

# The influence of land use and geomorphology on water and sediment dynamics in the Canadian Prairies



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# Canadian Prairies

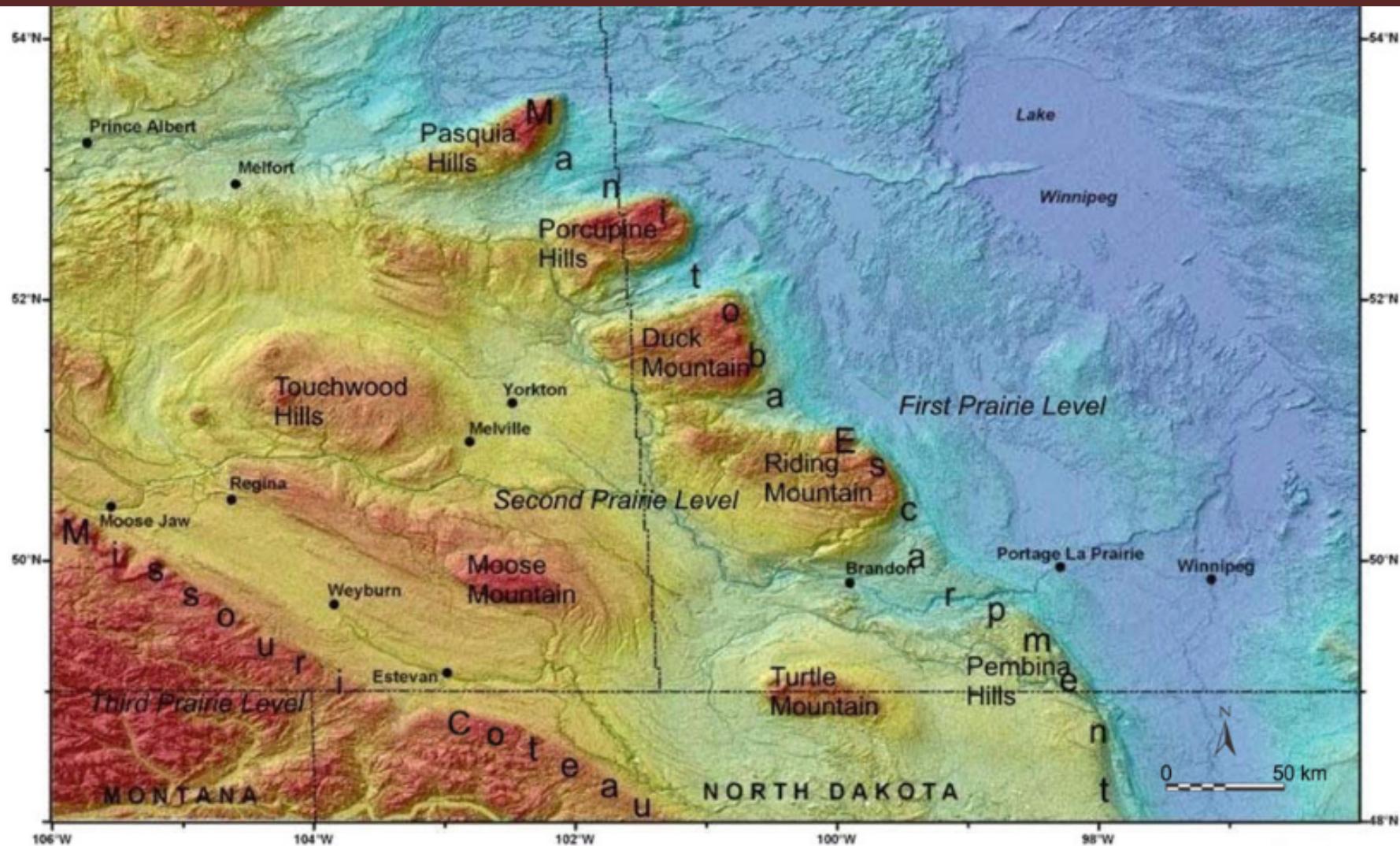
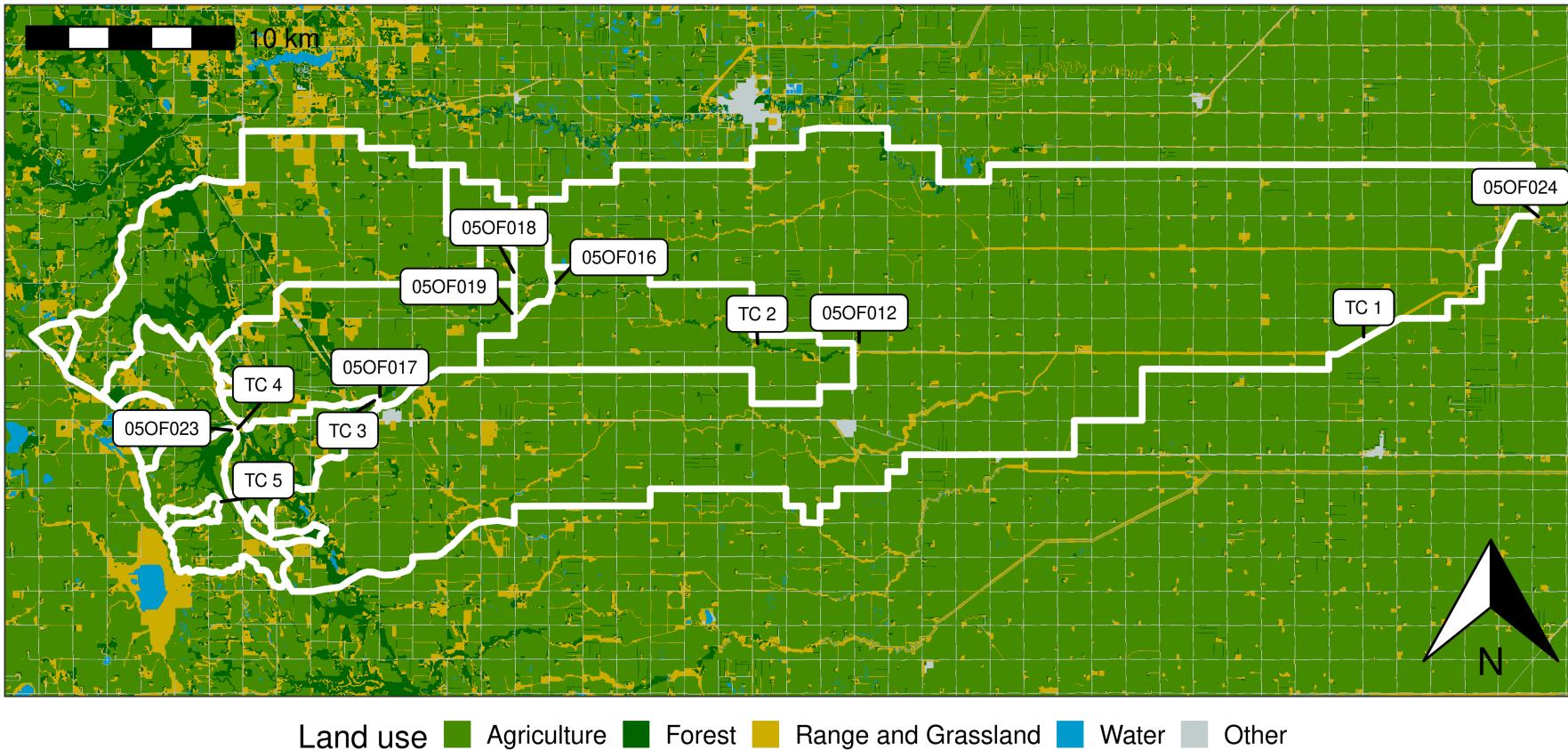


Fig. 9.2 The First, Second, and Third Prairie Levels, Manitoba Escarpment, and Missouri Coteau (after Bamburak and Nicolas 2010)

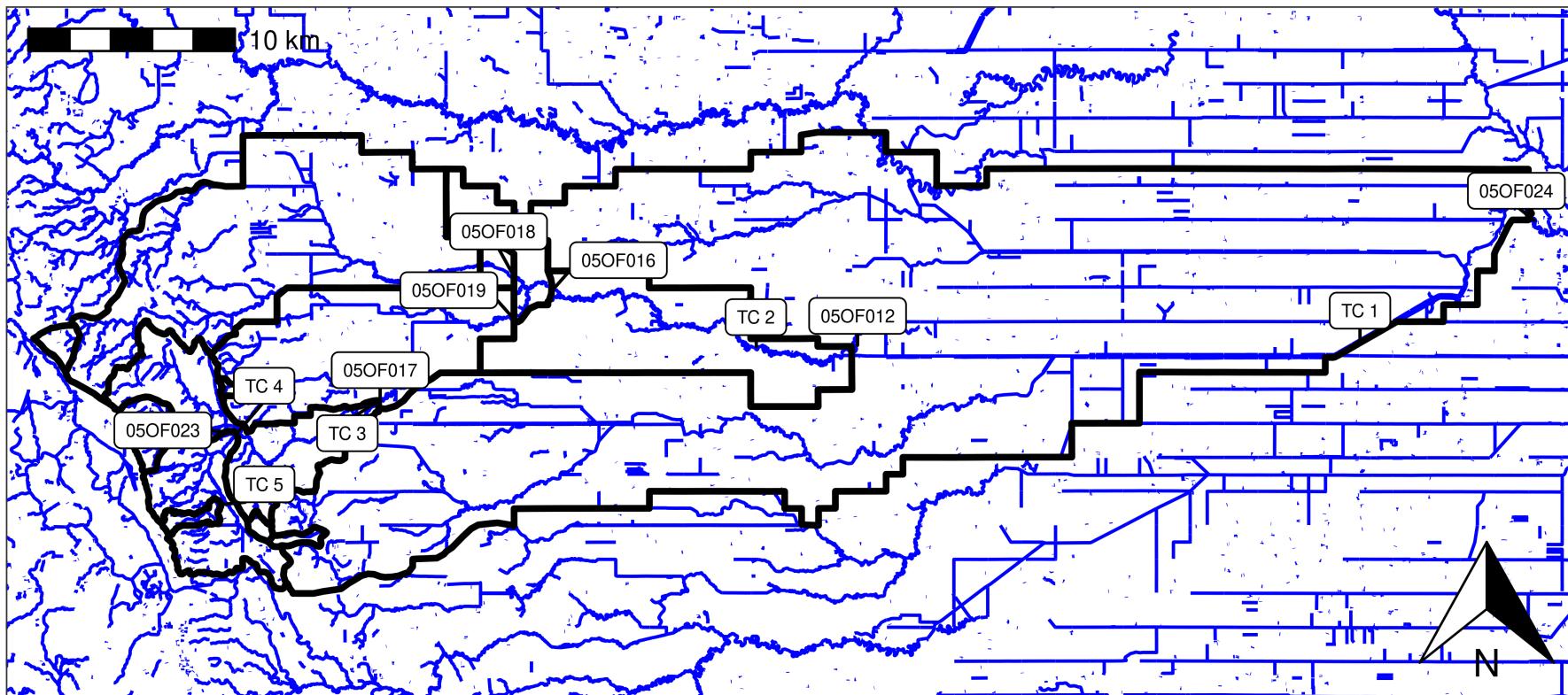
# Tobacco Creek Model Watershed

- Nested watersheds: ~2km<sup>2</sup> to ~1000km<sup>2</sup>
- Predominantly agricultural land use



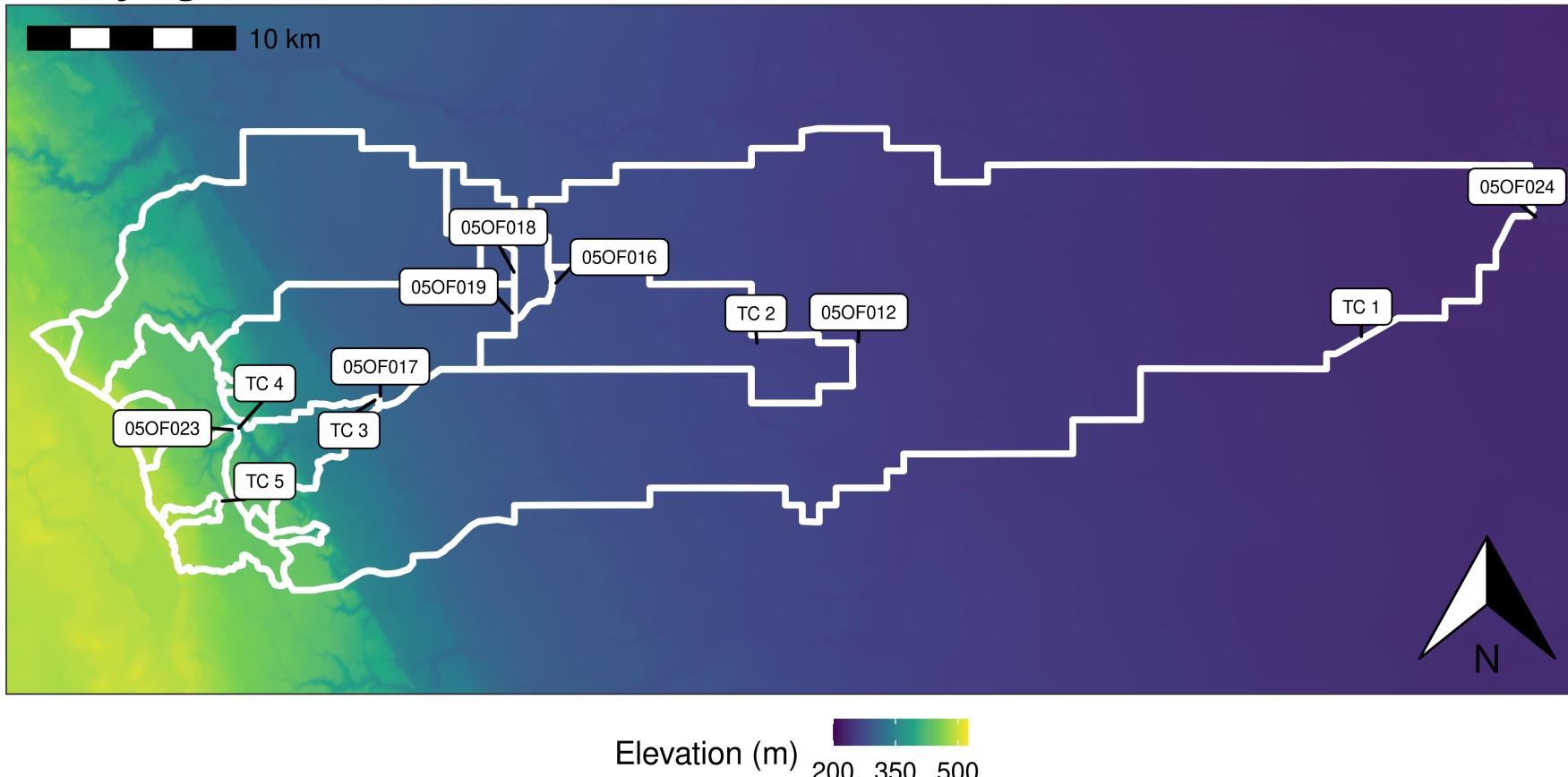
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- Predominantly agricultural land use
- Highly modified drainage network
- Three distinct physiographic regions



# Above the MB Escarpment

- Undulating hills
  - Glacial till
  - Headwater storage dams
  - Low-order streams



# MB Escarpment

- Incised streams
  - Rapid change in elevation
  - Steep valley walls
  - Low-strength shales
  - Beaver dams



# Lowlands

## Glacial Lake Agassiz

- Low relief
  - Meandering rivers and streams
  - Provincial drains
  - Municipal drains
  - Lots of in-field surface drains

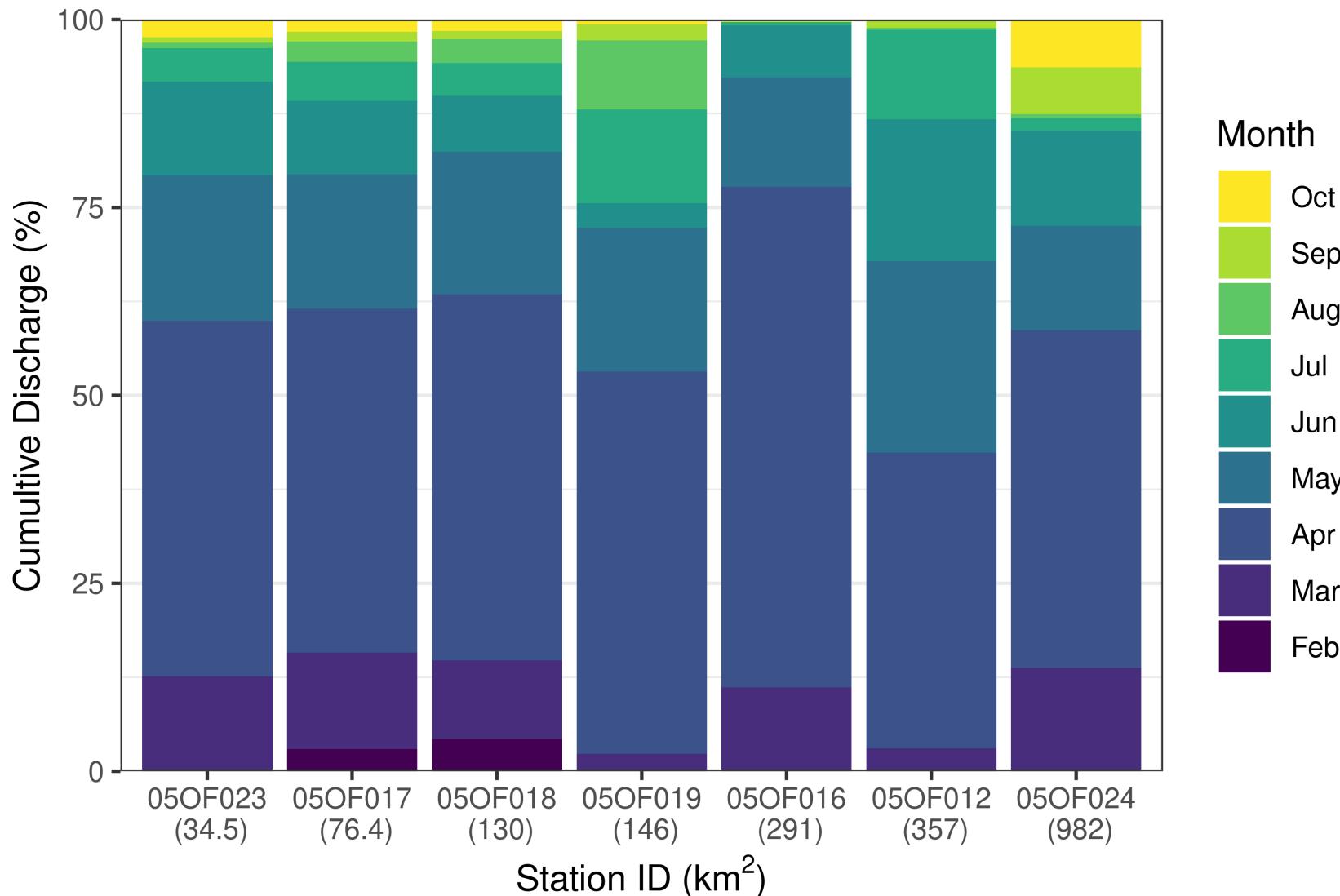
Complicates the normally simple concept of drainage area



# Discharge

## Annual

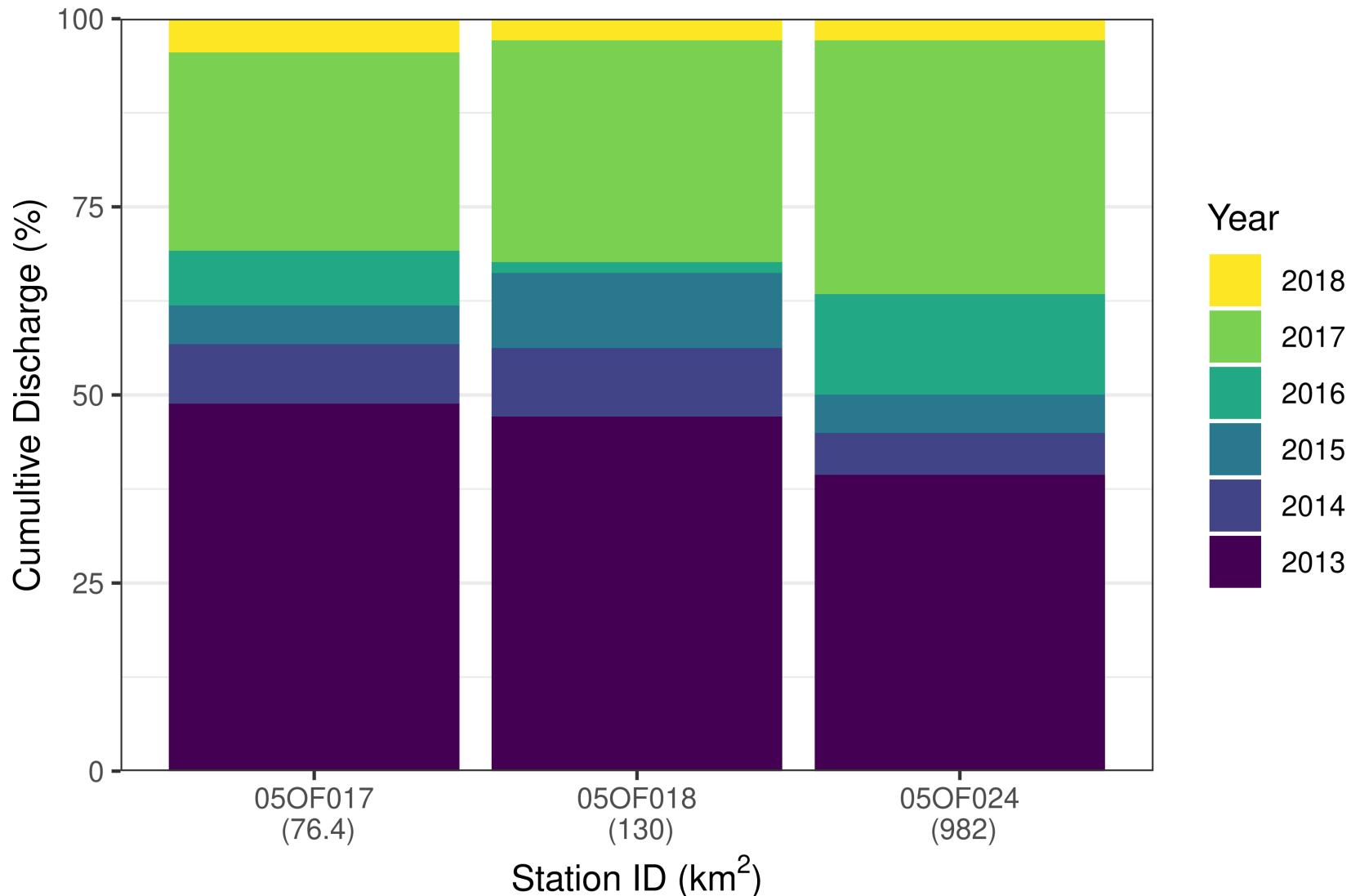
- Spring snowmelt dominated hydrology



# Discharge

## Inter-Annual

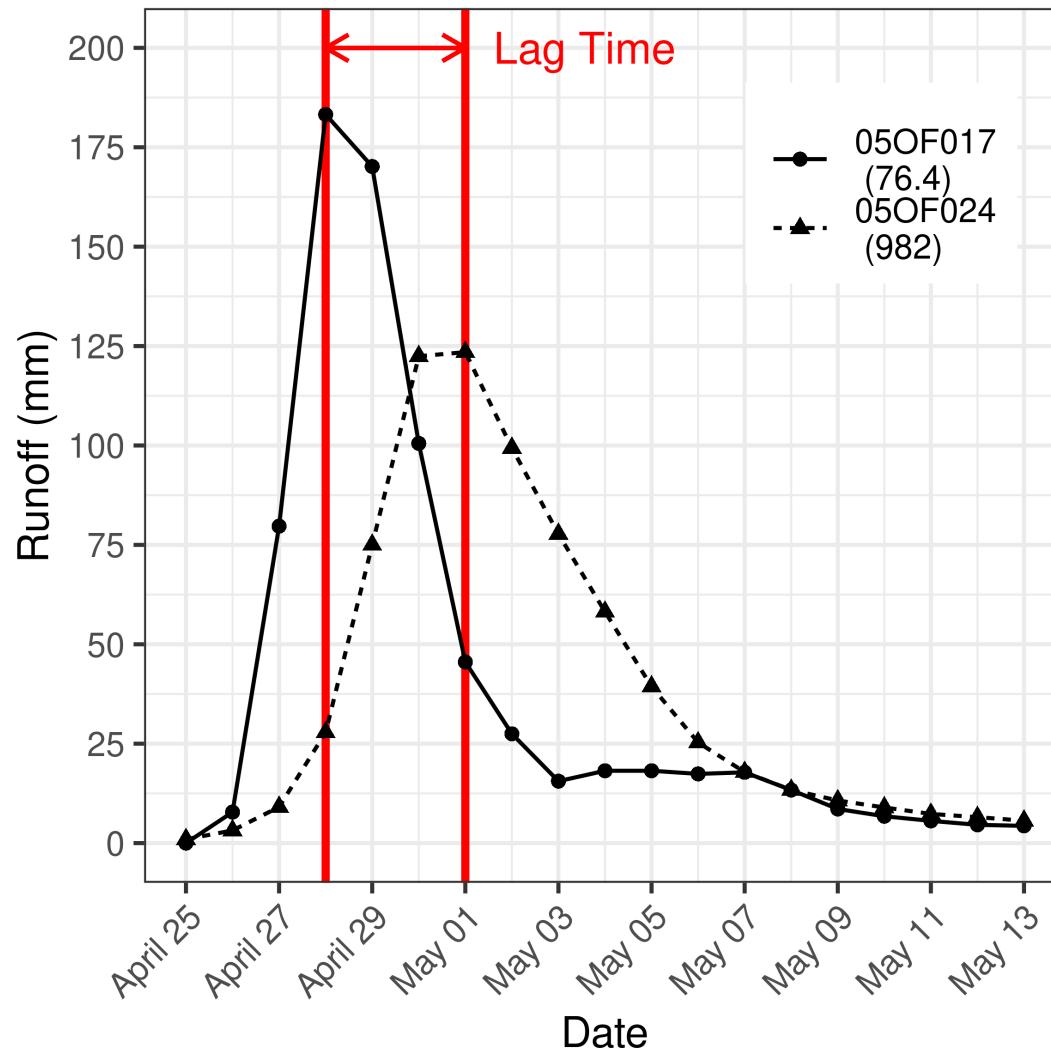
- 2/6 years account for more than >75% of water



# Runoff

## Lag Time

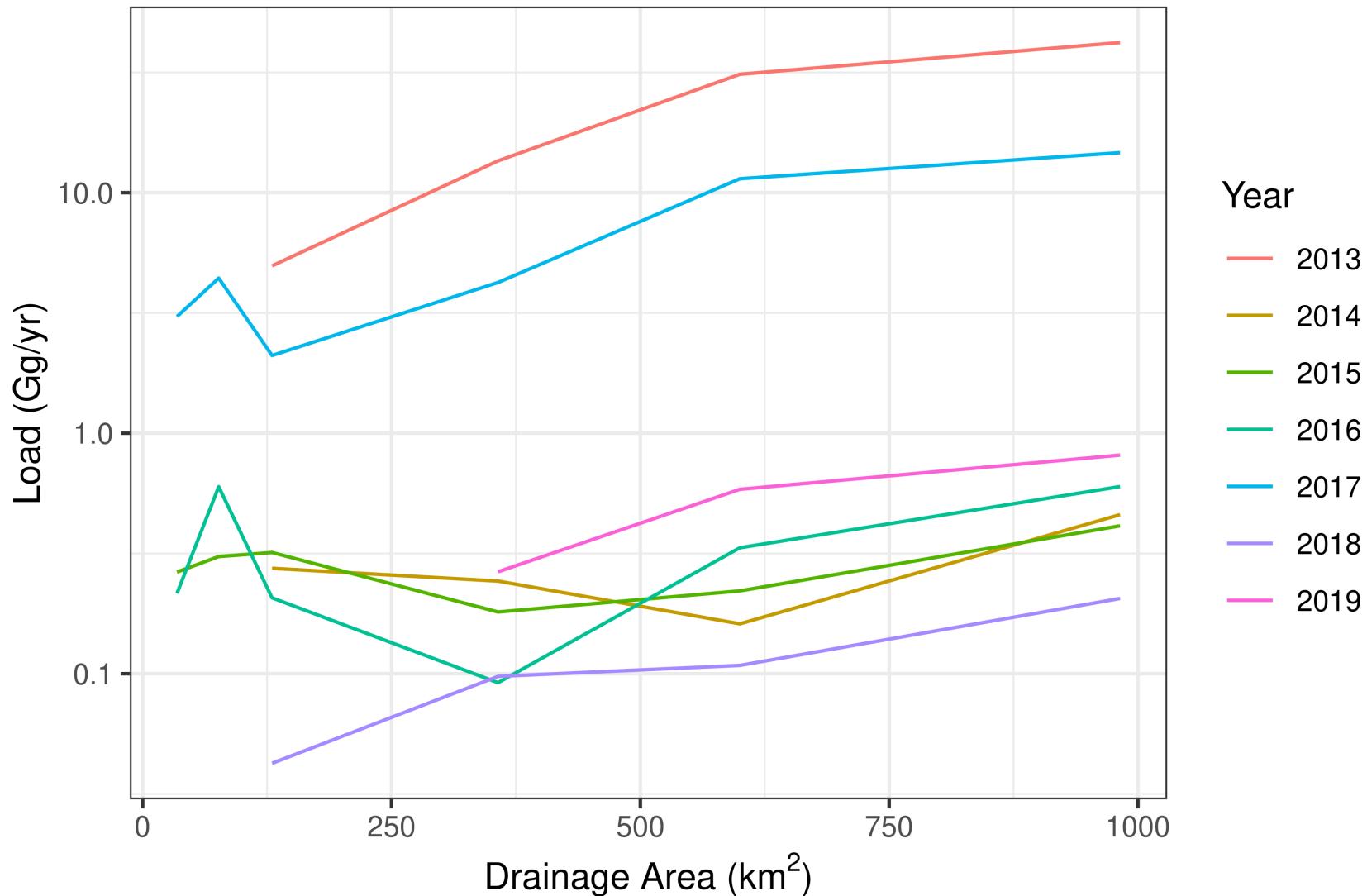
- Gaining streams above and within MB escarpment
- Losing streams below MB escarpment



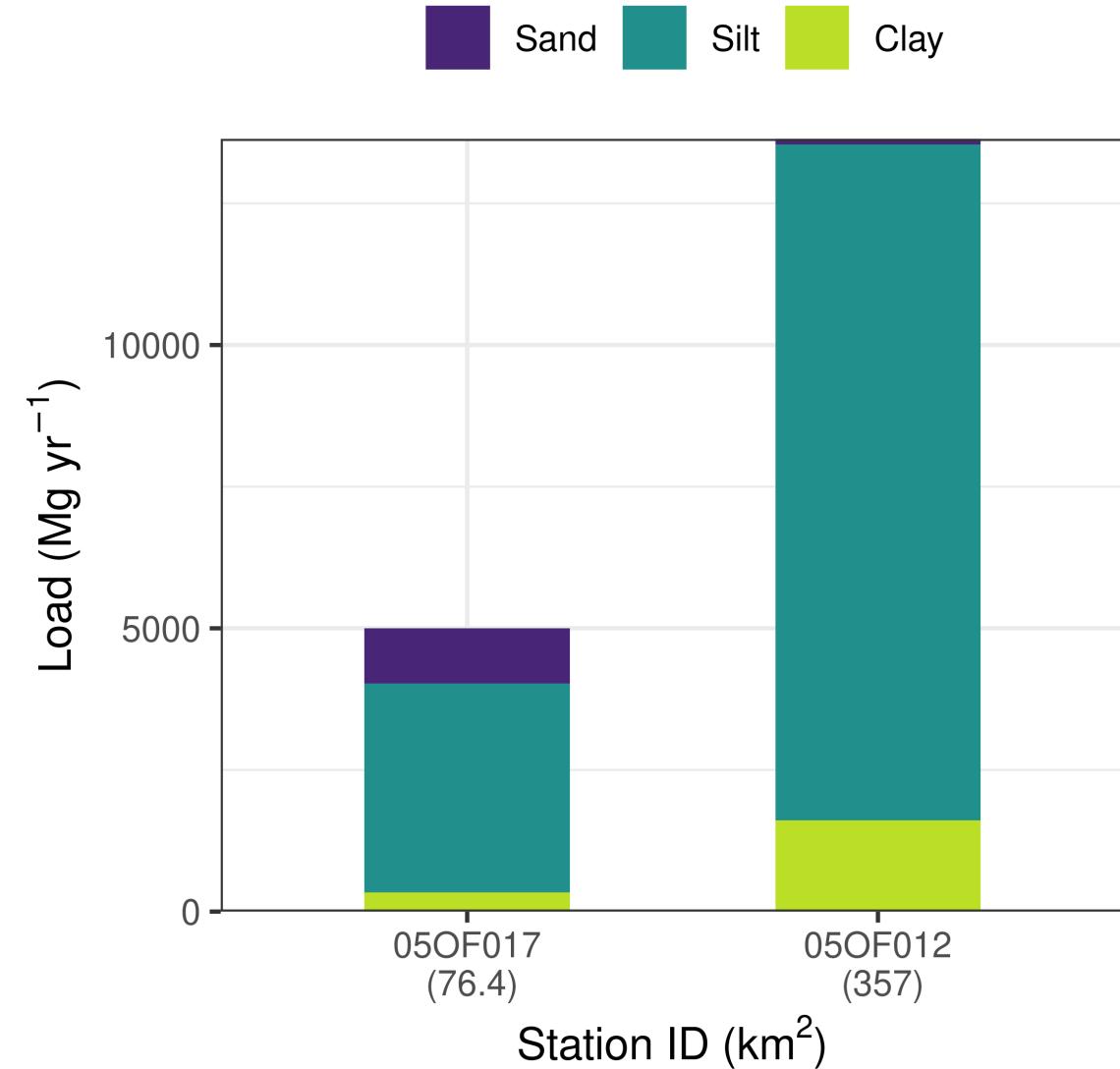
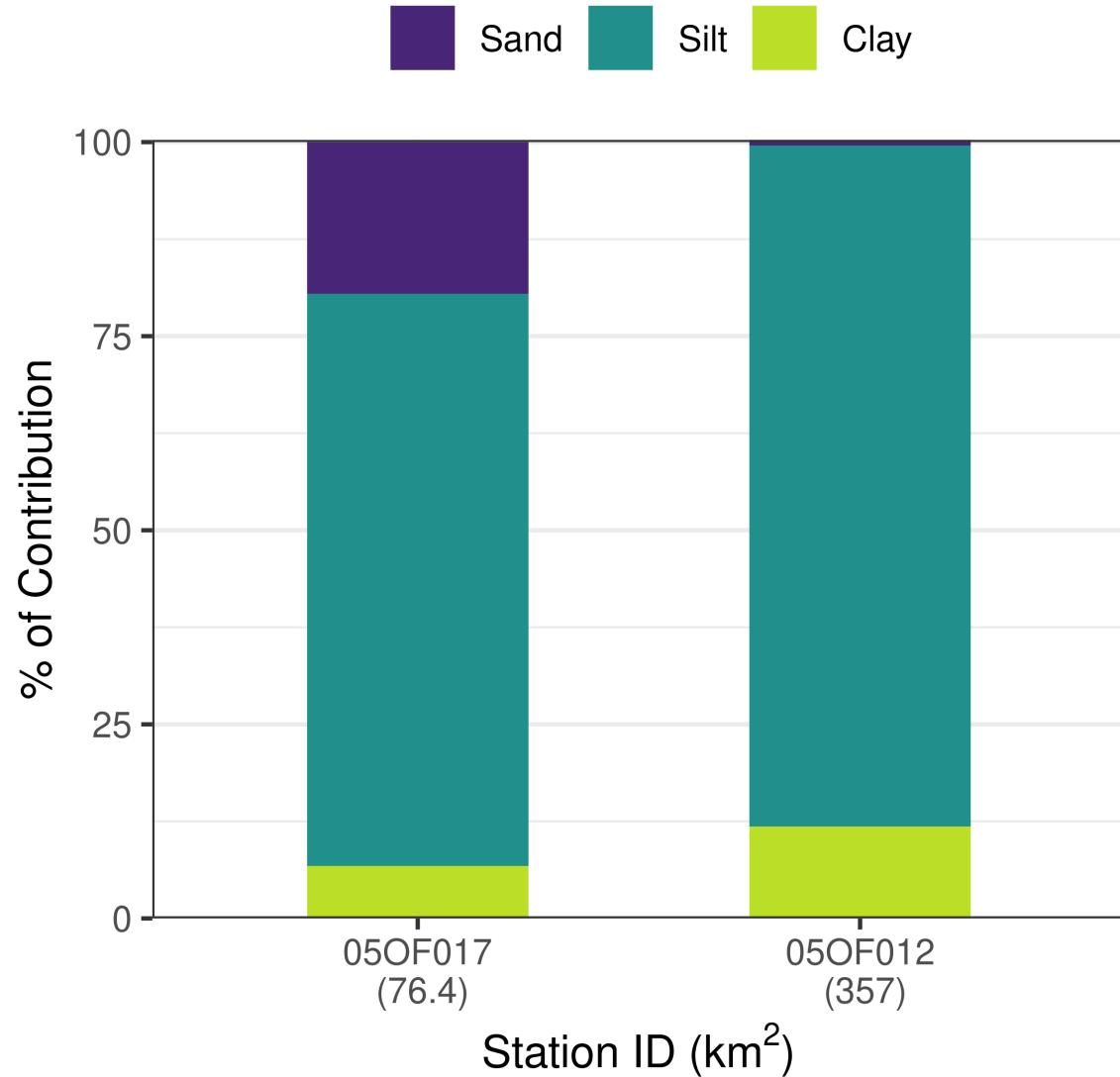
# Sediment Load

## Inter-Annual

- 2/6 years account for more than >80% of sediment moved

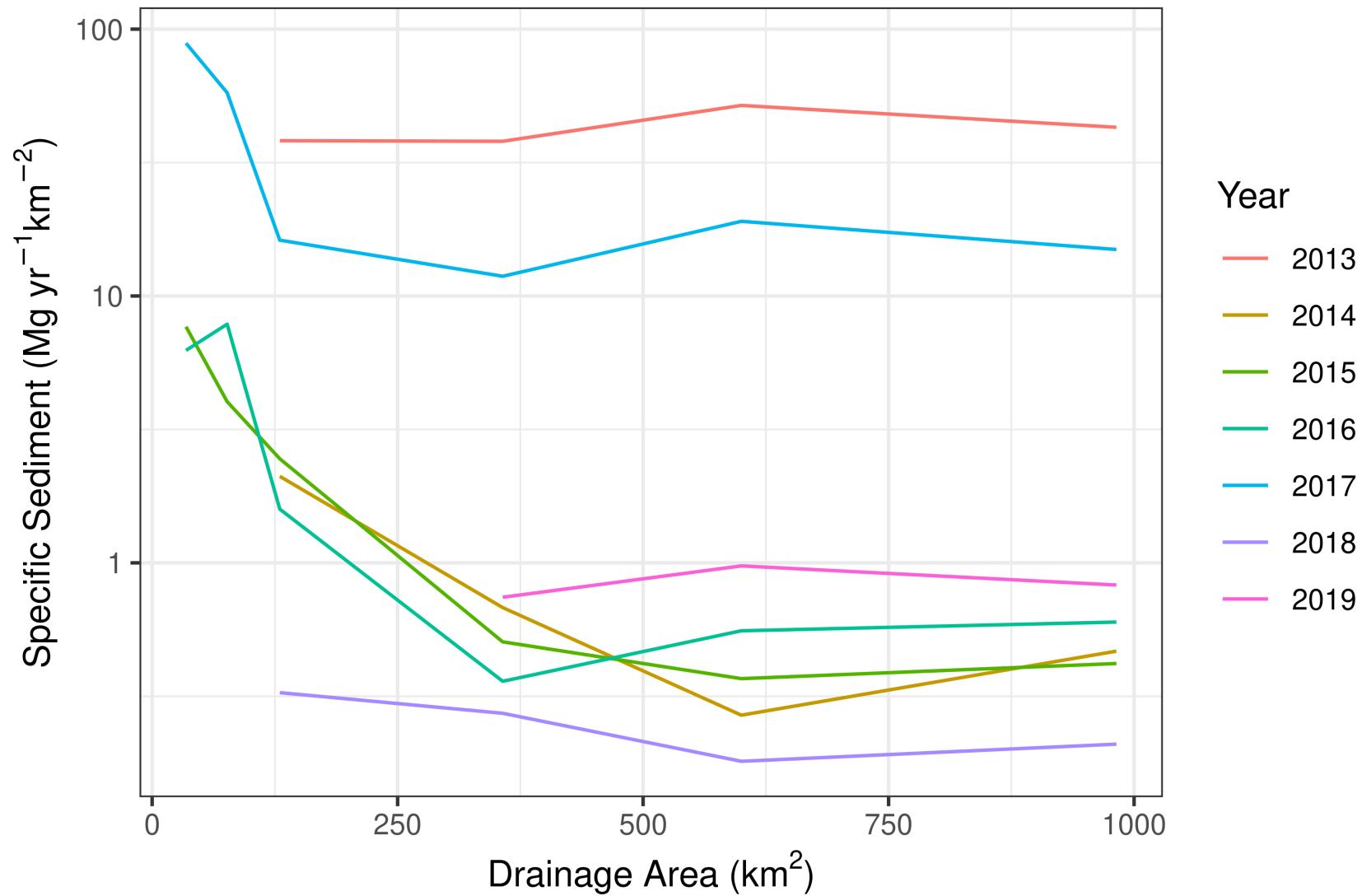


# Grain-size



# Specific Suspended Sediment Load

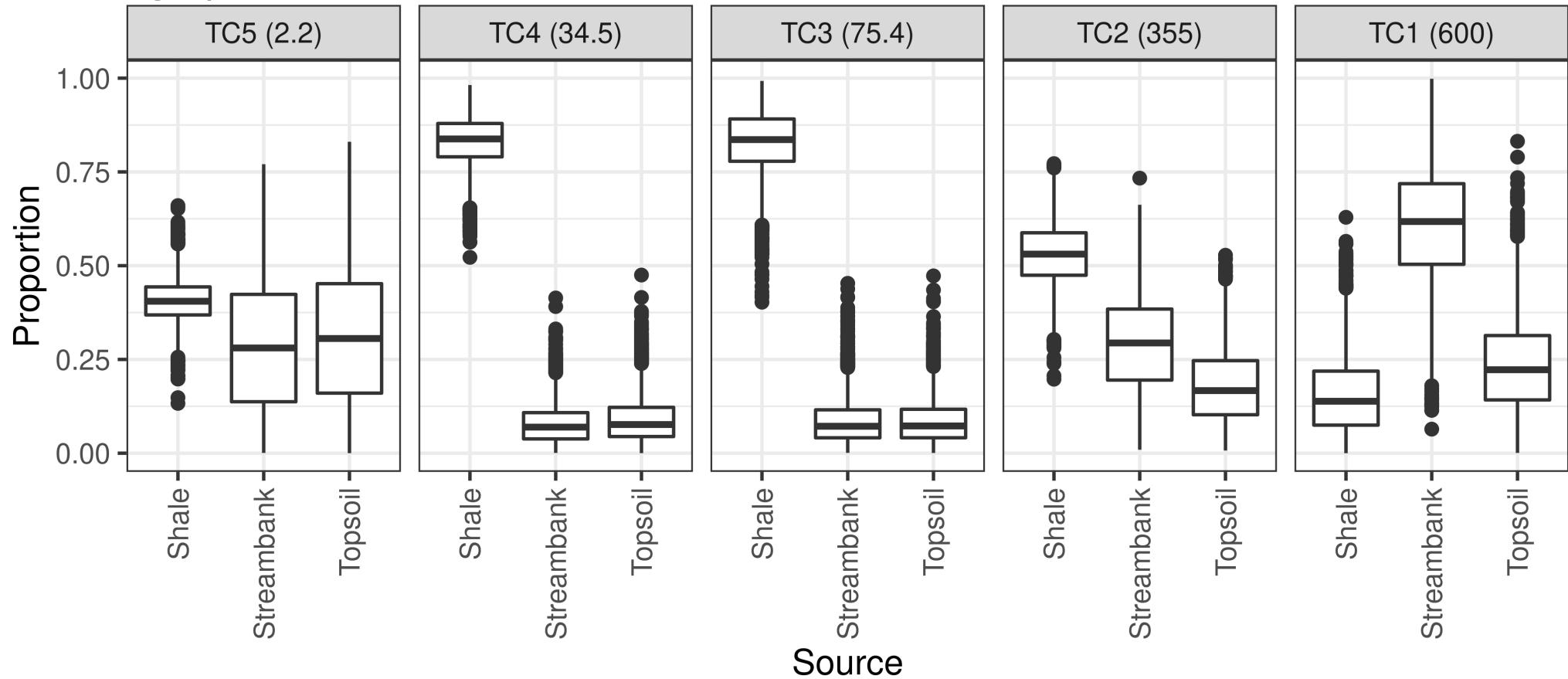
Decreases with increasing drainage area



# Sources of Sediment

## Shift in sources of sediment

- Colour fingerprints



# Thank You

## Changes in

- Physiographic regions, drainage, scale of observation

## Impact

- Water yield, sediment yield, sources of sediment

**Thank you!**



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Slides: <https://github.com/alex-koiter/presentations> (PDF)

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