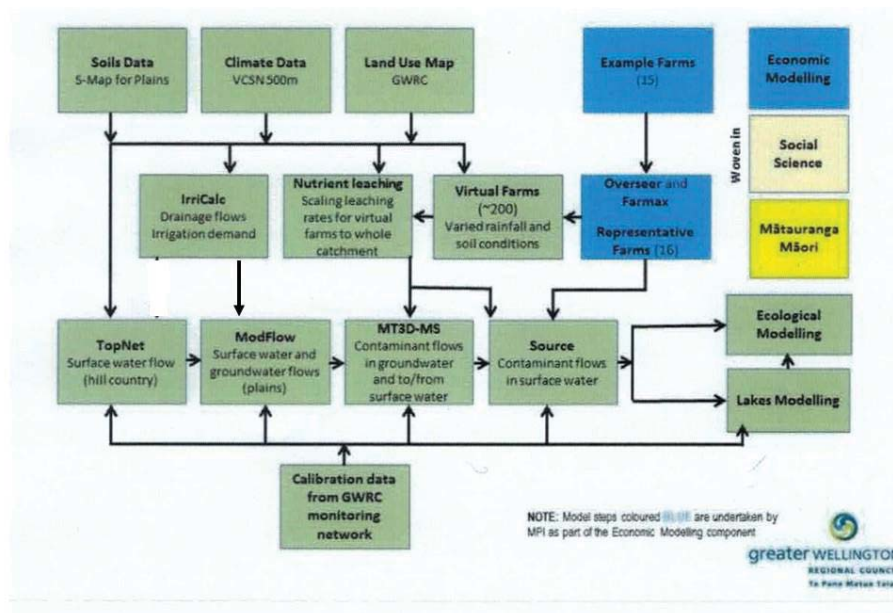


Ruamahanga Collaborative Modelling Project Status Summary

The modelling system

Modelling water flow and contaminant movement from the point they originate, down through the catchment to where they discharge to the sea.

We use a chain of models to achieve this.



Calibrating the Status Quo scenario

Calibrating the modelling system is an iterative process

Each model is setup, is driven by historical climate, land-use etc. data, and the predicted flows, levels and concentrations are compared to the measurements available.

There is always a mismatch somewhere.

The mismatches are analysed to identify any systemic problems with particular models, or the modelling system as a whole.

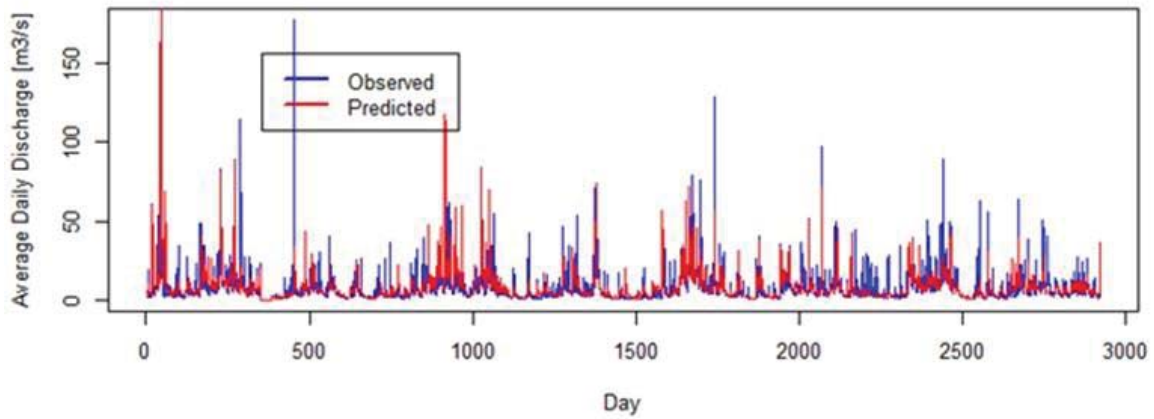
If there is, the models are adjusted and we have another go at modelling the status quo.

This is the process we are in. Completed the first iteration and part way through the second.

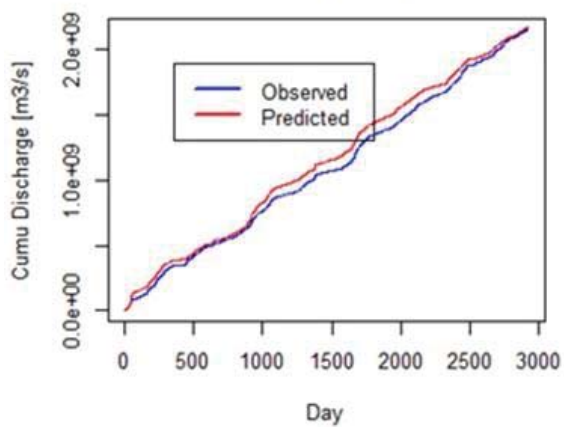
Modelling flow out of the hill country into the Valley (Topnet modelling)

Many of the sub-catchments have calibrated to status quo acceptably well, such as the Tauherenikau shown below.

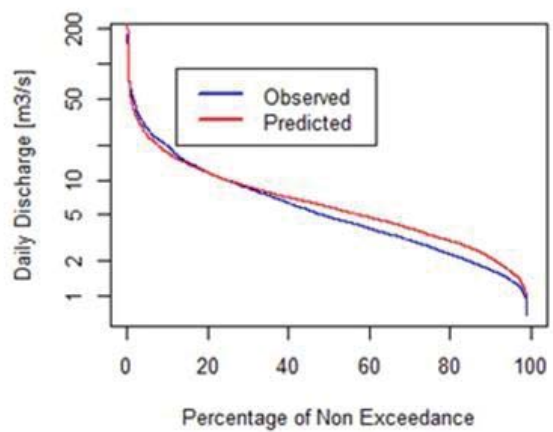
Daily Hydrograph Tauherenikau_2004_2014 RCHID= 9259046 Tideda id 29251 (114.208 km2)



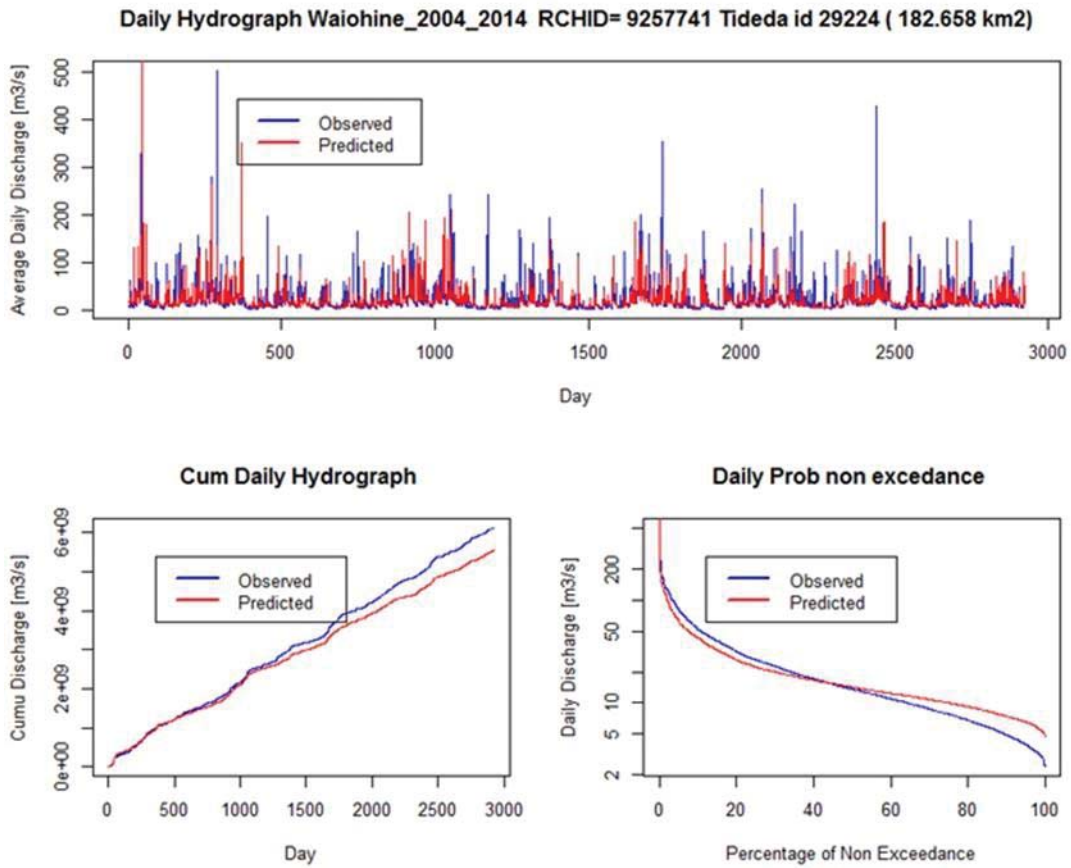
Cum Daily Hydrograph



Daily Prob non exceedance

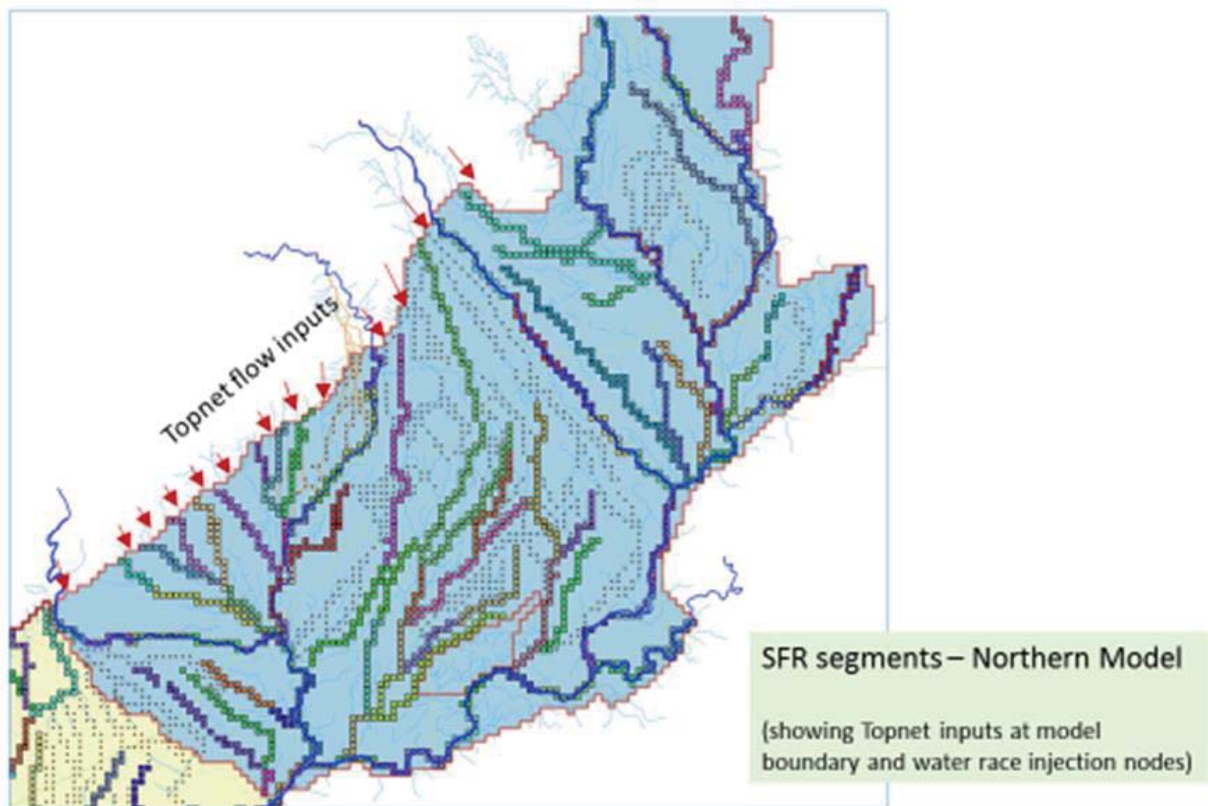


But for some of the sub-catchments draining the Tararua's the modelled flow is too low, as can be seen in the following figure for the Waiohine at Gorge. The modelled cumulative daily hydrograph (red line) is steadily diverging from the observed cumulative daily hydrograph (blue line).



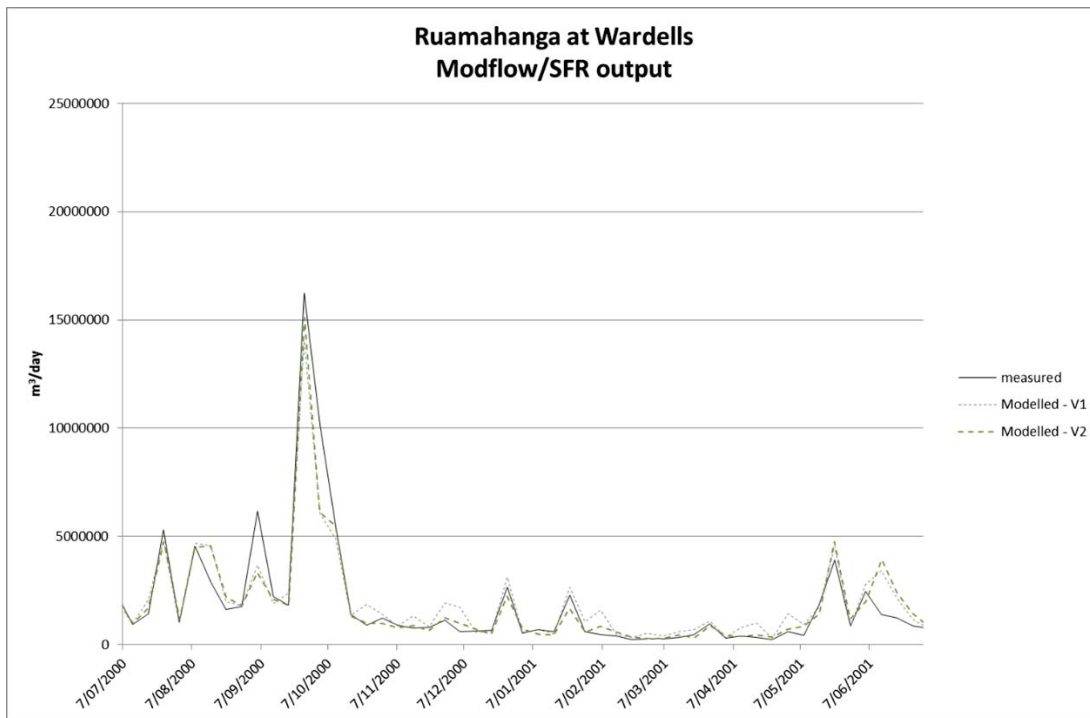
Flow across and under the plains (Modflow/SRF modelling).

The Topnet modelled rivers flows out of the hill country are 'fed into' the ModFlow/SFR model around the boundary of the later model. This is illustrated in the figure below.

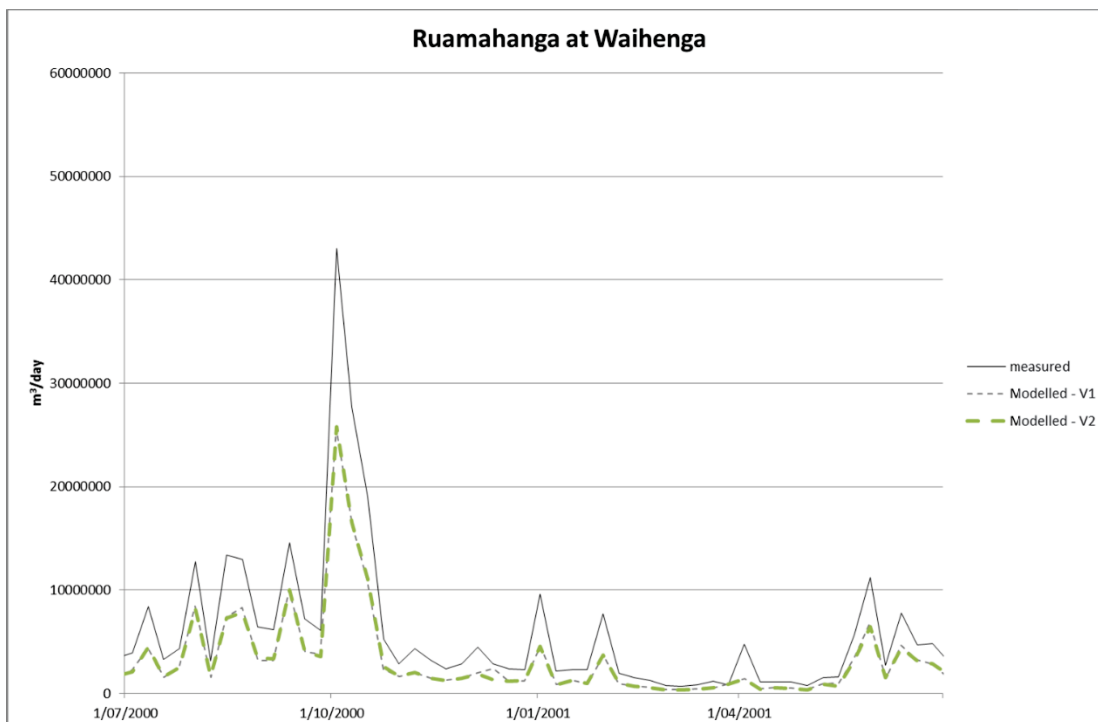


This model simulates the flow of water in the groundwater system, in the surface water system as it flows through the Valley, and the exchange of water between groundwater and surface water systems. Drainage from the soils across the Valley are the other key hydrological input to the Modflow/SFR model, in addition to the river and stream flows at the model boundary.

The river flows modelled using Modflow/SFR match the observations acceptably well for the Ruamahanga at Wardell's, as shown in the following figure.



But the cumulative effects of modelled flow being lower than measured flow from parts of the Tararua's show up with the modelled flow in the Ruamahanga at Waihenga being consistently lower than measured.



Some of the rainfall data estimated to have fallen on the western hills is now understood to be too low and thus the modelled flow is too low. The rainfall data will be adjusted to fix this.

Contaminant concentration modelling

Nitrate

Nitrate concentration modelling is still a work in progress – changes in the Overseer outputs have not yet worked their way through the chain of models.

e-Coli

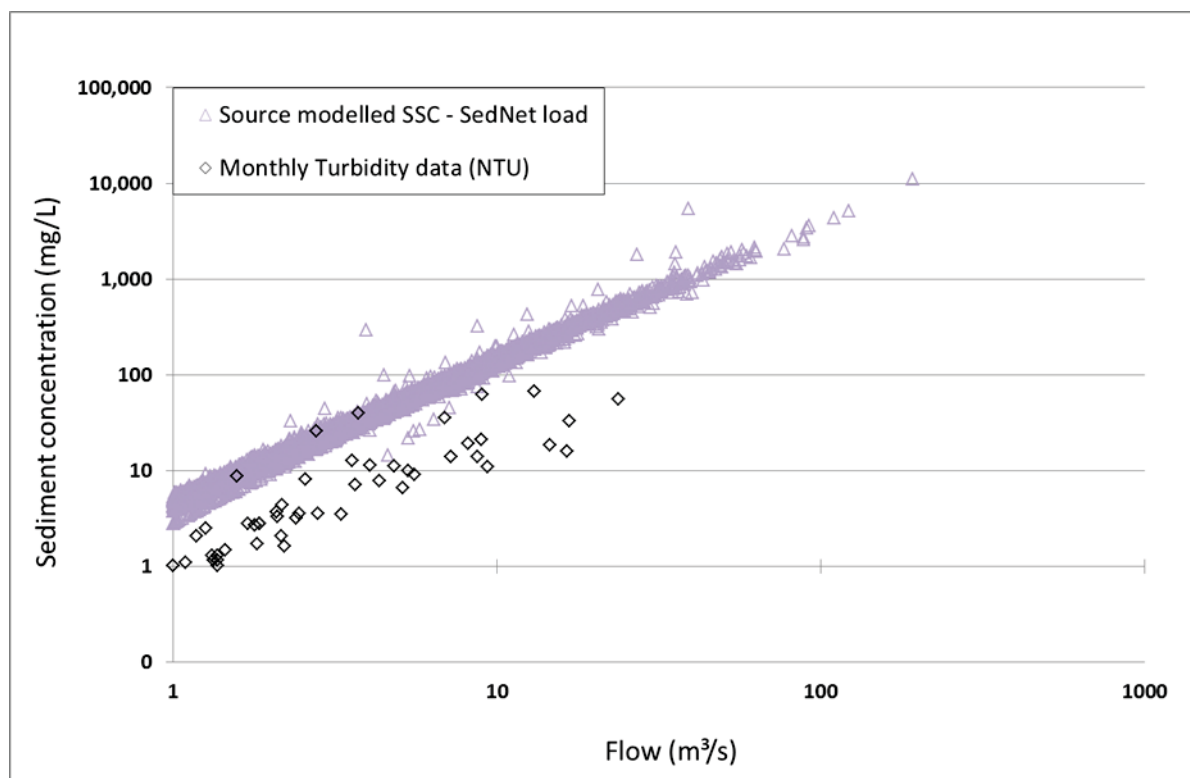
There is no observable relationship between measured concentrations and:

- Flowrate
- Time of year

There is a relationship between measured concentrations and land-use. This relationship is built into NIWA's CLUES software. This package will be used in the scenario analyses.

Sediment

The sediment concentration model in eWater Source has been calibrated to the limited data that is available. At this stage the modelled concentrations tend to be higher than those measured, as shown in the following figure.



Summary of overall position

There will always be a degree of mismatch between modelled and measured values. When to stop the refinement is a matter of judgement.

Further refinement is needed for:

- Some of the river flow modelling
- Sediment concentration modelling

John Bright

10 May 2016