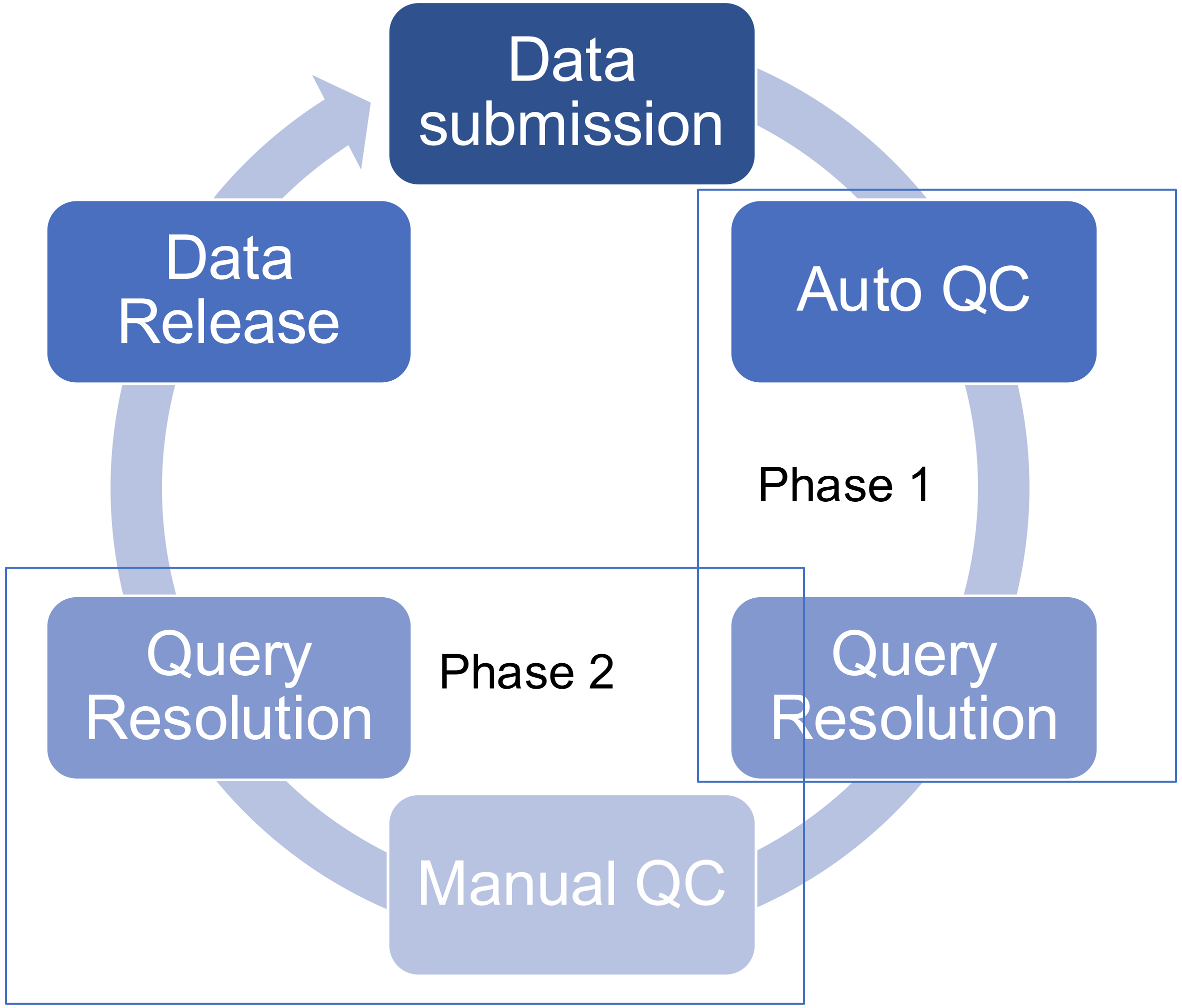
Rainfall



Land Cover Map

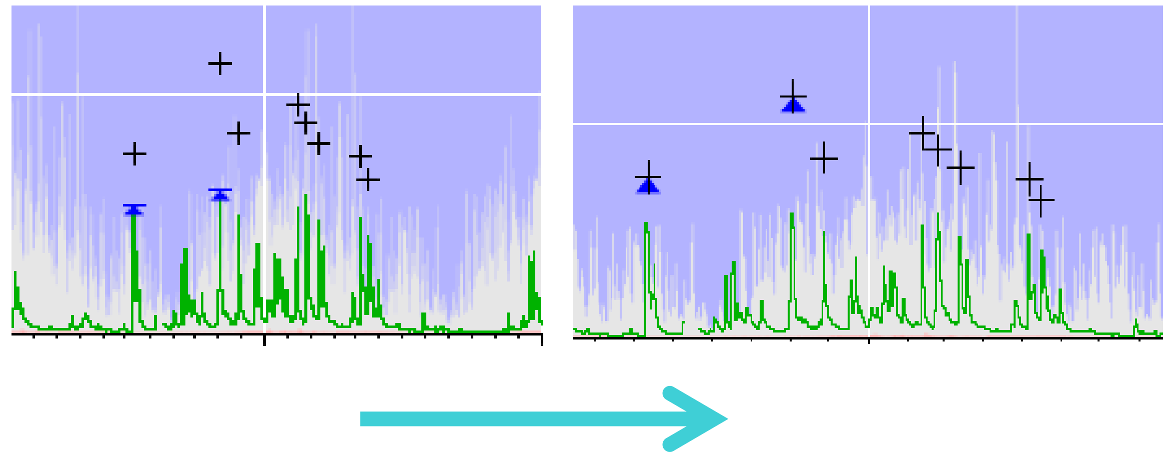


Data Acquisition Cycle



- Data Acquisition Cycle

Phase 1 QC (Automatic)



Structured Quality Control Procedure

•Automated checks readying the data for more in-depth manual checks

•Data Completeness

- Is all expected data present?
- Any missing values?
- Are there enough POTs (or too few)?
- Is there exactly one AMAX per water year?

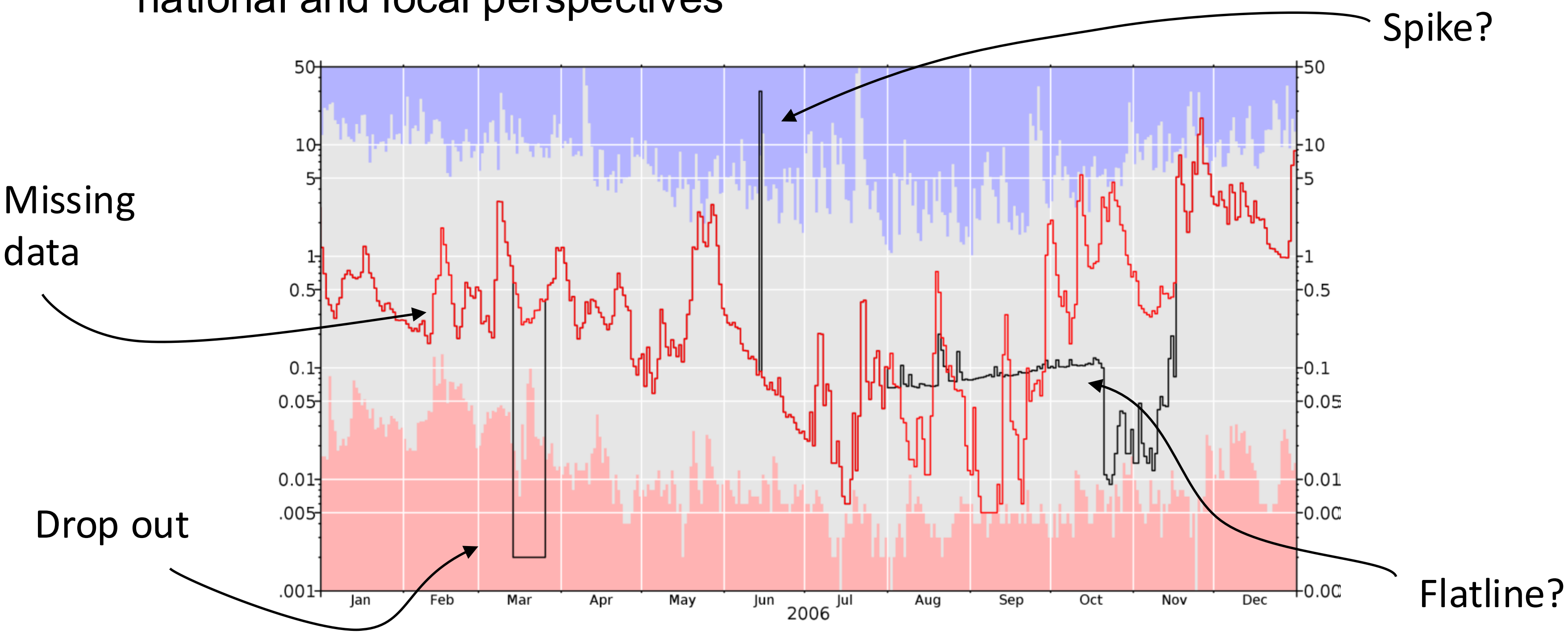
Data Quality

- Are data types correct?
- Does the AMAX equal the highest POT for that year?
- Are AMAX stage-flow pairs internally consistent?
- Are POT stage–flow pairs internally consistent?
- Do the submitted flows relate correctly to the NRFA rating?

- Data Acquisition Cycle

Phase 2 QC – Peak Flows

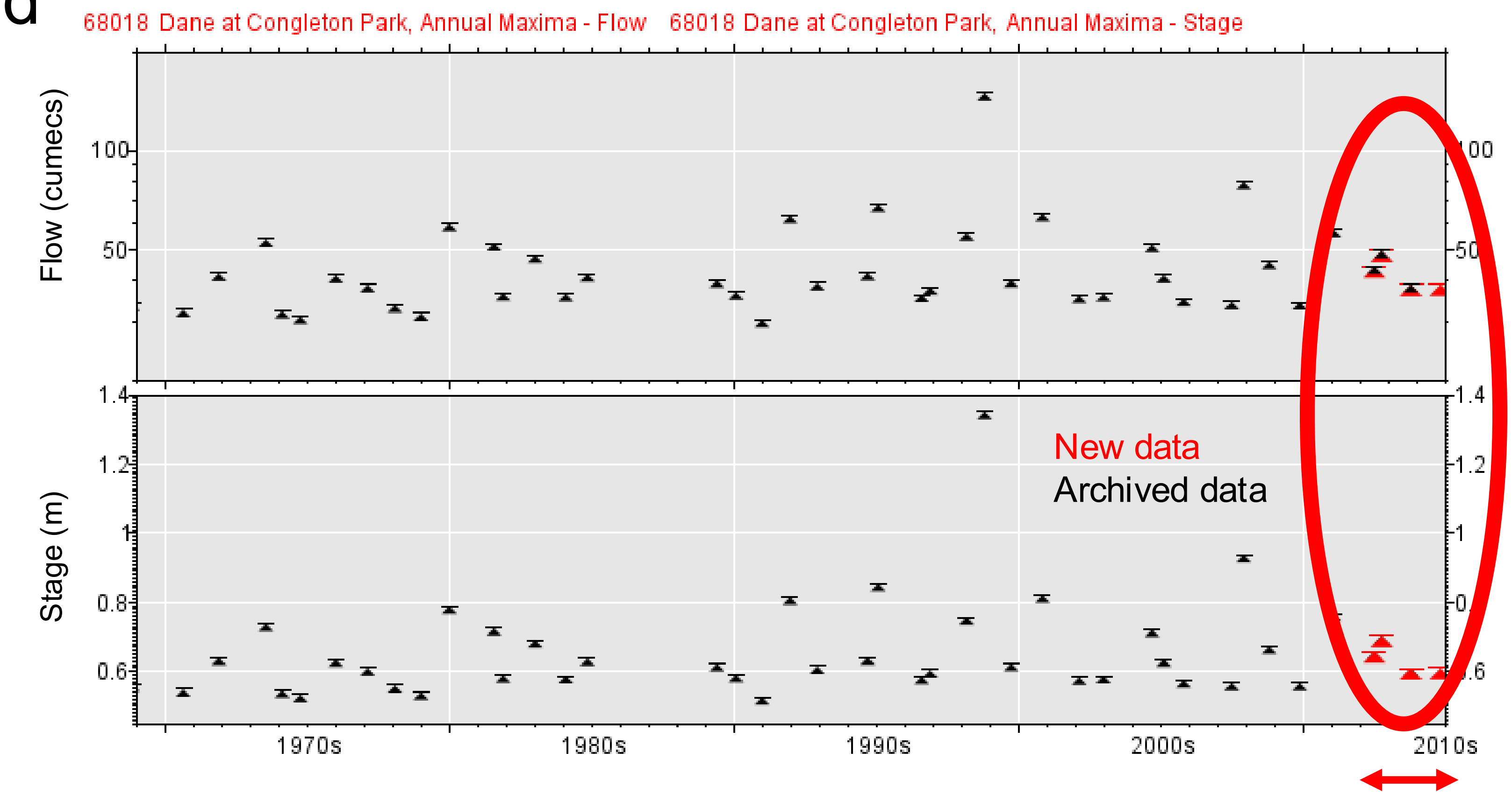
•A secondary level of quality control to complement Measuring Authority QC, identifying long-term issues and focusing on overall utility of the record whilst balancing national and local perspectives



- Data Acquisition Cycle

Annual Update

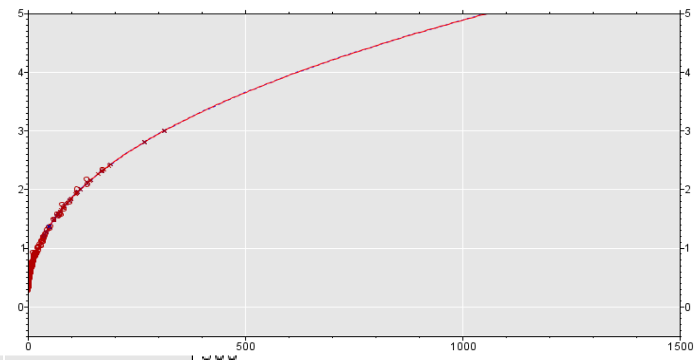
•Addition of one water year to the existing record

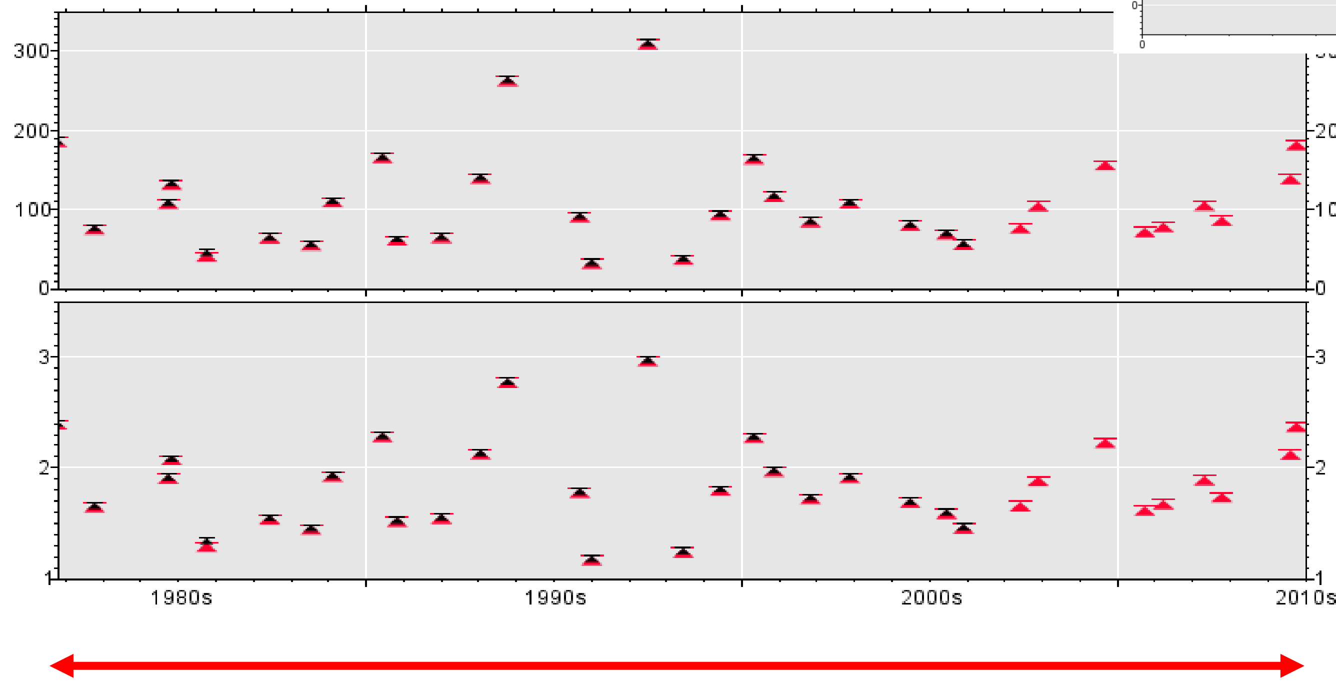


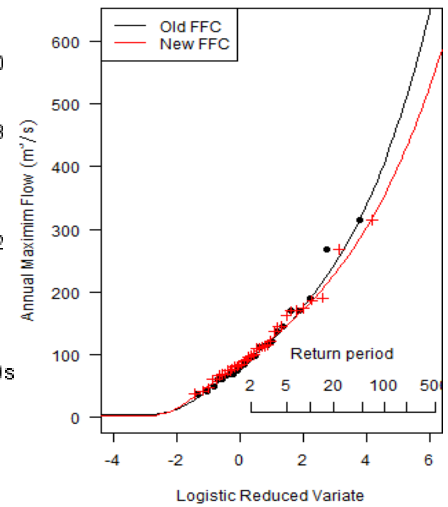
- **Data Acquisition Cycle**

Period of Record review

- Full review of POR data, ratings, metadata







New data
Archived data

Uncertainty in Peak Flows

Suitability for Flood Estimation

FEH indicative suitability for QMED:

FEH indicative suitability for pooling:

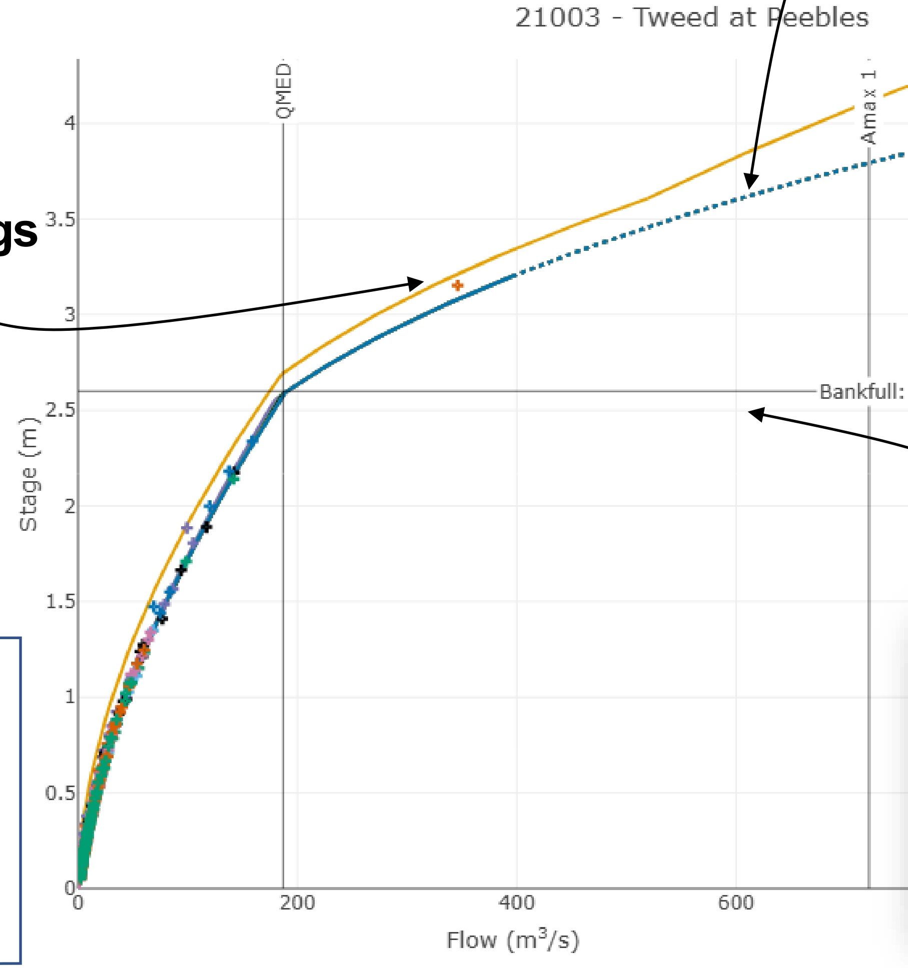
Yes - Rating well supported by gaugings to QMED.

Yes - Higher events calibrated from an in-depth fluvial modelling exercise. Gauged to 3.153m in 2018, with a measured flow of 346 cumecs, including a crude estimation for floodplain flow that bypassed the station. Flood flows from 1959 may be underestimating by around 10% due to well draw down.

Text descriptions

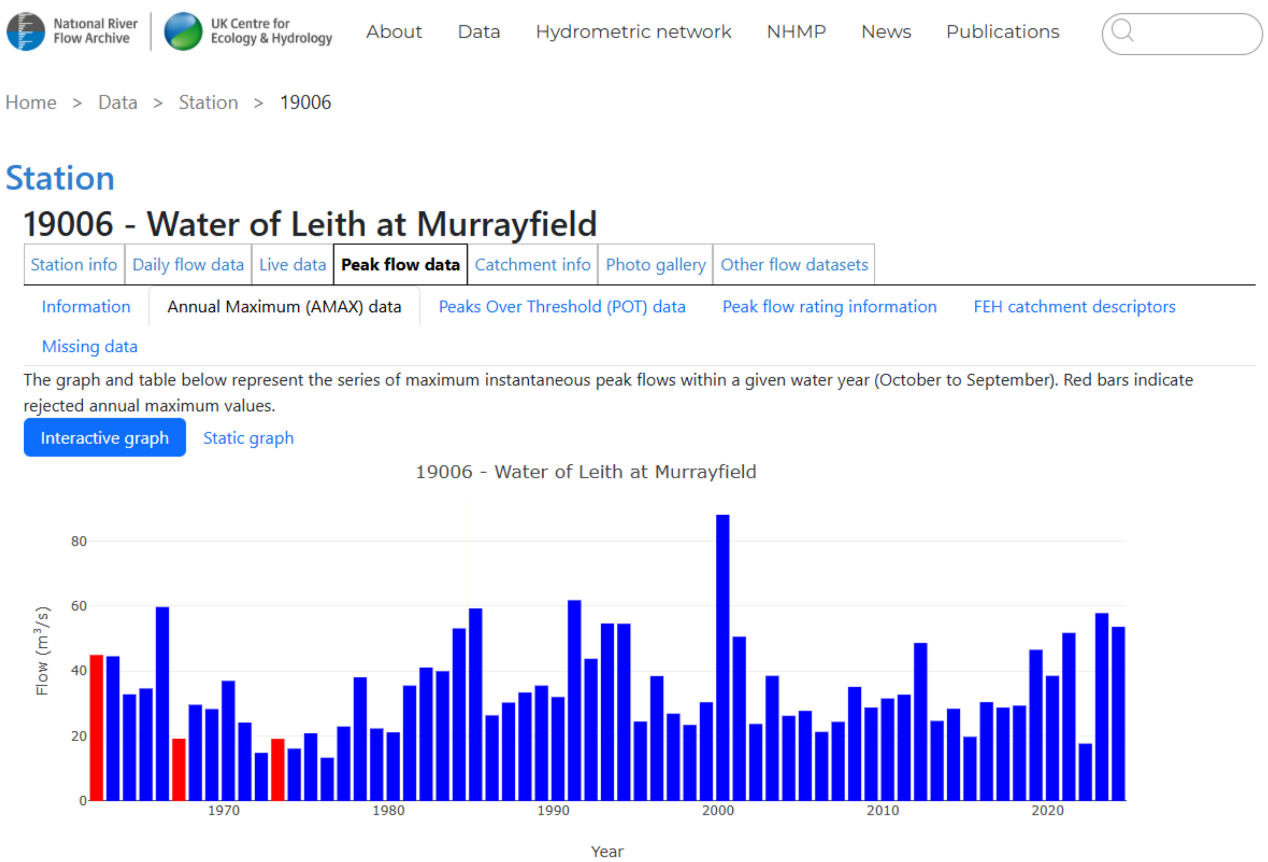
Hydrometric description

Priorsford gauging station began operation on 28/05/1939 located 360 meters upstream from the present station in Peebles. The well and hut were positioned on the downstream side of the Priorsford suspension bridge, with the gauge board on the opposite left buttress...



Data Releases

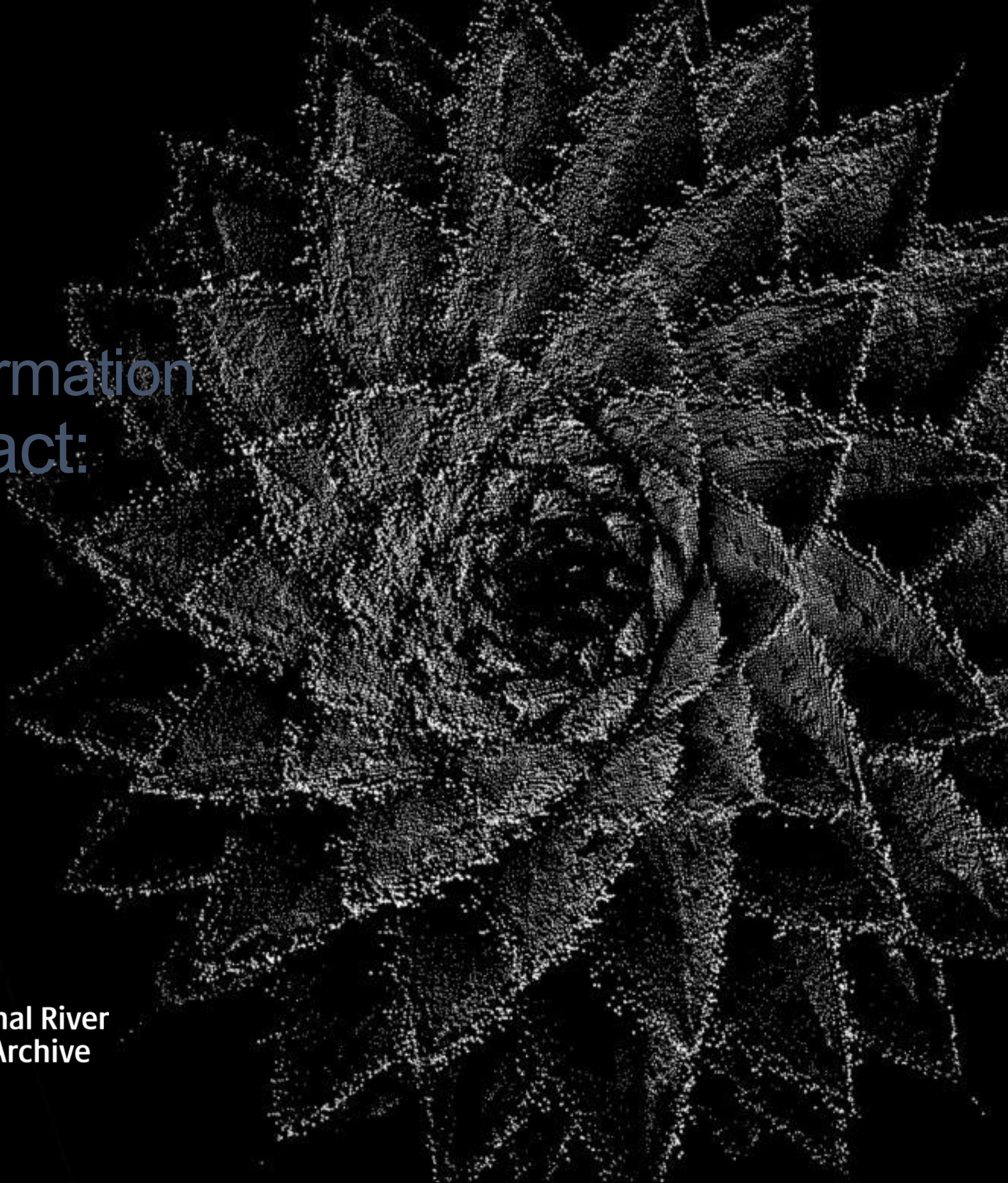
- Annual data releases consisting of the Annual Update, Period of Record Review other ad-hoc changes and metadata improvements – with release notes
- Available in data files, API, R package (rnrfa), Hydrology+



Thank you.

For more information please contact:

nrfa@ceh.ac.uk
nrfa.ceh.ac.uk
@UK_NRFA

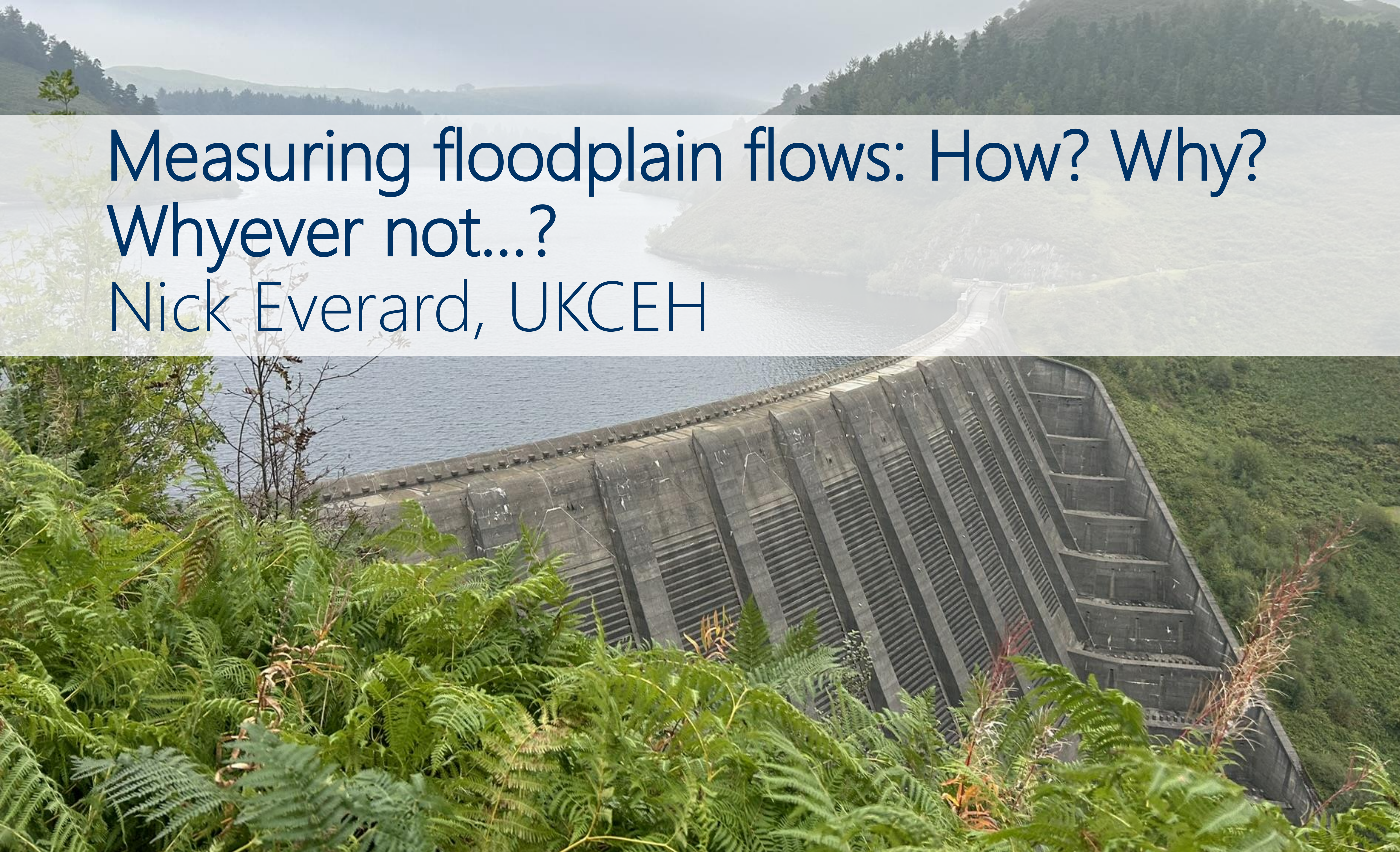


UKCEH Our planet. Decoded.

National River Flow Archive

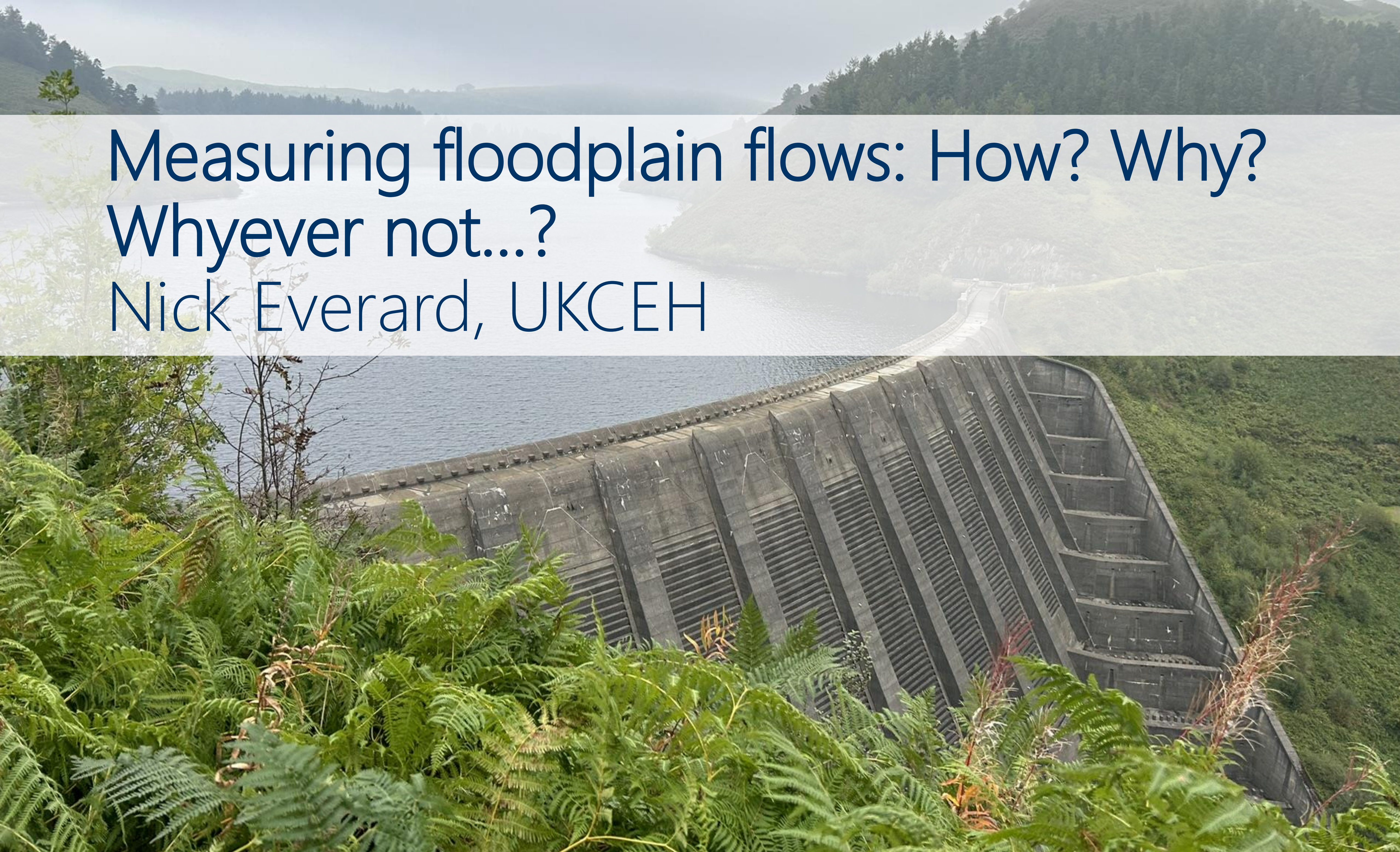
Measuring floodplain flows: How? Why? Whyever not…?

Nick Everard, UKCEH

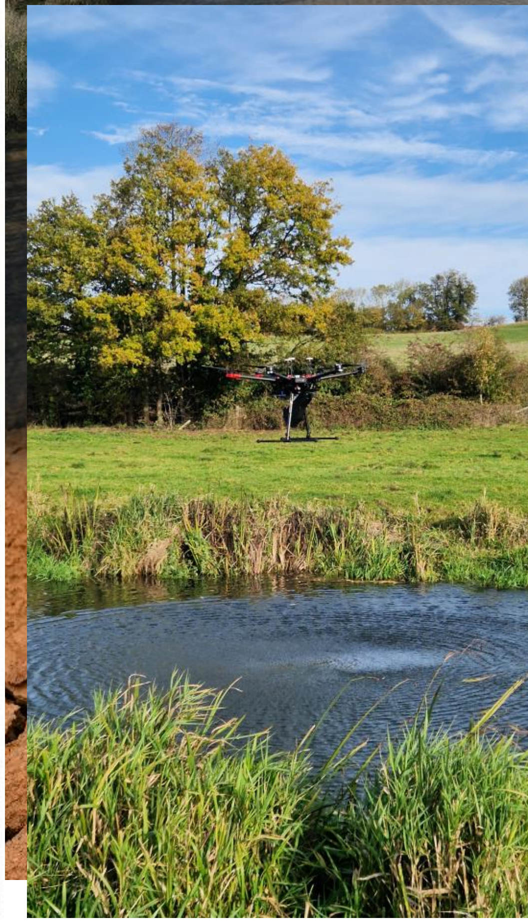


Measuring floodplain flows: How? Why? Whyever not…?

Nick Everard, UKCEH



Measuring water flow remotely using drones fitted with Surface Velocity Radar, Laser Doppler, and ADCP sensors

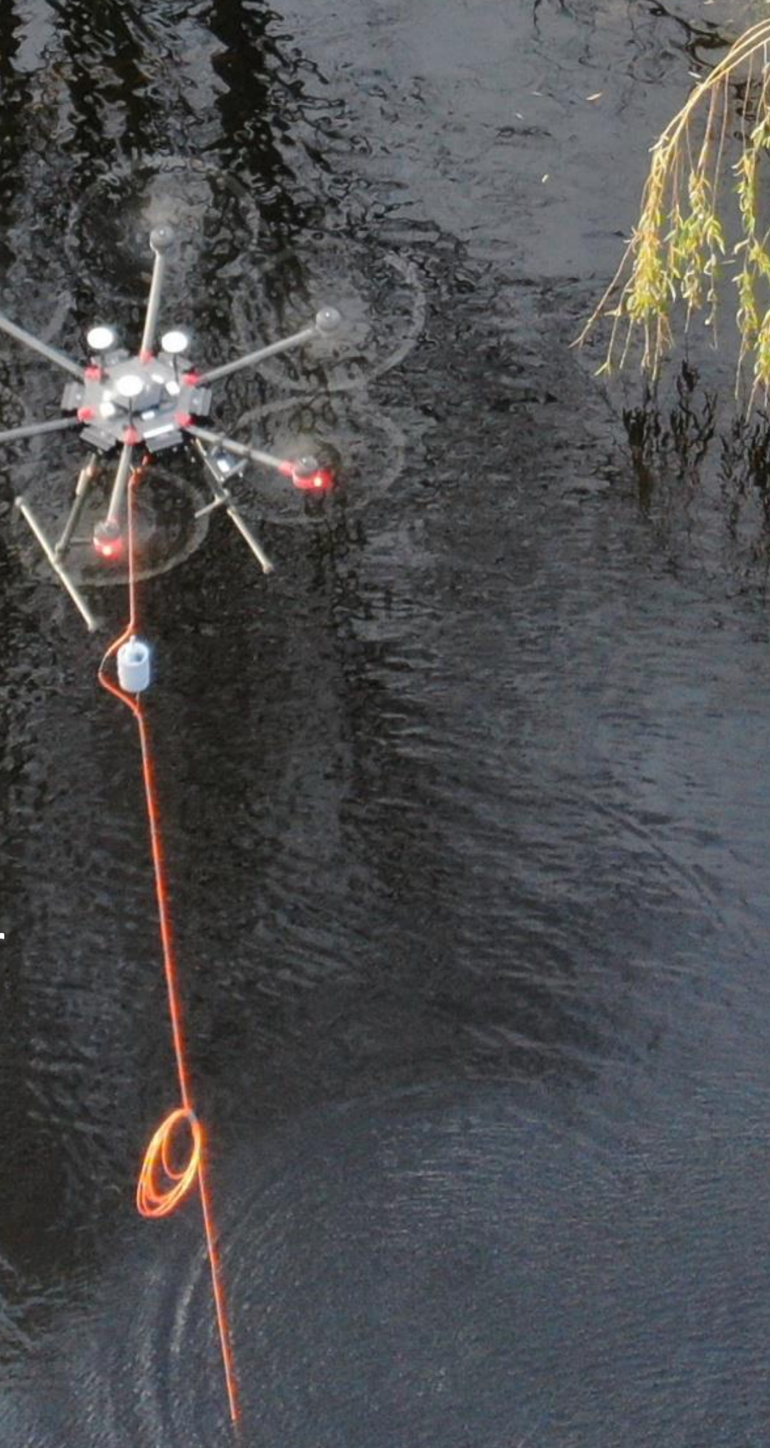


FDRI
UK Centre for Ecology & Hydrology
BGS British Geological Survey
IMPERIAL
University of BRISTOL
UKRI Natural Environment Research Council

Why drones?

Aerial drones open new possibilities in hydrometric data collection

- **Measure flow anywhere**
  - Can measure at challenging or inaccessible locations
  - Eliminate the need for human or boat access
  - Unlimited ‘virtual stations’
- **Save time**
  - Rapid deployment and simplified workflows
  - Drone missions can cover multiple cross-sections in a single area
  - Beyond visual line of sight operation brings huge advantages
- **Enhance safety**
  - Non-contact measurements allow operation at a safer distance from water
  - You can stay dry!



The UAWOS Project

The UAWOS project, funded under Horizon Europe, develops airborne and contactless hydrometric sensing technology to inform climate change adaptation, flood risk assessment and surveillance/management of extreme hydrologic events in remote, hard-to-reach and poorly monitored rivers. We aim to bring sensing technology and surveying workflows to the market and demonstrate data value in a range of use cases in alpine, Arctic and tropical regions.

Using UAWOS technology, you will be able to

- Perform river shape and conveyance control more effectively and cheaper than with traditional in-situ technology
- Perform contactless river discharge monitoring with an accuracy of better than 15%
- Parameterize and inform hydraulic models used in flood risk assessment and flood forecasting
- Validate water surface elevation observations provided by satellite earth observation
- Estimate river discharge from water surface elevation time series at virtual stations

UAS Hydrometry payloads

- Radar altimeter
- Tethered sonar
- Water penetrating radar
- Doppler radar
- Doppler laser

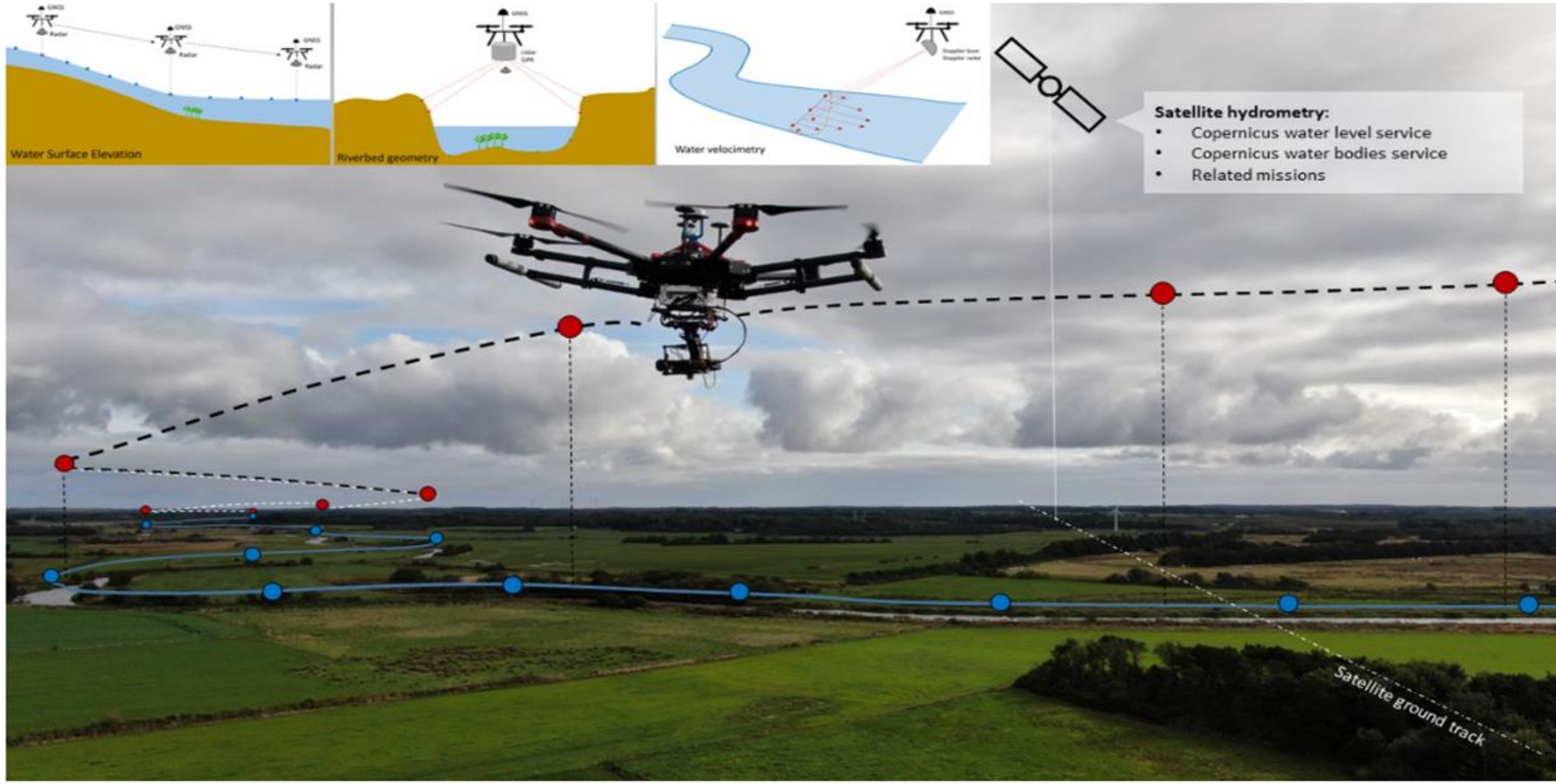
Surveying services

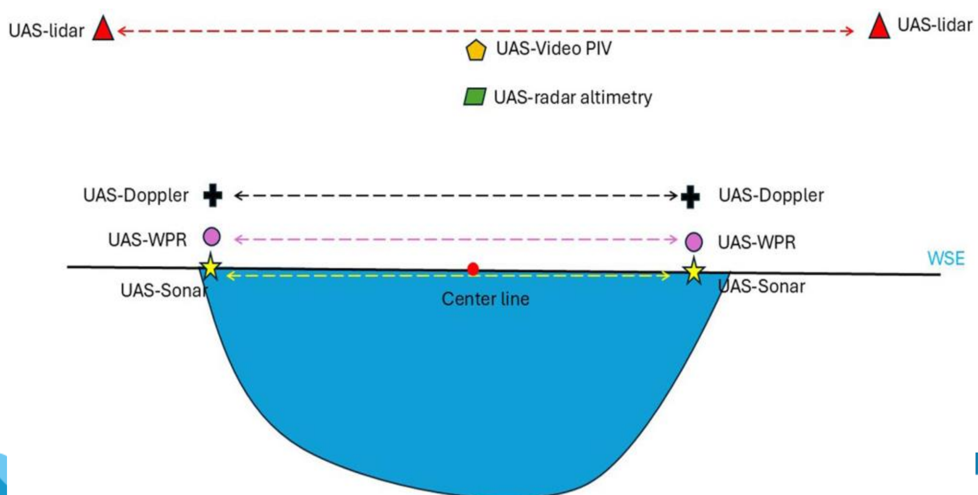
- Water surface elevation
- Bathymetry
- Velocimetry
- River Discharge

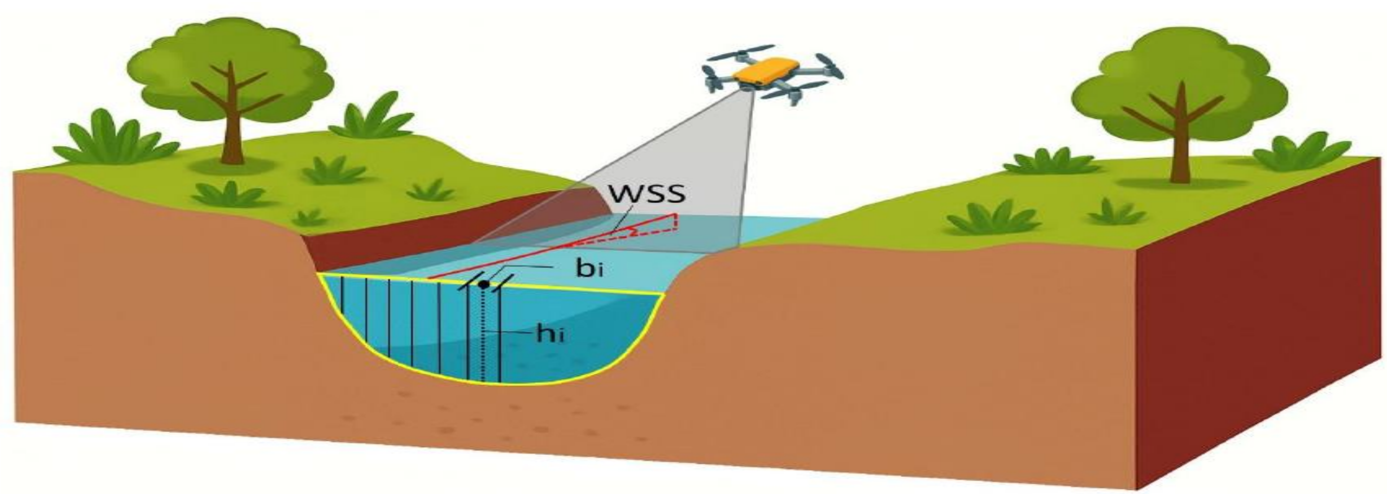
uawos.dtu.dk

UAWOS Survey Workflows

Multiple missions flown at each location with payloads swapped between flights. Lidar, Sonar, WPR and Doppler at cross sections; PIV and Radar Altimetry flown down centre line. Ground-truth with ADCP and MF Pro.



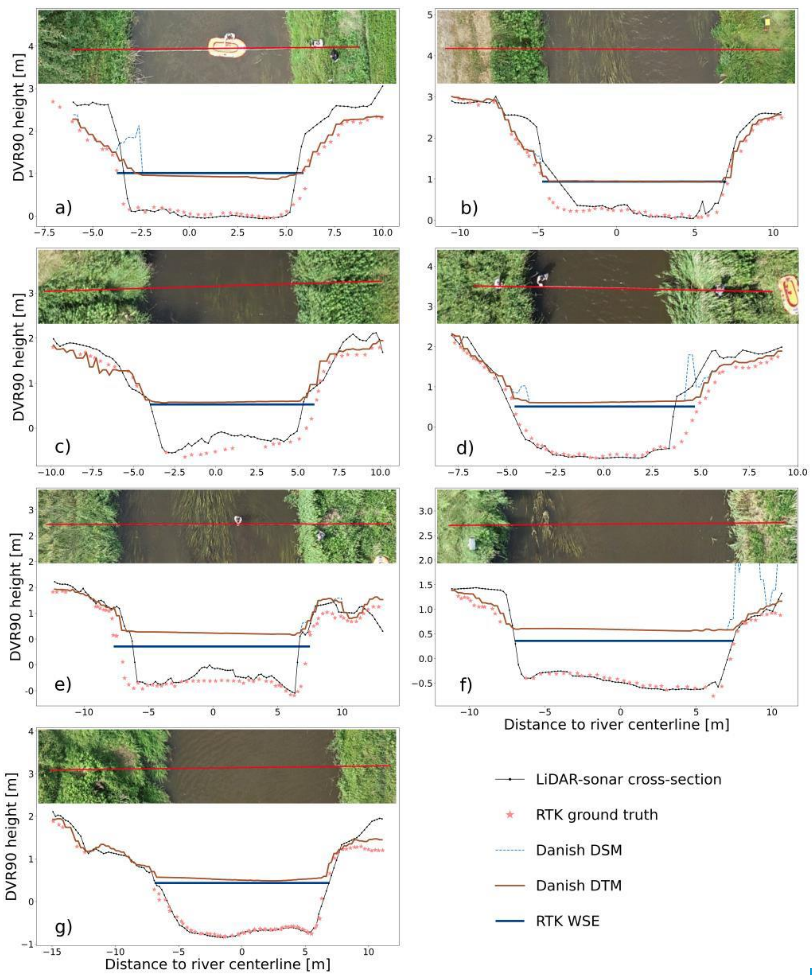


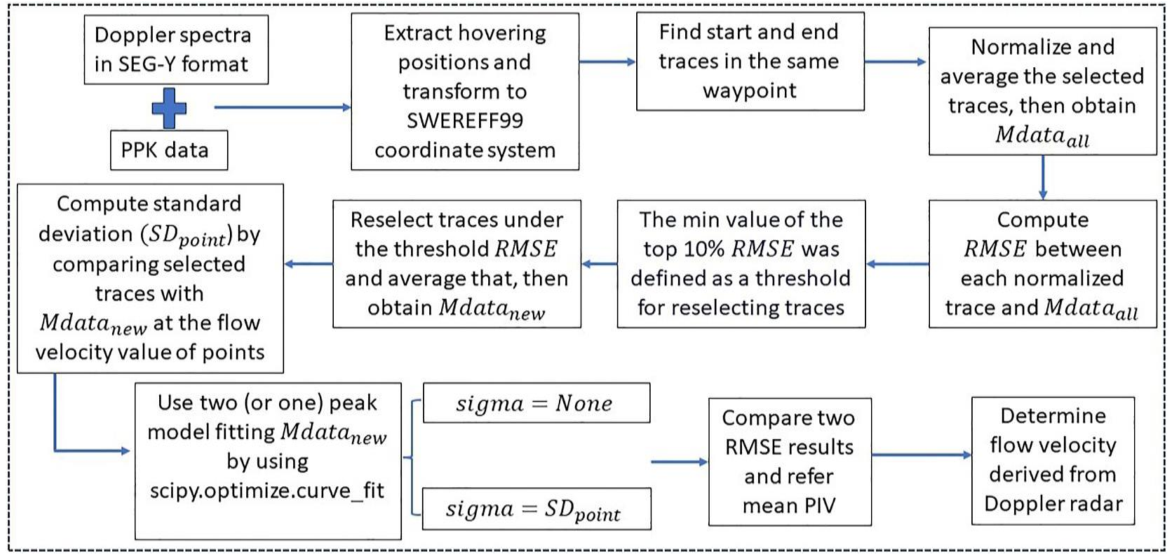


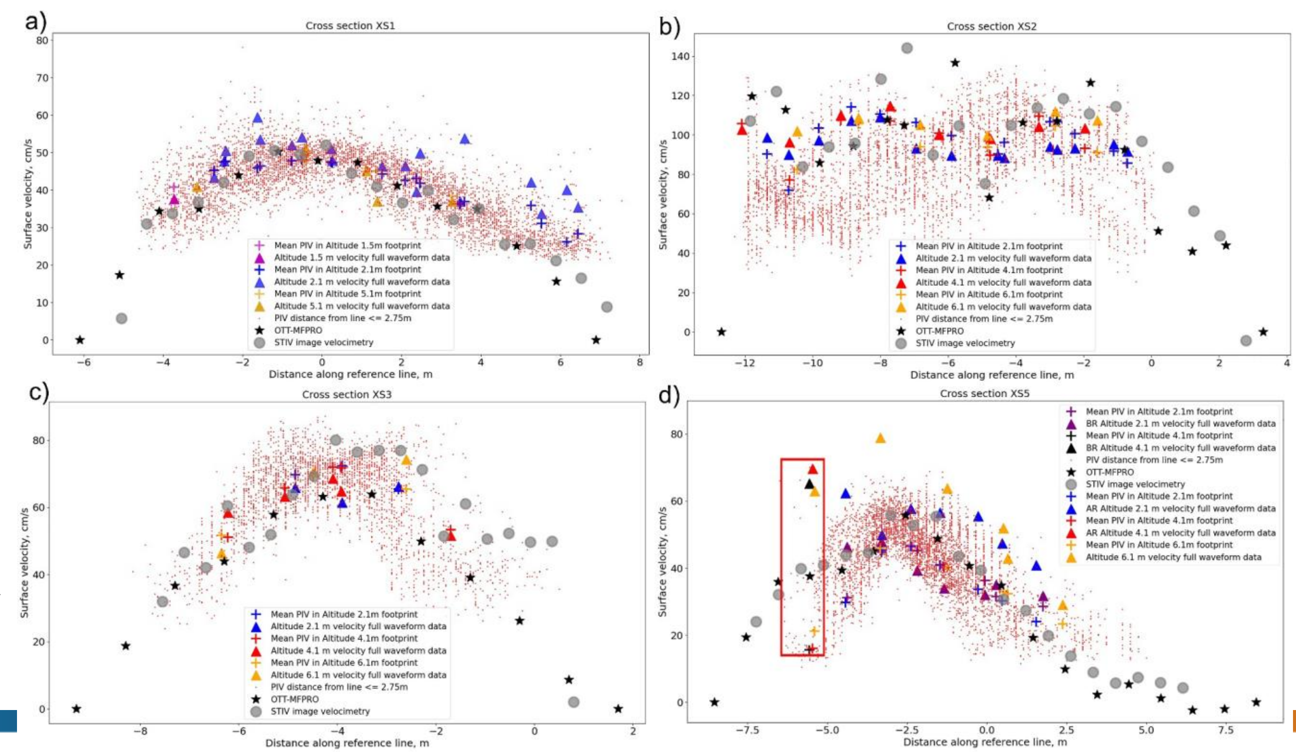
FDRI

Output Data

Location and bathymetry (left), surface velocity calculation (right)



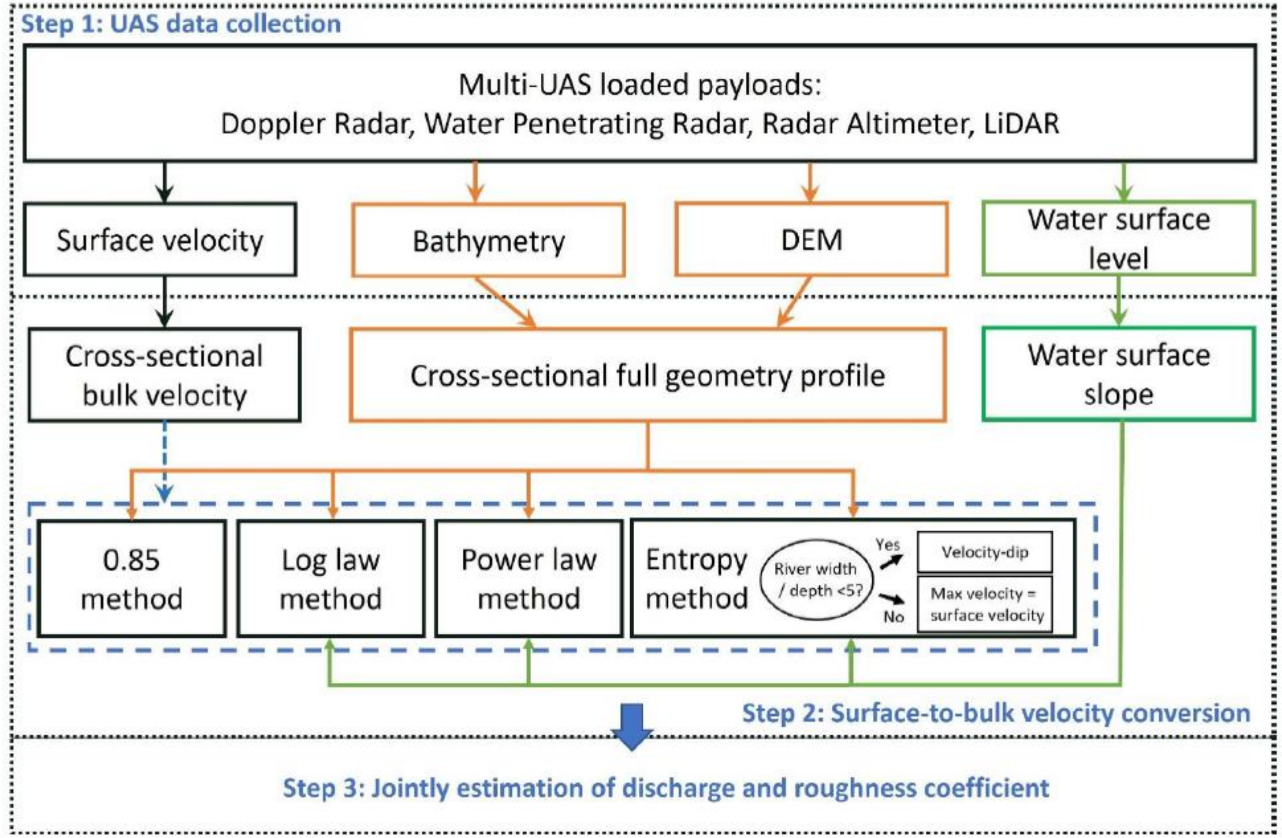


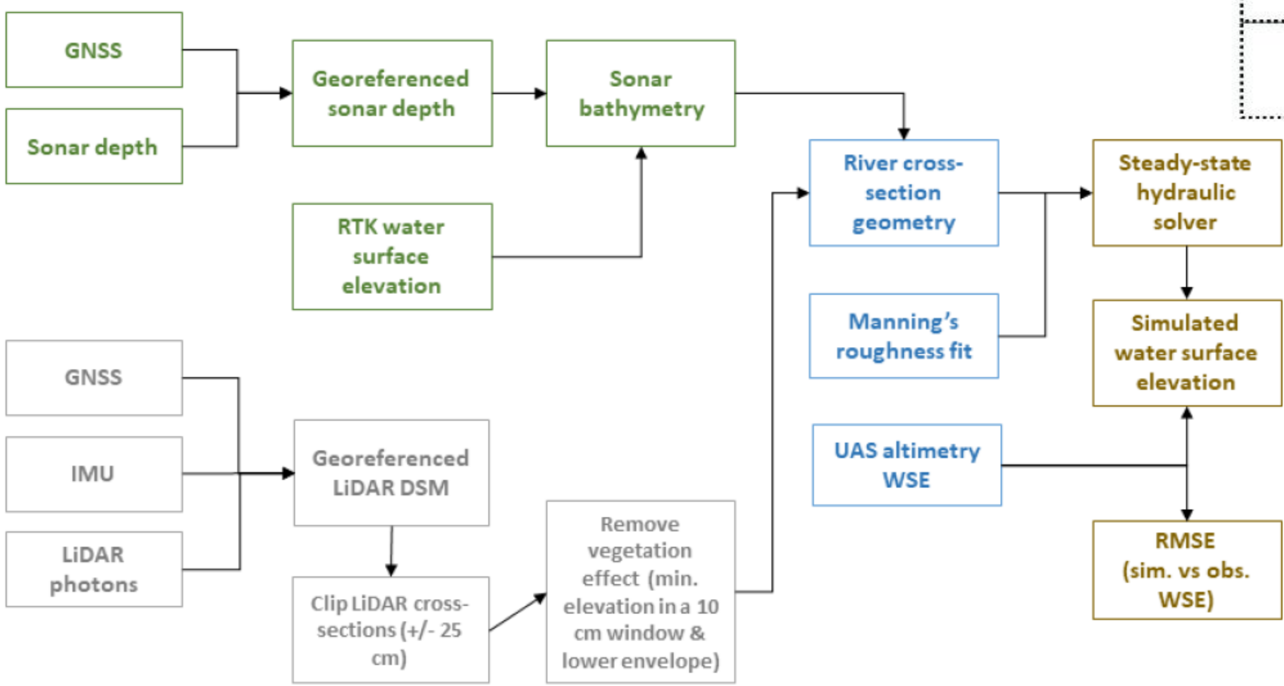


Comparisons of OTT MFPRO results (black stars), STIV image velocities (grey circles), velocities derived from Doppler radar full waveform data (triangles), PIV values calculated by combining u and v component with distance from the tagline ≤2.75 m (red points), and average PIV values in each elliptical footprint area (plus symbols).

Discharge Calculation

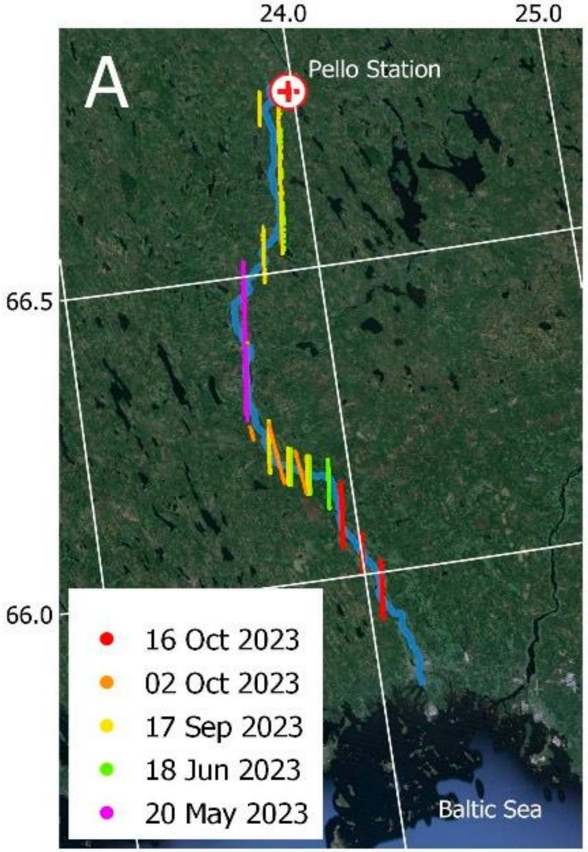
Please refer to the references slide at the end of the presentation and the publications section of the UAWOS website for in-depth analysis of the methods involved.

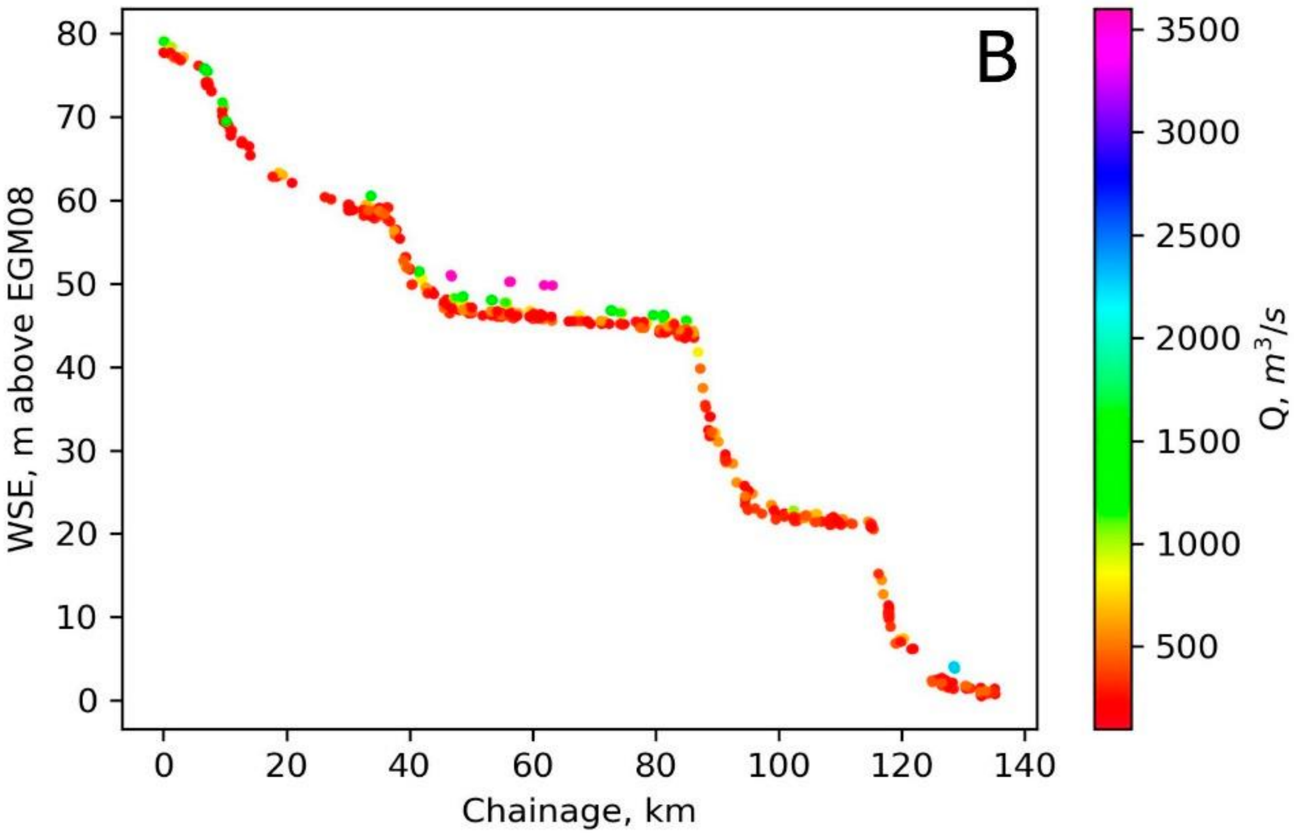




Satellite River Surface Altimetry

ATL03 water surface elevation profile for the Torne River. (**A**): Base map of the area with selected ICESat-2 tracks. Background is Google satellite imagery. Coordinate grid as decimal latitudeand longitude (EPSG 4326). (**B**): ICESat-2 WSE data versus river km from Pello. Pink datapoints are from 20 May 2023. Pello in-situ discharge data show a 100-year flood event on this day





UAWOS Summary

UAWOS develops airborne surveying protocols and standardised workflows for contactless measurement of:

1.[Water surface elevation] (WSE) in lakes and along rivers. The data can be used to establish hydraulic gradients in remote and poorly monitored areas, to map conveyance changes along rivers and to constrain spatial variation of river hydraulic properties using hydraulic inverse modelling.

2.[Riverbed elevation]. The data can be used to parameterise hydraulic river models, as an input to river discharge estimation, to control shape and conveyance of rivers and streams, and to monitor and control deposition and erosion processes in dynamic river environments.

3.[River velocimetry]. The data can be used as an input to river discharge estimation, for validation of hydraulic models and for flood risk assessment.

4.[River discharge]. Water surface slope, riverbed elevation and river velocimetry can be combined to estimate river discharge through a cross section and to jointly estimate discharge and hydraulic roughness parameters.

5.[Satellite Altimetry]**.** Linking the ground-truthed rating curves to water elevation data from satellite Earth Observation allows improved water management and early warning of flooding events in remote locations.

For full details and open data see: www.uawos.dtu.dk

Developing New Technologies and Integrations

Thurn are actively working on new drone carried sensors including:

Drone Mounted Doppler Laser
Developed under the UAWOS project, this sensor provides accurate point flow measurement below the water surface.

Drone based ADCP system
A light-weight ADCP unit with integrated AHRS and INS, fed with a live GNSS stream, carried and towed by a drone. This enables accurate water flow and discharge measurement in remote locations.

Enhanced SVR Sensor
New sensor system and analysis software for eliminating noise, enabling more accurate velocity measurement, especially at very low flow rates.

Bespoke integrated survey vessels
We work with businesses, universities and public bodies to develop new solutions for surveying in and around water using remote and autonomous drones and boats. Past projects include water sampling, chemical/gas sensing, and object detection. We are very open to exploring future R&I projects.

Sources and References

Fabrício, Artur C., Joerger, Mathieu, Bauer-Gottwein, Peter, Olesen, Daniel H., "INS/GNSS/LiDAR Fusion for Accurate Positioning of UAVs in Complex River Environments," Proceedings of the 38th International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2025), Baltimore, Maryland, September 2025, pp. 2011-2020. https://doi.org/10.33012/2025.20449

Xinqi Hu, Zhen Zhou, Farhad Bahmanpouri, et al. (2025): Contactless river discharge from Unoccupied Aerial Systems hydrometry: performance evaluation using a large and diverse set of river cross sections *Preprint published in ESS open archive*
Zhen Zhou, Laura Riis-Klinkvort, Emilie Ahrnkiel Jørgensen, et al. (2024): Measuring river surface velocity using UAS-borne Doppler radar. *Water Resources Research*, 60(11):e2024WR037375

Monica Coppo Frias, Alexander Rietz Vesterhauge, Daniel Olesen, et al. (2025): Combining UAS Lidar, Sonar and Radar Altimetry for River Hydraulic Characterization. *Drones*, *9*(1), 31

Fabian Merk, Timo Schaffhauser, Faizan Anwar, et al. (2024): The Significance of the Leaf-Area-Index on the Evapotranspiration Estimation in SWAT-T for Characteristic Land Cover Types of Western Africa. HESS, 28, 5511–5539

Zhen Zhou, Laura Riis-Klinkvort, Emilie Ahrnkiel Jørgensen, et al. (2025): UAS Hydrometry: Contactless River Water Level, Bathymetry, and Flow Velocity -The Rönne River Dataset. *Scientific Data*12, 294 https://doi.org/10.1038/s41597-025-04611-x

Peter Bauer-Gottwein, Linda Christoffersen, Aske Musaeus, Monica Coppo Frías, and Karina Nielsen (2024): Hydraulics of Time-Variable Water Surface Slope in Rivers Observed by Satellite Altimetry. *Remote Sensing*, 16(21), 4010

Musaeus, A. F., Kittel, C. M. M., Luchner, J., Frias, M. C., & Bauer-Gottwein, P. (2024). Hydraulic River Models From ICESat-2 Elevation and Water Surface Slope. *Water Resources Research*, *60*(6). https://doi.org/10.1029/2023WR036428

Using hydraulic modelling to estimate floodplain flows

David Cameron BSc PhD CSci MCIWEM C.WEM

david.cameron@jbaconsulting.com

11 February 2026

Acknowledgments

- SEPA: especially Grant Kennedy and Dr Alistair Cargill.
- Scottish Borders Council: Duncan Morrison.
- JBA: Emma Blades.

River Tweed has a long flood history

1948
An extremely large flood in the Borders. Extensive flooding of the Tweed.

1949
In January heavy rains caused the Tweed to breach. The railway was inun13 August 2024d and when flood was at its highest flooded to a dept of 2ft 6inches.

1977
Several bridges swept away. Residential, commercial property and agricultural land also affected.

Overwhelming of property defences in December 2015

2005
January- River Tweed flooded at Tweed Green in Peebles.

2009
River Tweed flooded at Tweed Green in Peebles.

2013
December- Tweed Green area of Peebles was inundated by water from the River Tweed. No properties flooding but surrounded. Flooding to Kerfield Park pitches recorded 200m from the river banks.

2015
Largest event recorded at the Peebles gauging station. Extensive flooding throughout the Tweed catchment.

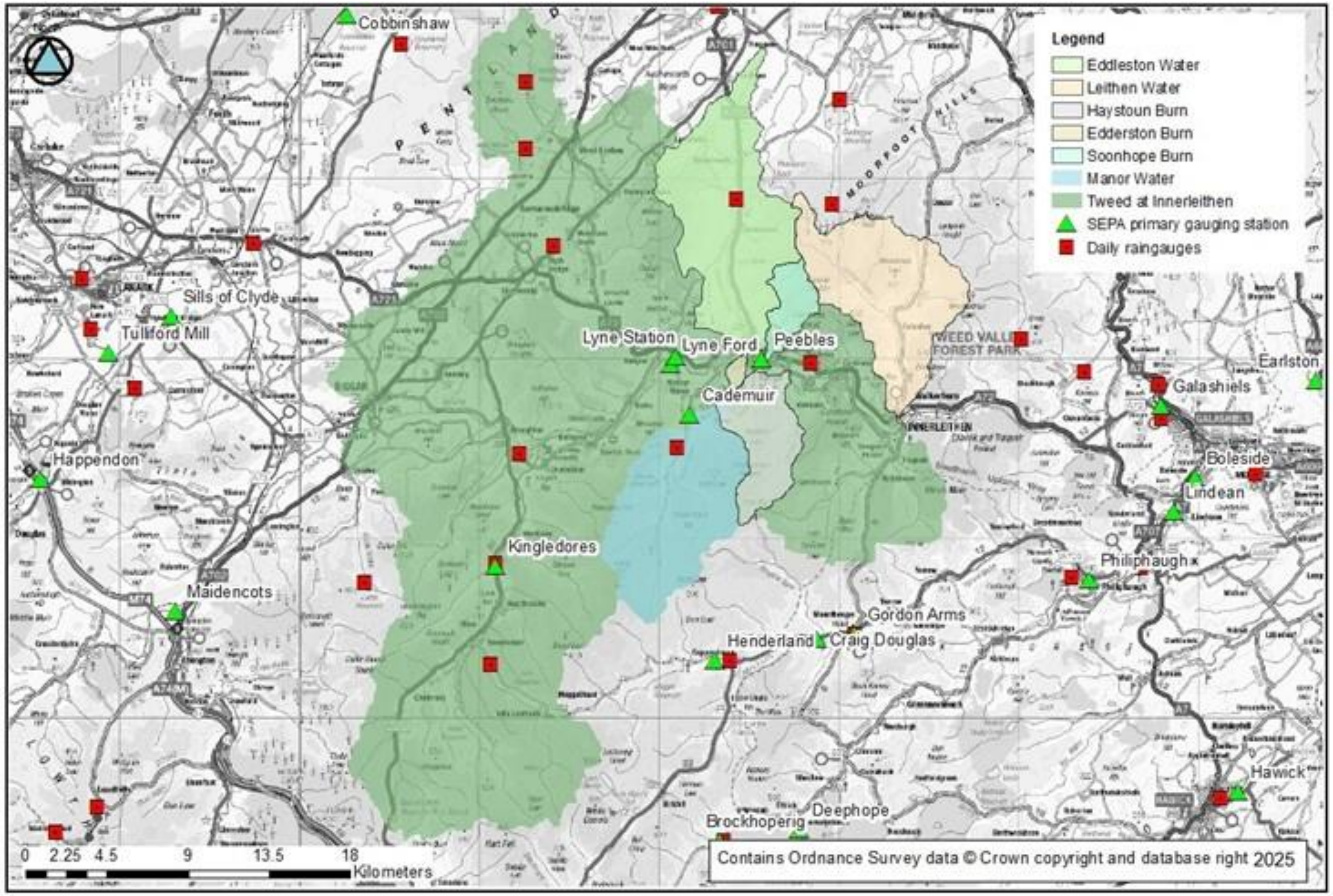
2018
High flow event that inundated parts of Tweed Green and Kerfield Park.

2022
December Refuge centre opened after Tweed floods

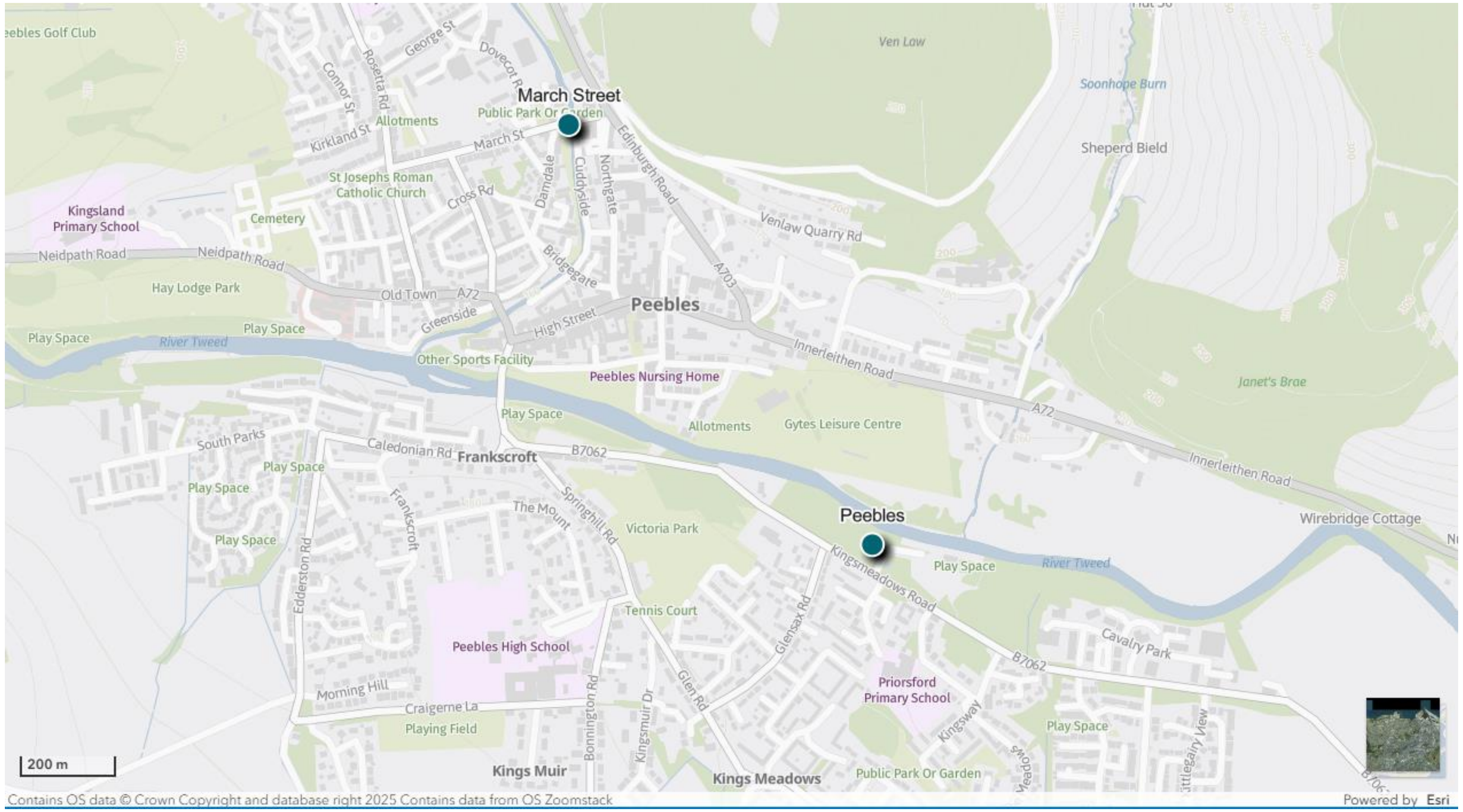
Photo taken in Dec 2015 looking downstream from Tweed Bridge

g.com

Tweed at Peebles is a key gauge

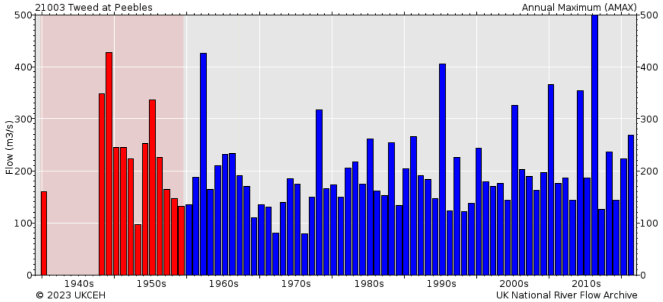


Tweed at Peebles

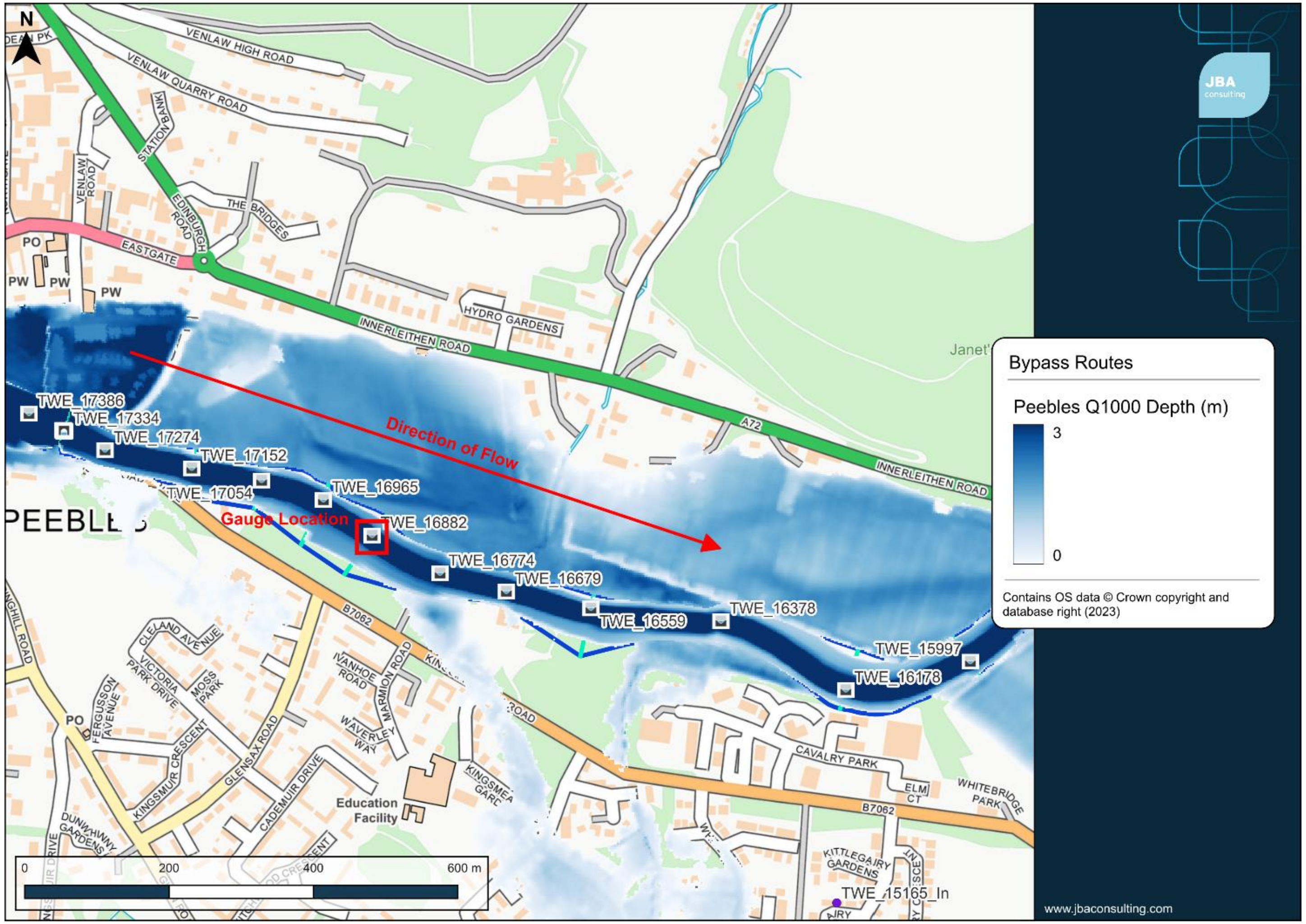


Tweed at Peebles gauge

- Velocity area gauge with cableway. Subject to bypass.
- Hut with stilling well
- Current gauge record began 1959.
- Previous gauge at old Priorsford bridge ~360 m upstream. Record 1939 to 1959. Notable floods in 1948 and 1949, but flow record uncertain.
- AMAX from 2023 peak flow dataset:



Example of modelled bypass flows



david.cameron@jbaconsulting.com

Hydraulic Modelling Aims

- Develop rating for Priorsford to allow for record extension.
- Develop high flow rating limbs for Peebles to account for bypass.

Tweed at Priorsford

Details

- Was located in Peebles (catchment area ~694 km^2)
- Station downstream face of footbridge, upstream of rail bridge location until 1959.
- Gauge zero:
  - Priorsford: 155.15 mAOD (supplied by SEPA, 2007,2014).
  - Peebles (existing station from 1959): 154.577 mAOD (JBA survey for SEPA, 2017)
- Important floods occurred during Priorsford period (e.g. 1949)
- Previous flood ratings from log linear extrapolation and transfer of Peebles data
- But..
  - Presence of railway bridge control

Site location (source: SEPA)

david.cameron@jbaconsulting.com

11 February 2026

Station from right bank (SEPA image)

david.cameron@jbaconsulting.com

Foot and railway bridges (SEPA image)

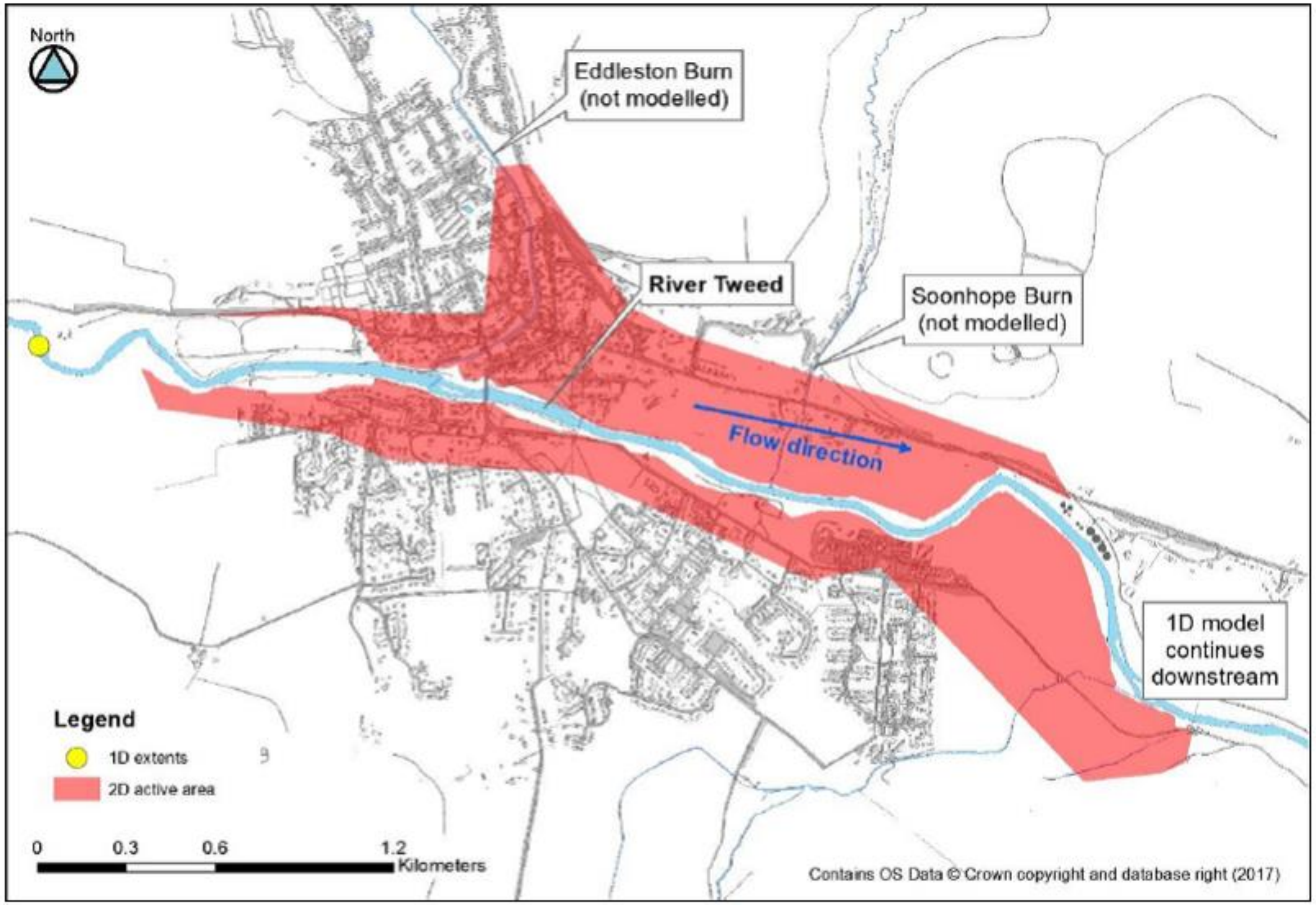
david.cameron@jbaconsulting.com

Existing model

- Developed for Scottish Borders Council ~2017.
- 1D/2D model (FM/TUFLOW).
- Includes bridges and floodplain flow.
- 1D: surveyed channel cross sections.
- 2D: LiDAR.
- Boundaries: flow hydrograph and normal depth.

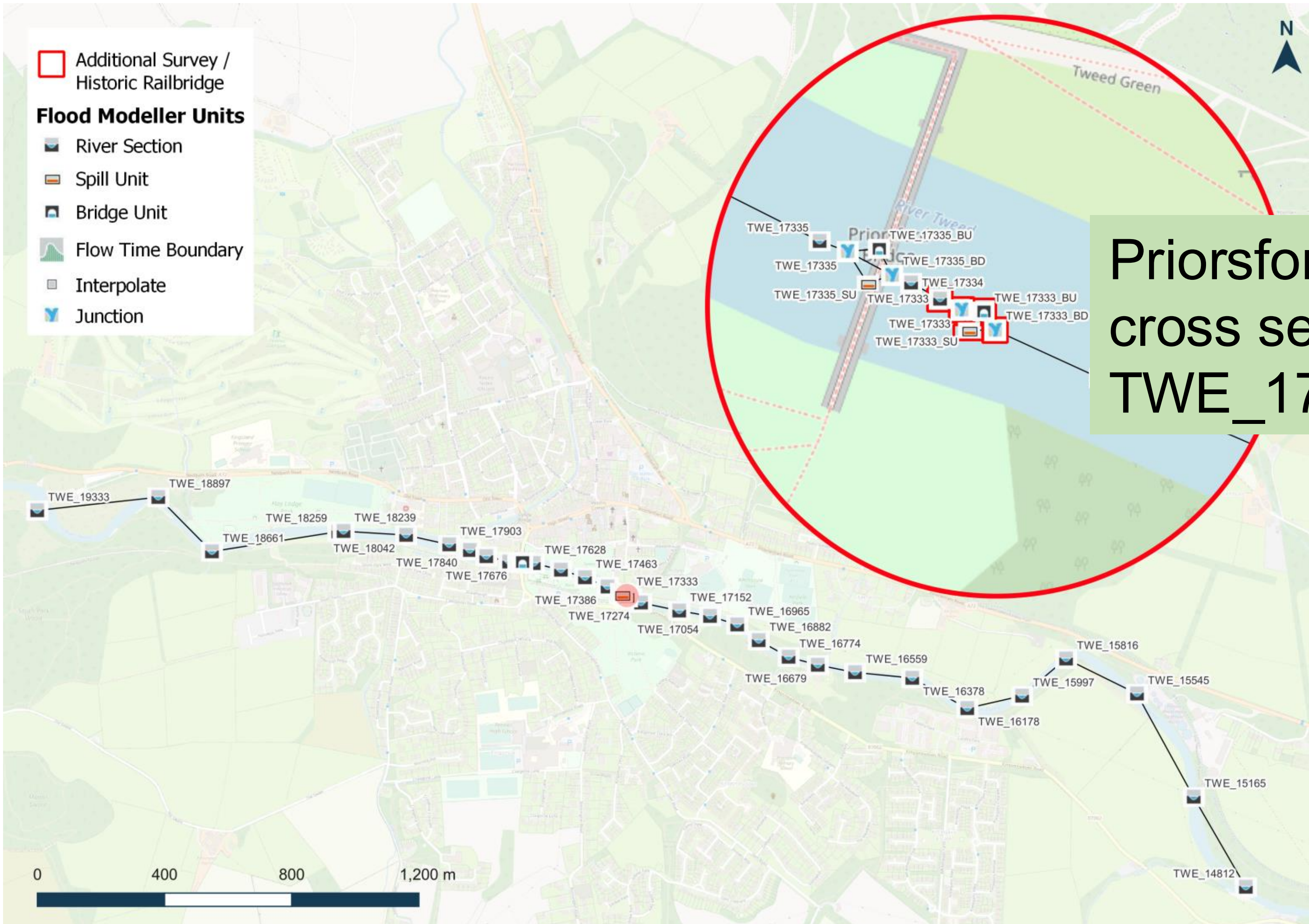
Tweed model extent

Figure 2-1: River Tweed model overview schematic - 2D area



david.cameron@jbaconsulting.com

Tweed model: Priorsford reach



Priorsford at cross section TWE_17334

david.cameron@jbaconsulting.com

Existing model: Manning’s ‘n’

- 1D: Set to suitable value for flood flow (e.g. 0.025 at Peebles gauging station).
- 2D: Land use defined by Mastermap classes.
- Out of bank Manning’s ‘n’ values defined by classes.

Out of bank Manning's 'n'

Item	'n' value
Buildings	0.1
Structures	0.1
Inland and Coastal Water	0.03
Natural Surface and Gardens	0.05
Manmade Surface Roads and Paths	0.025
Trees, Roughland and Scrub	0.1
Marsh, Reeds or Saltmarsh	0.046

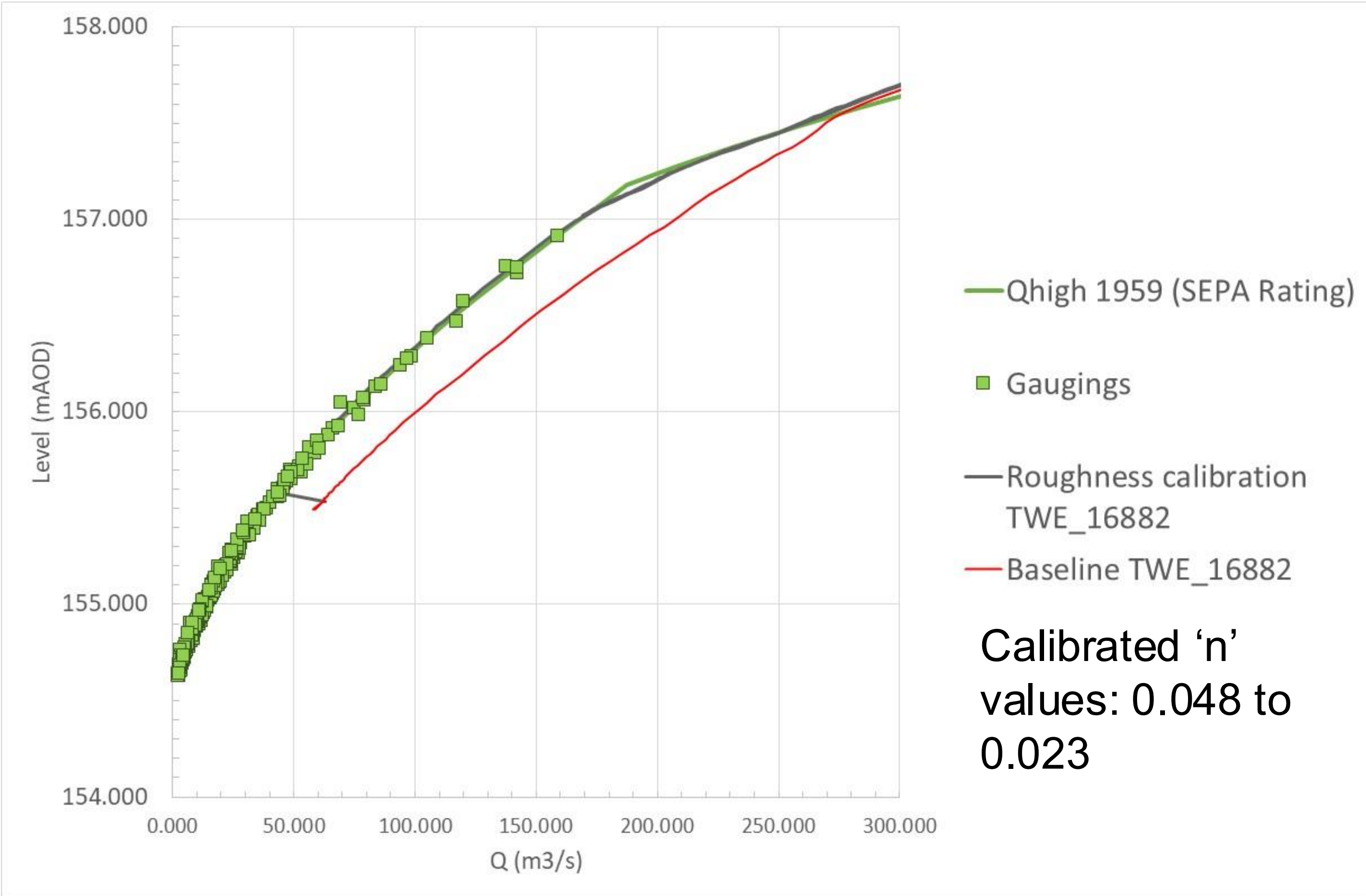
Model sensitivity (2017 model build)

- Manning's 'n' values were adjusted globally by +20% and +40%. At the Priorsford Bridge, the maximum observed changes in water level were 0.2m and 0.35m respectively
- Flow was tested by ±20%. Average stage change of ± 0.3m throughout.
- The downstream boundary was tested by ±20%. No changes upstream of the River Tweed and Walkerburn confluence.

Model approach

- Model was developed for flood studies, only has one in channel Manning's 'n' value.
- 1D: Improve fit to in-channel SEPA rating (at existing Peebles station) by allowing Manning's 'n' to vary with depth.
- 1D/2D: full run to obtain bypass flows.

Peebles: Manning's 'n' with depth



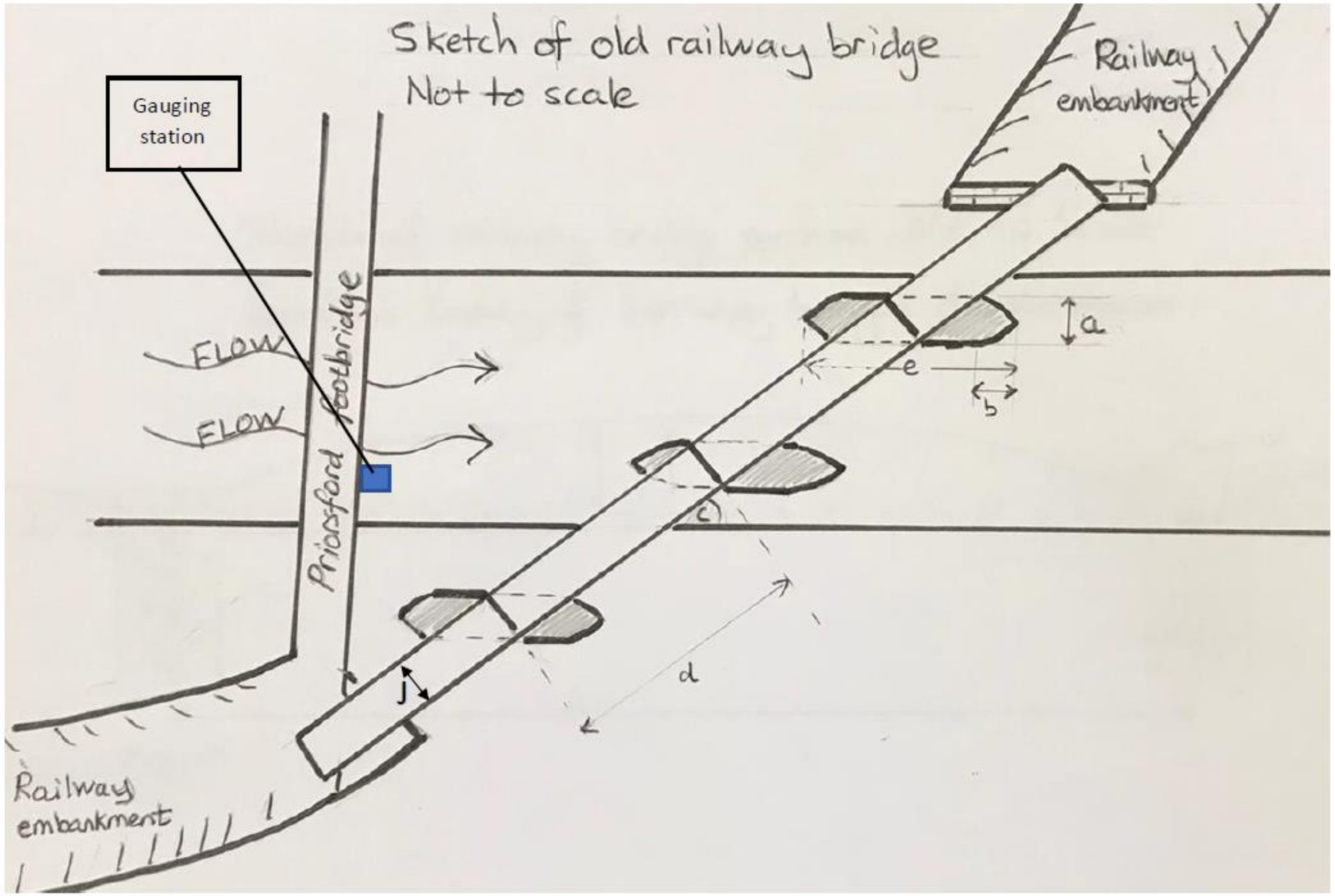
Calibrated 'n' values: 0.048 to 0.023

david.cameron@jbaconsulting.com

Model approach: historical station

- Use present day model (calibrated as above).
- Add railway bridge (new survey and LiDAR data used to help with this; embankment height 160.41 mAOD and assumed to be rail track surface elevation).
- 1D/2D: full run (from 2017 1000 year estimate 1142 m^3/s at Peebles gauging station).

Existing information: railway bridge

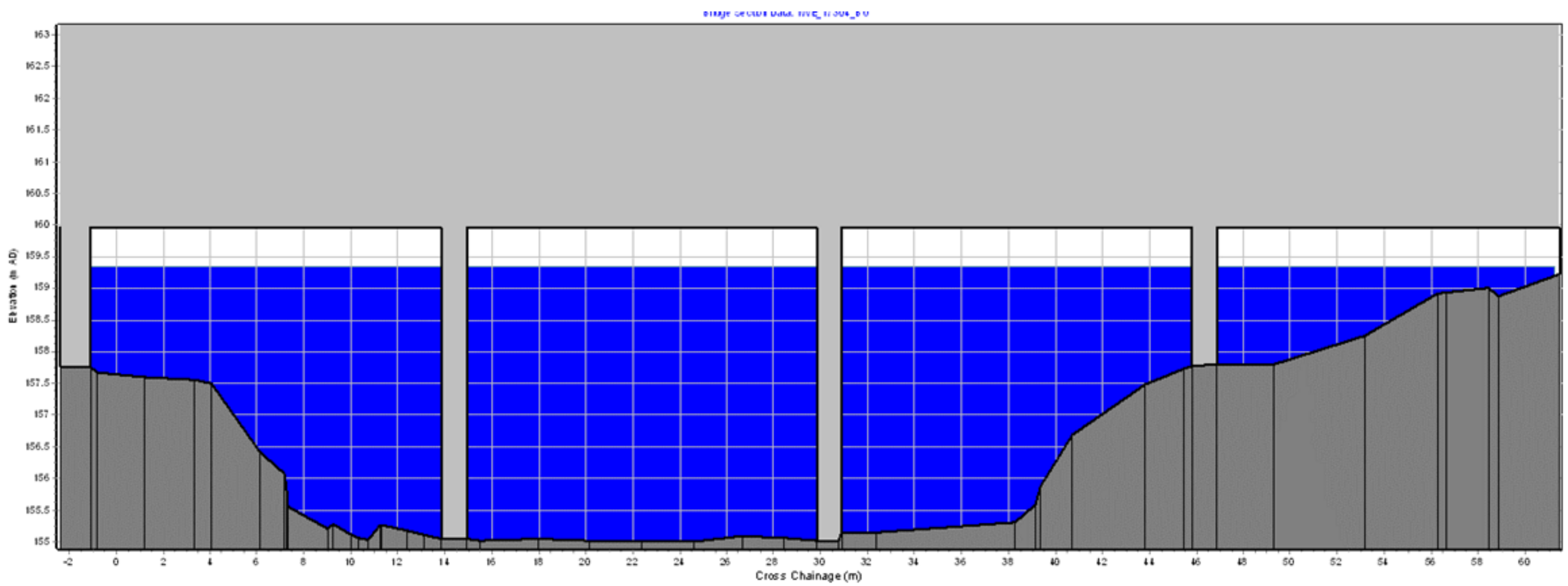


Source: SEPA

david.cameron@jbaconsulting.com

Model representation: bridge unit

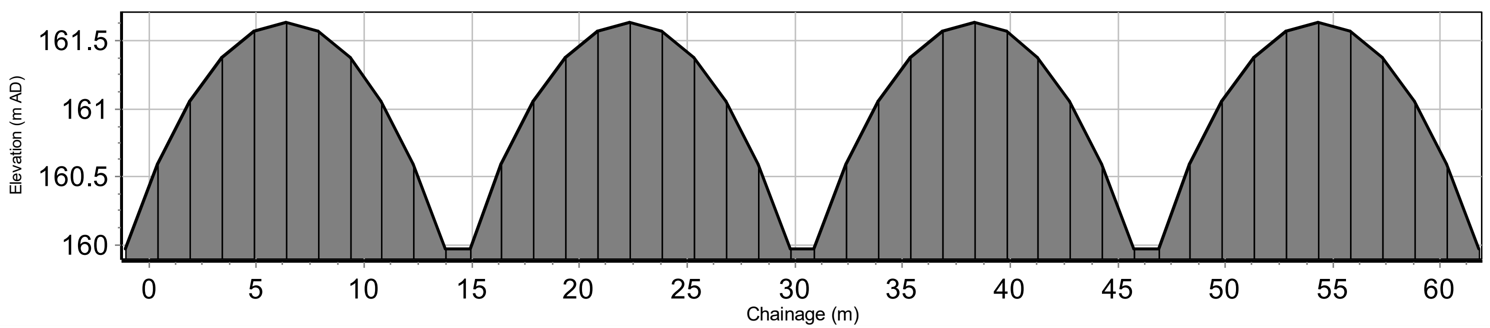
- SEPA estimate: bottom of bridge 0.44 m below track level (160.41 mAOD survey): 159.97 mAOD
- Below elevation of 159.97 mAOD, in FM represented by bridge:



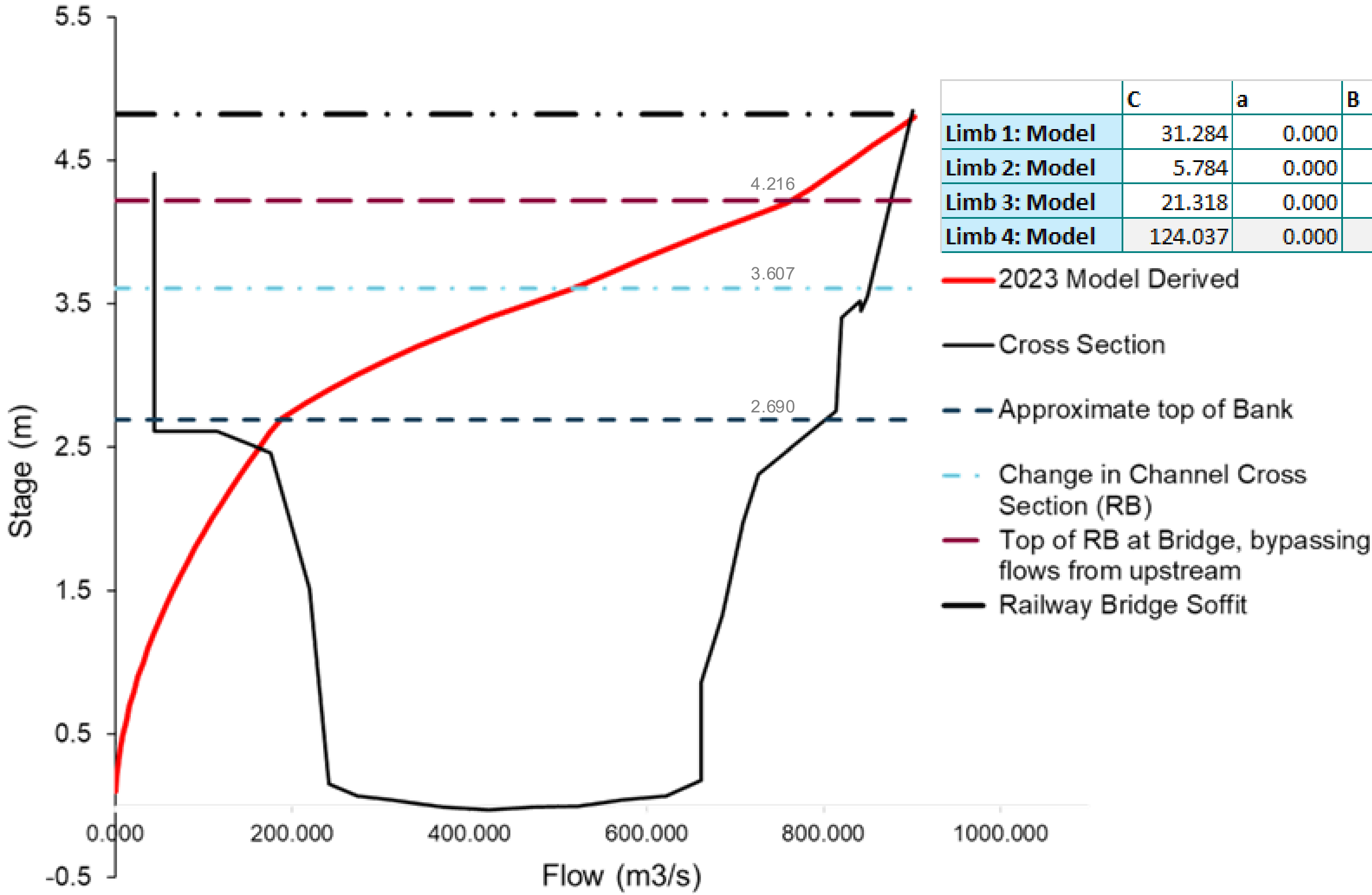
david.cameron@jbaconsulting.com

Model representation: spill unit

- Above elevation of 159.97 mAOD, in FM represented by spill:



Priorsford: model derived rating



	C	a	B	hmax (m)
Limb 1: Model	31.284	0.000	1.801	2.690
Limb 2: Model	5.784	0.000	3.506	3.607
Limb 3: Model	21.318	0.000	2.489	4.216
Limb 4: Model	124.037	0.000	1.265	5.400

david.cameron@jbaconsulting.com

Implications for flood flows

- Some uncertainty over stage of January 1949 flood. New rating estimates are (NRFA value pre-dates recent update):

Source	Stage (m)	Level (mAOD)	Flow from model rating (m3/s)
Raw chart digitisation	3.563	158.713	504
SEPA recommended (from observer note)	4.115	159.265	721
NRFA	4.320	159.470	790

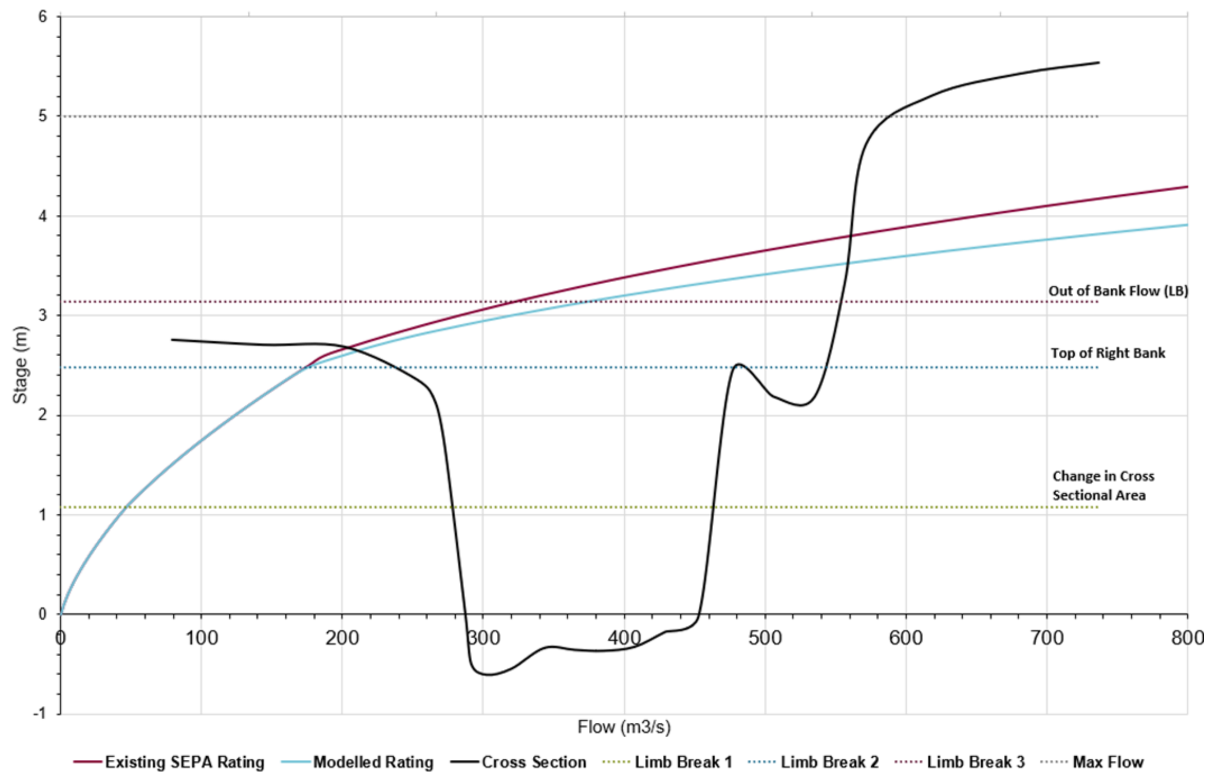
- Note – all water levels below the soffit of the rail bridge (159.97 mAOD).
- Above estimates assume bridge is clear (not blocked).

Tweed at Peebles

Model approach

- Re-run present day model.
- Extract bypass flows for floodplain.
- Develop new high flow rating limb.

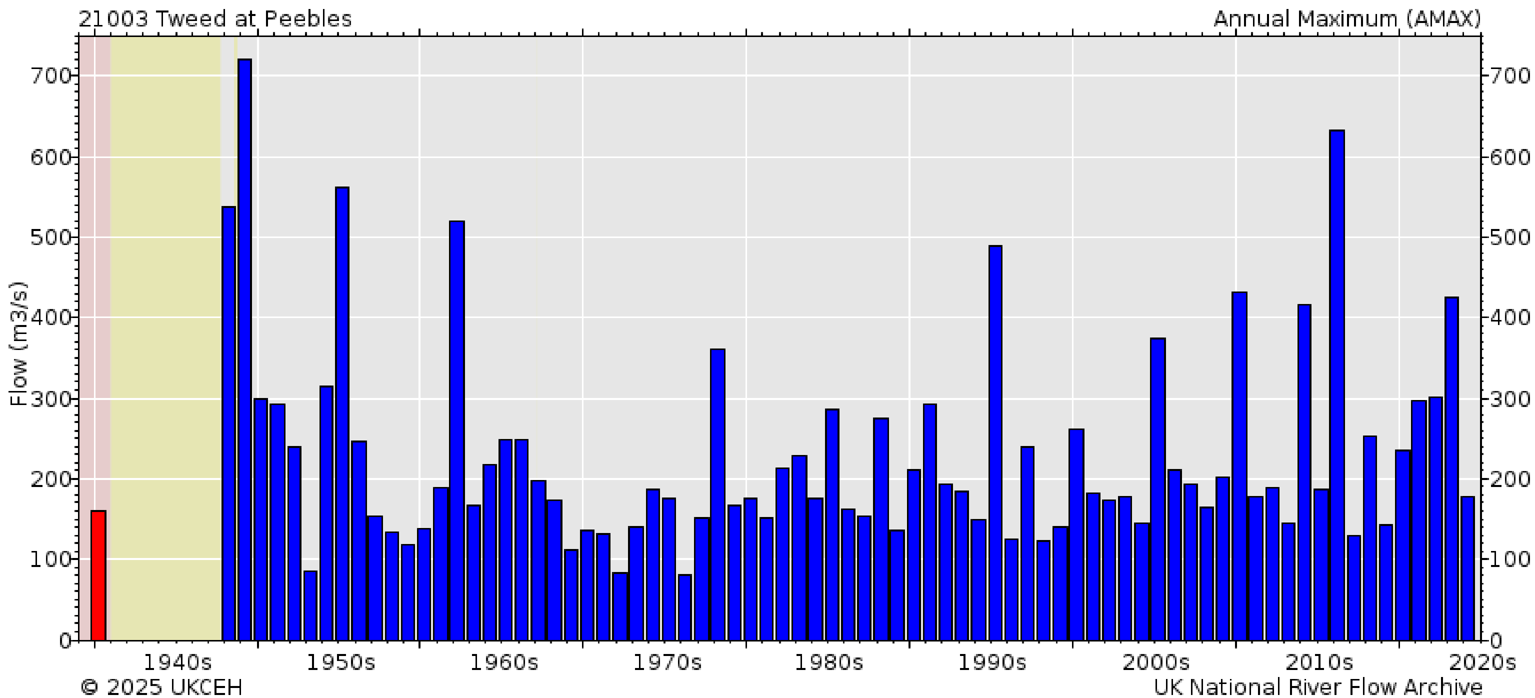
Rating Development & Comparison



15	1	N/A	Q = 32.000 * (h + 0.1510) ^ 1.800	29/11/2018	0.643628395	01/01/2100
15	2	N/A	Q = 45.000 * (h -0.03900) ^ 1.500	29/11/2018	2.558	01/01/2100
15	3	N/A	Q = 6.594 * (h + 0.000) ^ 3.520	29/11/2018	3.2	01/01/2100

As implemented in Peak Flow Dataset https://nrfa.ceh.ac.uk/data/station/peakflow/21003#rating

Combined Priorsford/Peebles AMAX



Source 2025: https://nrfa.ceh.ac.uk/data/station/peakflow/21003#amaxStaticGraph

Conclusions

- Hydraulic modelling can be used to improve rating curves both existing and historical.
- In this project, ratings developed for Priorsford and Peebles.
- Can be applied at other locations.

Questions?

david.cameron@jbaconsulting.com

The standardisation of methods and techniques in floodplain flow measurement

Rod Wilkinson   MBA, F.CWEM, CEnv.

What I’m not going to cover

1. *What is a Standard and how is it created*
2. *Who is involved in hydrometric standardisation in the UK and how is it organised*
3. *What’s the current work programme*
4. *Where you can help*

1. What is a Standard and how is it created

- A standard is a ***formalized set of guidelines*** **and specifications** developed to ensure that ***materials, products, processes, and services*** meet ***consistent*** and **reliable** criteria. It serves as a common framework, created through a consensus process involving experts and stakeholders, to facilitate ***uniformity, interoperability, and safety.***
- ***It can record design requirements, operational requirements, experience, results of research, good practice***
- ***It does not carry any legal status***

Fuse - BS1362
Plug - BS1363

ISO 4373:2022 - Hydrometry — Water level measuring devices.

1. What is a Standard and how is it created

- *A Standard is created by a Technical Committee (TC) of volunteer (unpaid) experts hosted and controlled by the British Standards Institution (BSI)*
- *A TC is led by a Chair and has a dedicated Committee Manager provided by BSI, with experts from industry eg UK Water Industry or environmental protection agencies*
- *Committees meet as often as the workload demands but usually twice per year. Remote/virtual meetings are now the norm.*
- *All forms of Standard are reviewed on a 5 yearly cycle by the Committee*
- *If a revision is undertaken, it is done by a Working Group of Committee members*

2. Who is involved in hydrometric standardisation in the UK

- *CPI113 Hydrometry has subcommittees on open channel level and flow measurement, precipitation, instrumentation, sedimentation and groundwater*
- *CEN* TC318 mirrors this committee in Europe; ISO** TC113 mirrors this internationally ; a WMO*** rep attends all CEN and ISO meetings*

  (* Comité Européen de Normalisation ** *International Standards Organisation* *** *World Met Organisation)*

- *In the UK CB501 develops standards and guidelines on Flood Risk and water courses (managing the impact of flood flows on developed floodplains)*

FDRI

3. Examples of the current work programme

- ***Rainfall intensity measurement with Italy via CEN TC318***
- ***Snow water equivalent with Sweden via CEN TC318***
- ***Raingauge network design with ISO TC113***
- ***ISO 1070 Hydrometry – Slope-area method***
- ***BS 8533:2017 Assessing and managing flood risk in development — Code of practice***

FDRI

4. Where you can help

CPI113 and CB501 are always looking for new experts.

So if you are:-

- ***Involved in research into floodplain flow measurement***
- ***Measuring and recording floodplain flow***
- ***Using floodplain flow data***
- ***Interested in setting standards for the future***
- ***Making a difference to your profession***
- ***Improving your CV or CPD record***

- ***get in touch – rodwilkinson2@gmail.com***

Thank you

FDRI