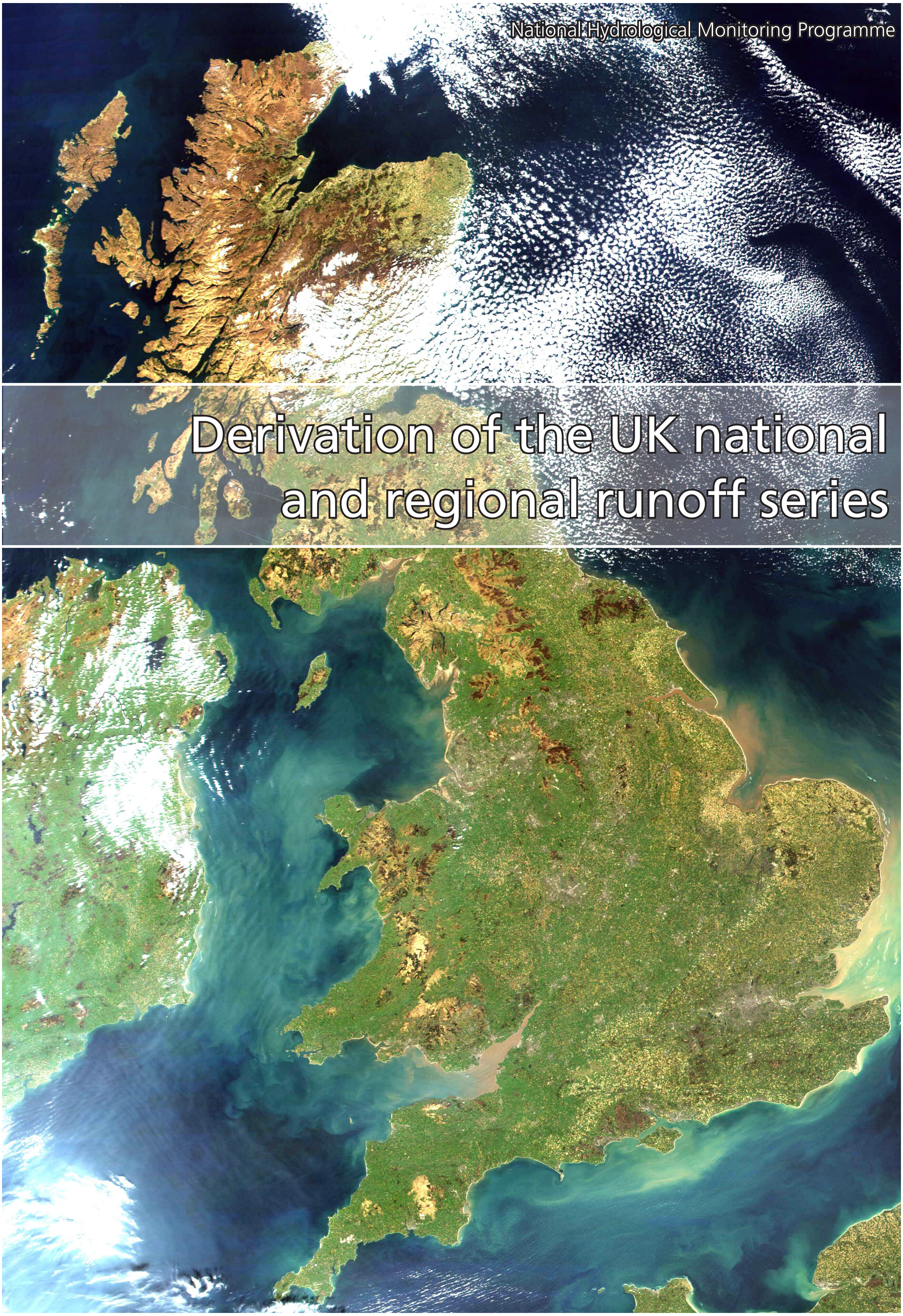
National Hydrological Monitoring Programme

Derivation of the UK national and regional runoff series



Centre for Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

British Geological Survey
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DERIVATION OF THE UK NATIONAL AND REGIONAL RUNOFF SERIES

by

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For further information about the National Hydrological Monitoring Programme please visit: http://www.ceh.ac.uk/data/nrfa/nhmp/nhmp.html

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1 Introduction

This technical report details the derivation and updating of the daily and monthly outflow series for the UK and its constituent parts. These series are widely exploited in the National Hydrological Monitoring Programme (NHMP), to meet international data exchange obligations, and in an extensive range of research applications particularly those relating to the detection and quantification of hydrological trends at the macro scale.

The selection criteria for the individual gauging stations which provide the basis for the calculation of the national and regional outflow series are discussed together with the methodology used to assess flows for the ungauged areas in each domain[1] and thence to derive a time series of total daily outflows for the post-1960 period.

1.1 Geographical background

With an average rainfall of 1125mm the UK is one of the wettest countries in Europe but spatial contrasts in rainfall amounts are large. Annual rainfall totals can exceed 5000mm in parts of the western highlands of Scotland whilst annual averages fall below 500mm in the driest parts of south-east England. On average, rainfall is well distributed through the year but with a tendency to an autumn and early winter maximum. At the national scale around 45% of the rainfall is lost to evaporation, rising to more the 80% in the driest parts of the country. Evaporation is a relatively conservative variable with annual losses generally in the 350-600mm range but seasonal contrasts are large: more than three-quarters of the annual evaporation normally occurs during the summer half-year (April-September). The residual rainfall sustains a very dense stream network – over 200,000km of rivers and streams draining to over 100 estuaries; this underlines the impracticality of directly monitoring all significant outflows and dictates the need to base national and regional runoff assessments on representative sets of gauged rivers.

At the national scale mean annual runoff represents around 55% of the average rainfall but for individual catchments mean runoff ranges across two orders of magnitude with average annual totals falling below 100mm across a significant proportion of the English Lowlands. The bulk of the annual runoff occurs during the late autumn and winter when fluvial flooding is most common. Annual minimum flows in western and northern rivers generally occur in June or July whilst, to the east and south, flows are typically at their lowest during the late summer, and later in slower-responding rivers draining permeable catchments where outflows from groundwater provide the major component of low flows.

[1] *Here taken to include both national and regional divisions.*

1.2 The need for national and regional assessments of outflows

River flows integrate the combined effects of rainfall and evaporation patterns across a drainage basin and are therefore generally the best indicators to use for water resources assessments, engineering design procedures and to develop improved water management strategies. At the national scale, estimates of annual and seasonal freshwater outflows to the seas around the UK are required to enable macro-scale assessments of water resources (Littlewood and Marsh, 2005; Defra, 2011) and, crucially, to help assess the impact of climate change on water balances and, particularly, runoff patterns. National outflow estimates also form an important component of the UK Government's data reporting obligations to bodies such as the European Environment Agency, Eurostat and OECD where they are published to inform international policy development (European Environment Agency, 2010; EIONET, 2014).

Political devolution has reinforced the need for better quantification of hydrological trends relating to those constituent parts of the UK under the aegis of the devolved administrations. At a European scale, homogeneous time series of regional runoff are also essential to provide a context in which to document and assess the magnitude of the contemporary high flow and drought episodes. These information needs were a primary stimulus for the inclusion of assessments of national outflows in the range of reports published as part of the NHMP (http://www.ceh.ac.uk/data/nrfa/nhmp/nhmp.html). The national and regional runoff series now extend beyond fifty years and provide a complete and homogeneous time series of well-documented provenance to support a wide spectrum of research initiatives.

2 Calculating estimates of national and regional runoff

2.1 Methodological background

Across most of the globe overall water resources assessments and national outflows are derived using areal rainfall data adjusted to take account of evaporative demands. The latter remain difficult to determine accurately and, in very few cases, are adjustments made to account for the systematic underestimation of precipitation (Rodda and Dixon, 2012). In addition, for most countries, any direct assessments of national water budgets – incorporating runoff data – are hampered by the complications associated with international rivers crossing and re-crossing national boundaries.

The alternative approach, adopted here, is to base outflow estimates on a selection of index catchments which, taken together, are demonstrably representative of runoff at a regional or national scale. Whilst differences in rainfall patterns between the index catchments and the rest of each domain will inevitably imply some uncertainty in the regional daily outflow assessments, the use of a fixed set of index catchments serves to maximise the homogeneity in the runoff time series. This is of central importance in relation to the detection and quantification of hydrological trends. In addition, focussing on a fixed network of well-gauged catchments across the UK allows the required daily flows to be acquired and validated within a short timespan – facilitating the contemporary monitoring of macro-scale runoff conditions and the timely production of reports on notable hydrological episodes.

2.2 Assessing national runoff from gauged catchments

Attempts to derive estimates of runoff from England & Wales date back to John Dalton who used rainfall data and sporadic flow estimates for the Thames in a pioneering attempt to establish a national water balance (Dalton, 1802). Linton (1959) used a, still very patchy, gauging station network to reappraise the mean runoff for England & Wales. Later, and capitalising on a long historical rainfall series (Lough *et al.*, 1984) and flow data from nine large catchments, a provisional 248-year monthly runoff dataset was derived for England & Wales (Marsh and Littlewood, 1978). Nonetheless, the lack of directly measured river flows across most of the UK remained a constraining factor until the provision of grant-aid for gauging station construction stimulated a rapid network expansion through the late-1960s and the 1970s (Lees, 1987). By 1990, there were more than 1200 operational gauging stations across the UK – a very dense network in an international context – but gauging facilities remained relatively sparse in many low-lying areas (where low gradients and tidal influences can present particular hydrometric problems) and in the more remote regions of the country where the operational justification for river flow measurement is less compelling (e.g. in the Scottish Highlands and Islands). For Northern Ireland, the development of a province-wide network did not begin until the 1970s and an effective regional coverage was not achieved until the mid-1980s.

The continuing network expansion into the twenty-first century ensured that, by 2010, river flows from around 70% of mainland Britain were directly monitored. As importantly in relation to the derivation of lengthy runoff time series, the number of gauging stations with records exceeding 50 years in length on the UK National River Flow Archive had risen above 150. This established an effective capability to both to assess regional runoff patterns and detect and quantify hydrological trends.

3 Derivation of the national and regional runoff series

3.1 General background

Being surrounded by water, Britain is fortunate in avoiding the complex issues associated with trans-boundary river flows[2]. However the substantial spatial and temporal variations in runoff patterns which characterise much of the UK, implies that considerable care needs to exercised when selecting groups of gauged catchments which can be considered representative of national and regional outflows. Importantly also, the degree to which artificial influences (e.g. abstractions, discharges, reservoir management) impact on natural runoff patterns is a distinguishing feature of river flows across most of the country.

For many rivers the net impact is modest but only around 15% of the river flow series held on the UK National River Flow Archive can be regarded as natural (Marsh and Hannaford, 2008). The overall impact of artificial influences is particularly significant in the English Lowlands where concentrations of population, commercial activity and intensive agriculture – which together result in high water demand – generally coincide with the areas of lowest average runoff.

There are a few rivers, including the Thames, for which convincing adjustments are made to account for the impact of major upstream abstractions or discharges but for most the gauged flows, particularly low flows, are insufficiently representative to be incorporated in regional index networks.

In addition, the effect of, for example, changes in abstraction rates or the re-routing of sewage effluent across catchment boundaries can compromise the homogeneity of river flow time series – particularly in relation to low flows.

3.2 Selection criteria for the Index Gauging Stations

A primary driver for the development of national and regional runoff series was to provide contemporary assessments of runoff patterns at the macro scale for use in the National Hydrological Monitoring Programme. Initially, outflow series were required for five domains: Great Britain, England & Wales, Scotland, Wales and England. A sixth domain – the English Lowlands – was subsequently developed in recognition of the particular vulnerability of central, southern and eastern England to climate change; across much of this region average rainfall only modestly exceeds average potential evaporation losses. The domain boundaries are shown on Figure 1 and reference details are given in Table 1.

[2] *Although it remains a issue in relation to outflows from Northern Ireland.*

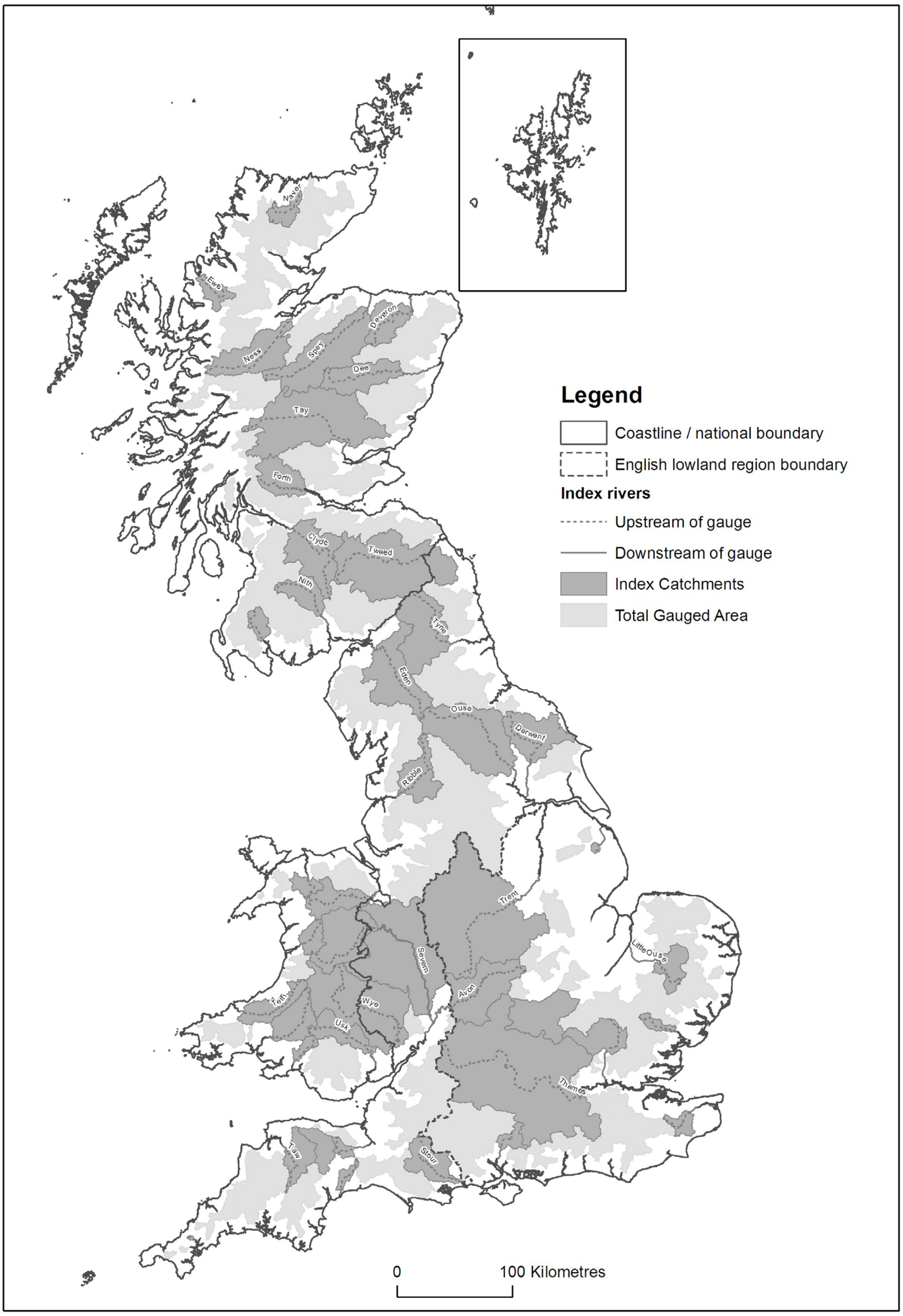

Figure 1 *Index Network catchments together with the Total Gauged Area and Domain boundaries.*

Table 1 *Reference details for each domain.*

Domain	**Britain**	**England & Wales**	**Scotland**	**Wales**	**England**	**English Lowlands**
Total Gauged Area (km^2)	140977	95723	45254	14638	84515	42232
TGA annual mean rainfall (mm)	1094	947	1406	1371	859	716
Domain annual mean rainfall (mm)	1090	897	1440	1393	820	694
Mean TGA rain as % of Domain mean	97.2	102.9	92.5	95.5	102.5	103.9
Number of Index Catchments	37	26	12	9	19	10
Combined area (km^2)	70437	49930	20550	10987	35198	25045
71-00 average annual rain (mm)	1036	906	1347	1313	835	726
% of Domain average annual rainfall	95.1	101.0	99.4	94.3	101.2	104.6

The qualifying criteria for gauging stations to be incorporated in the Index Networks for each domain were:

i. They should be capable of measuring annual mean flows to within +/-5% of the true runoff

ii. The net impact of abstractions and discharges on the annual mean flow should be limited or quantifiable (in a few cases naturalised flow series were utilised).

iii. Flow records should ideally exceed 40 years in length and be sensibly continuous (to facilitate trend analyses).

iv. That good quality contemporary daily flow data are capable of being supplied to the National River Flow Archive within 10 days of the end of the month – this reflects a requirement for the index network to support the operational reporting that is a necessary component of the National Hydrological Monitoring Programme.

Due to the paucity of the gauging station network in Northern Ireland prior to the 1980s and the domination of the outflows from Loch Neagh, the selection of the Index catchments was undertaken less rigorously than for the other domains. In addition to outflows from Loch Neagh, four catchments with flow records exceeding 30 years were selected to help characterise the overall outflow.

3.3 Database construction and data validation/infilling

To facilitate the selection of Index Gauging Stations a database of annual mean flows over the 1971-2010 period was constructed incorporating all of the lowest gauging stations on gauged rivers held on the National River Flow Archive. In total this involved 279 stations monitoring outflows from around 70% of mainland Great Britain – see the Total Gauged Area (TGA) shown on Figure 1.

A proportion of the gauging stations had incomplete flow records, due to temporary hydrometric limitations, or because gauging stations were out of commission during part of the calibration period[3]. To infill and, where necessary, extend these flow records the equipercentile method was used to synthesise daily flows for the missing periods. The equipercentile method has been shown to have high utility relative to alternative data-infilling mechanisms (Harvey *et al*, 2012) and relies on the selection of surrogate gauging stations with similar regime characteristics to estimate missing flows at the target stations. For any given missing day the same percentile of the flow at the surrogate station is applied to the target series. The equipercentile approach provides a robust and auditable capability to estimate missing flows throughout Great Britain. However, where the gauging station network is particularly sparse (e.g. in north-west Scotland), surrogate stations may necessarily be drawn from a wider geographical pool and their flow characteristics may be less representative of those at the target stations.

3.4 Finalising the Index Networks

A primary objective in selecting catchments in the Index Networks was to ensure that, taken together, they are representative of the runoff patterns which characterise the totality of outflows from each domain. To this end, and using the database of annual mean flows, a representative subset of Index Catchments was iteratively selected to achieve a high correlation with the annual outflows from the TGA in each domain. The Index Catchments were selected so that, as far as is practicable, the average rainfall for the selected catchments approximates well to the estimated mean rainfall for the corresponding domain. Table 1 confirms that, Scotland excepted, the average rainfall for the Index Catchments in each domain is within 10% of that for the domain as a whole.

In total 48 catchments, monitoring outflows from around 35% of mainland UK,were selected for inclusion in the Index Networks. Reference information relating to the Index Gauging Stations in England, Scotland and Wales are given in Appendix I and their catchment areas are shown on Figure 1. Details of the Index Catchments in Northern Ireland are given in Appendix II.

Figure 2 shows annual mean flows for the combined Index Catchments together with the corresponding flows for the TGA of England and Wales. Whilst, precise equivalence in the variations captured by both time series would not be expected due to the within-region variations in rainfall patterns[4], the correlation between the two series (r = 0.997) confirms that the Index Catchment series is highly representative of the outflows from the TGA.

Table 2 confirms the strong the association between the runoff from the TGA and that for the Index Network for all domains. In addition, the standard deviation in the annual ratios of the outflows from the Index Network relative to those from the TGAs is very modest. Correspondingly, applying the mean of the annual ratios to the combined daily outflows from

[3] *The record gaps are concentrated in the early 1960s – prior to the commissioning of a significant proportion of the Index Stations.*

[4] *At low flows differences in the patterns of water utilisation between the Index Catchments and the TGA may also be influential.*

the Index Network for each domain was deemed to provide a convincing assessment of the outflows from the TGA.

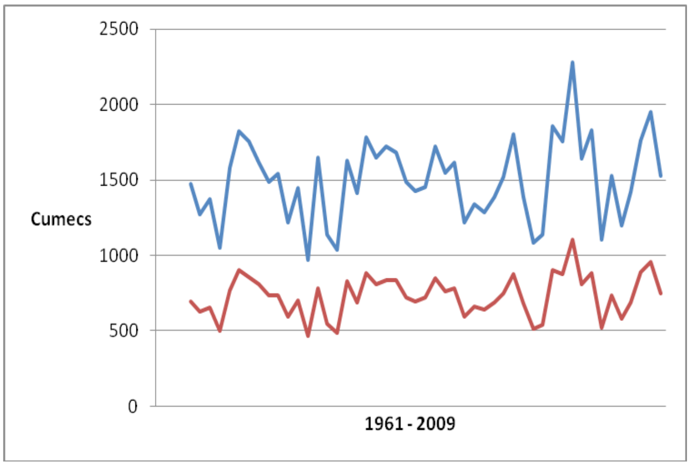

Figure 2 *Annual mean outflows from the Total Gauged Area (blue trace) and the Index Catchments (red trace) for England & Wales.*

Table 2 *Association between the combined outflows from the Index Network and the Total Gauged Area.*

Domain	Correlation between Index Network outflows and those for the Total Gauged Area	Mean Ratio of annual outflows from the TGA relative to outflows from the Index Network	Standard Deviation of the annual ratios
Britain	0.997	2.142	0.028
England & Wales	0.997	2.049	0.034
Scotland	0.993	2.208	0.039
Wales	0.998	1.419	0.019
England	0.996	2.488	0.052
English Lowlands	0.993	1.522	0.051

3.5 Assessing outflows from the Ungauged Areas

In order to capture the outflows from the totality of each domain it is necessary to account for the outflows from the Ungauged Areas (UA) below the lowest gauging stations (illustrated schematically in Figure 3). For most domains runoff from the Ungauged Areas is considerably below the domain average but this is not the case for Scotland where outflows from much of the Highlands remain ungauged.

The mean runoff from the Ungauged Areas was assessed using G2G, a spatially-distributed hydrological model, used in Britain for both real-time flood

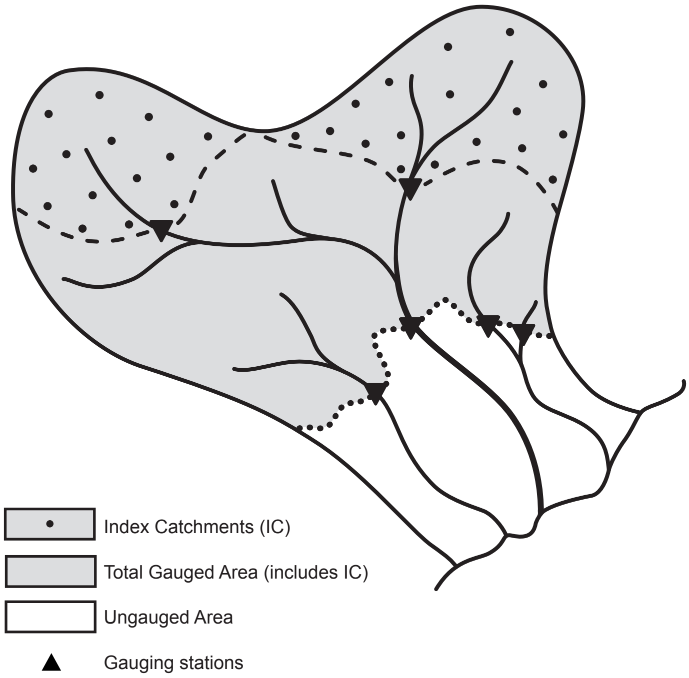

Figure 3 *Schematic representation of the areal components in each domain.*

forecasting and continuous simulation of river flows in a changing climate (Bell *et al*., 2009). The model is generally configured to a 1km² grid across the UK, with a 15-minute time-step, and is underpinned by digital spatial datasets of topography, soil/geology and land cover. Driven by gridded time-series of precipitation and potential evaporation, the G2G model provides area-wide, gridded estimates of soil moisture, river flows and runoff.

The average outflow for the Ungauged Areas computed using the G2G model constitutes between 30% and 42% of the corresponding average outflows from each domain (see Table 3).

3.6 Derivation of the daily outflow series for each Domain

The average combined runoff from the Total Gauged Area and the Ungauged Area in each domain was then used to derive a Weighting Factor (WF) which could be applied to the aggregated outflows from the Index Catchments (IC) to assess the total outflow from each domain:

$$WF = \frac{\text{(Mean outflow from the TGA + UA)}}{\text{Mean outflow from IC}}$$

The Weighting Factors for each domain are given in Table 3. They are routinely applied to update the daily time series for each domain which – beginning in January 1961 – are stored on the National River Flow Archive.

Table 3 *Outflows from the Ungauged Areas.*

Domain	Britain	England & Wales	Scotland	Wales	England	English Lowlands
Ungauged Area (km^2)	90461	55945	34516	8175	47770	25091
G2G modelled mean annual runoff for the Ungauged Areas (mm)	562	315	962	748	315	232
Average Ungauged runoff as a % of Average Domain runoff	37.1	31.4	42.2	30.6	30.6	32.3
Weighting Factor	3.32	2.98	3.82	2.04	3.58	2.29

Spatial variations in daily rainfall patterns across the UK are such that on occasions the combined flows from the Index Catchments will not be fully representative of the total daily outflows from individual domains. Generally however, the domain outflows in the monthly and annual timeframes can be expected to be highly indicative of macro-scale runoff patterns. Importantly also, the use of stable networks of Index Catchments will maximise time series homogeneity – a necessary capability in the context of identifying and quantifying hydrological trends.

4 Applications of the National and Regional Outflow Series

The national and regional outflows series are regularly featured in the reports published as part of the UK National Hydrological Monitoring Programme (http://www.ceh.ac.uk/data/nrfa/nhmp/nhmp.html). They have also been exploited in a wide range of research applications and to help characterise contemporary runoff and resources variability and, in particular, to provide an objective framework within which to assess the exceptional nature of extreme hydrological episodes. Most significantly, the series constitute a strategically important resource for indexing change – in circumstances where the impact of global warming on flood and drought risk across the UK remains high on both scientific and political agendas.

Figure 4 provides illustrative examples of how the national and regional runoff series are being capitalised on. Figure 4a confirms the outstanding nature of the drought conditions experienced in 1976. Outflows from the English Lowlands fell considerably below any other low flow sequence recorded over the last 65 years and the 60-day minimum for 1976 was less than 70% of the second lowest (registered in 1990). By contrast, Figure 4b illustrates the record abundance of runoff from Great Britain through the winter of 2013/14; over 10% greater than the previous maximum.

Despite the exceptional increase in average temperatures since the early 1960s, the outflow time series, whilst exhibiting substantial year-on-year and decadal variability, show few compelling trends. Figure 4c confirms that annual average and Q_{95} outflows from Great Britain show little tendency to increase or decrease. However high flows (Q_5) during the last two decades have been considerably more frequent than over the 1960-80 period (see Figure 4d) and, whilst Figure 4e suggests a relative stability in annual Q_{95} flows for Scotland, there has been an erratic decline in the number of days with flows falling below the long term average Q_{95} since the 1970s.

The availability of the outflow series, together with other national hydrometeorological datasets also allow macro-scale changes in water balances to be objectively monitored (Marsh and Dixon, 2012). Figure 4f illustrates water-year (Oct-Sept) rainfall, actual evaporation (based on MORECS data – Hough, 1997) and outflows from Great Britain for the 1961/62 - 2012/13 period. Rainfall and national outflows have increased appreciably in this timeframe[5] – but the notable dryness of the 1960s and 1970s will have contributed to the degree of increase – whilst actual evaporation losses[6] exhibit little or no trend. Determining the degree to which water balance components are changing as temperatures rise is a substantial scientific challenge with important implications for water and environmental management. The national and regional outflow series provide an essential capability for monitoring the degree of change, identifying runoff trends, and contributing to the identification of the mechanisms driving change.

[5] *A contributory factor in relation to rainfall may be the decline in snowfall as a proportion of total precipitation. Snowfall is difficult to measure and, generally, is underestimated to a greater degree than the well documented undercatch of standard raingauges.*

[6] *Here derived for a grass cover.*

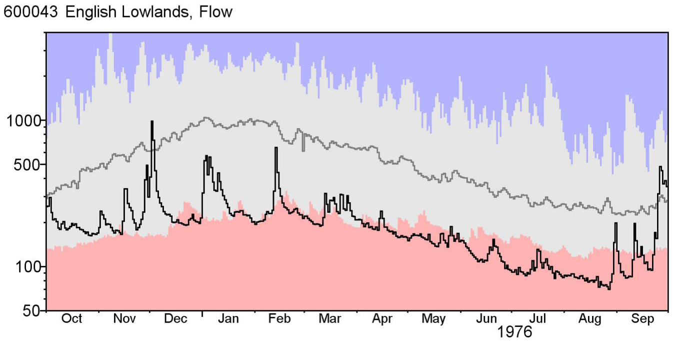

Figure 4a *Outflows from the English Lowlands for the water-year 1975/76. The grey trace is the long term average daily flow and the blue and pink envelopes show the highest and lowest daily flows on record (excluding 1975/76); flows in m^3s^{-1}.*

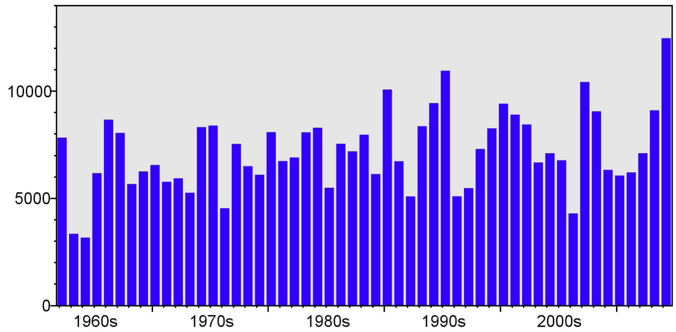

Figure 4b *Average winter (Dec-Feb) outflows from Great Britain (m^3s^{-1}).*

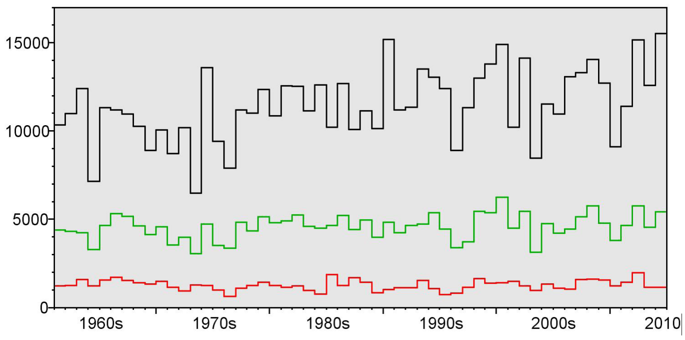

Figure 4c *Water-year (Oct-Sept) mean, Q_5 and Q_{95} outflows from Great Britain (m^3s^{-1}).*

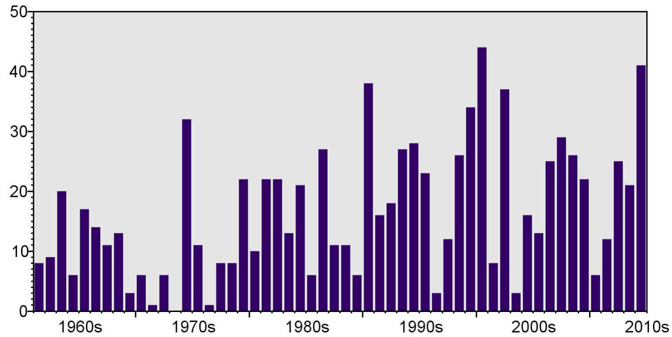

Figure 4d *Number of days each water-year when outflows from Britain exceeded 12,000 m^3s^{-1}.*

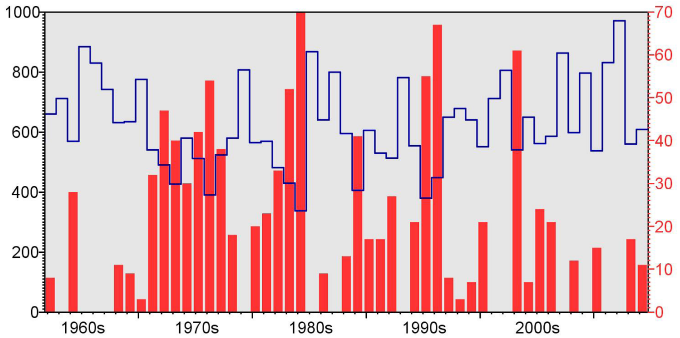

Figure 4e *Water-year Q_{95} outflows from Scotland (blue trace, m^3s^{-1}) with the number of days that fell below the long term Q_{95} (red bars).*

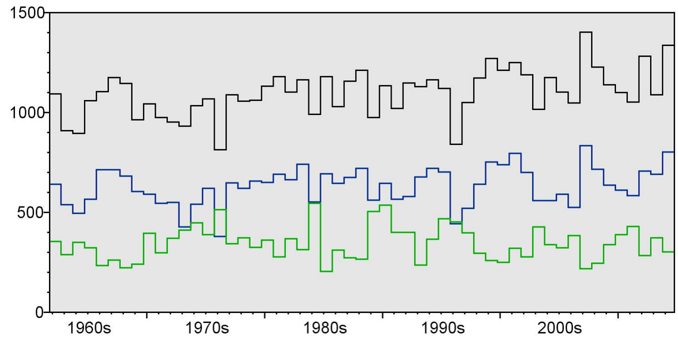

Figure 4f *Water-year water balances for Great Britain; black trace – rainfall, blue trace – outflows, green trace – losses (all in mm). Rainfall data provided by Met Office.*

Acknowledgements

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Appendix I

Gauging stations used in the derivation of the National Runoff Series

NRFA Station Number	River	Gauging Station	Catchment Area (km²)	1st year of record	Average annual rain (mm)	Avverage annual runoff (mm)	Average annual loss (mm)	Average flow (m^3s^{-1})	Domain in which utilised
6007	Ness	Ness-side	1839.1	1972	1887	1531	356	89.28	GB, SCOT
8006	Spey	Boat o Brig	2861.2	1952	1126	714	412	64.78	GB,SCOT
9002	Deveron	Muiresk	954.9	1960	918	525	394	15.89	GB, SCOT
12001	Dee	Woodend	1370	1929	1126	865	261	37.57	GB, SCOT
15006	Tay	Ballathie	4587.1	1952	1502	1201	301	174.66	GB, SCOT
18011	Forth	Craigforth	1036	1981	1835	1481	354	48.66	GB, SCOT
21009	Tweed	Norham	4390	1962	990	559	430	77.87	GB, SCOT
23001	Tyne	Bywell	2175.6	1956	1049	630	419	43.45	GB, EW,ENG
27009	Ouse	Skelton	3315	1969	915	479	436	50.34	GB, EW,ENG
27041	Derwent	Buttercrambe	1586	1973	771	320	451	16.1	GB, EW,ENG
28009	Trent	Colwick	7486	1958	773	349	423	82.92	GB, EW,ENG,EL
29003	Lud	Louth	55.2	1968	690	246	445	0.43	EW, ENG
33034	Little Ouse	Abbey Heath	688.5	1968	612	164	449	3.57	GB, EW,ENG,EL
33039	Bed. Ouse	Roxton	1660	1972	644	217	428	11.4	GB, EW,EL
37005	Colne	Lexden	238.2	1959	569	134	435	1.01	GB, EW,ENG,EL
38001	Lee	Feildes Weir (N)	1036	1879	634	129	505	5.48	ENG,EL
39001	Thames	Kingston (N)	9948	1883	717	191	525	80.02	GB, EW,ENG,EL
40011	Great Stour	Horton	345	1964	749	280	469	3.06	GB, EW,ENG,EL
42010	Itchen	Highbridge	360	1958	853	461	392	5.26	GB, EW,ENG,EL
43007	Stour	Throop	1073	1973	878	404	474	13.74	GB, EW,ENG,EL
45001	Exe	Thorverton	600.9	1956	1302	848	455	16.15	GB,E&W
45005	Otter	Dotton	202.5	1962	994	487	508	3.13	GB,EW,ENG
48005	Kenwyn	Truro	19.1	1968	1146	646	500	0.39	GB,EW,ENG
50001	Taw	Umberleigh	826.2	1958	1180	709	471	18.58	GB,EW,ENG
52005	Tone	Bishops Hull	202	1961	1017	480	537	3.07	ENG
54002	Avon	Evesham	2210	1936	664	239	425	16.75	GB, EW,ENG,EL
54005	Severn	Montford	2025	1953	1183	693	490	44.47	WAL
54032	Severn	Saxons Lode	6850	1970	878	402	475	87.42	GB,EW
55023	Wye*	Redbrook	4010	1936	1054	591	463	75.15	GB,EW,WAL
56001	Usk	Chainbridge	911.7	1957	1409	1004	405	29.03	GB,EW,WAL
59001	Tawe	Ynystanglws	227.7	1957	1948	1739	210	12.56	GB,EW,WAL
60010	Tywi	Capel Dewi	1090.4	1958	1606	1130	476	39.09	WAL
62001	Teifi	Glanteifi	893.6	1959	1388	1013	375	28.7	GB,EW,WAL
64001	Dyfi	Dyfi Bridge	471.3	1962	1905	1581	324	23.63	GB,EW,WAL
66011	Conwy	Cwmlanerch	344.5	1964	2176	1711	465	18.69	GB,EW,WAL
67015	Dee	Manley Hall	1013.1	1937	1423	963	460	30.93	WAL
71001	Ribble	Samlesbury	1145	1960	1351	890	462	32.3	GB,EW,ENG
76007	Eden	Sheepmount	2286.5	1967	1208	712	497	51.59	GB,EW,ENG
79002	Nith	Friars Carse	799	1957	1577	1115	462	28.26	GB, SCOT
81002	Cree	Newton Stew.	368	1963	1876	1370	505	15.99	GB, SCOT
84013	Clyde	Daldowie	1903.1	1963	1183	822	361	49.62	GB, SCOT
94001	Ewe	Poolewe	441.1	1970	2465	2131	334	29.8	GB, SCOT
96002	Naver	Apigill	477	1977	1154	1046	108	15.83	GB, SCOT

**Note: In assessing outflows for Wales, the Weighting Factor accounts for the proportion of the Wye's runoff which derives from England.*

Appendix II

Gauging stations used to assess outflows from Northern Ireland

NRFA Station Number	River	Gauging Station	Catchment Area (km^2)	1st year of record	Average annual rain (mm)	Avverage annual runoff (mm)	Average annual loss (mm)	Average flow (m^3s^{-1})	Domain in which utilised
201010	Mourne	Drumnabuoy	1843.8	1982	1308	973	335	56.89	NI
202002	Faughan	Drumahoe	273.1	1976	1237	921	316	7.97	NI
203040	Lower Bann	Movanagher	5209.8	1980	1001	558	443	92.05	NI
204001	Bush	Seneirl Bridge	299.2	1972	1128	705	423	6.64	NI
205004	Lagan	New Forge	491.6	1972	921	547	374	8.51	NI

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