The role of groundwater in adapting to climate change and increasing resilience to drought in Eastern Scotland

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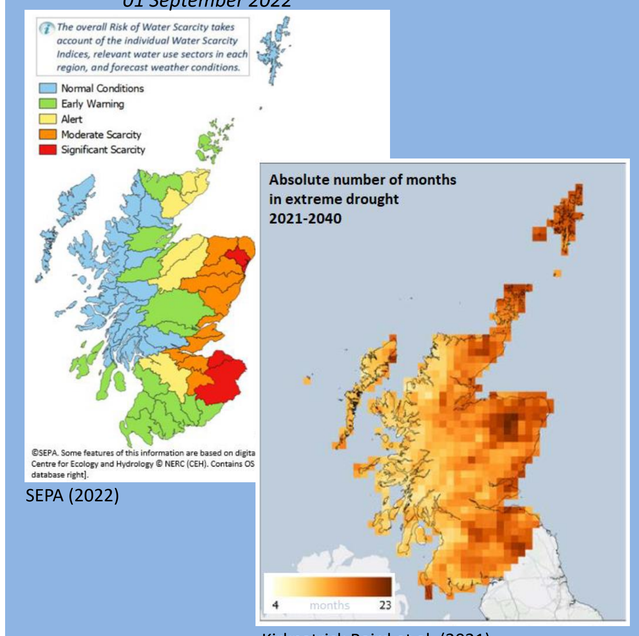
INTRODUCTION

Transforming how we use water



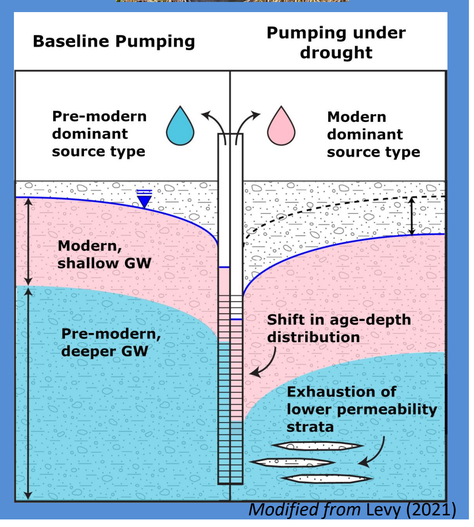
SEPA (2022)

Kirkpatrick Baird et al. (2021)

In 2022, severe drought led to all Eastern Scotland river catchments being listed as moderate to significant water scarcity status. At significant scarcity, Scottish Environment Protection Agency (SEPA) may suspend abstractions to protect the water environment in affected areas. These events follow the 2018 drought which was then the most severe since the 1970s. Recent droughts are consistent with predictions of increased drought frequency and severity as a result of climate change.

OBJECTIVES

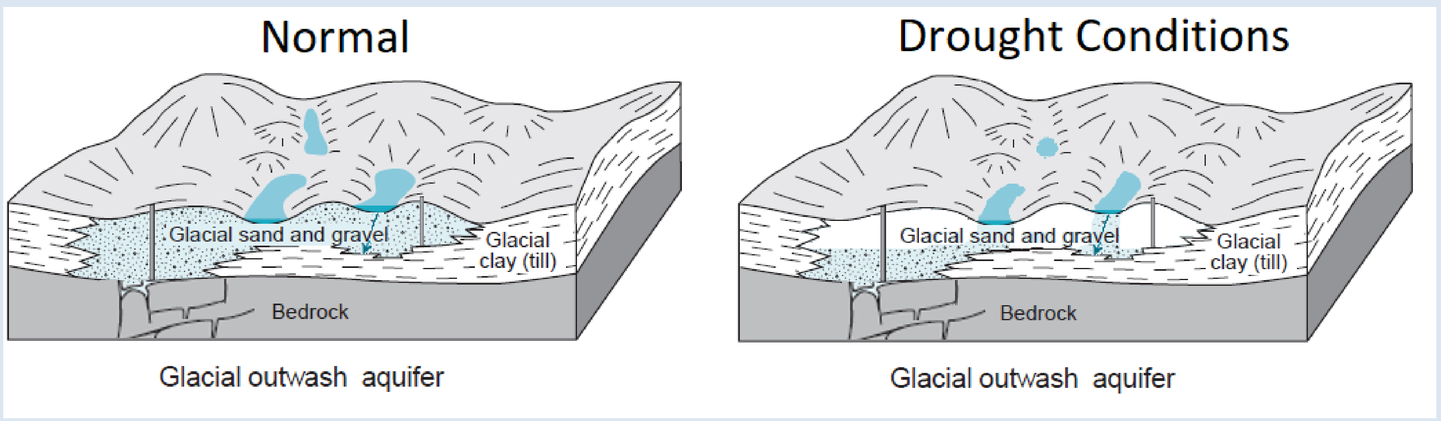
- Assess the number, type, and extent of private water supplies that rely on groundwater in Eastern Scotland
- Assess performance during the 2022 and 2018 droughts and the owner's perception of reliability
- Compare temporal response and change in water storage and quality during drought conditions considering hydrogeologic setting
- Provide hydrogeologic mapping assessment of the resilience of groundwater resources to drought
- Identify opportunities for sustainable use and new development to address future scarcity



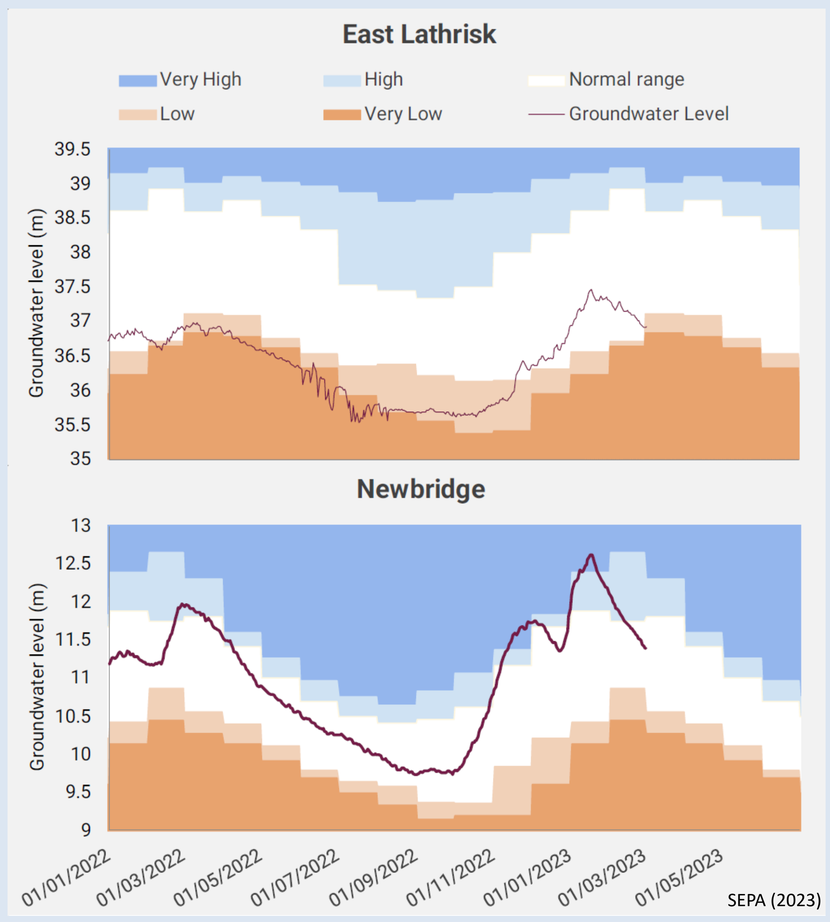
Modified from Levy (2021)

METHODS AND ANALYSIS

- Develop conceptual site model for recharge, incorporating water flowpaths, timeframes, volumes and interaction of aquifer systems
- Private well owner's interviews to develop perception of the resource and provide firsthand information on source and yield
- Installation of monitoring equipment (e.g. water level, temperature, conductivity)
- Water quality sampling with focus on source and temporal differences
- Additional analysis of existing datasets from SEPA, British Geological Survey (BGS) and other collaborators



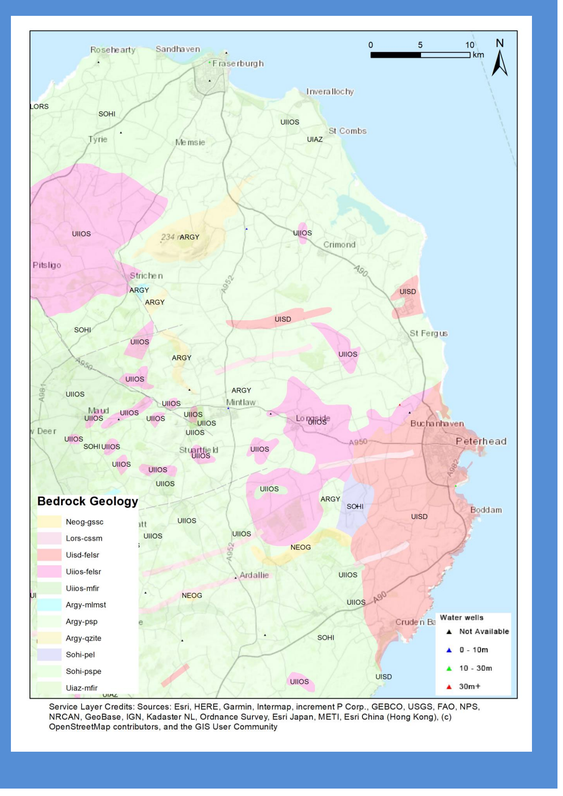
Modified from Freeze and Cherry (1979) and Davis and De Weist (1966)



SEPA (2023)

FUTURE PRODUCTS

- GIS mapping of private supplies and factors of resilience (depth, aquifer type, land use)
- Modelling groundwater recharge and flow, and the response to drought conditions for a representative area for Eastern Scotland
- Assessment of the role of deep groundwater in building water resilience under drought conditions



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Acknowledgements

This work was supported by The Hydro Nation Scholars Programme funded by the Scottish Government and managed by the Hydro Nation International Centre. The author would like to thank Dr. Jean-Christophe Comte, Dr. Alan MacDonald, Dr. Chris Soulsby and Dr. Rachel Helliwell for their work in developing the scope of the project.

Scottish Funding Council
Comhairle Maoineachaidh na h-Alba

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