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# Hydrologic parameter sensitivity across a large-domain

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## 1. Introduction

- Due to the computational demands of modelling large domains, model calibration of Land Surface Models (LSMs) typically involves adjustment of only a small subset of parameters.
- Majority of parameters that can potentially contribute to the model output variance remain fixed/ hard coded.
- Spatial variability of the parameter sensitivity over large domains with heterogenous climatic and physiographic conditions is largely ignored during the calibration process.

## 2. Objectives

- Explore how parameter sensitivity varies spatially with the dominant physical and climatic conditions.
- Explore how dominant model parameters change depending on the simulated hydrologic process.

## 3. Study Area

- The study area extends from 40.75°N to 57.6°N and 109.96° W to 127.9°W.
- Selected catchments exhibit a range of climatic and physiographic conditions.

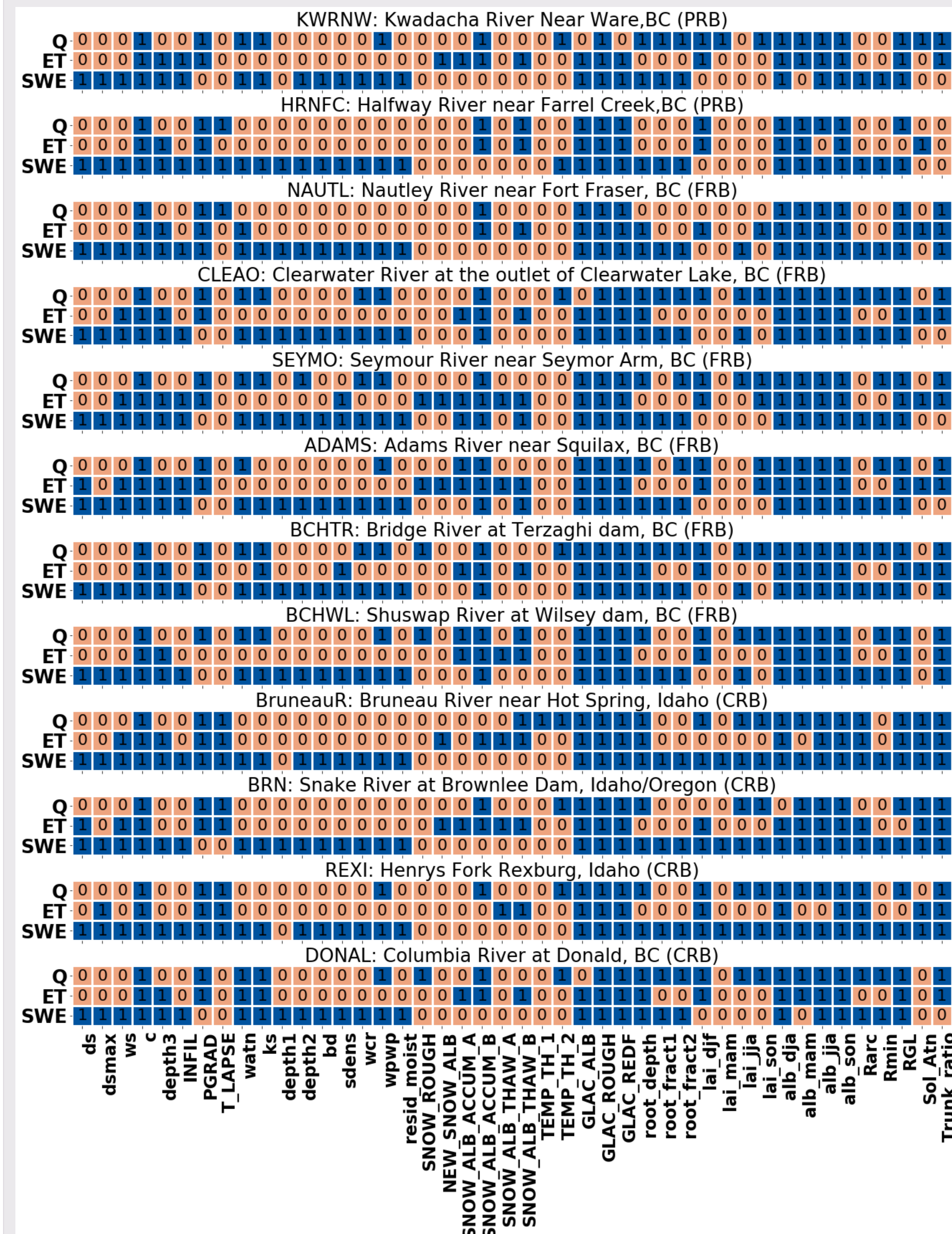
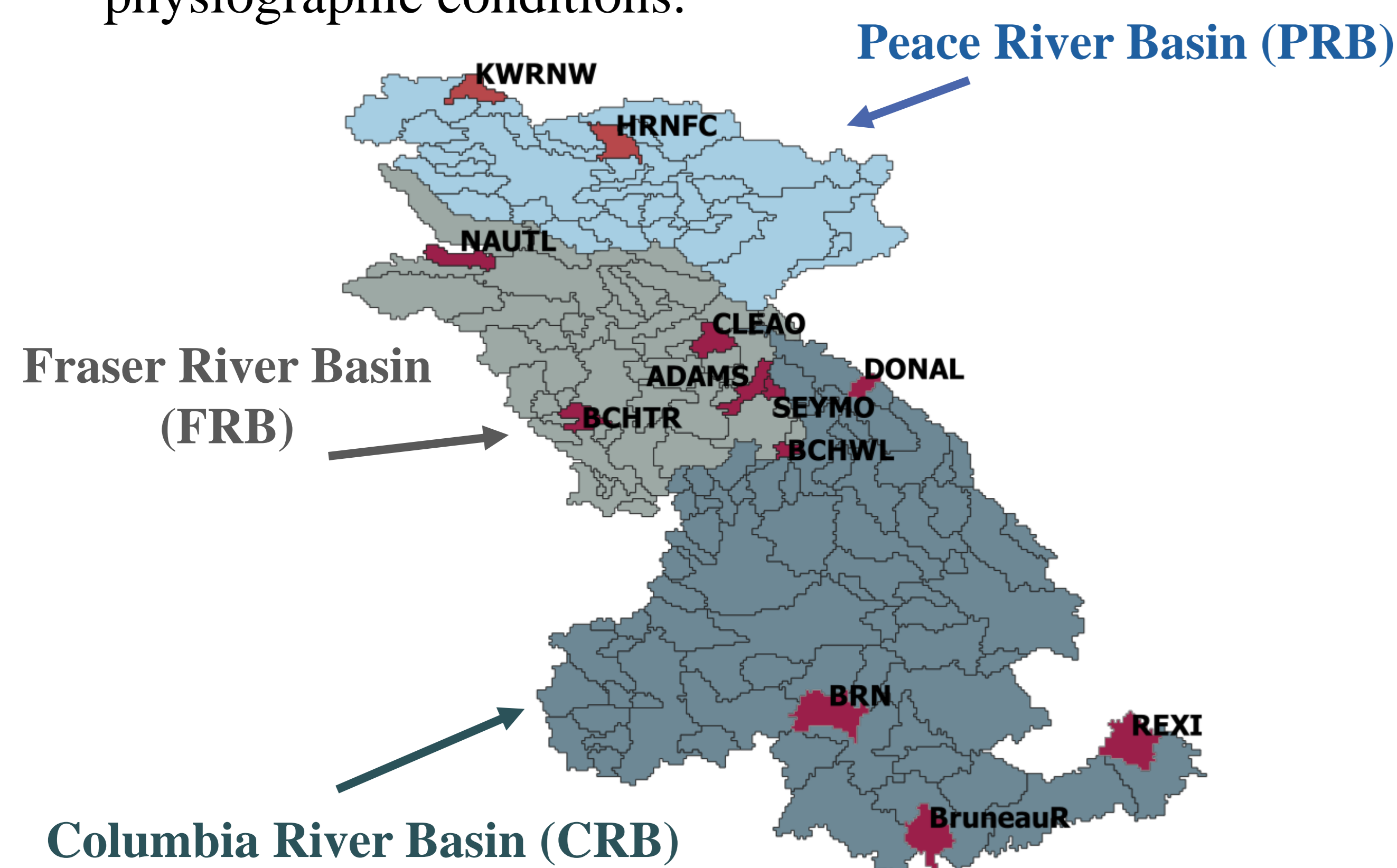


Fig: Sensitive (0) and insensitive (1) parameters with regard to streamflow (Q), ET and SWE over a sub-selection of watersheds.

## 4. Methods

- A total of 45 parameters of the Variable Infiltration Capacity model (VIC) are examined.
- Parameters describe climate, soil, vegetation, snow, and glacier properties.
- Sequential parameter screening is used to identify parameters as sensitive or insensitive.
- Parameter sensitivity with regard to 3 model outputs, streamflow (Q), ET and SWE.

## 5. Results and discussion

- Parameter sensitivity varies both geographically and with the process being simulated.
- For each process, parameters can generally be organized into three categories:
  - **consistently sensitive** (should be adjusted for all basins)
  - **consistently insensitive** (can be fixed for all basins)
  - those where **sensitivity varies geographically**.
- Preliminary results show that spatial variability of the third category of parameters can be related to basin topography and climate.

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## References

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