

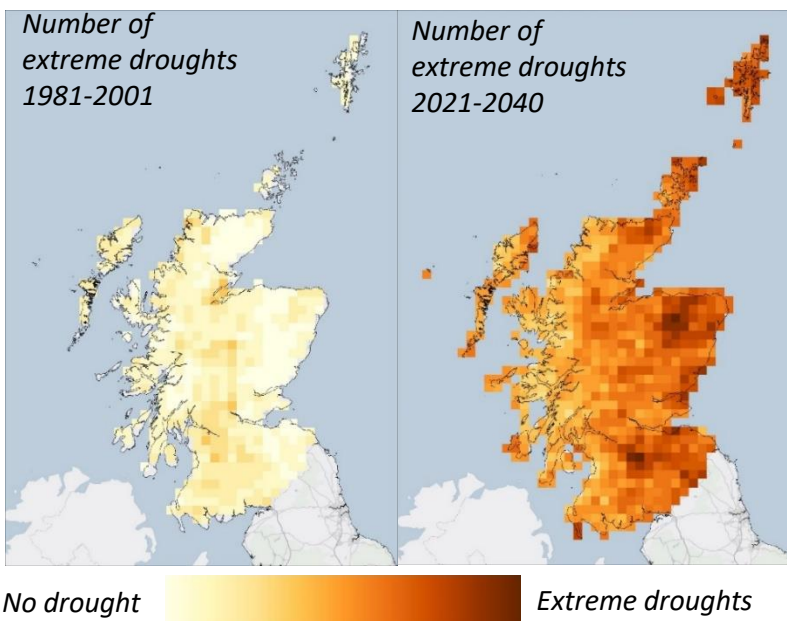
Modelling extreme drought in Scotland

Kirkpatrick Baird, F., Stubbs Partridge, J., & Spray, D. 2021. Anticipating and mitigating projected climate-driven increases in extreme drought in Scotland, 2021-2040. NatureScot Research Report No. 1228.

Methods

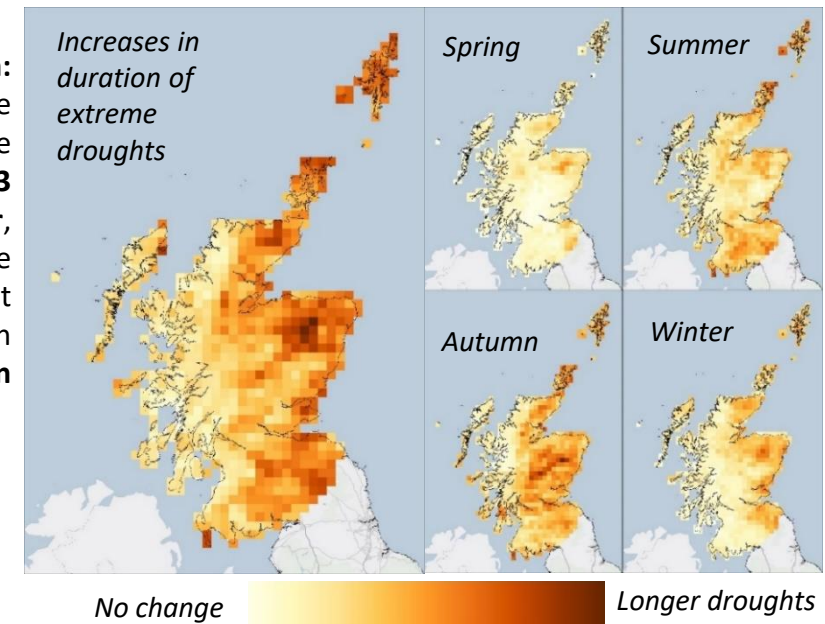
The SPEI Drought Index was selected because of its inclusion of evapotranspiration. The inputs to the SPEI were temperature and precipitation data (from UKCP18 regional projections (high emissions scenario)), which is an ensemble consisting of 12 model members. Modelling was to a 12km grid across Scotland and data were obtained from the UKCP18 for 1981-2040 inclusive. Before calculating SPEI, the climate model outputs were bias corrected using observational data (also to a 12km grid across Scotland). SPEI was calculated for each model member using 1981-2001 as the baseline, and 2021-2040 as the period of interest. Two drought metrics were calculated based on SPEI values for each 12km grid cell: 1) frequency of extreme drought, and 2) total duration of extreme drought. Drought metrics were calculated for each of the 12 members of the climate model ensemble. The 12 members were then combined by taking the median of each metric at each grid cell. Once combined, the metrics were mapped using ArcGIS Pro.

Results



Frequency:
Extreme droughts may increase from **one every 20 years** to **one every 1.7 years** in the driest areas

Duration:
Typical extreme events may be up to **2-3 months longer**, with the greatest increases in **autumn**



Next Steps

Explore the unique risks and dynamics of individual sites to ensure mitigation is tailored to the challenges.

Integrate into water scarcity planning and nature-based solutions to tackle the climate emergency.