Temporal and spatial groundwater contribution to the Southern River (WA) based on MODHMS modelling

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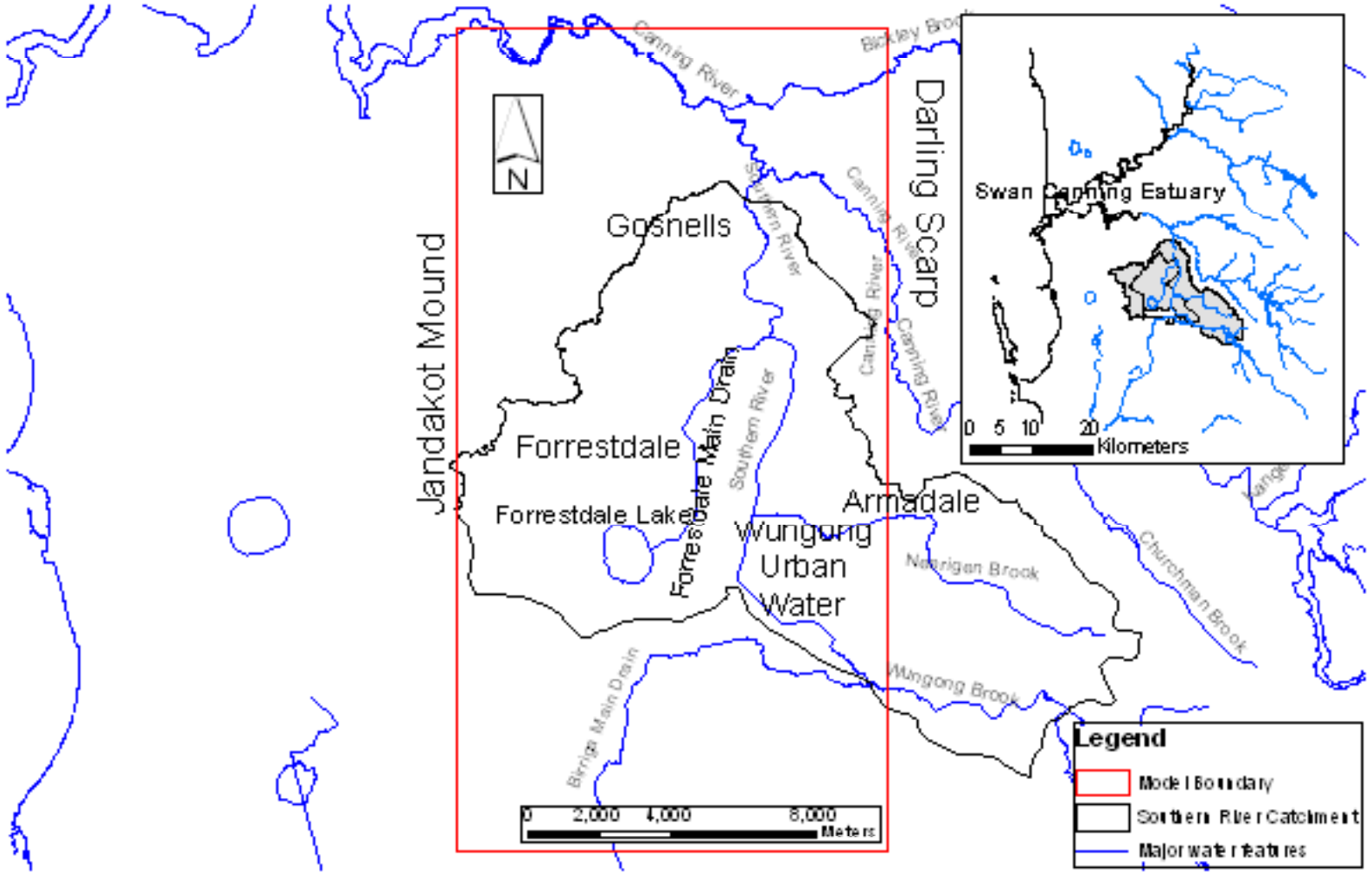
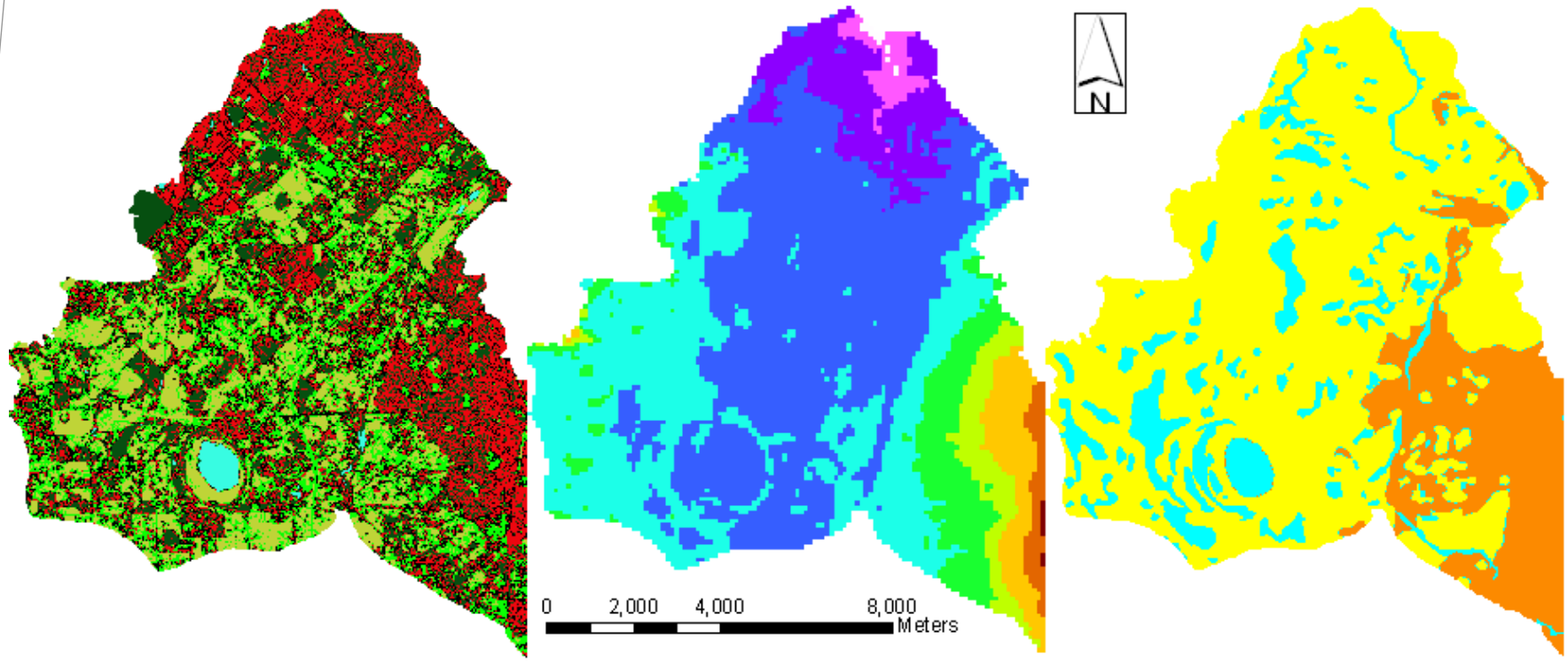
Synopsis

- Southern River catchment
- Model
- Channel flows
- Groundwater interaction with channels
- Conclusions

Southern River catchment



Southern River catchment



Land cover

Elevation

Lithology

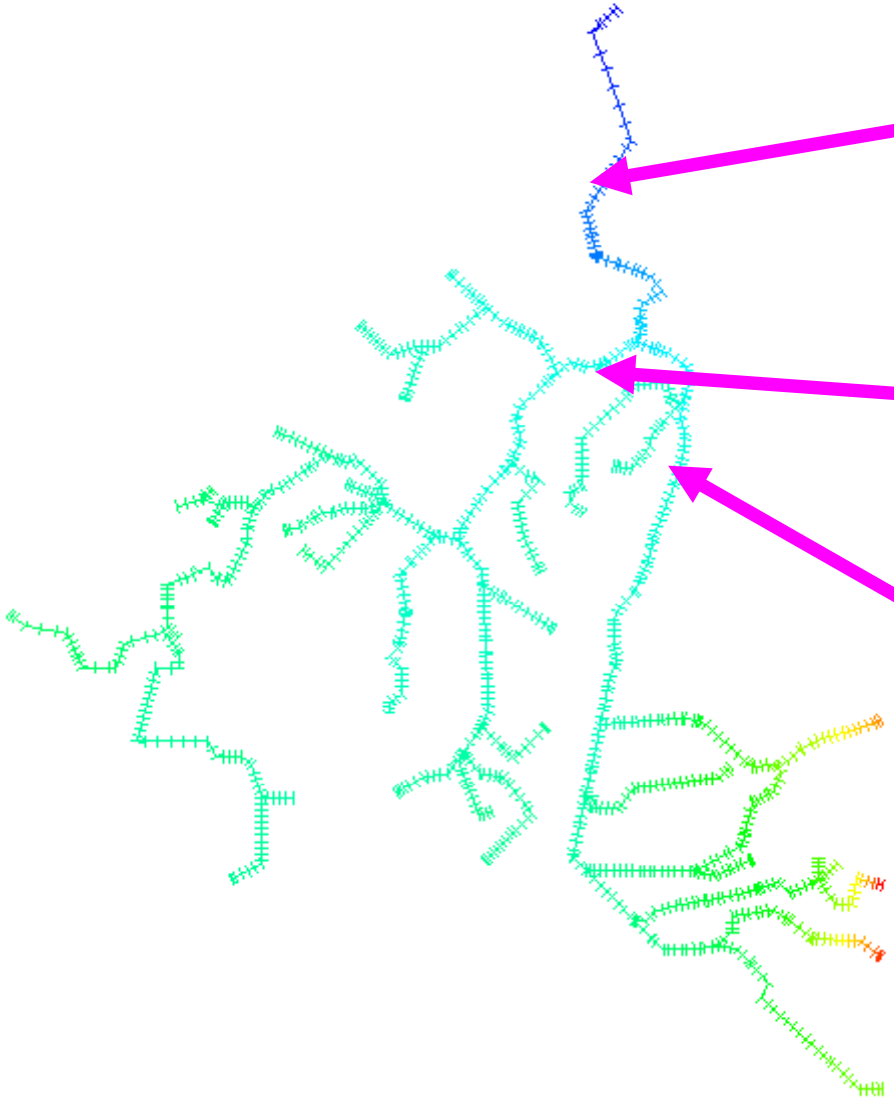
MODHMS

- Sub-surface
- Overland
- Channel
- Vegetation
- Adaptive time stepping

Southern River model

- Discretisation
  - Spatial: Cell spacing from 83 m to 500 m
  - Temporal: monthly for 10 years
- Channel System
  - 1020 segments
  - Interacts with surface and subsurface cells
  - Parameterisation
  - Flow routing

Channel network

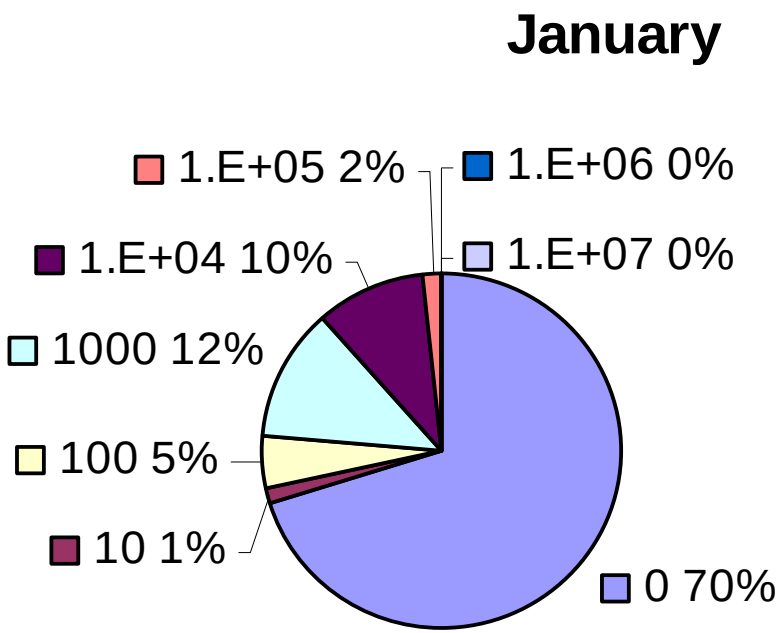


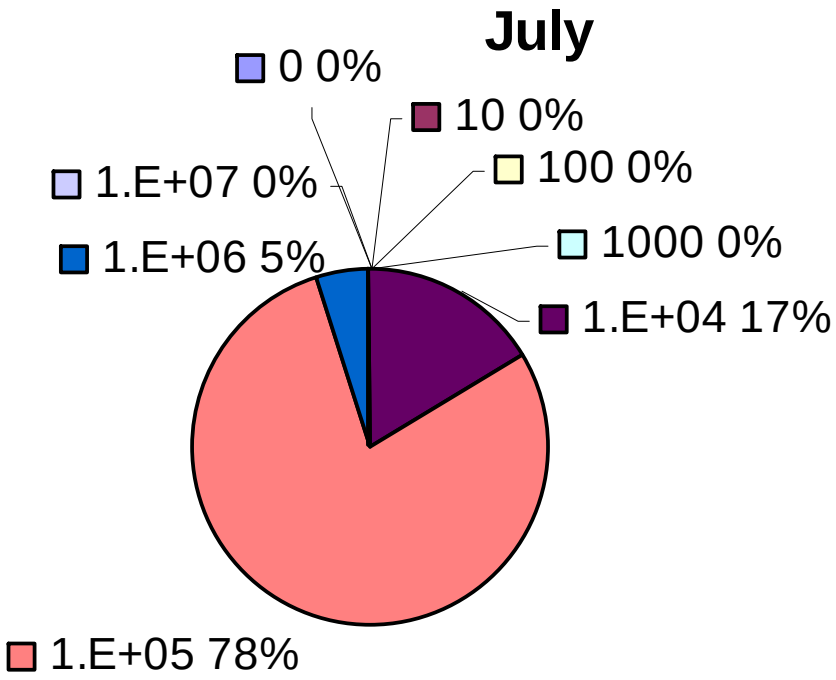
Anaconda Drive

Forrestdale
Main Drain

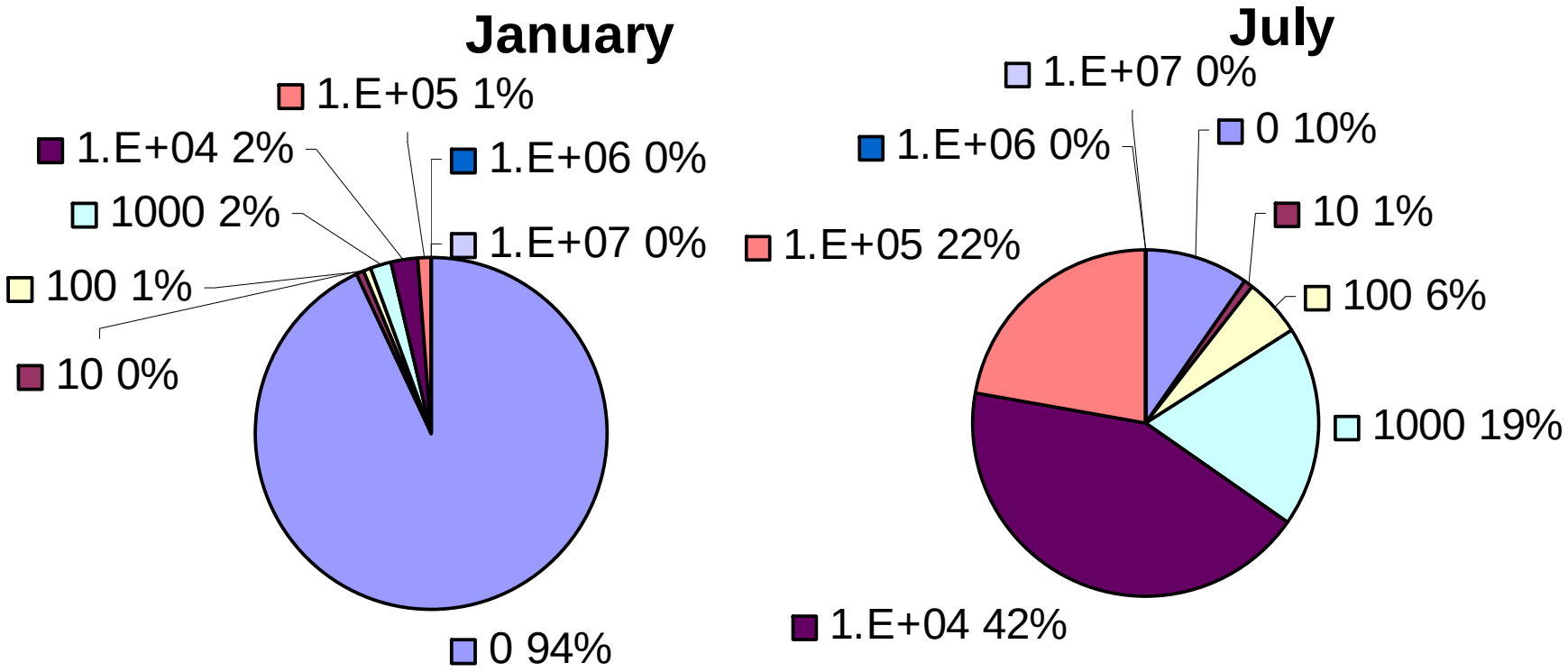
Mid Southern River

Mid Southern River

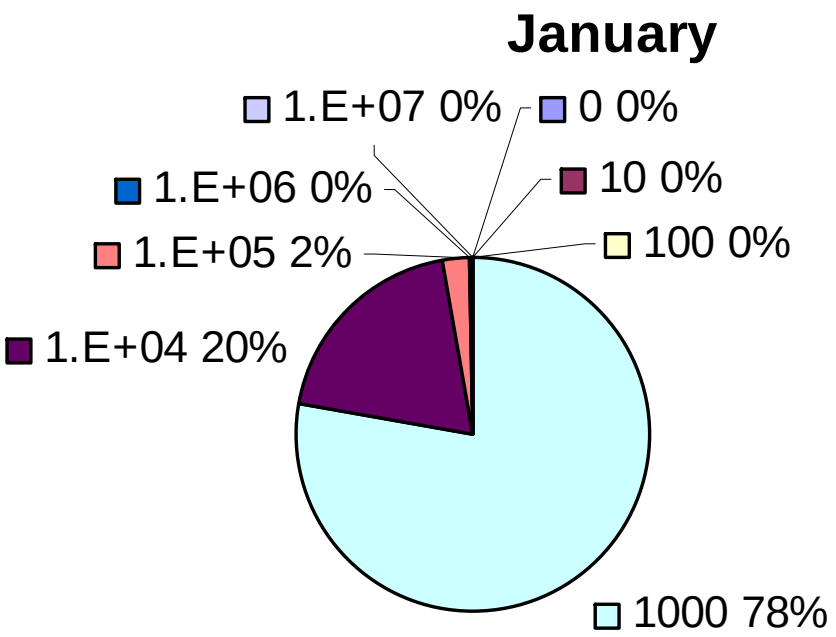


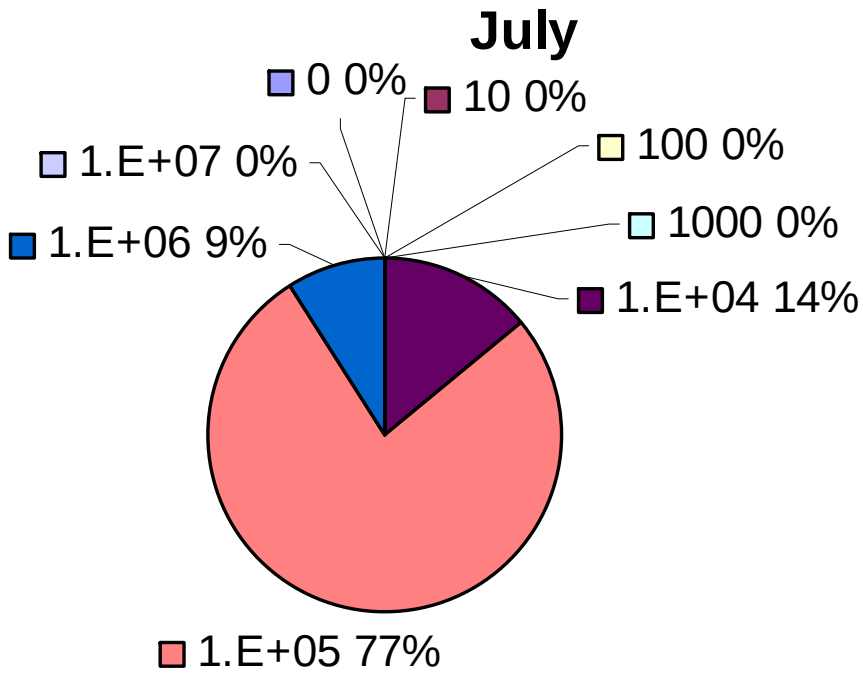


Forrestdale Main Drain

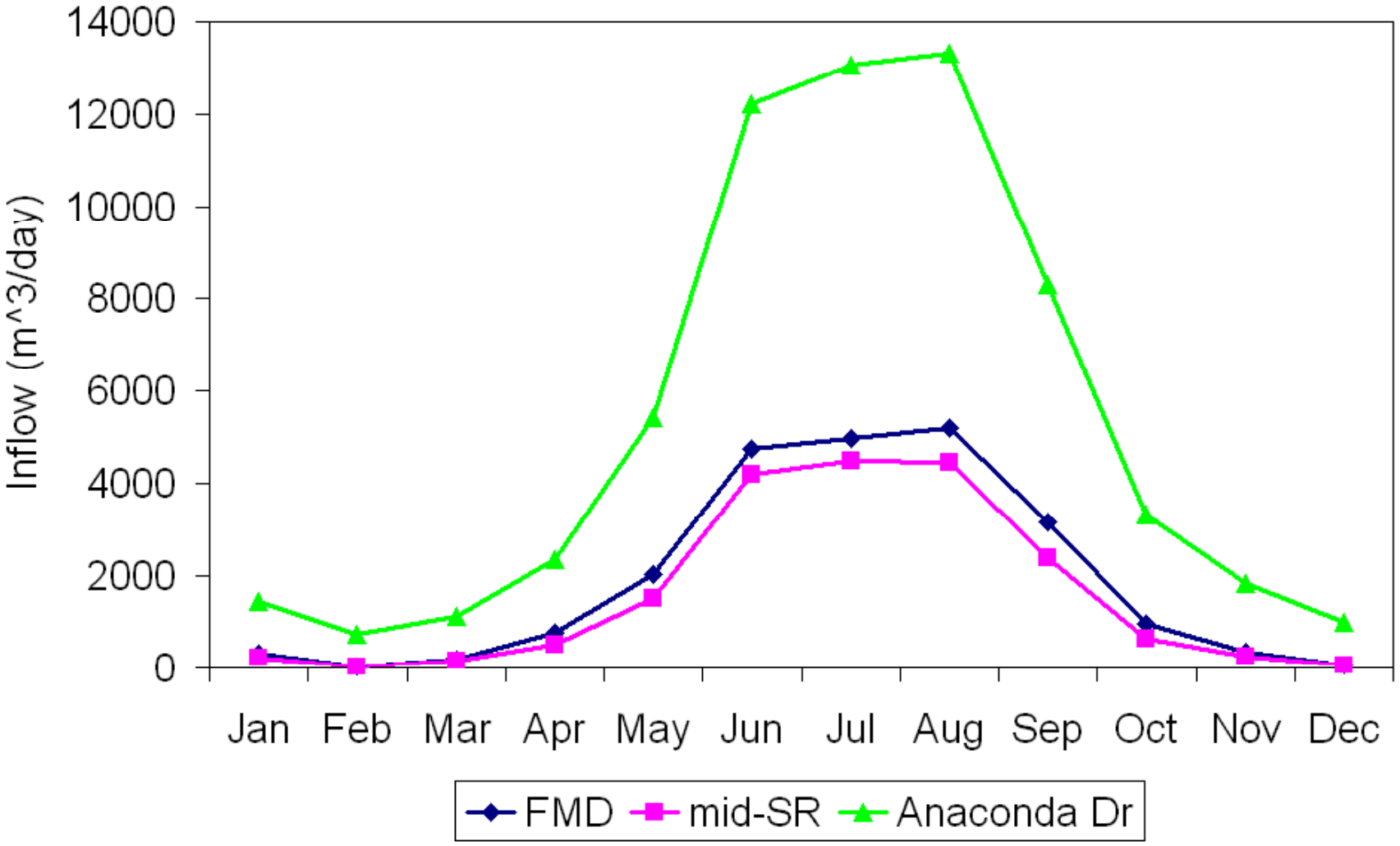


Anaconda Drive

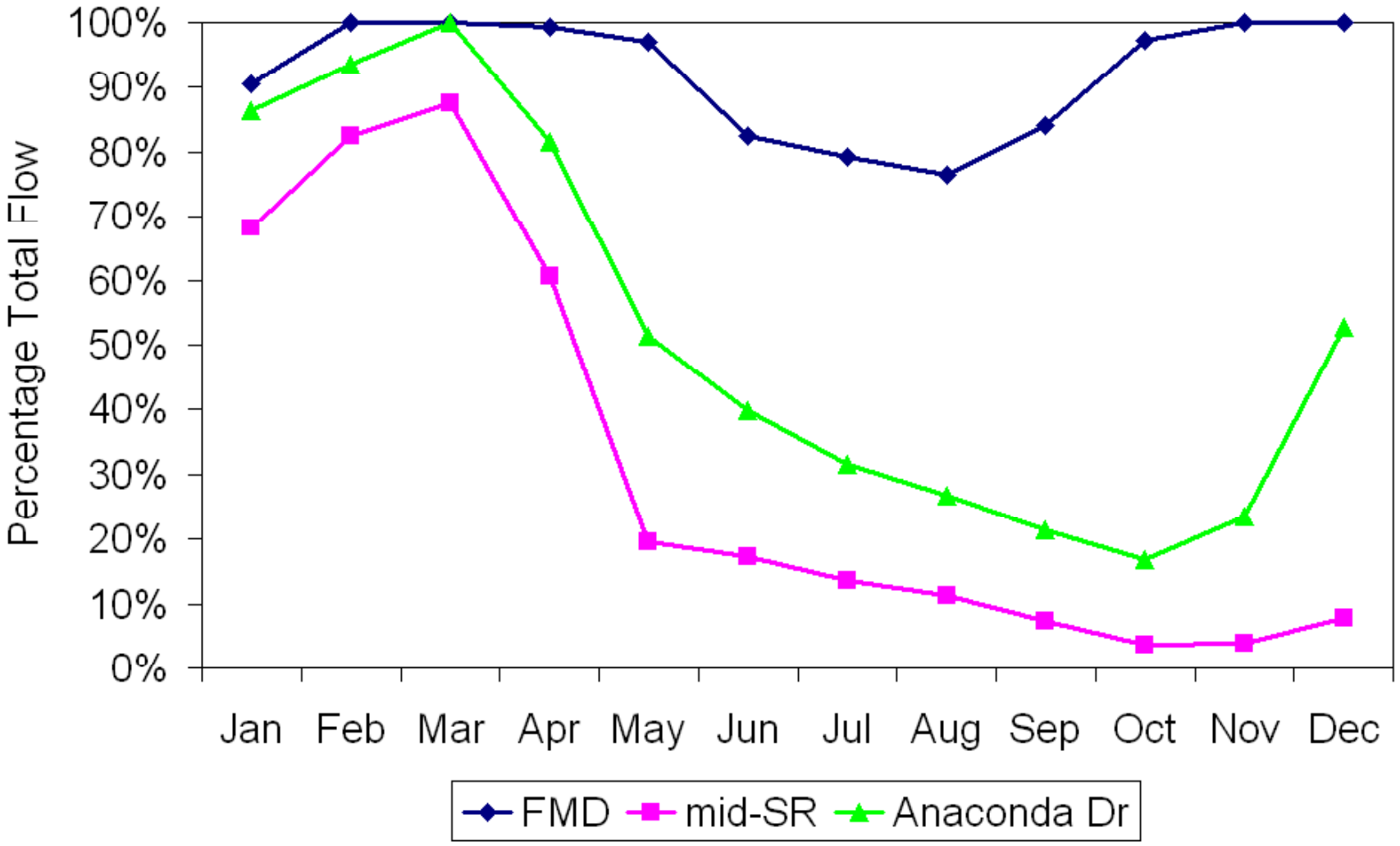




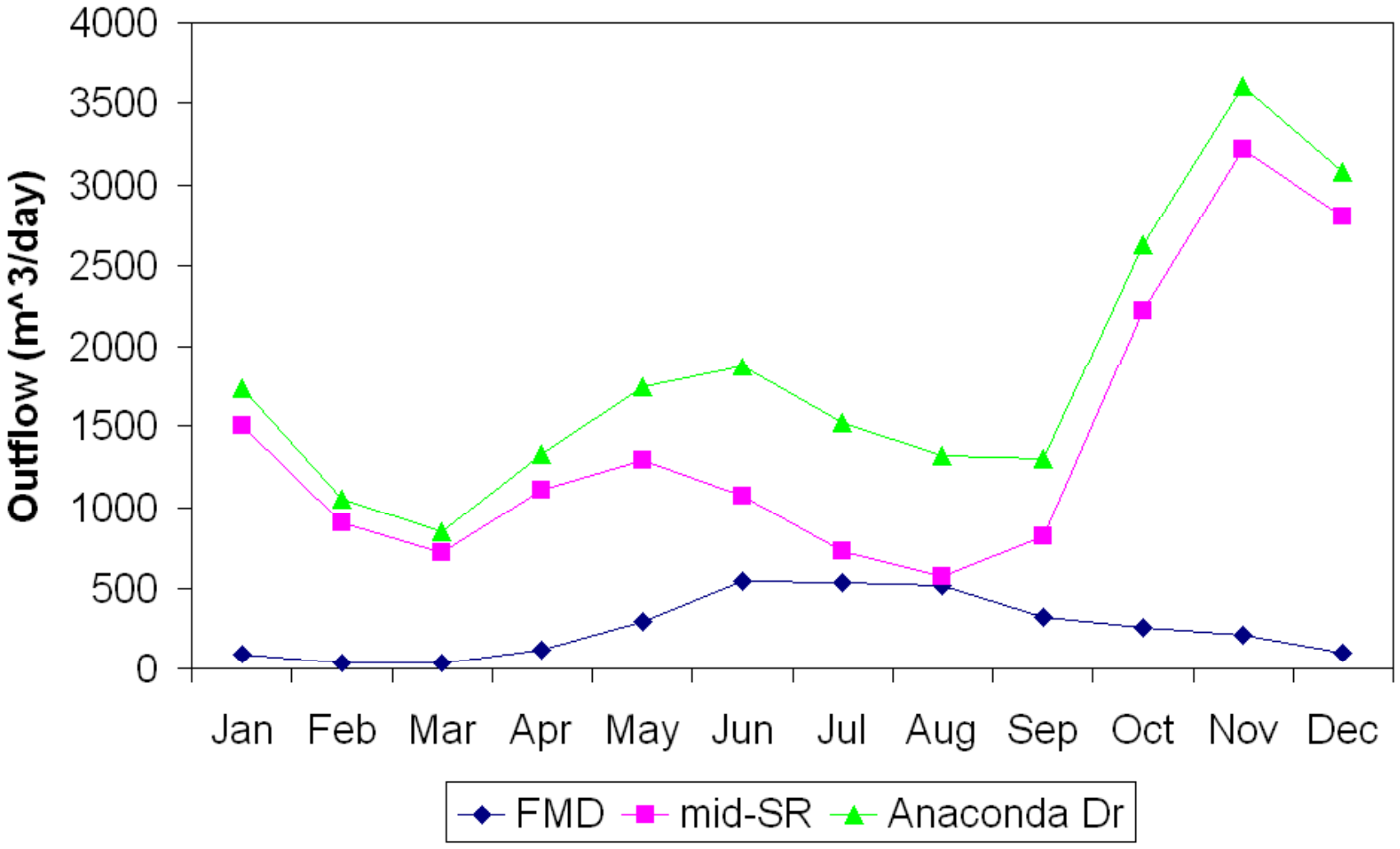
Cumulative groundwater discharge



Groundwater in channel flow



Cumulative channel leakage



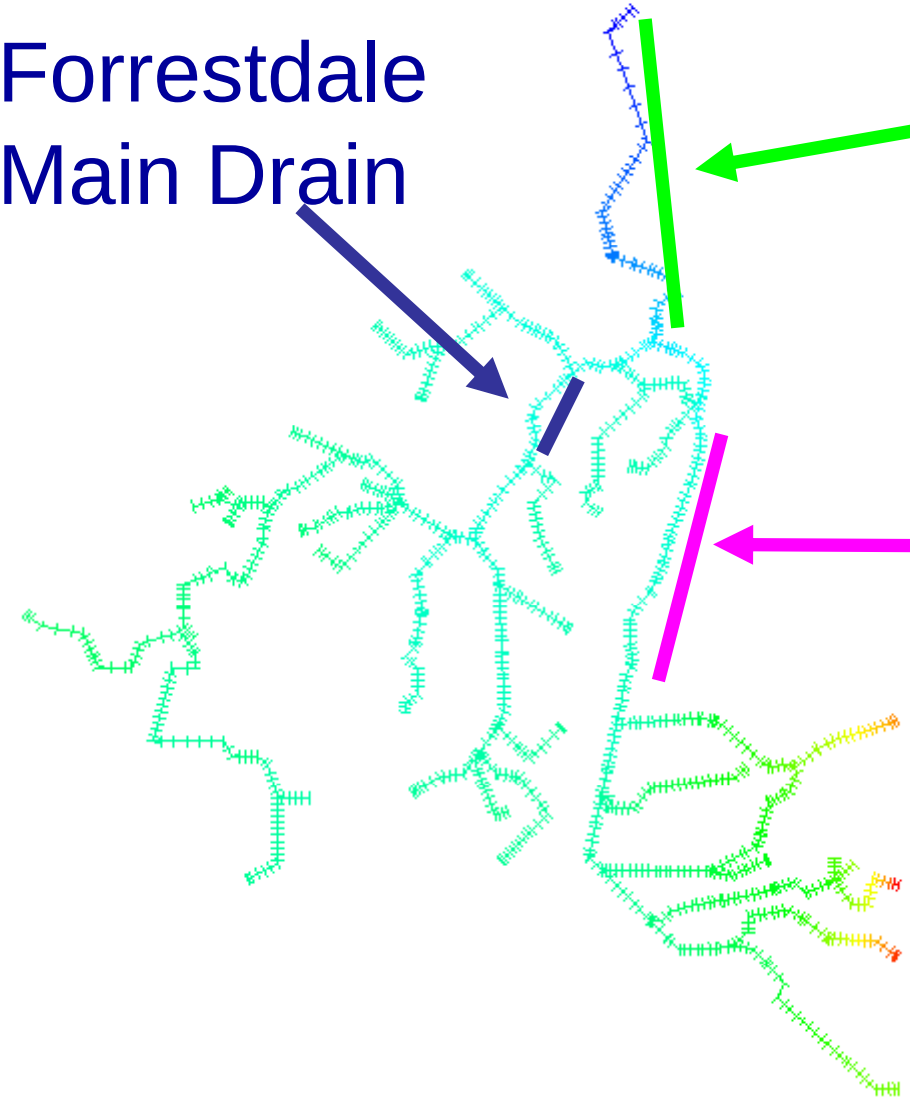
Groundwater

- Inflow:
  - 97% infiltration
  - 2% lateral flow
  - 1% channel leakage
- Outflow:
  - 92% evaporated/transpired
  - 5% discharges to channel system
  - 2% lateral flow
  - 1% abstracted

Groundwater 2

- Maximum groundwater discharge occurs during winter
- Channel leakage has a double maximum for runoff from hills/urban
  - Early wet season
  - Post wet season
- Average watertable variations greater than channel level changes

Channel reaches

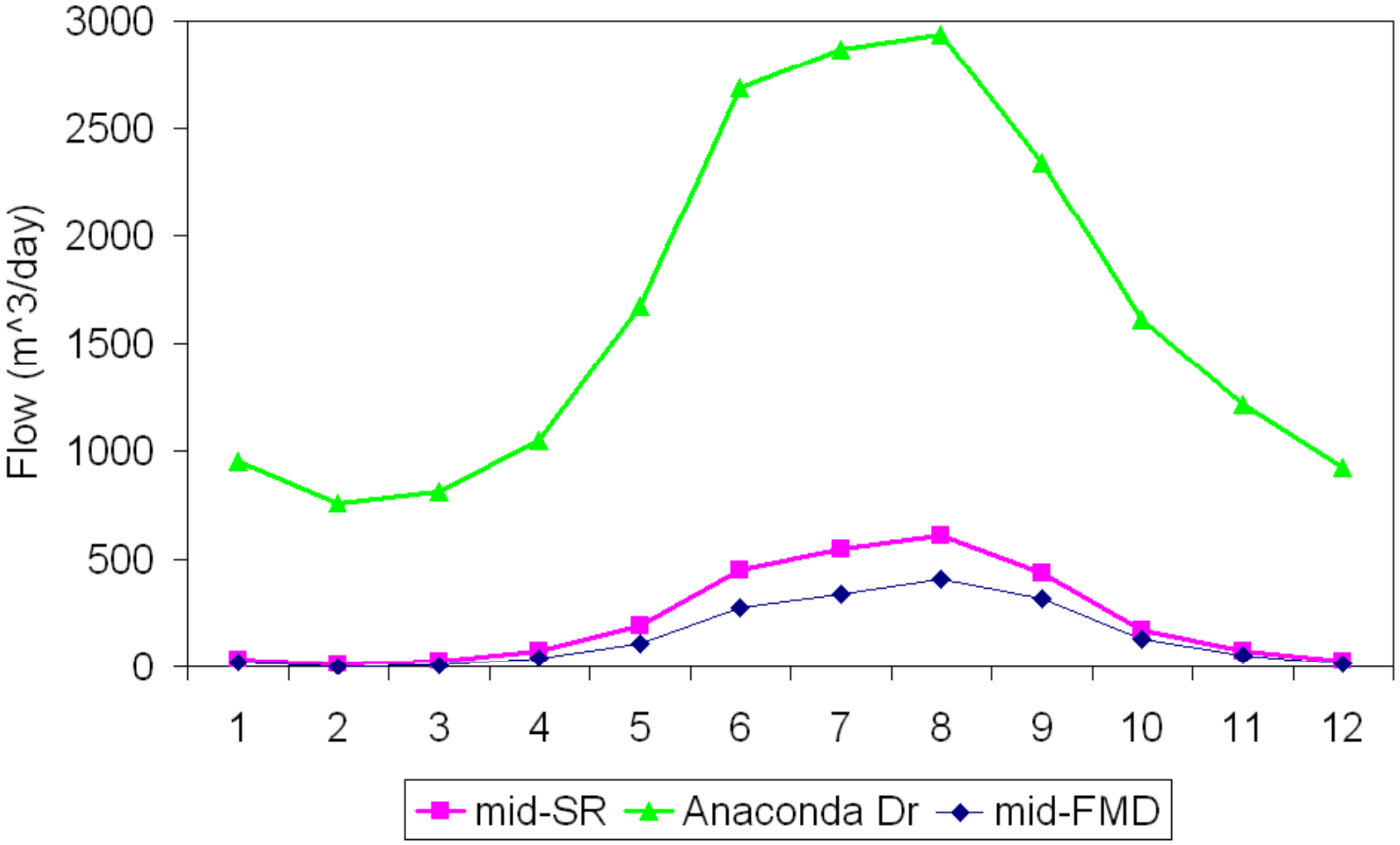


Forrestdale Main Drain

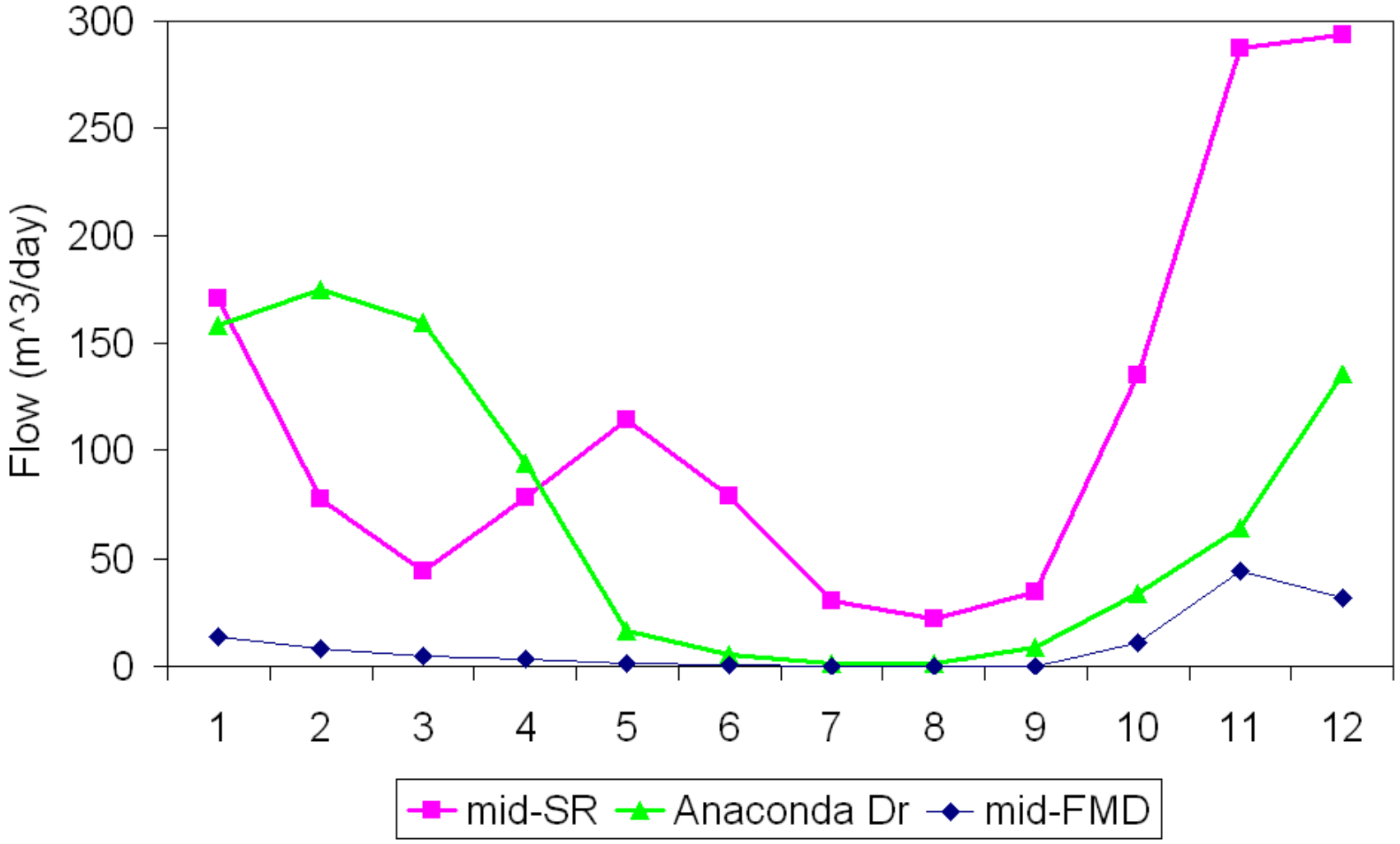
Anaconda Drive

Mid Southern River

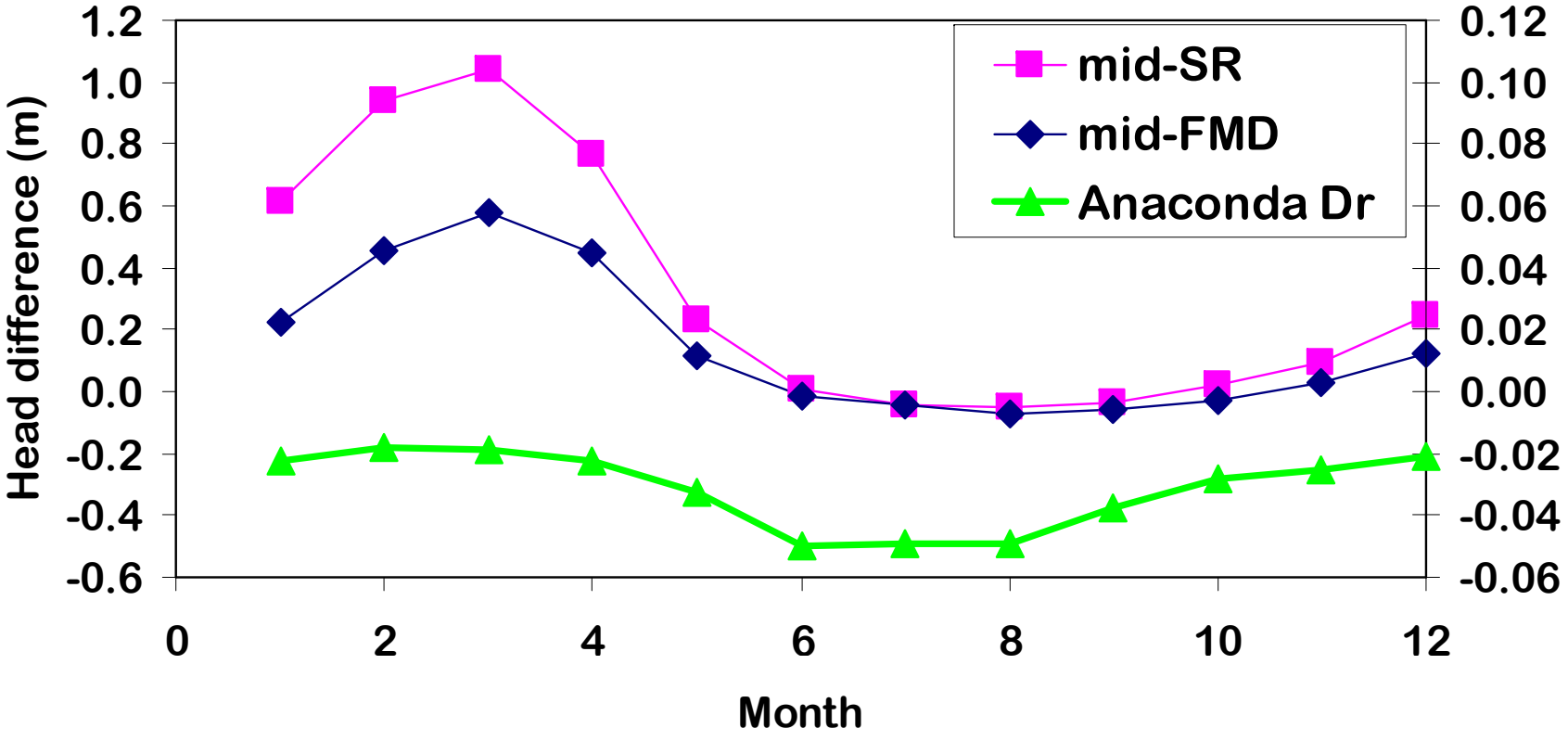
Groundwater discharge



Channel leakage



Channel level – Watertable



Conclusions

- Maximum groundwater discharge to channels during the wet winter months
- Leakage from channels show two different behaviours depending on source of water
  - Shallow depth channels with water from hills/urban areas leak to groundwater at the start and after wet season
  - Channels (drains) arising in the sand on the coastal plain or deep channels

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Thank you

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Southern River catchment

- Tributaries from hills and coastal plain
- Forrestdale Lake (RAMSAR listed)
  - Terminal lake
- Land use
  - Urban, agricultural, wetlands
  - Urban development occurring
- Surface geology and lithology
- Climate