



Assessing River Flow Predictability

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Flow Predictability: Outline

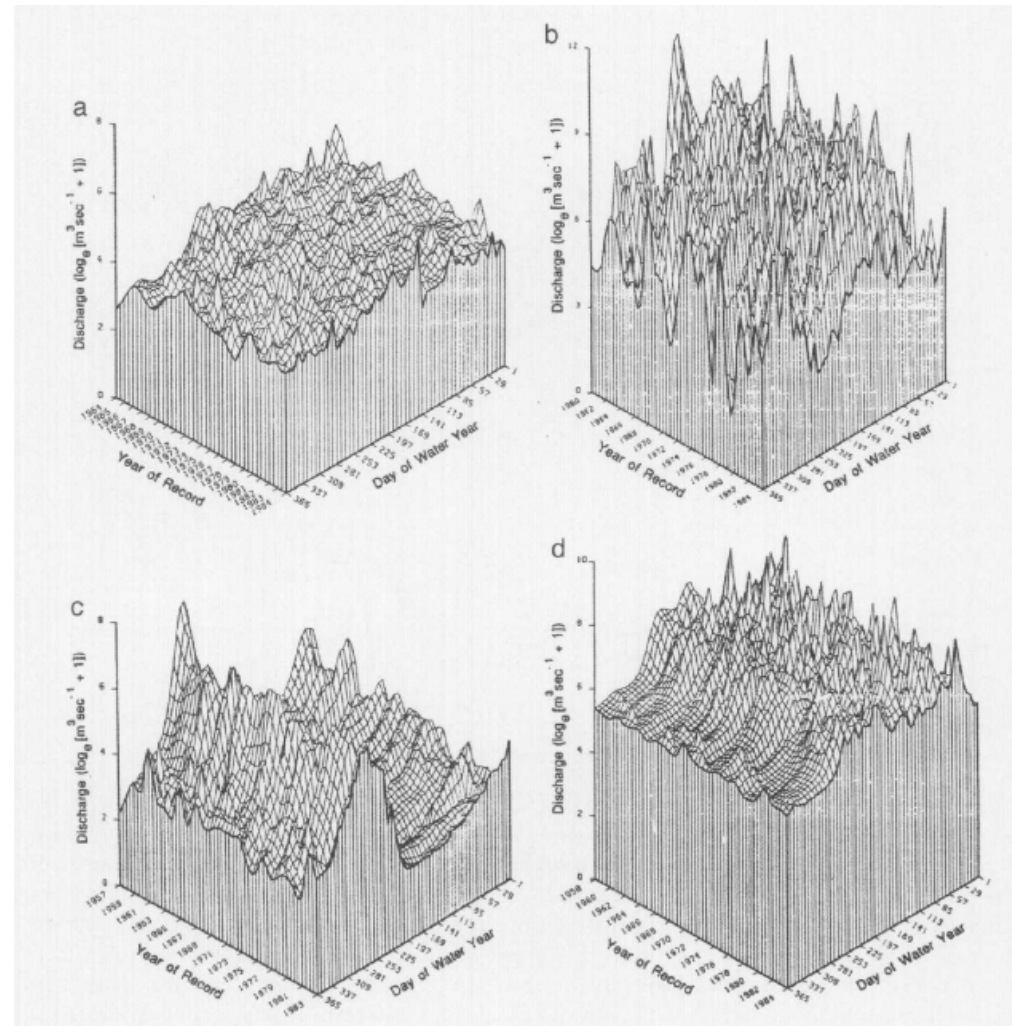
- Motivation
- River flow patterns
- Variability
 - Flow Duration Curves
- Seasonality
 - Seasonal Flow Duration Plots
- Conclusions

Motivation: Natural Rivers

- “Hydroecological” flow statistics are used for:
 - assessing suitability of environmental flows (with reference to the natural flow regime)
 - broad scale survey of condition / alteration
 - relating ecological variables to hydrology (scientific studies)
 - clustering rivers with similar flow patterns
 - identifying interesting sites (different habitats)

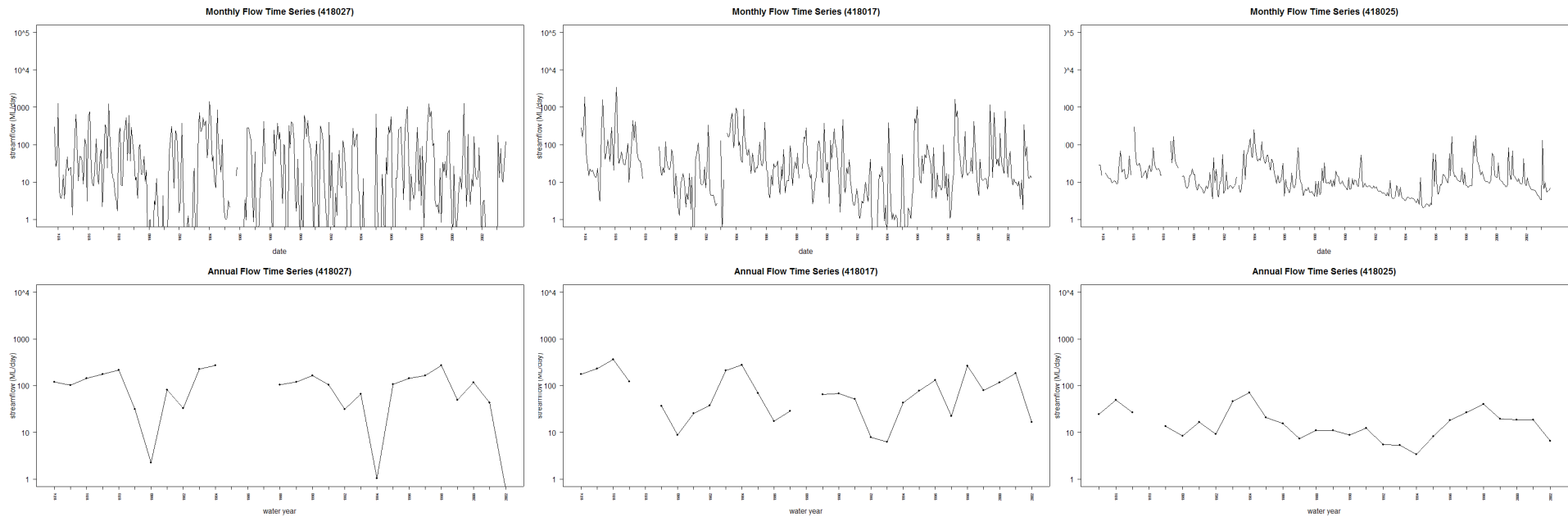
River Flow Patterns

- Multi-scaled climatic inputs affect river flow patterns
- Variability: different flow conditions over time
- Seasonality: different flow probabilities over the year
- Predictability: consistency of flow pattern across years
- This talk introduces a framework for assessing these.



Flow Time Series

30 year flow time series from rivers in the Gwydir Basin, NSW.



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Upper Horton River

418017
Myall Creek

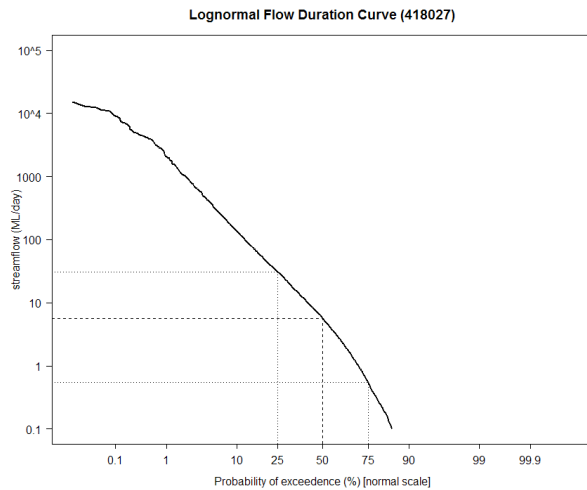
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Variability

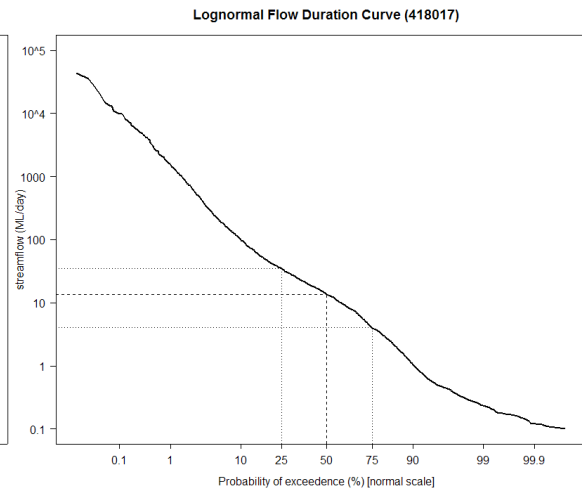
- Many different statistics can be used to represent flow variability
- All time periods (e.g. days) are lumped together and treated as independent
 - seasonal patterns, floods and “droughts” all contribute to variability
- Variability can be assessed visually (or quantified) with a Flow Duration Curve

Flow Duration Curves

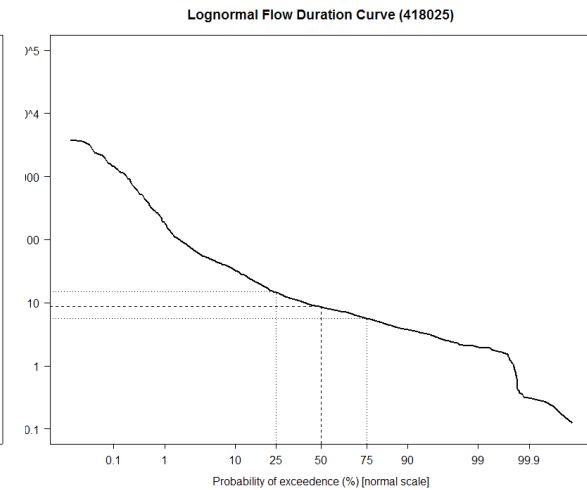
Based on 30 years of daily flow data



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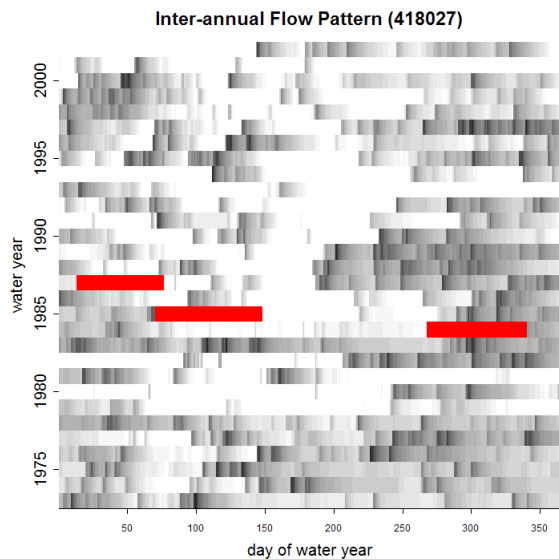
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Seasonality

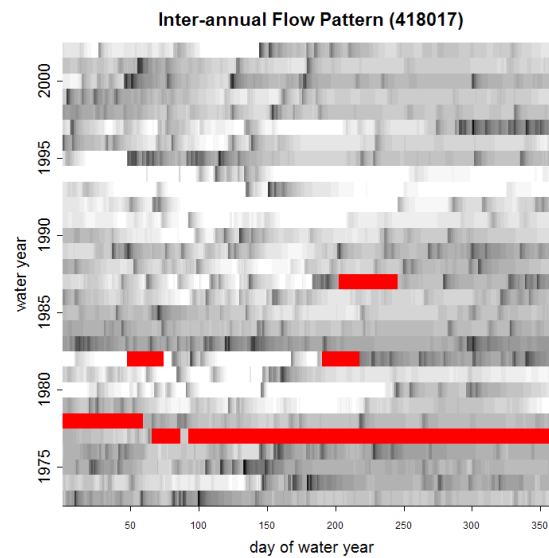
- Flow and temperature are the primary drivers of river ecosystems – so floods (or other flows) in different seasons have different effects
- It may be useful to assess typical flow conditions at different times of year
- Seasonal Flow Duration plots can be used

Seasonal Flow Time Series

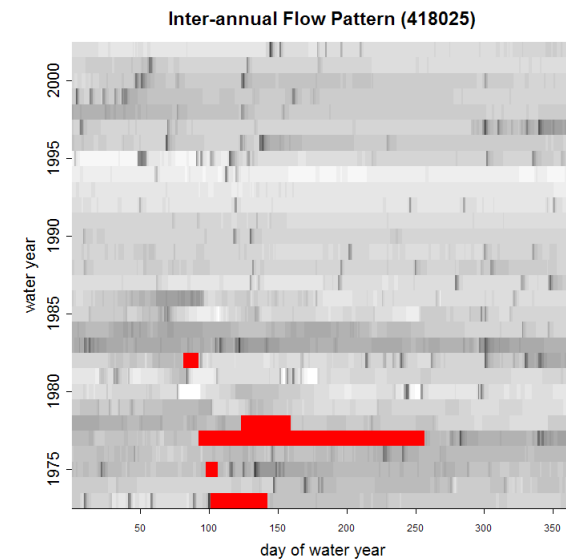
30-year flow time series from rivers in the Gwydir Basin, NSW.



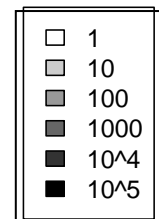
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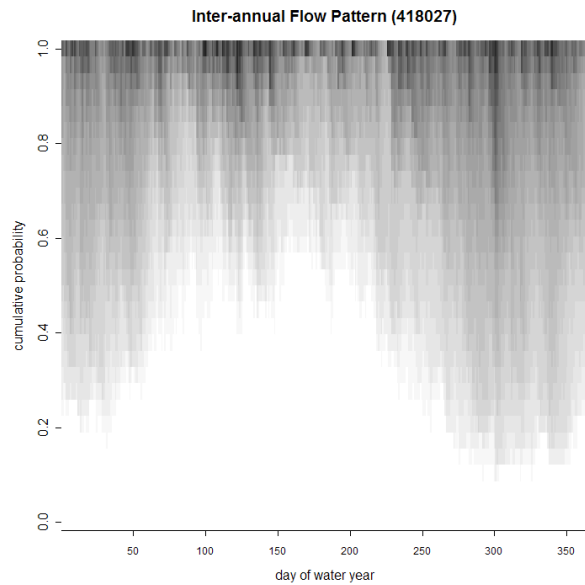
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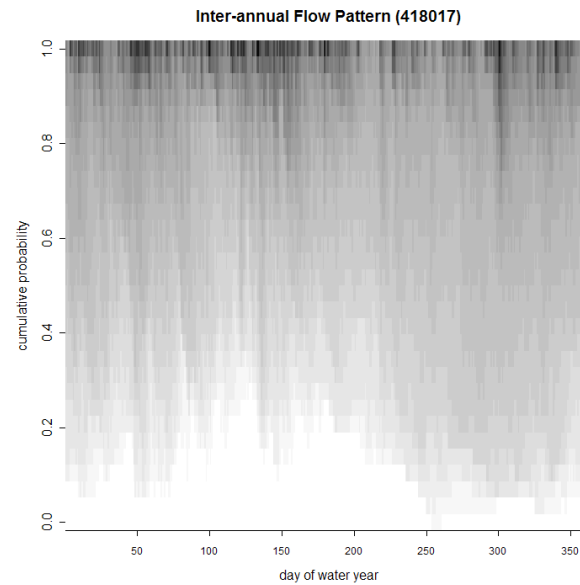
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Seasonal Flow Duration Plots

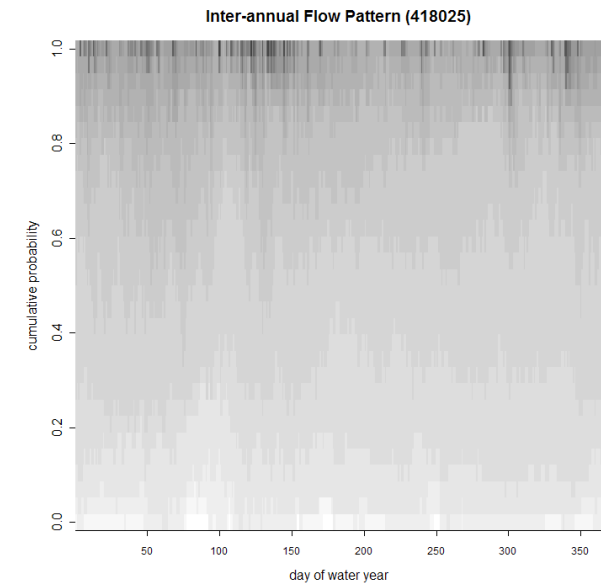
Based on 30-years of daily flow data



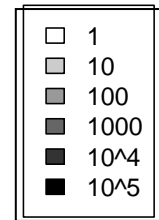
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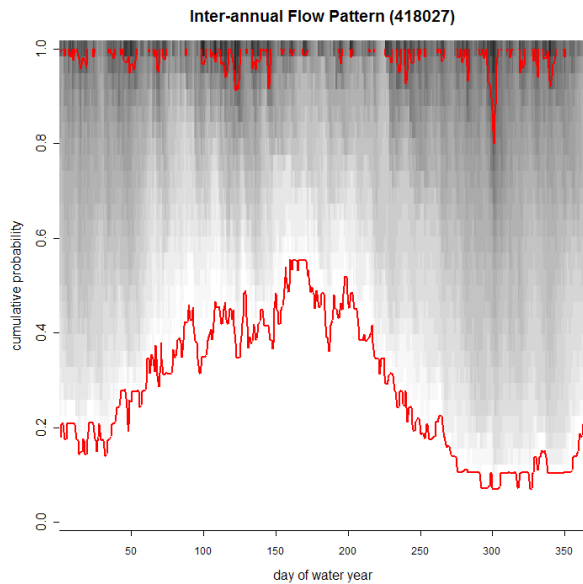


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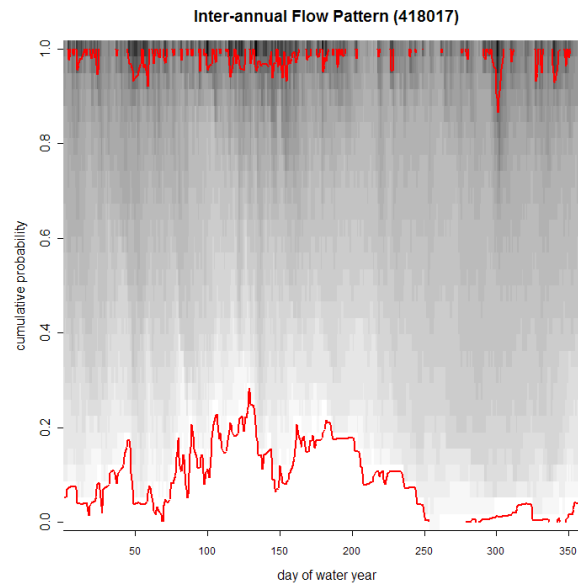


Seasonal Flow Duration Plots

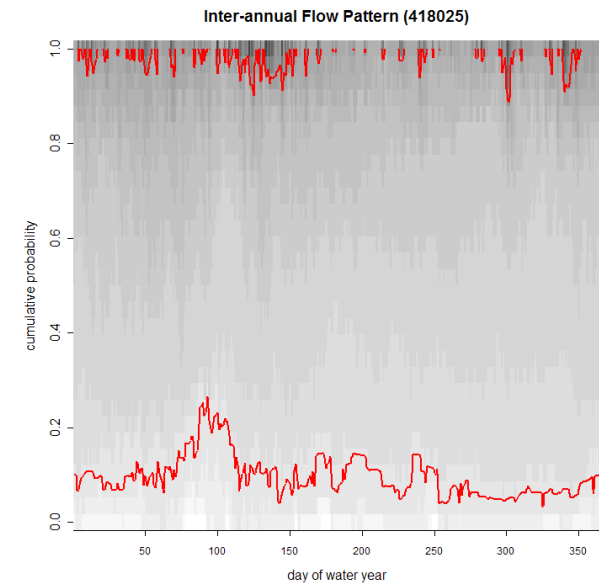
Based on 30-years of daily flow data



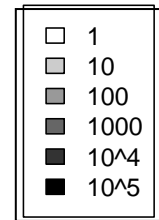
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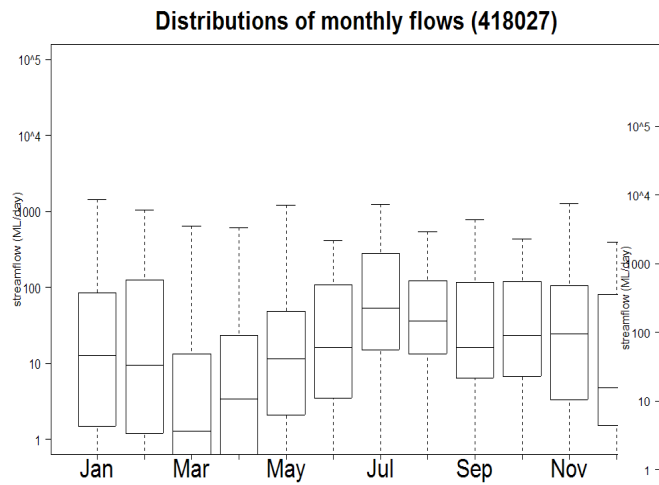
Seasonality

- Predictability: the average variability of flow in each seasonal period (over years)
 - i.e. the similarity of flow patterns from year to year
- Seasonality: difference between typical flows at different times year
 - i.e. the strength of annual climate cycles
- The seasonality / predictability of “floods” might be very different to “droughts”
- Note: Flow predictability (and variability) changes with temporal resolution
 - e.g. daily vs monthly

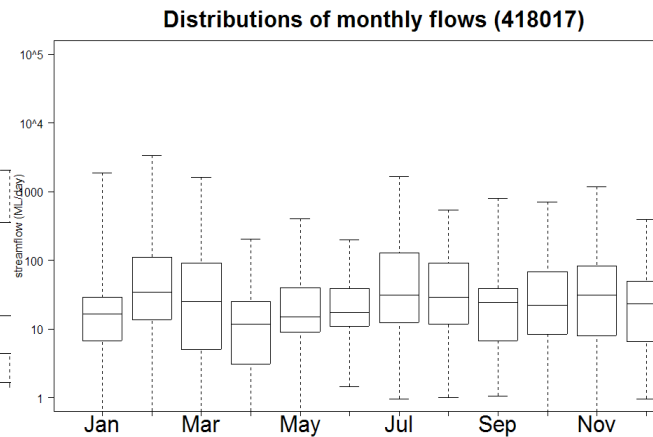
Conclusions

- Overall variability can be a useful concept, but it obscures seasonal patterns
- In assessing variability and seasonality, temporal scale is an important consideration
- Relevant flow features should be defined for specific applications (e.g. flow above bank-full)
- Time series and distributions should be examined visually rather than blindly calculating statistics
 - “face validation” of statistics

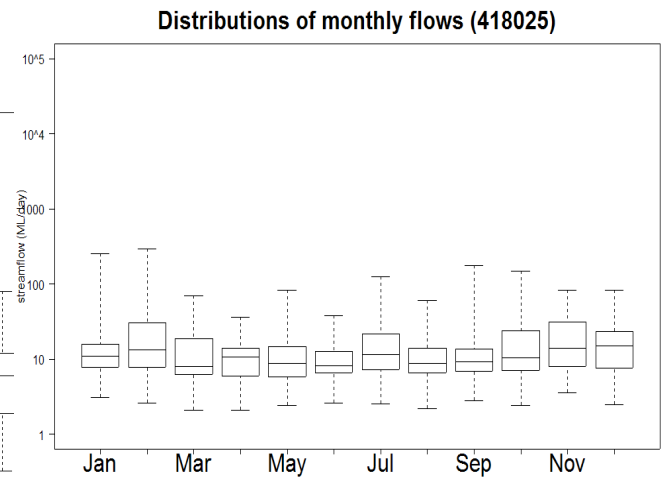
Monthly flow distributions



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