Historic hydrological droughts 1891-2015: systematic characterisation for a diverse set of catchments across the UK

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Supplementary information

Table S1 Catchments and months with missing SSI-3 values

Catchment	Months with missing SSI-3 values	Impact
29003 Lud at Louth	2007-09	No impact on the extracted drought events
40011 Great Stour at Horton	1921-12	Splits a drought event which without the NaN, would be the longest (and most severe in terms of accumulated deficit) event in this catchment
54034 Dowles Brook at Oak Cottage	2007-07; 2007-08	No impact on the extracted drought events
72014 Conder at Galgate	1907-07	No impact on the extracted drought events

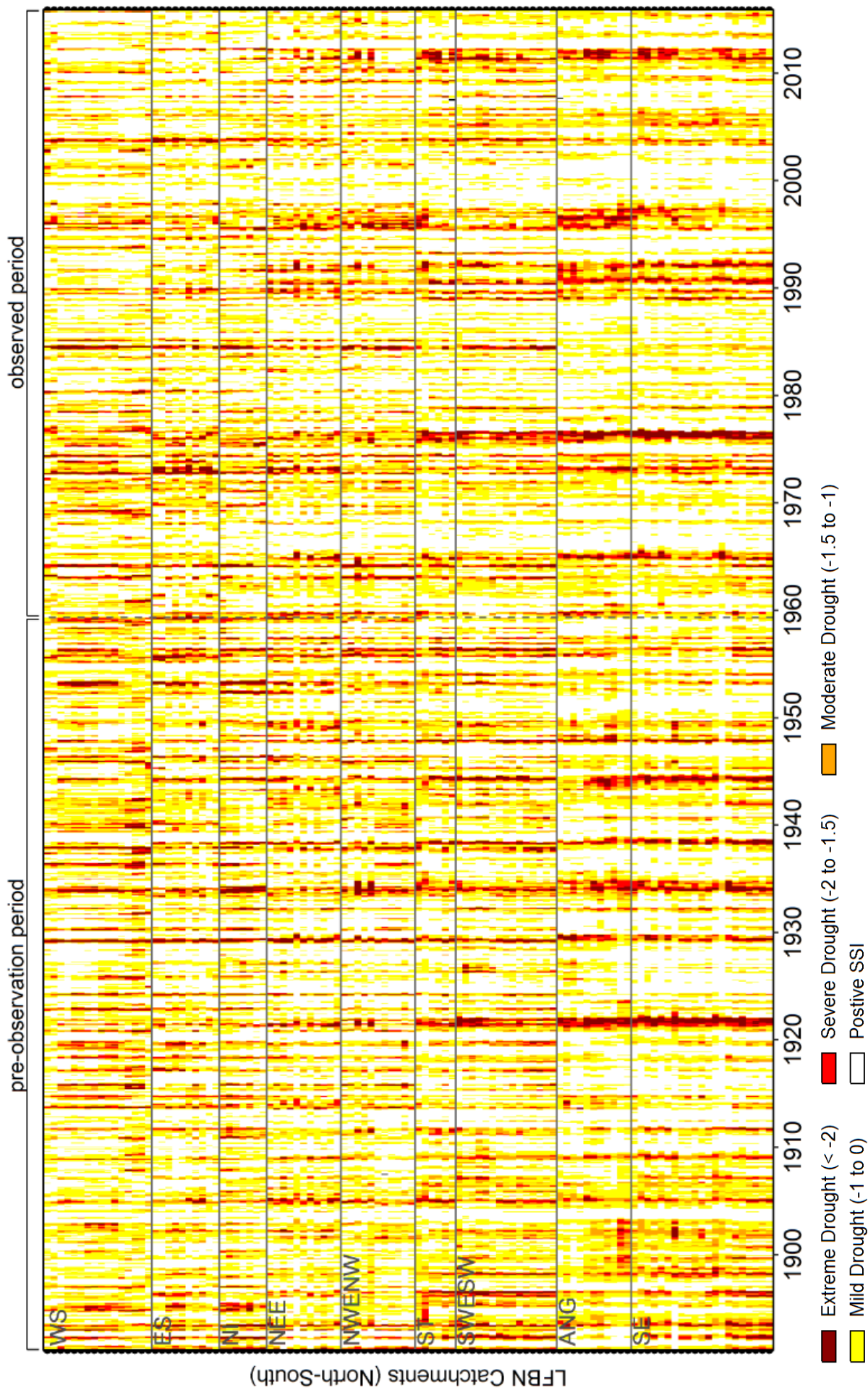



Figure S1 Heatmap of SSI-3 for LFBN catchments (arranged broadly north to south on the y-axis) from 1891 to 2015. Regions are marked for clarity.

Figure S2 Extracted events from SSI-3 and their characteristics for the nine case study catchments, plotted at the midpoint of the event. The size of each point is proportional to the maximum intensity and the colour indicates the mean deficit.

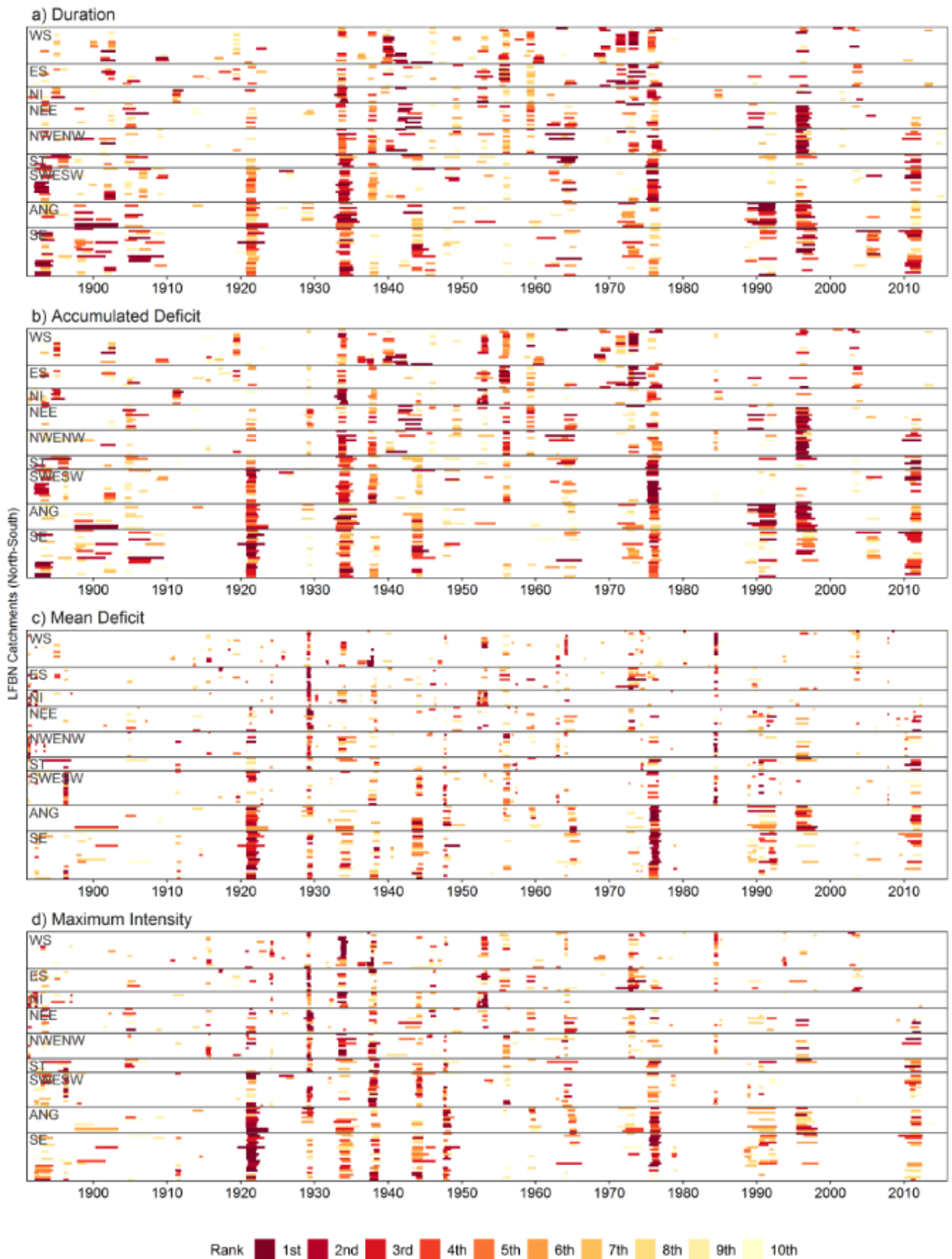



Figure S3 Top 10 extracted events from SSI-3 using a threshold of -1.5 for each drought event characteristic. Catchments are arranged roughly north to south on the y-axis with each row representing a catchment; bars represent the top 10 events and are coloured according to the event rank. Darker shades represent higher ranking (i.e. more severe) events.

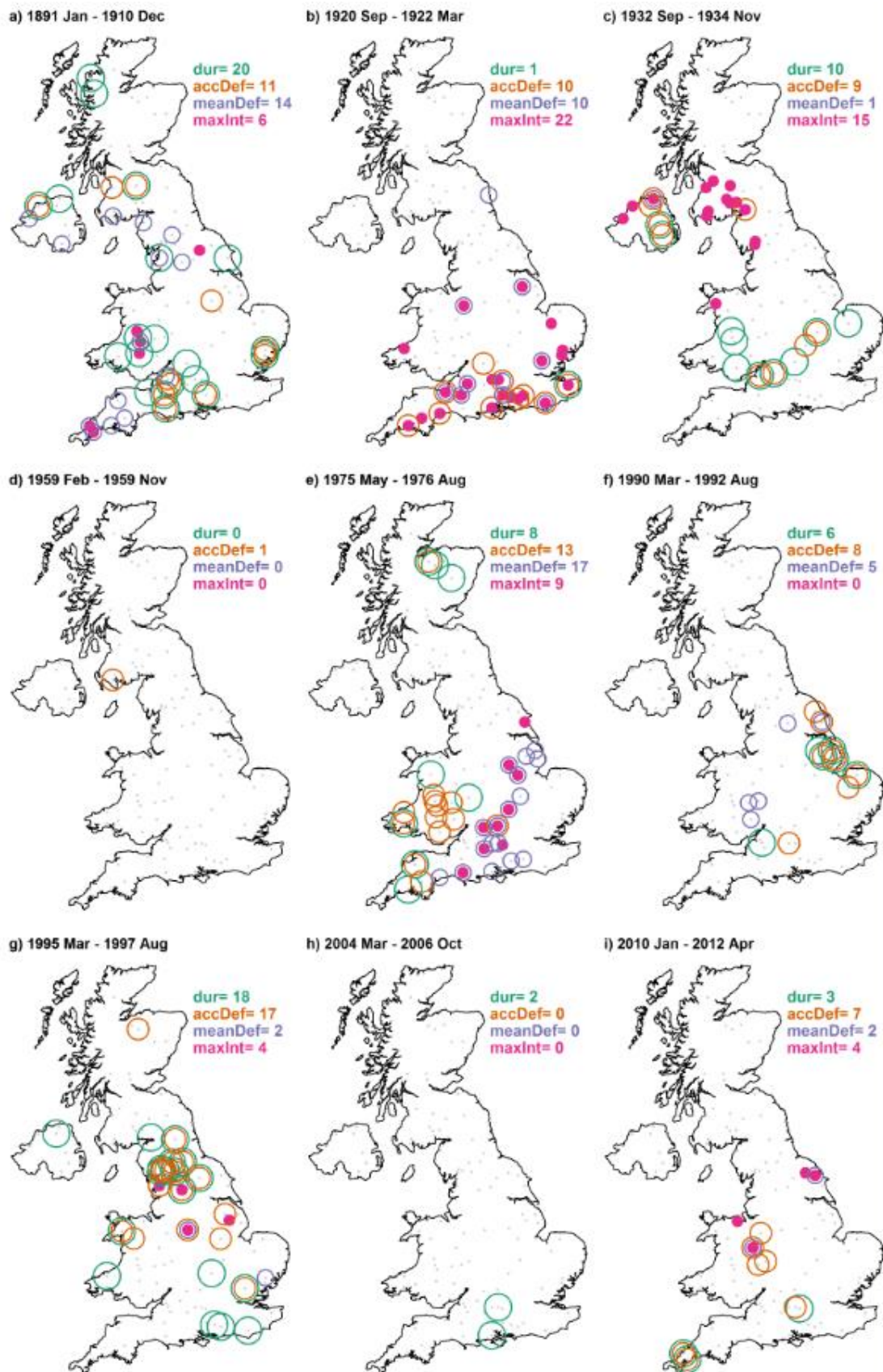
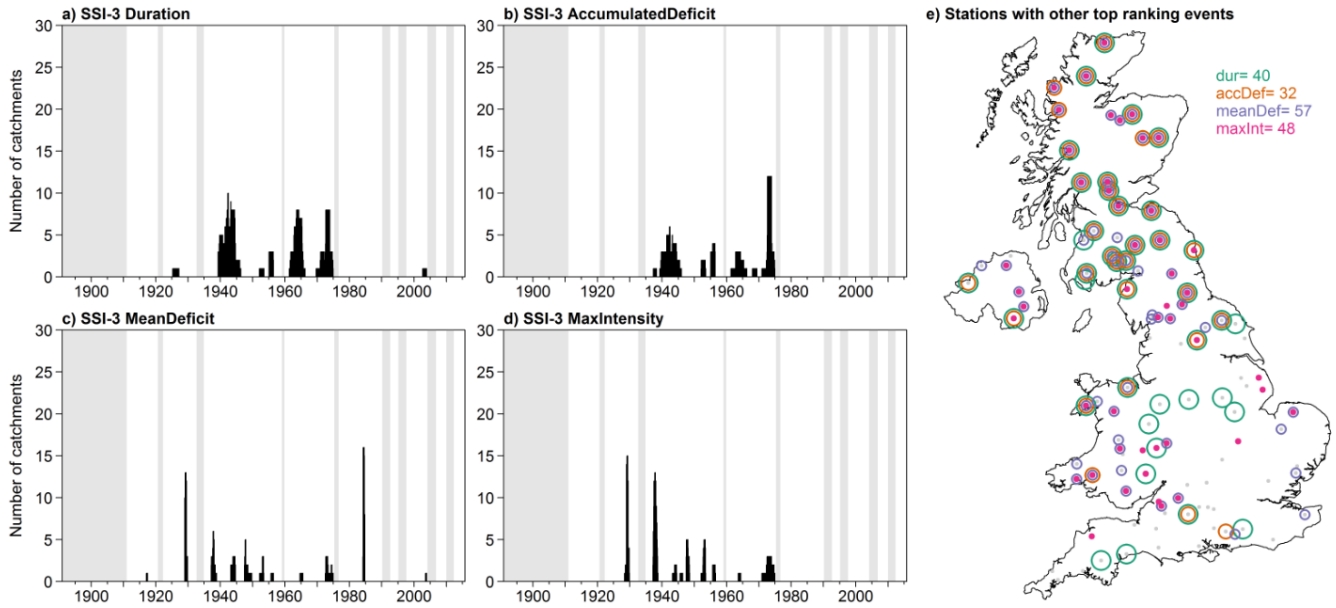



Figure S4 Location and number of LFBN catchments where the top ranking SSI-3 event corresponds to major events (Table 1) for duration, accumulated deficit, mean deficit and maximum intensity. Each of the nine maps represents one of the major drought events listed in Error! Reference source not found.**. Each point on the maps represents the location of the 108 LFBN catchments. Points are coloured pink where the particular event was ranked most severe according to maximum intensity for that catchment. Similarly, points are circled in purple, orange and turquoise to indicate catchments where the particular event was ranked most severe in terms of mean deficit, accumulated deficit and duration, respectively. The numbers**

in the top right of each map show the number of catchments ranked as most severe for each characteristic for that particular event.

5 **Figure S5 Months when SSI-3 top ranked events occurred outside of the major events (shaded in grey) for the LFBN catchments and each event characteristic (a-d), and e) the location and number of catchments with other top ranking events for each event characteristic. Points are coloured as described in the caption for Figure S4.**

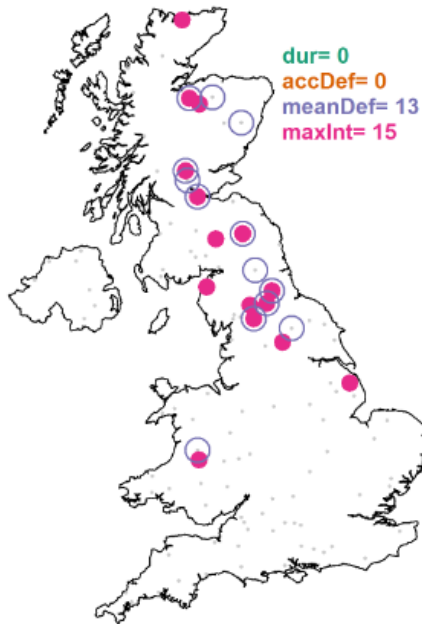
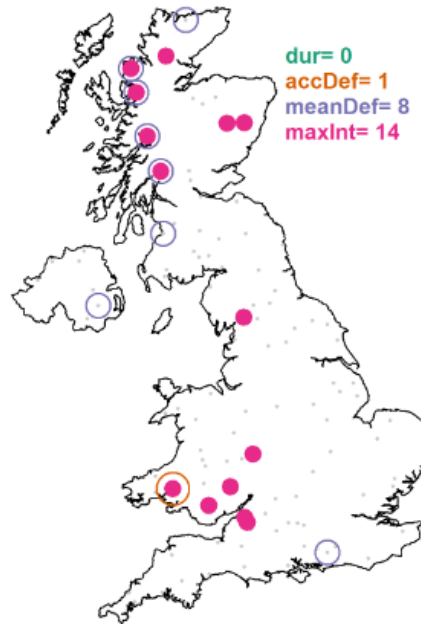
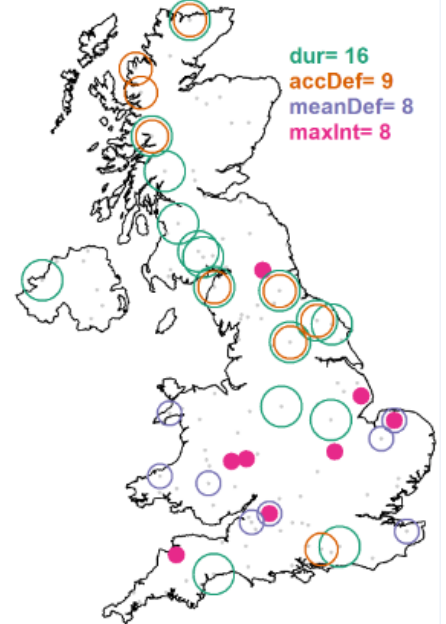
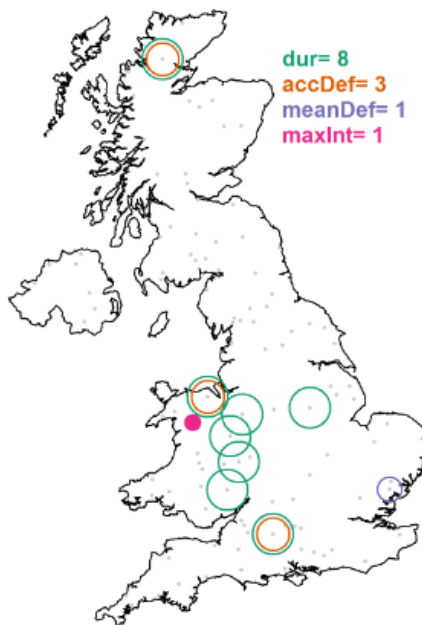
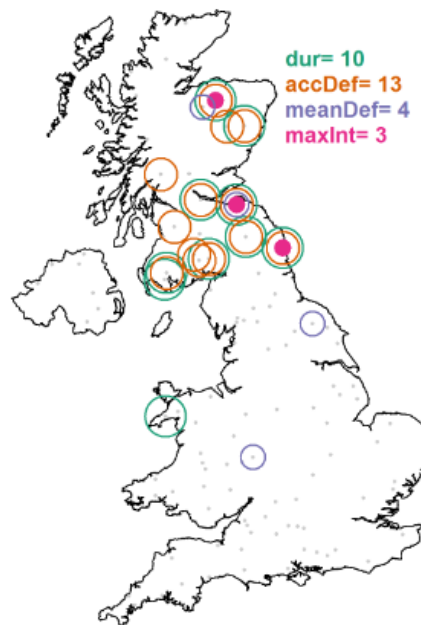
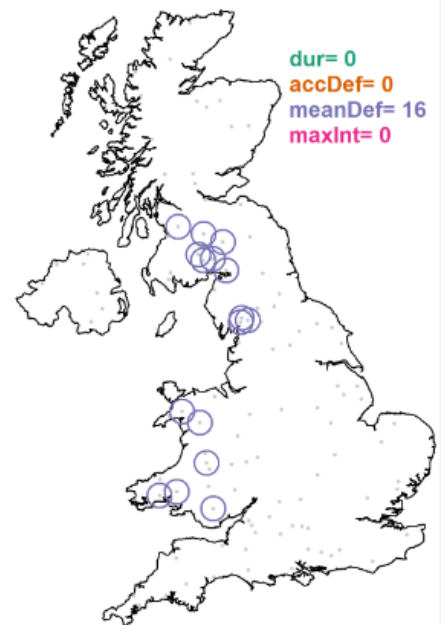



Figure S6 Location and number of LFBN catchments where the top ranking SSI-3 events for each event characteristic occur in periods outside of the major drought events: 1940-1949, 1960-1966 and 1968-1975. Points are coloured as described in the caption for Figure S4.

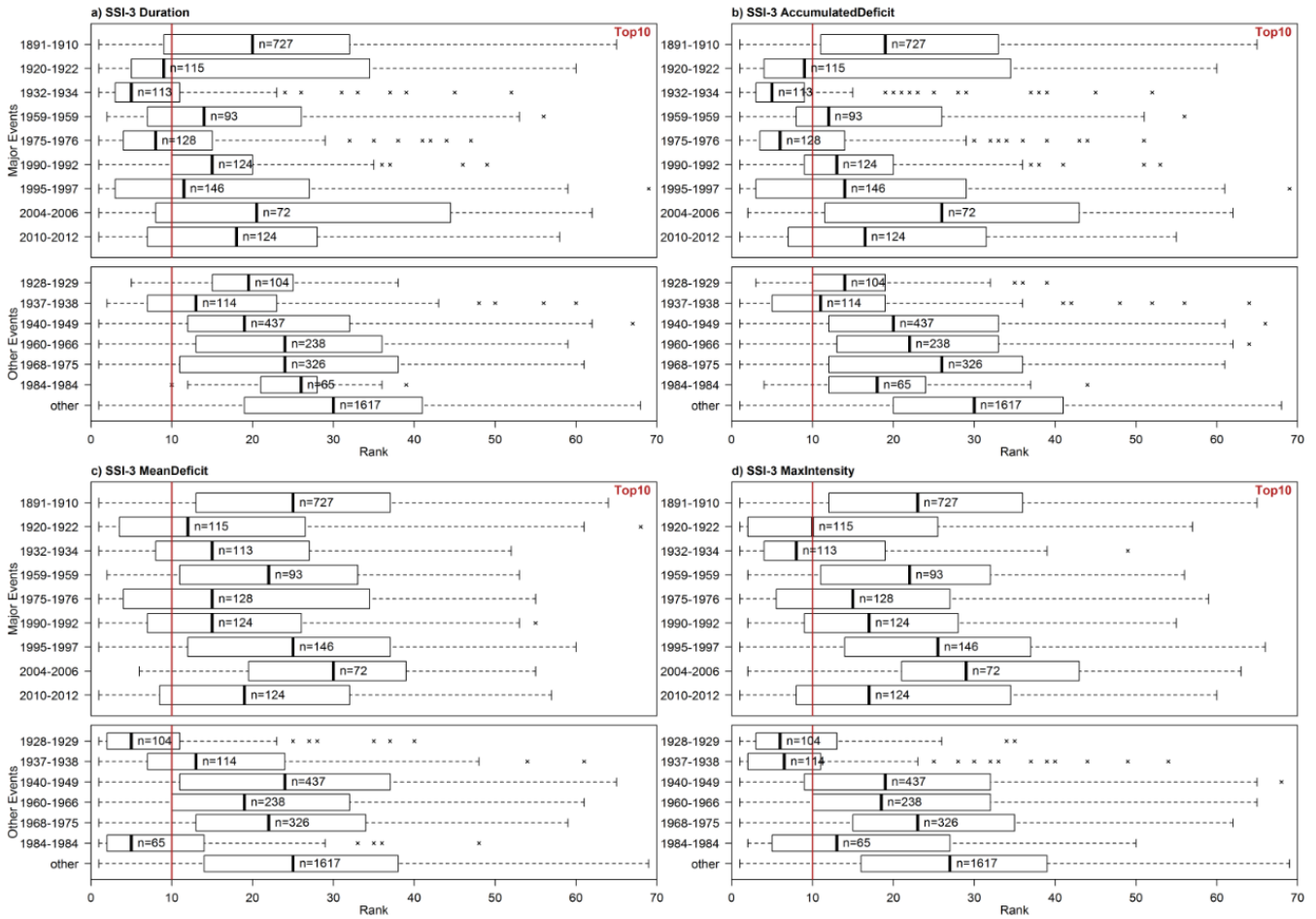



Fig S7 Boxplots showing the ranks of all extracted SSI-3 events where they overlap with the major drought events (top panel for each event characteristic) and identified 'other' events (bottom panel for each event characteristic). Within each box, n refers to the total number of events (across the LFBN) identified that occurred within this period. As multiple events can occur within each given period, it is possible for the value of n to be greater than the number of catchments (i.e. 108).

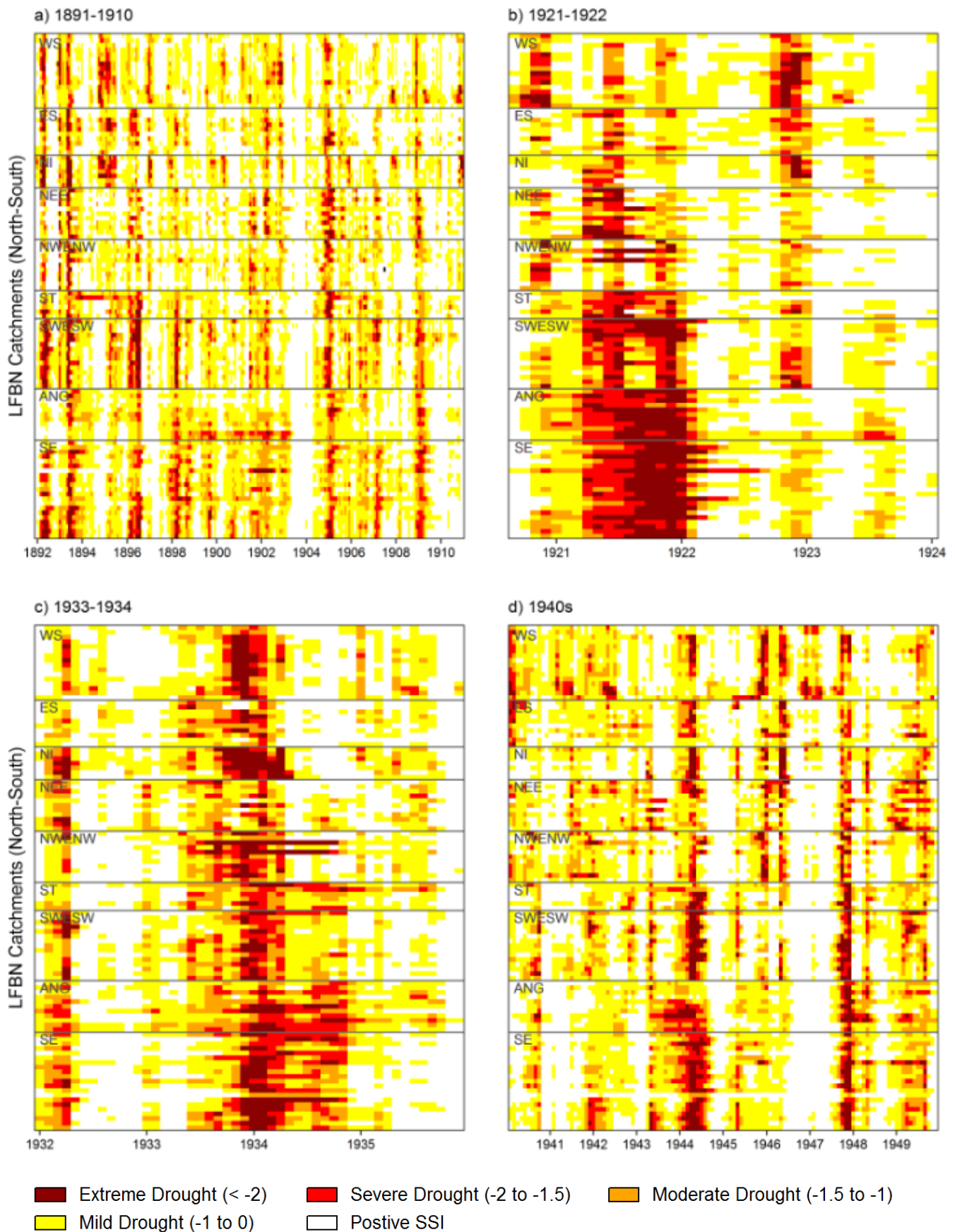



Figure S8 Heat maps of reconstructed SSI-3 for low flow benchmark catchments, arranged roughly north to south with regions marked for clarity for a) the 'Long Drought' (1890s-1910s), b) 1921-1922, c) 1933-1935 and d) the 1940s.