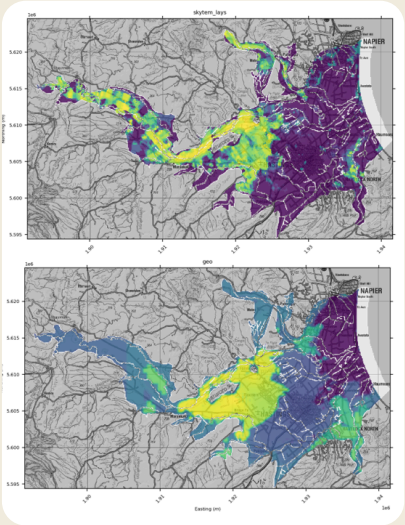
Factsheet 10

Te Whakaheke o Te Wai

Numerical Groundwater Modelling

Incorporation of groundwater age data (Factsheet 6) and airborne electromagnetic data from SkyTEM (Factsheet 1) in numerical models is novel. These methods were explored in numerical groundwater model construction, primariliy using the Heretaunga Plains, Wairau Plains, and Bridge Pa Groundwater Models (see Factsheet 3). The overall aim was to develop data processing methods within the numerical workflow, to reduce predictive uncertainty. Methods were generally probabilistic.



Newly acquired data was used to make improved predictions on the basis of updated or defined model parameters for:

- hydraulic conductivity (horizontal, vertical, streambed)
- drain conductance (see Figure) and porosity
- general head boundary (GHB) conductance and elevation
- model layering and depth to basement.

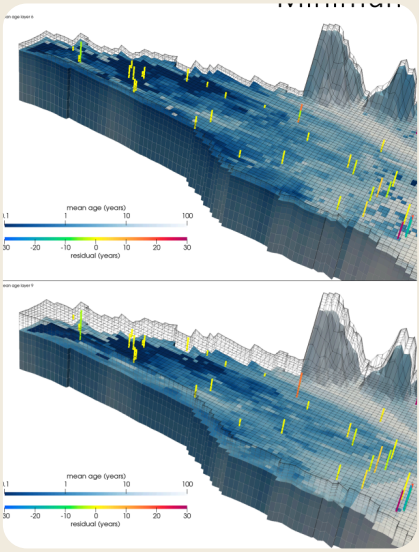
Numerical Groundwater Modelling

The new modelling workflows improve the transfer of information from data to decisions. This novel information was found to be particularly useful for questions as such as:

- How long before a contaminant may reach a well or stream?
- How much water is flowing into/out of the aquifer?
- In which areas is groundwater flowing into/out of the aquifer?
- How much water is discharging to the coast?
- How much water can be safely allocated from the aquifer before streams run dry?
- What variation in groundwater levels can we expect under changing abstraction rates and climate?
- What management scenarios are likely to be successful?

Key outcomes of the project are:

1. That uncertainty in predictions were reduced in history matching datasets:
   - in contaminant predictions where age data was incorporated (see Figure)
   - in most instances where SkyTEM and age data were combined
2. There are multiple ways to bring SkyTEM and age data into models, each with strengths and weaknesses.



Hemmings et al., 2024. Te Te Whakaheke o te Wai Heretaunga Plains regional groundwater model update: Age and flow predictions and uncertainty. SR 2024/44