Worth of data in hydrological modelling

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environment SOUTHLAND
REGIONAL COUNCIL
Te Taiao Tonga

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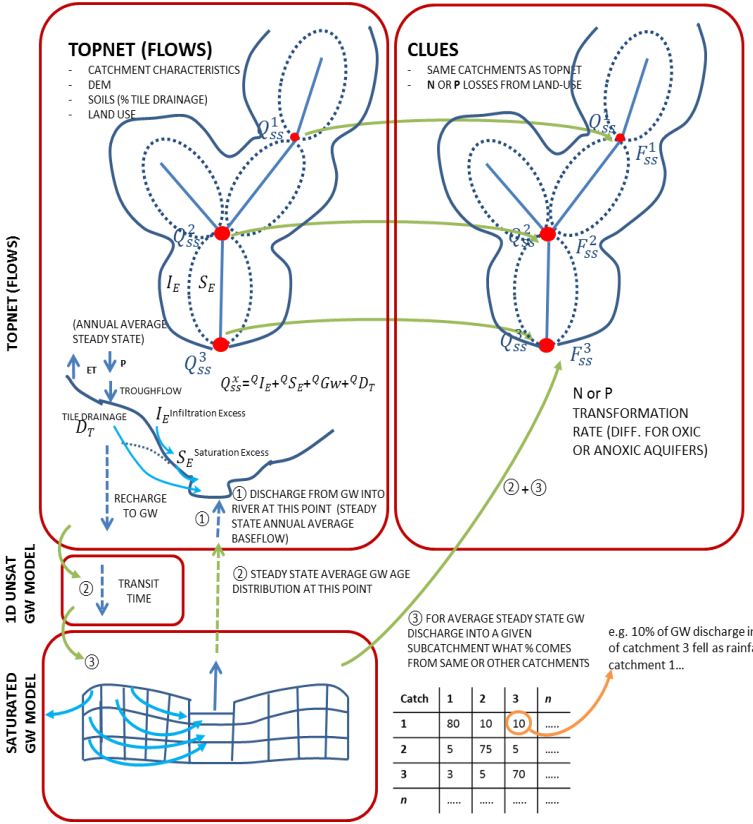
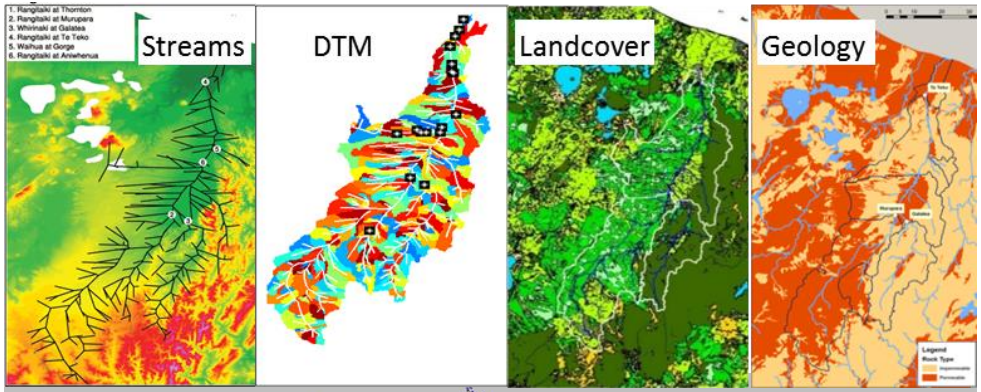
ES field staff

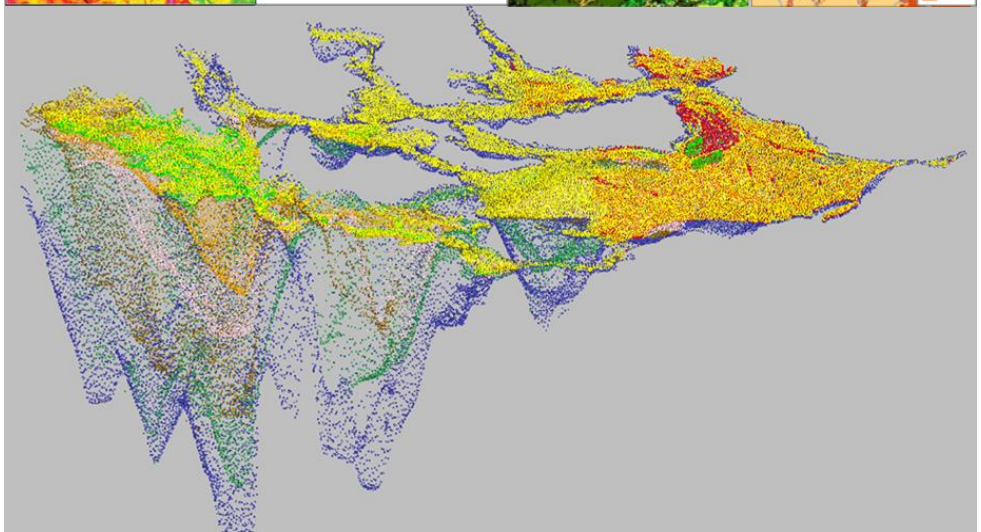
Objectives

- Answer questions of future land use and hydrology
- Look at the departure from one environmental state to another
- Regional characterisation - synthesising data and knowledge into predictive models
- Asses the effect of climate and land use on catchment hydrology and cumulative effects

What we did


TOPNET (FLOWS)
- CATCHMENT CHARACTERISTICS
- DEM
- SOILS (% TILE DRAINAGE)
- LAND USE
CLUES
- SAME CATCHMENTS AS TOPNET
- N OR P LOSSES FROM LAND-USE
TOPNET (FLOWS)
(ANNUAL AVERAGE STEADY STATE)
ET
P
TROUGHFLOW
TILE DRAINAGE
Infiltration Excess
Saturation Excess
RECHARGE TO GW
① DISCHARGE FROM GW INTO RIVER AT THIS POINT (STEADY STATE ANNUAL AVERAGE BASEFLOW)
② STEADY STATE AVERAGE GW AGE DISTRIBUTION AT THIS POINT
② + ③
N or P TRANSFORMATION RATE (DIFF. FOR OXIC OR ANOXIC AQUIFERS)
1D UNSAT GW MODEL
② TRANSIT TIME
SATURATED GW MODEL
③
③ FOR AVERAGE STEADY STATE GW DISCHARGE INTO A GIVEN SUBCATCHMENT WHAT % COMES FROM SAME OR OTHER CATCHMENTS
e.g. 10% of GW discharge into rivers of catchment 3 fell as rainfall in catchment 1...
Catch | 1 | 2 | 3 | n
1 | 80 | 10 | 10 | .....
2 | 5 | 75 | 5 | .....
3 | 3 | 5 | 70 | .....
n | ..... | ..... | ..... | .....

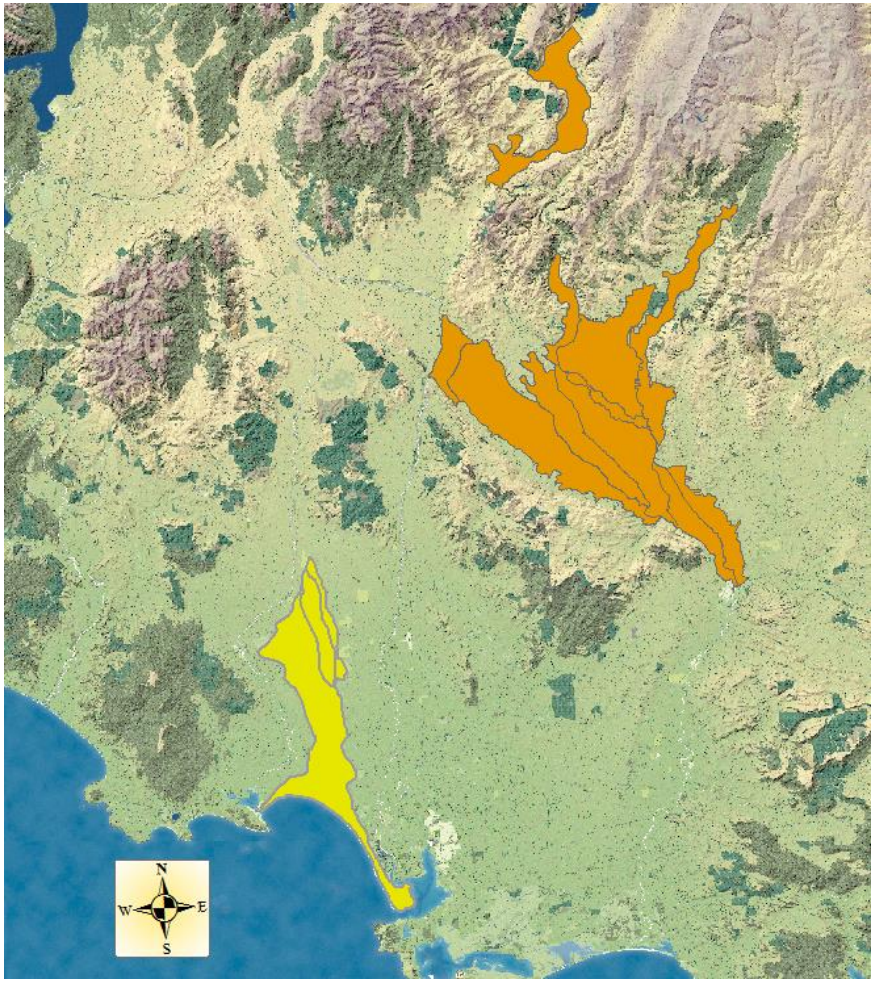

Streams
DTM
Landcover
Geology



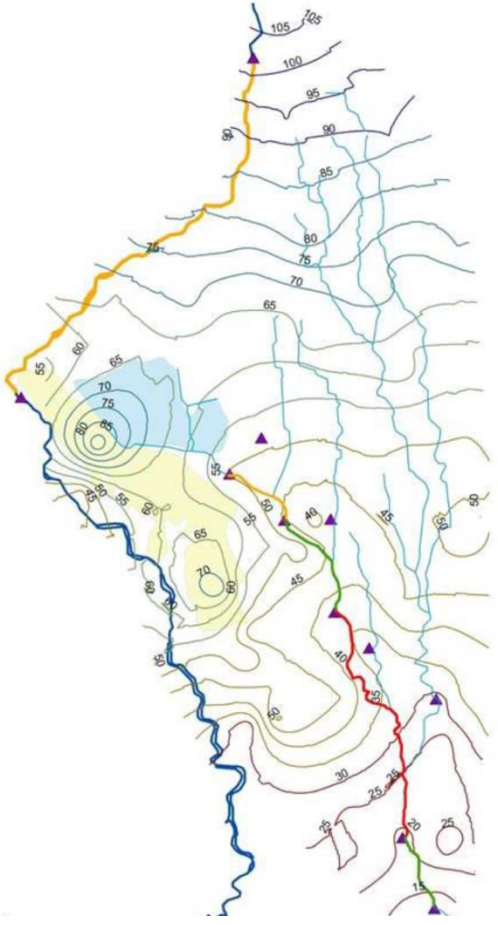
Where we did it

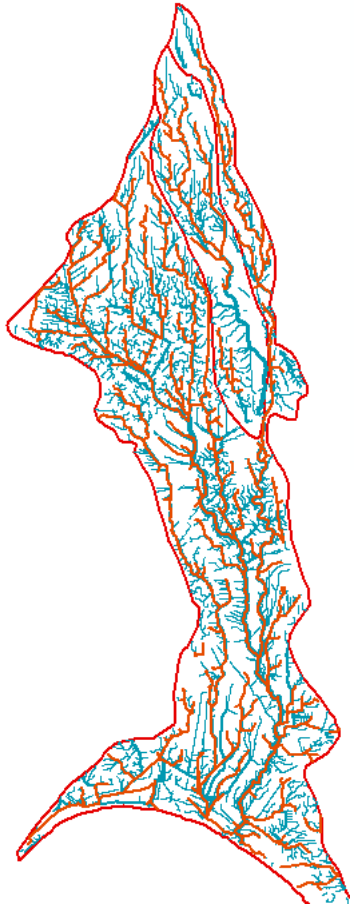
- **Waimea** Smart Aquifer Management
  - GNS data worth investigation

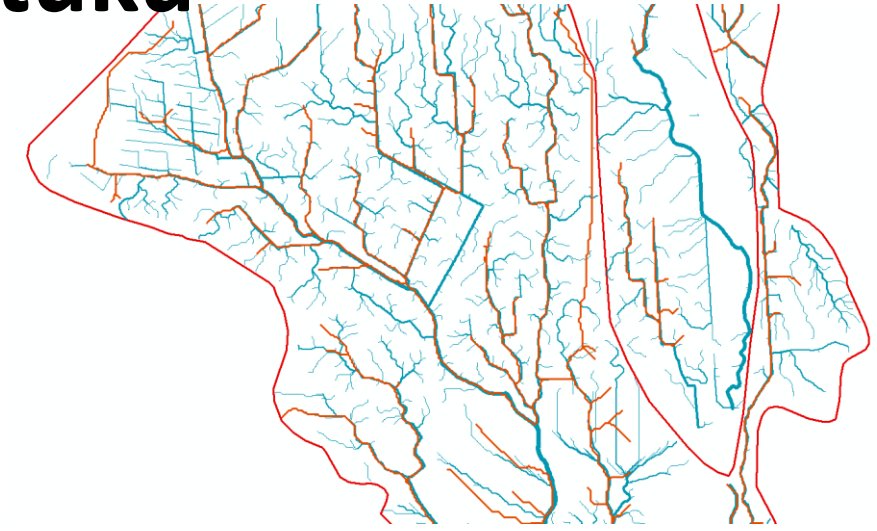
- **Waimatuku** Fluxes and Flows
  - NIWA catchment modelling



Waimatuku







- 14 (FSL) < 24 Topoclimate) soil series
- Increased terrain resolution (8m DEM)
- More accurate stream representation
  - REC3 stream reaches; 3711
  - REC1 stream reaches; 395

Waimatuku

Aim

Impact of tile drainage on hydrology

Outputs

Calibration on winter (water take)

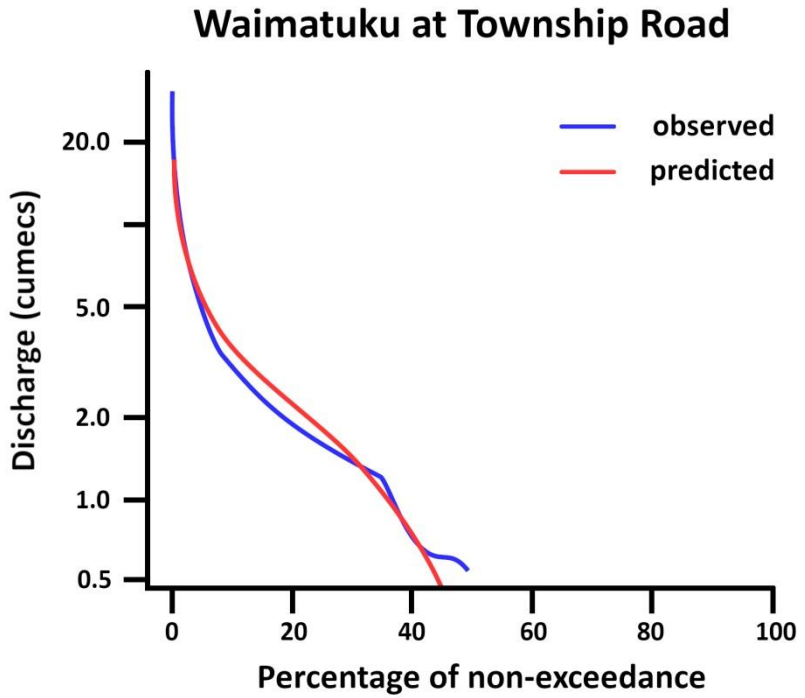
Validation across hydrological characteristics

Validation at spot gauging

Lesson

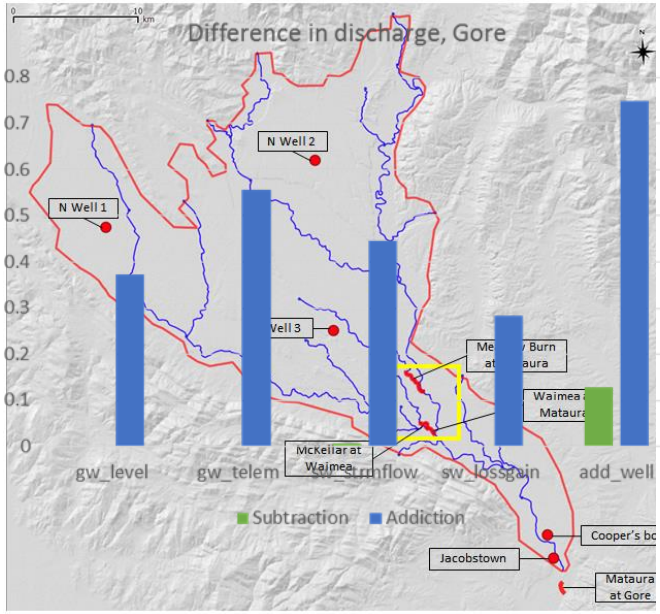
Discontinuity in FDC

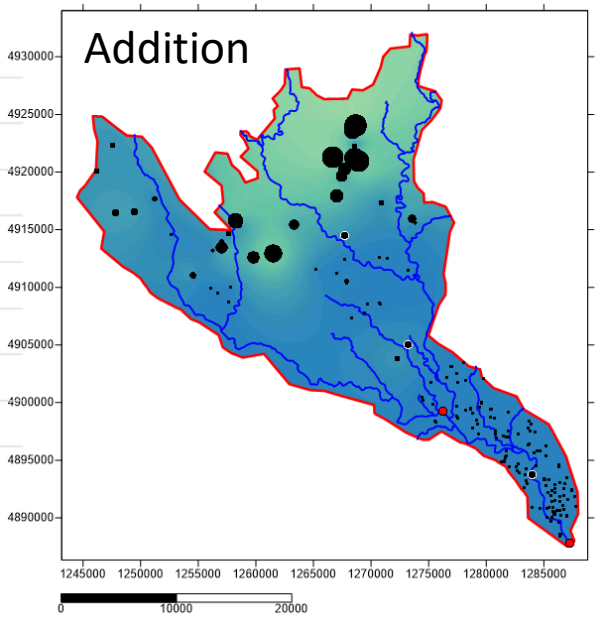
Tile drainage impact?

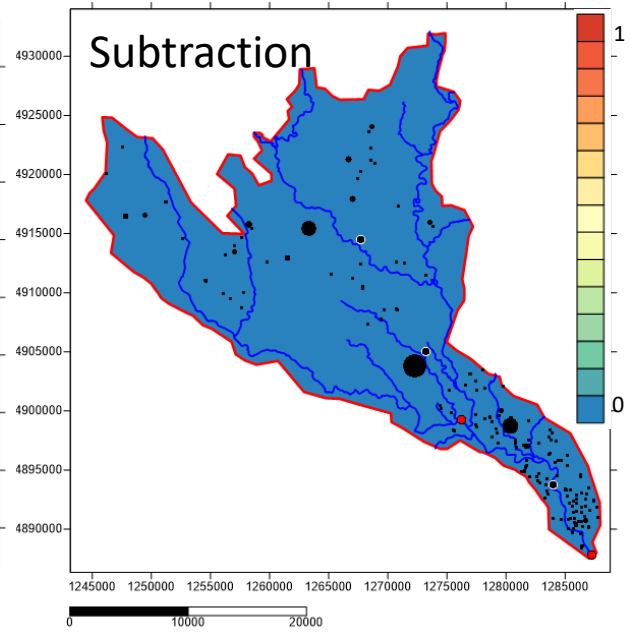


Mid Mataura

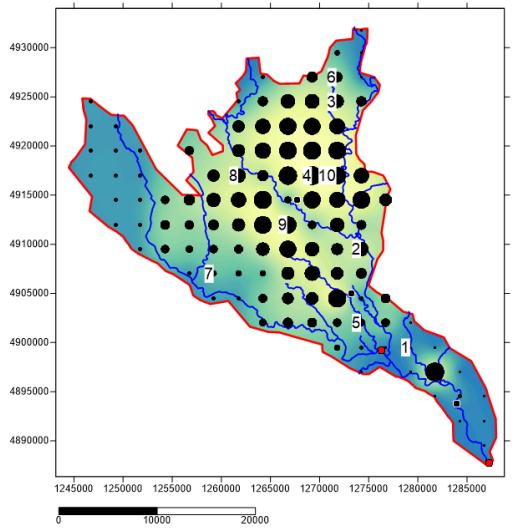
Results: Spatial Data Worth plots groundwater level – difference in discharge



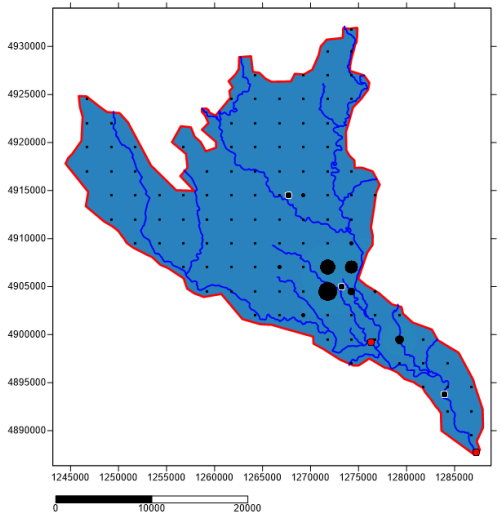




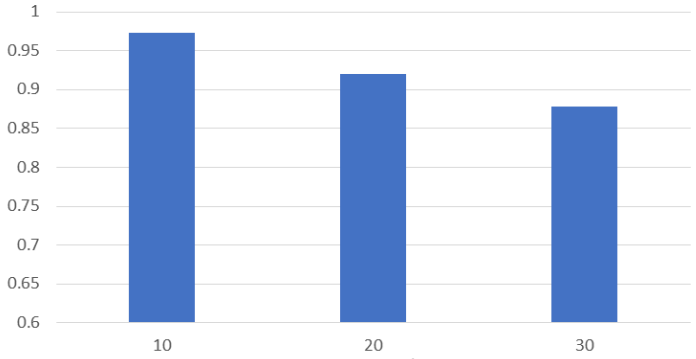
Results : Spatial Data Worth plots additional telemetry data – difference in discharge



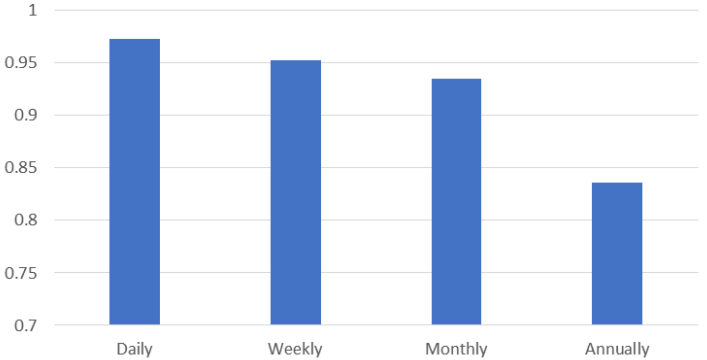
Difference in discharge, Gore



Difference in discharge, Gore

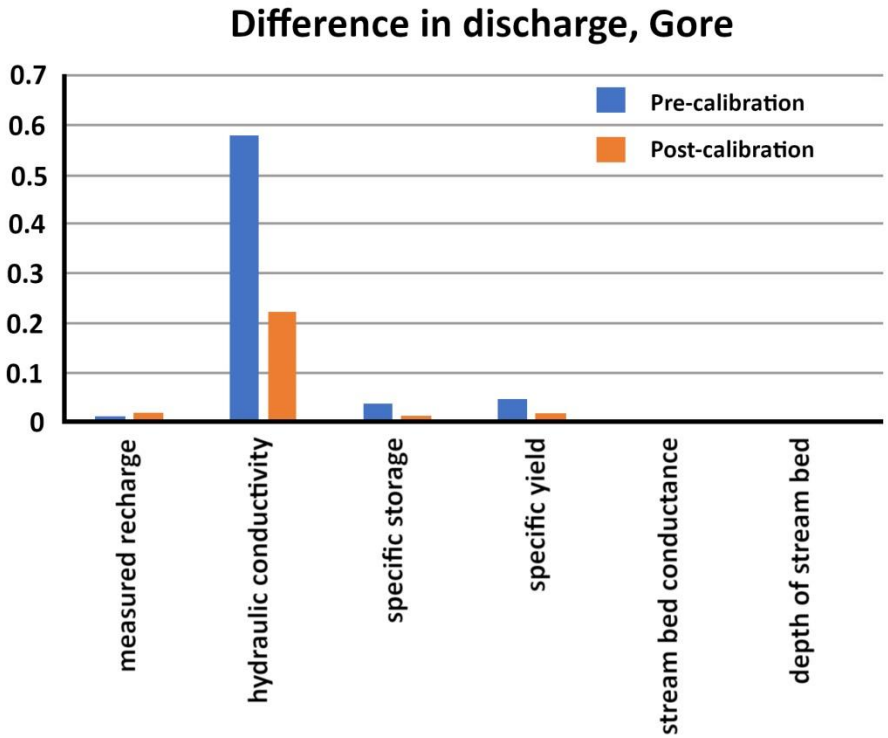


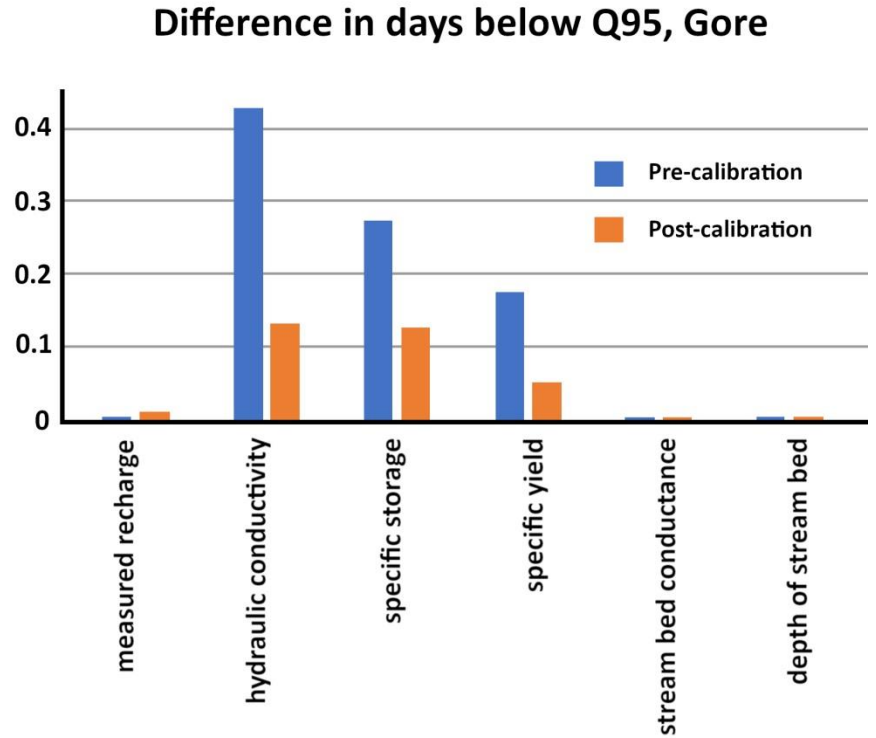
Spatial



Temporal

Results: pre- and post- calibration parameter contribution to predictive uncertainty





Conclusions

- Focus council activities where it matters
- Present the likelihood of a particular environmental outcome with more reliability
- Assess fit for purpose model use
- Assess appropriate level of effort required to inform community decision making in order to meet the challenges of limit setting