

The Groundwater Data Analysis (GDA) tool – an application example

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Groundwater Data Analysis (GDA) tool

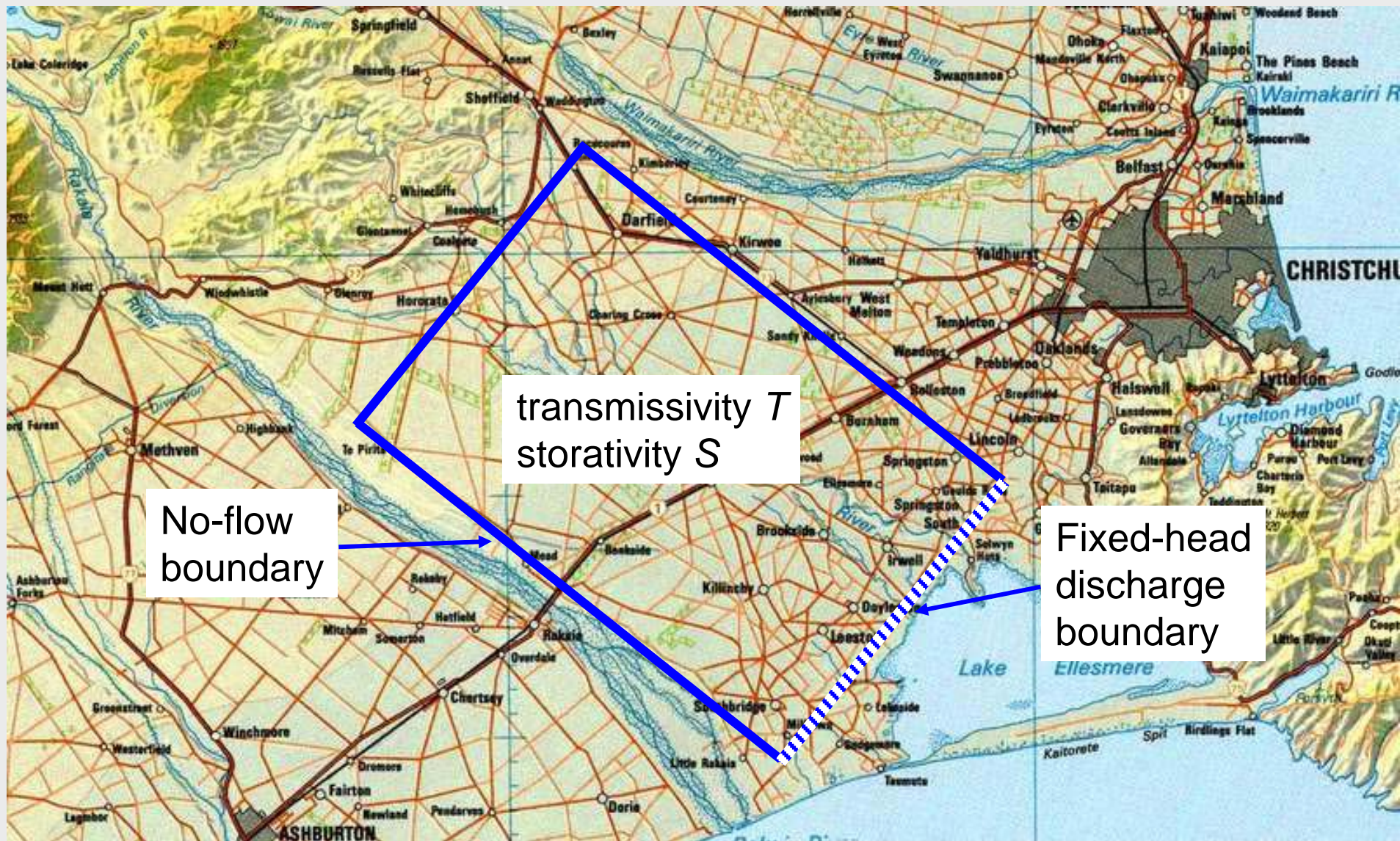
- Under development as an Envirolink project
- Based on the eigenmodel method for modelling dynamic behaviour of groundwater level and flow
- Includes Exponential-Weighted-Moving-Average (EWMA) smoothing
- Current prototype is spreadsheet-based
- Future development is a down-loadable version with friendly interface

Monitoring well L36/0092

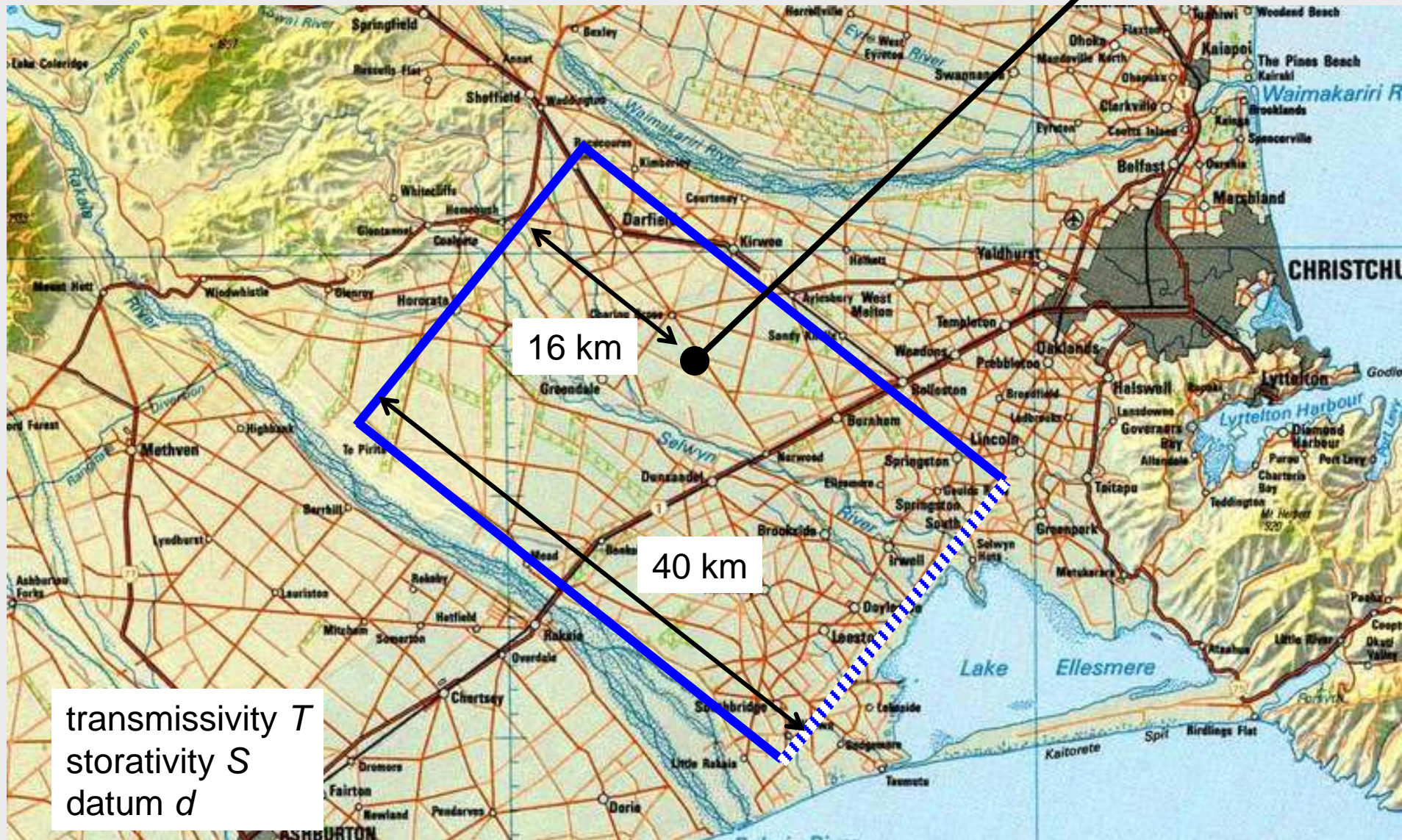
Selwyn River flow at Coes Ford



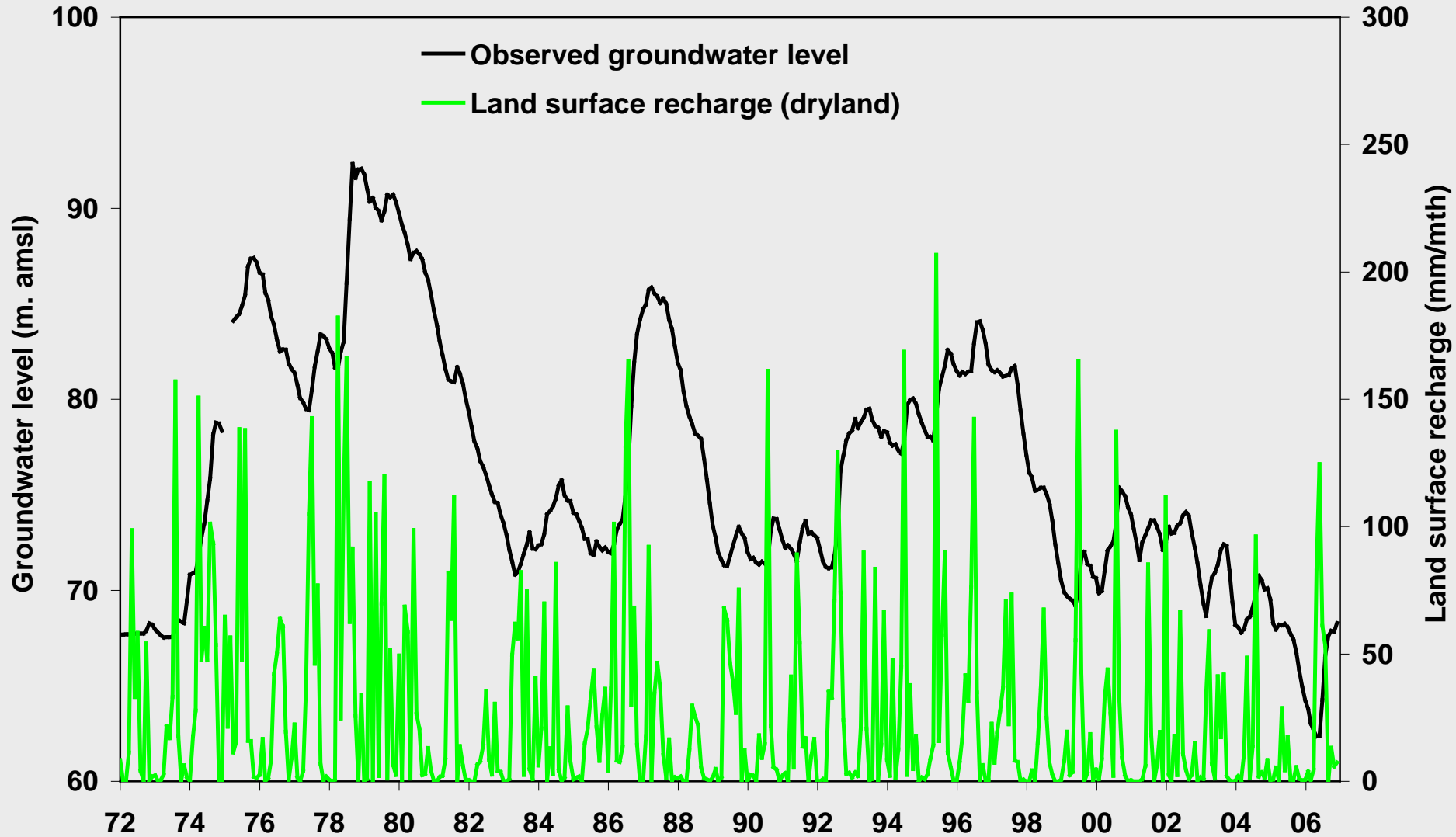
A simplified aquifer is modelled as the dynamic equivalent of a complex aquifer system, on a unit-area basis



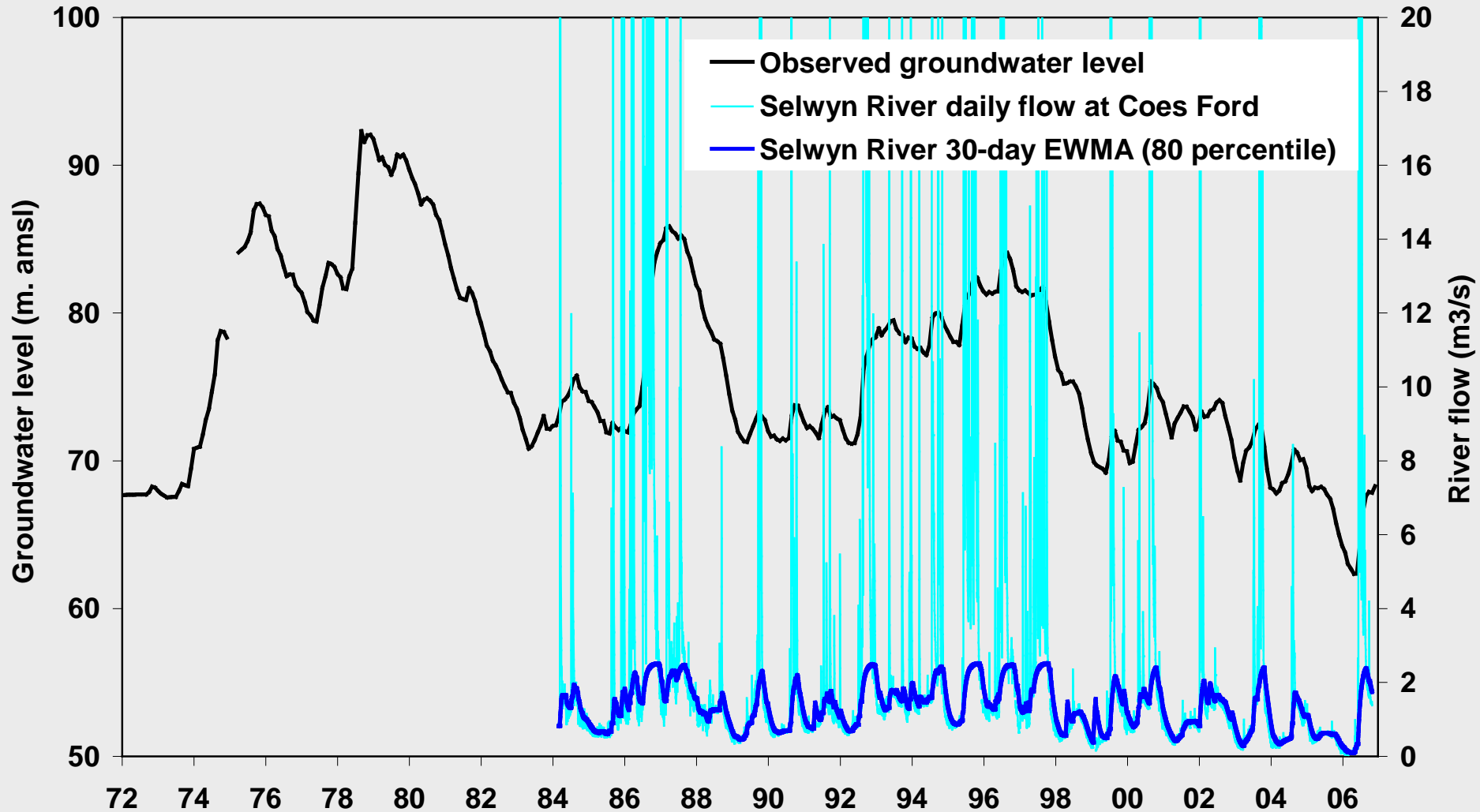
Calibrate 1D simple aquifer model to well L36/0092



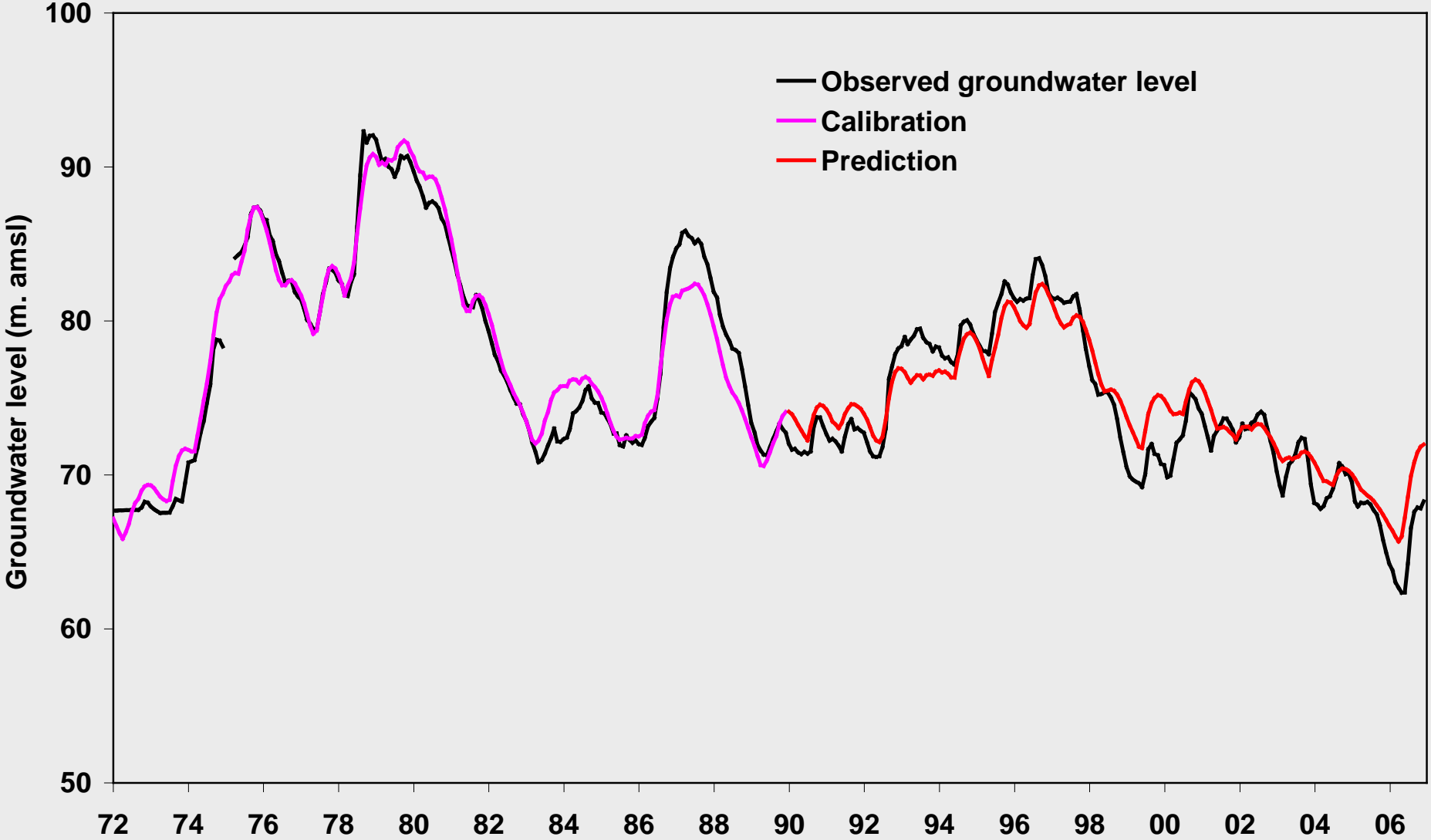
Data: monthly groundwater level, monthly totals of land surface recharge from a daily water balance model



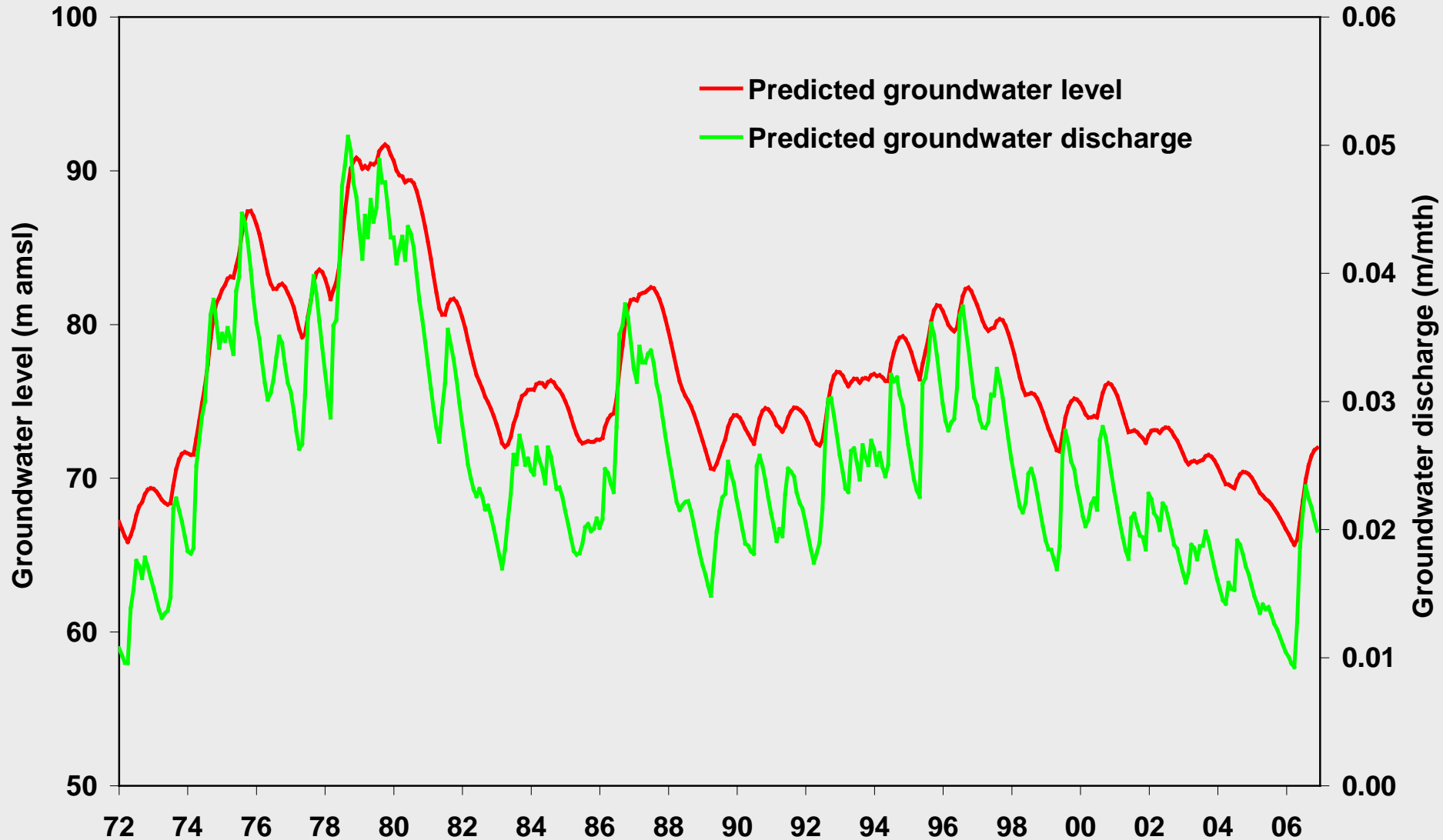
Daily river flow: values below 80 percentile smoothed with 30-day Exponential-Weighted-Moving-Average



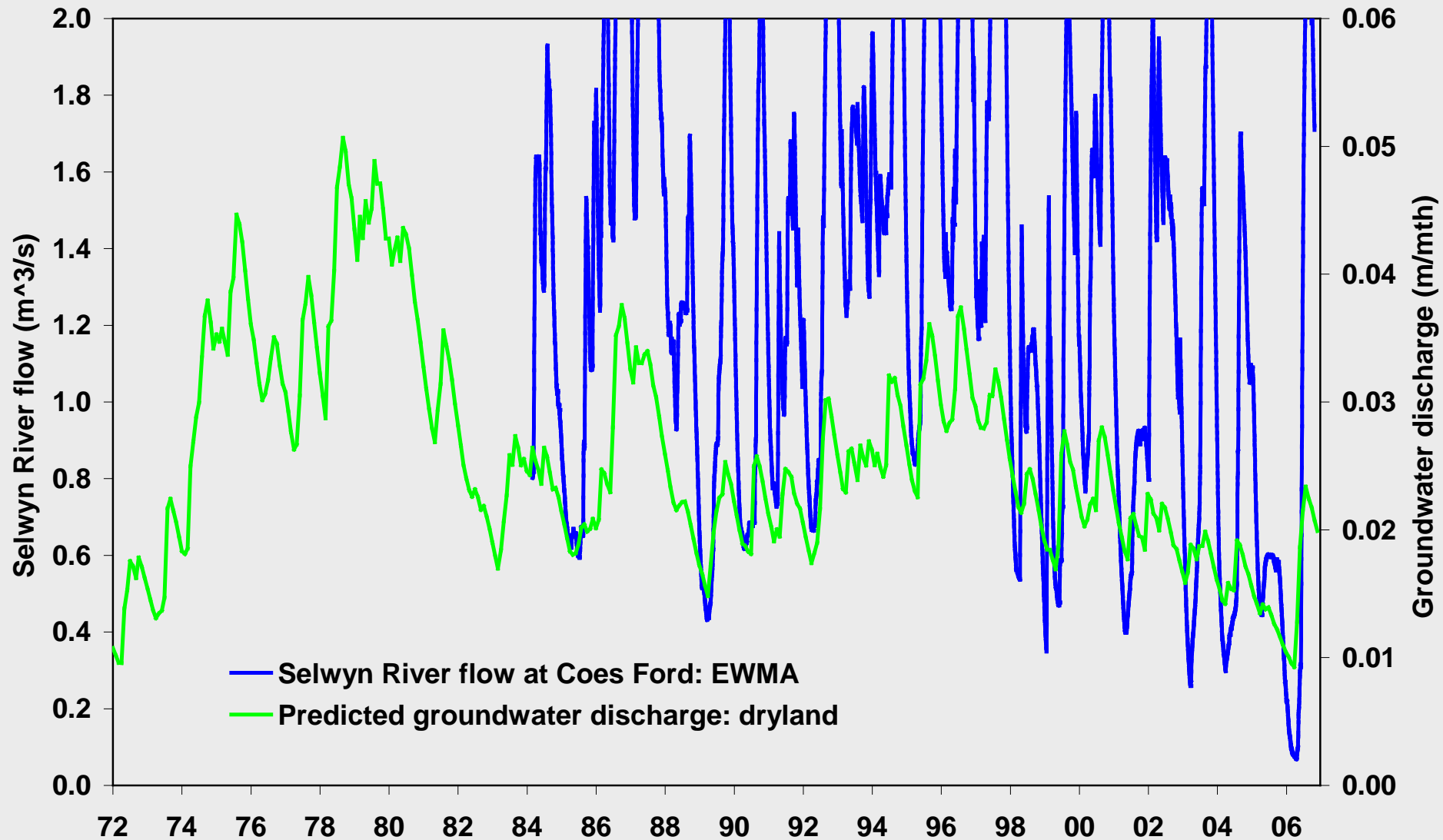
Model Calibration to pre-1990 groundwater level data



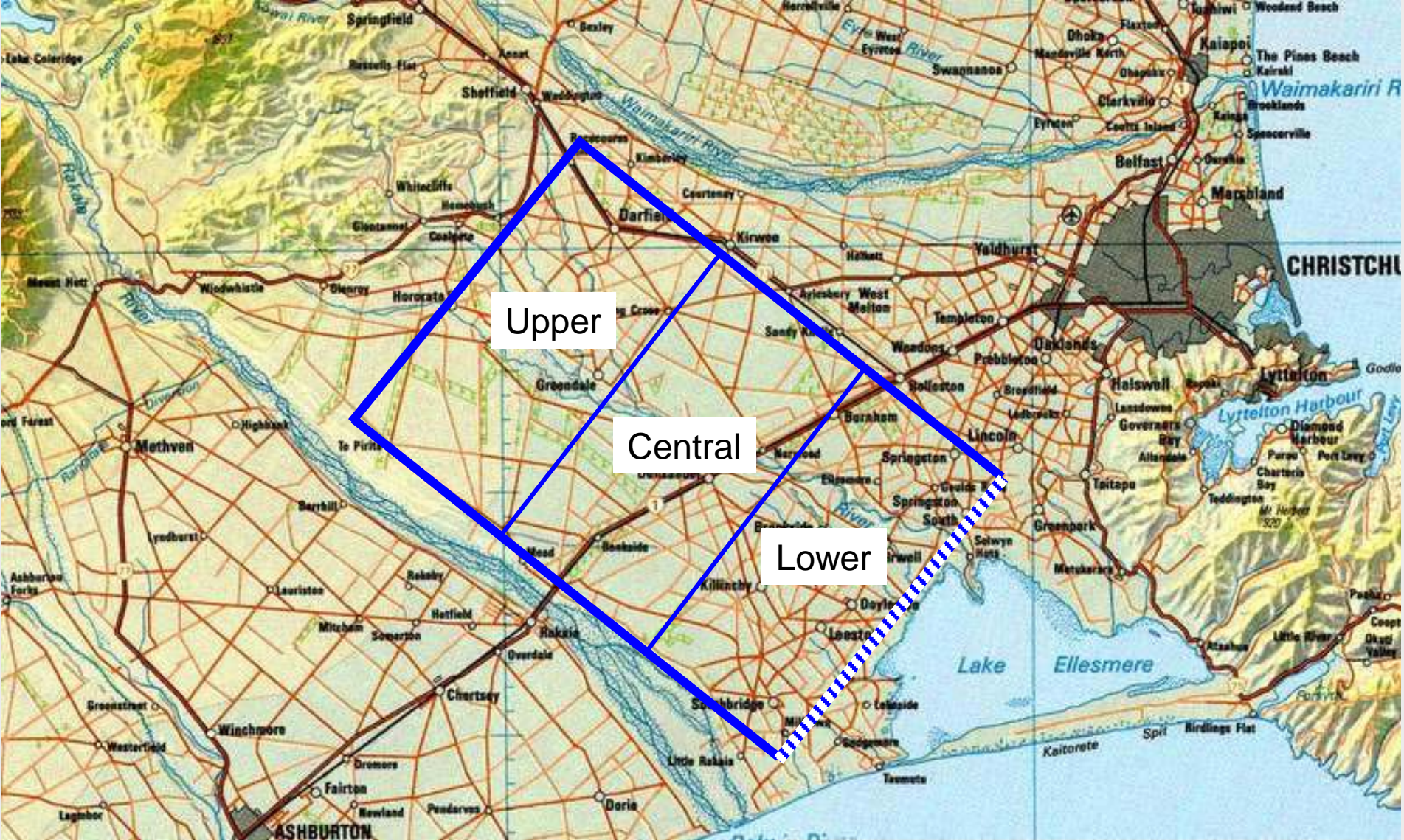
The pattern of predicted groundwater discharge applies to all the connected surface waters



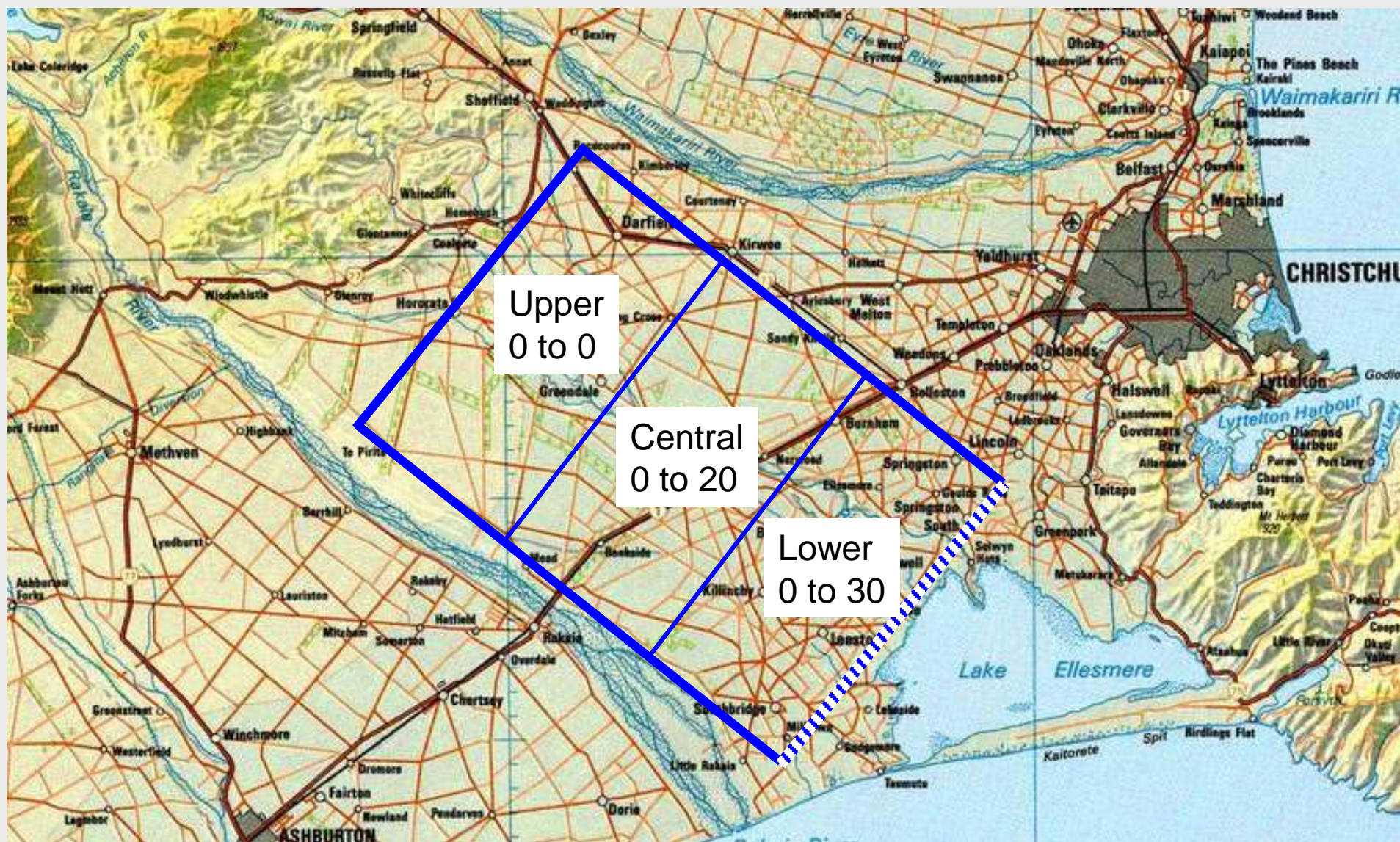
Comparison of **patterns** of predicted groundwater discharge and smoothed observations of river flows < 80 percentile



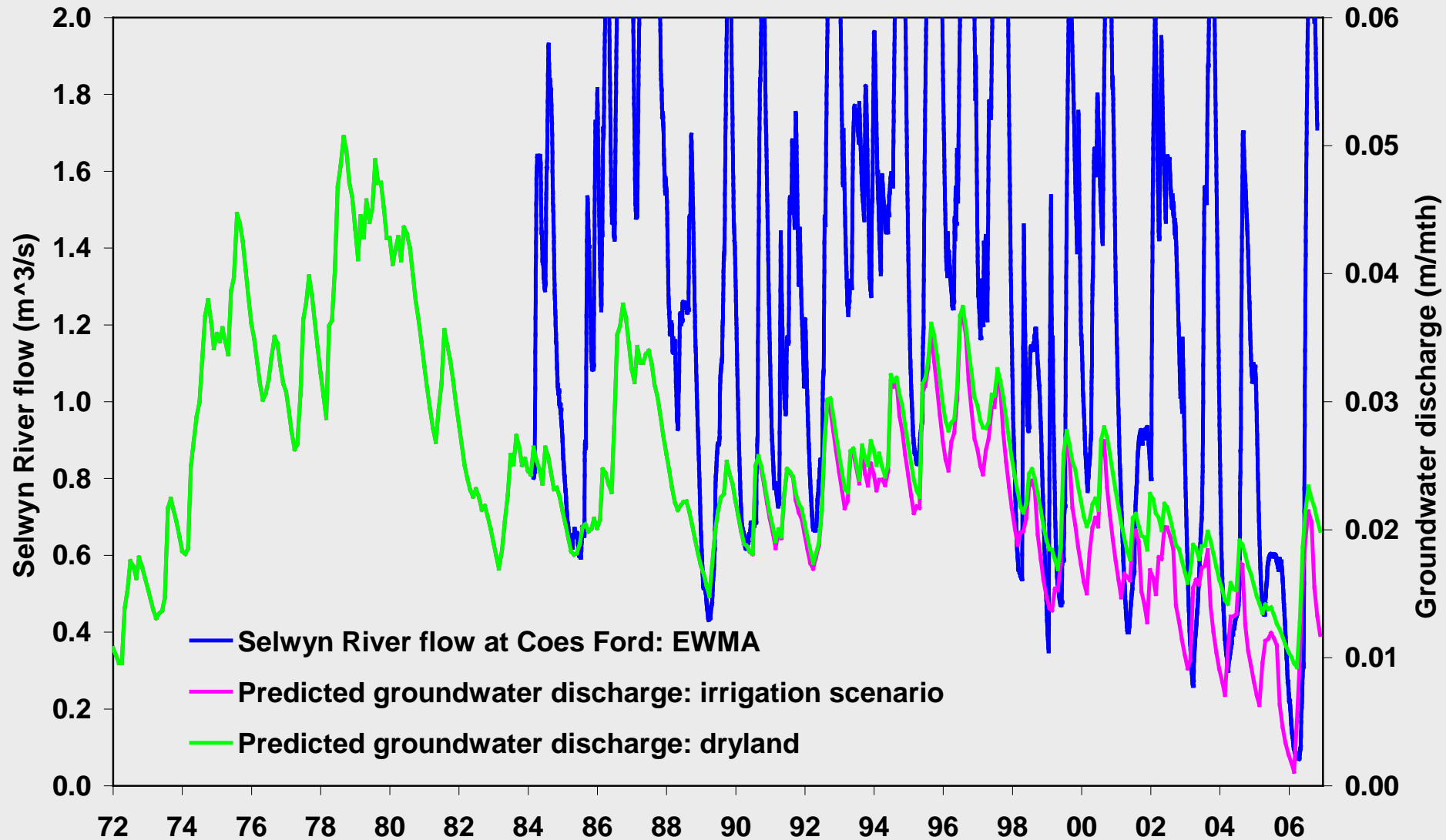
Irrigation pumping abstraction zones



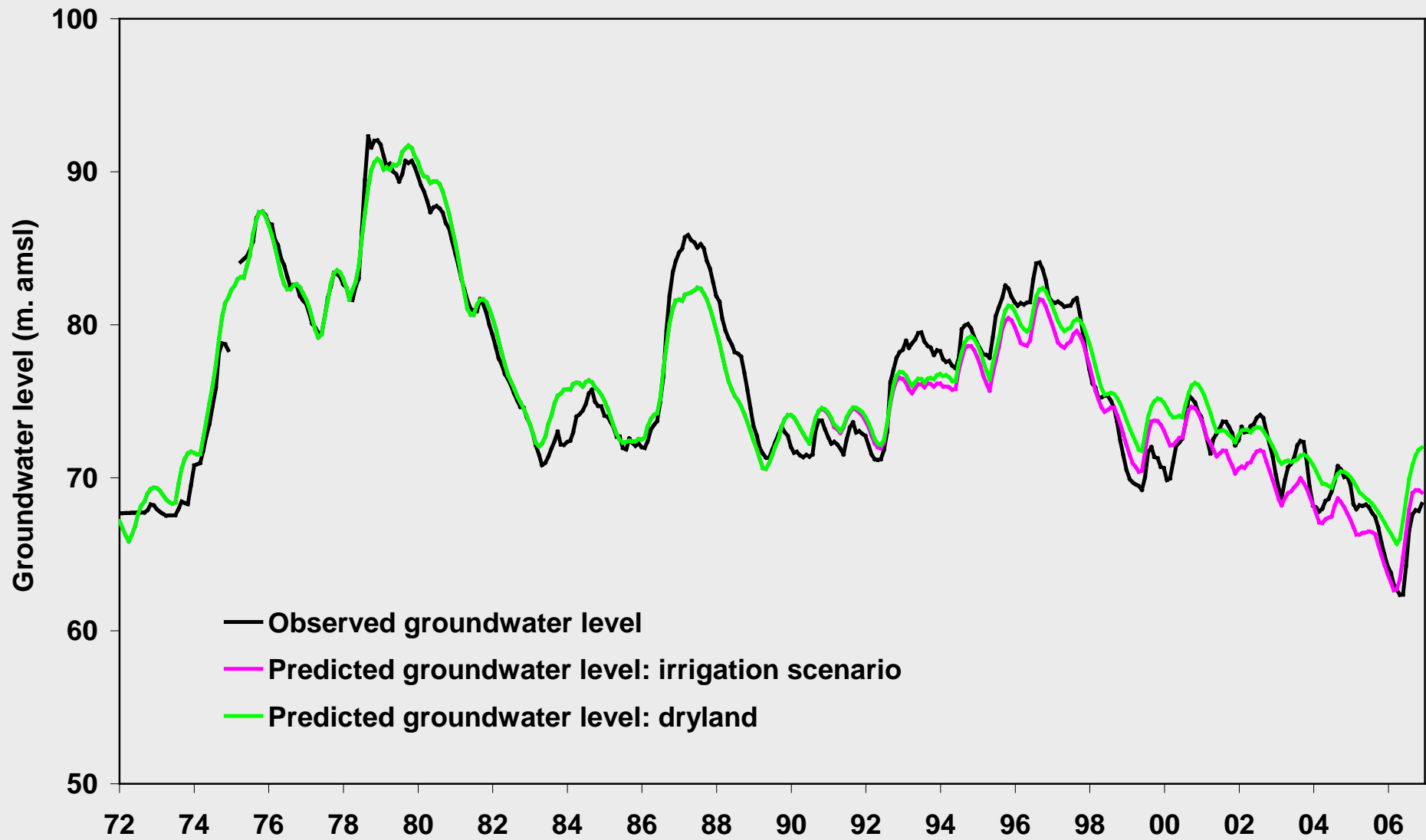
Scenario: linear increase in percent irrigated since 1990



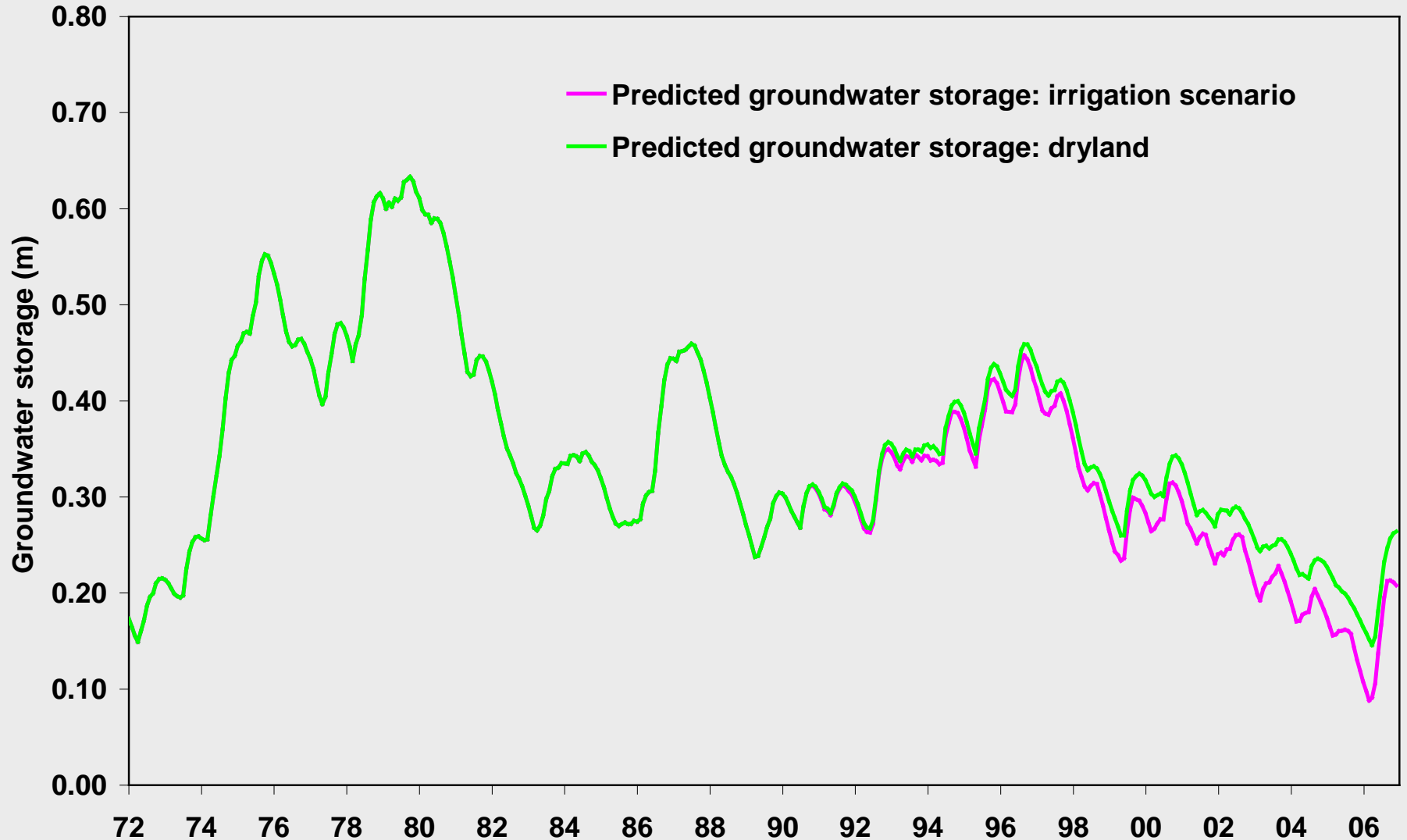
Predictions of groundwater discharge for dryland and irrigation scenarios, compared with Selwyn River flow



Observed and predicted groundwater levels at L36/0092



Predicted groundwater storage: unit-area basis (m) for groundwater volume from land surface recharge



GDA tool: summary

- Focuses on dynamic response of groundwater to climate, land use, and pumped abstraction
- Predicts time-varying pattern of groundwater discharge to surface waters
- Enables evaluation of groundwater use and consequent effects on groundwater levels and flows in surface waters