

Using R Shiny to visualise and share your data

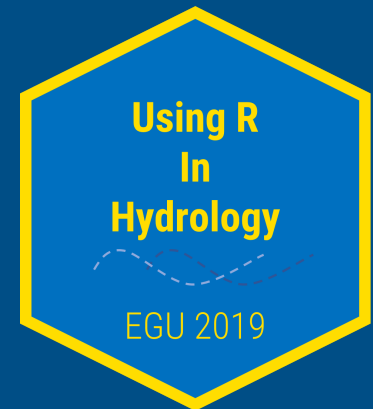
A UK drought story

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What is Shiny?

"Shiny is an R package that makes it easy to build interactive web apps straight from R. You can host standalone apps on a webpage or embed them in R Markdown documents or build dashboards. You can also extend your Shiny apps with CSS themes, htmlwidgets, and JavaScript actions."

<https://shiny.rstudio.com/>

Getting started!

Install the **shiny** package from CRAN:

```
install.packages("shiny")
```

Check out <https://shiny.rstudio.com/> for tutorials, a gallery and cheatsheet.



Why did I need Shiny?

I was analysing 125 years of reconstructed flow data and extracted hydrological droughts using:

- 303 catchments
- 24 accumulation periods
- 3 event extraction thresholds
- at least 4 plot types per combination

87264 individual plots (not accounting for multi-panel plots)



Why did I choose Shiny?

Initially it meant I could:

- easily use dynamic plotting (like dygraphs)
- view data and all plot types for each catchment at the same time
- easily change the catchment, accumulation period or event extraction threshold

Now it means:

- People can explore hydrological drought data for 303 catchments across the UK over the last 125 years
- You can explore the published dataset before downloading it from the Environmental Data Information Centre (EIDC):

Barker, L.J. et al. (2018). [Historic Standardised Streamflow Index \(SSI\) using Tweedie distribution with standard period 1961-2010 for 303 UK catchments \(1891-2015\)](https://doi.org/10.5285/58ef13a9-539f-46e5-88ad-c89274191ff9). NERC Environmental Information Data Centre.
<https://doi.org/10.5285/58ef13a9-539f-46e5-88ad-c89274191ff9>

UK Hydrological Drought Explorer

UK Hydrological Drought Explorer



UK Hydrological Drought Explorer



Centre for
Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL



This app allows you to explore historic hydrological droughts in the UK and is an output of the **Historic Droughts Project** (<http://historicdroughts.ceh.ac.uk>) . Droughts have been characterised using the Standardised Streamflow Index (SSI). The SSI has been derived from a new dataset of daily streamflow reconstructions. See the **About data** tab for more information.

The hydrological drought information can be viewed for any of the 303 modelled catchments (naturalised series are also available for the Thames (390010) and the Lee (38001), making 305 SSI series in total). You can view a map of the catchments on the **Introduction** tab.

Select a catchment

UK Hydrological Drought Explorer

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UK Reconstructed Flow Data Explorer


UK Reconstructed Flow Data Explorer

A companion Shiny app which shows the reconstructed flow data and the model evaluation metrics for the 303 catchments


The logo for 'Historic Droughts' features a stylized water droplet. The left half of the droplet is brown and contains a white, branching tree-like structure. The right half is blue and contains a white, stepped, staircase-like structure.

Historic Droughts


UK Reconstructed Flow Data Explorer

The logo for the Centre for Ecology & Hydrology (CEH), featuring the letters 'CEH' in white inside a blue and green circular emblem.

Centre for Ecology & Hydrology

The logo for the Natural Environment Research Council (NERC), featuring the letters 'NERC' in white inside a dark green rectangular box.

NERC

The logo for the Science of the Environment, featuring the text 'SCIENCE OF THE ENVIRONMENT' in white inside a light green rectangular box.

SCIENCE OF THE ENVIRONMENT

UK Reconstructed Flow Data Explorer



UK Reconstructed Flow Data Explorer



Welcome to the UK Reconstructed Flow Data Explorer! This app allows you to explore the reconstructed flow data produced for the [Historic Droughts Project](#). The flow simulations are available for 303 UK catchments from 1891 to 2015, and were produced using the [GR4J](#) hydrological model. A separate [Hydrological Drought Explorer](#) app has been produced for the exploration of the drought data that has been derived from this flow data. Please see the [About the Data](#) tab for more information on how the data were derived.

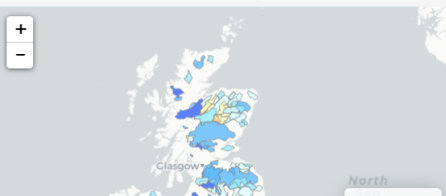
Catchment ID numbers used in this app relate to those used by the [National River Flow Archive](#).

Use this sidebar to Select an Evaluation Metric to view on the map below. Your chosen metric will also be reflected in the graphs on the 'Model Performance and Parameters' tab. To view the catchment timeseries, go to the 'Flow Data' tab.

Select an Evaluation Metric

NSE

Map of the Evaluation Metric Scores for Each Catchment



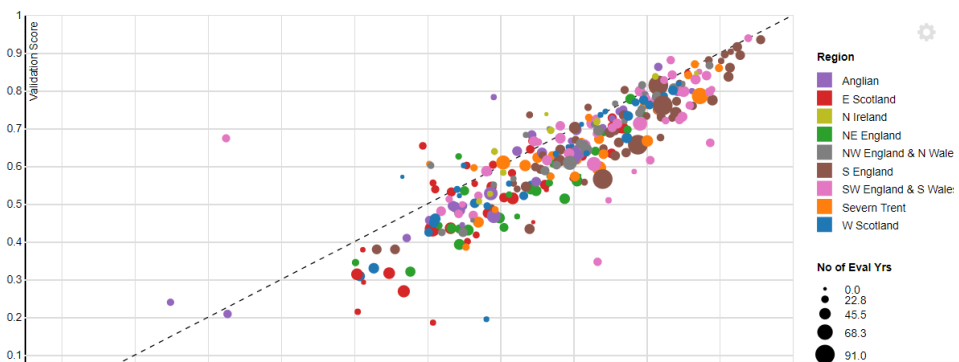
Model Performance and Parameters

Flow Data

About the Data

This page lets you explore the model performance in different catchments to help guide you in selecting an appropriate reconstruction for your study. The evaluation metrics are described in more detail in the 'About the Data' tab.

Scatter Plot of the Evaluation Metric Scores Over the Calibration and Evaluation Periods



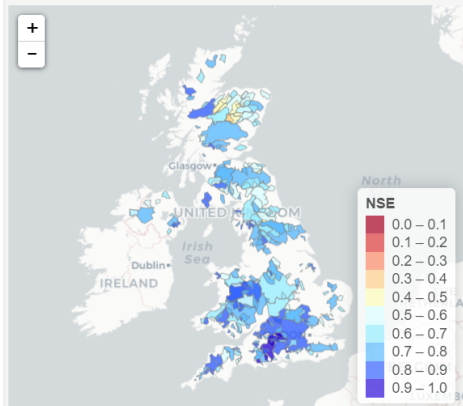
UK Reconstructed Flow Data Explorer

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Select an Evaluation Metric

NSE

Map of the Evaluation Metric Scores for Each Catchment



Model Performance and Parameters

Flow Data

About the Data

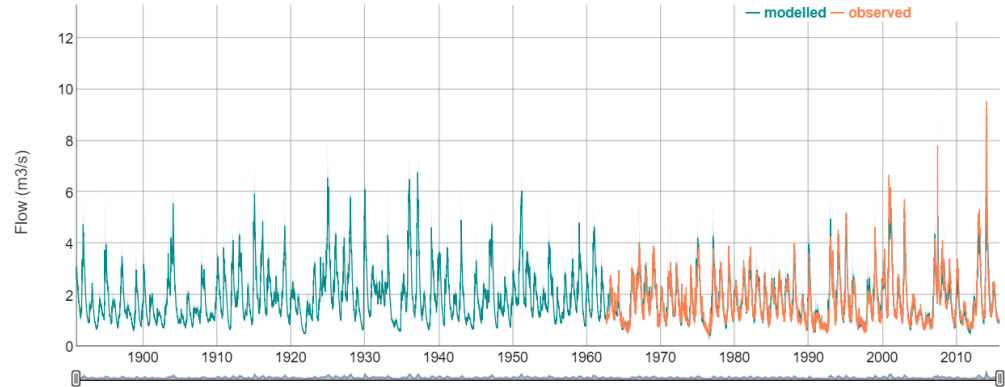
This page lets you view the timeseries data interactively. Select a catchment using the drop-down below.

Select a catchment

39019 Lambourn at Shaw

Please be patient, this graph takes a while to load as it processes 125 years of daily data.

Observed and Reconstructed Flow Time Series for 39019 Lambourn at Shaw



This graph displays both the single best model run (turquoise line), and the range of the 500 ensemble members (shaded turquoise). The flow observations are

Shiny demonstration



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Data

From the UK National River Flow Archive: www.nrfa.ceh.ac.uk/data/search

Downloaded data for Thames at Kingston, Lambourn at Shaw & Coln at Bibury (all SE England):

- Gauged Daily Flows
- Catchment Daily Rainfall
- Shapefile