What is RFFA – regression for RFFA

Mulitple flood durations and why we need multiple estimates

How to incorporate duration into design values: event-based vs aggregation

Regression models at different durations require special considerations

There is a gap – we build models independently for each duration. We must be able to compare to existing models

What is a GAM – advantages, description

Where have GAMs been used before

Why predictor selection is difficult in GAMs…shrinkage based methods

Need to select a small, uncorrelated set of predictors

Why we describe our predictor selection method here

Objectives and research questions

Flow-duration curves

Moving window analyses

Copulas and multivariate analyses

Synthetic design hydrographs

Moving windows – average out the time spent above a threshold.

*Durations at ungauged locations*

Developing regional regression equations for duration-specific methods

Nonlinear and data-driven approaches

Thorough (practically motivated) reliability and predictive performance assessment

Can we make the argument that a moving window approach is simple, practical and allows us to focus on answering question about the regression model structure?

That’s maybe not the strongest argument

Random thoughts:

(A common problem is the need for values for engineering design at ungauged locations). We work with specific engineering design, storage-based systems.

Engineering design for retention-specific applications (storage-based systems) often requires average flowrates over pre-specified durations.

IF we want a method that is good for designing storage-based systems THEN we use moving window analyses

We average discharge across duration (average flowrate)

Regional.

Hydrologically: The processes that produce a high average flowrate over 1 hour may be different than the processes that produce a high average flowrate over 24 hours. Practically: a model would have to adapt to different relationships at different durations, or we risk imposing an artificial mathematical relationship on a changing hydrological process.

This is acknowledged by developing, or if it is, separate parametric regression models are developed for different average flowrates (burden to practitioners). Examples: NIFS v RFFA2018

Recent developments leave us well-positioned to develop more accurate and more reliable regression models. Data-driven approaches. And examine potential watershed processes governing different durations.

A challenge when working with some of the newer statistical approaches is available performance metrics

Practically-oriented

We did not find evidence for different covariates at different durations, just different functional relationships…maybe because we use annual maxima.