

Management of stream compensation for a large conjunctive use scheme, Chropshire, United Kingdom

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Outline

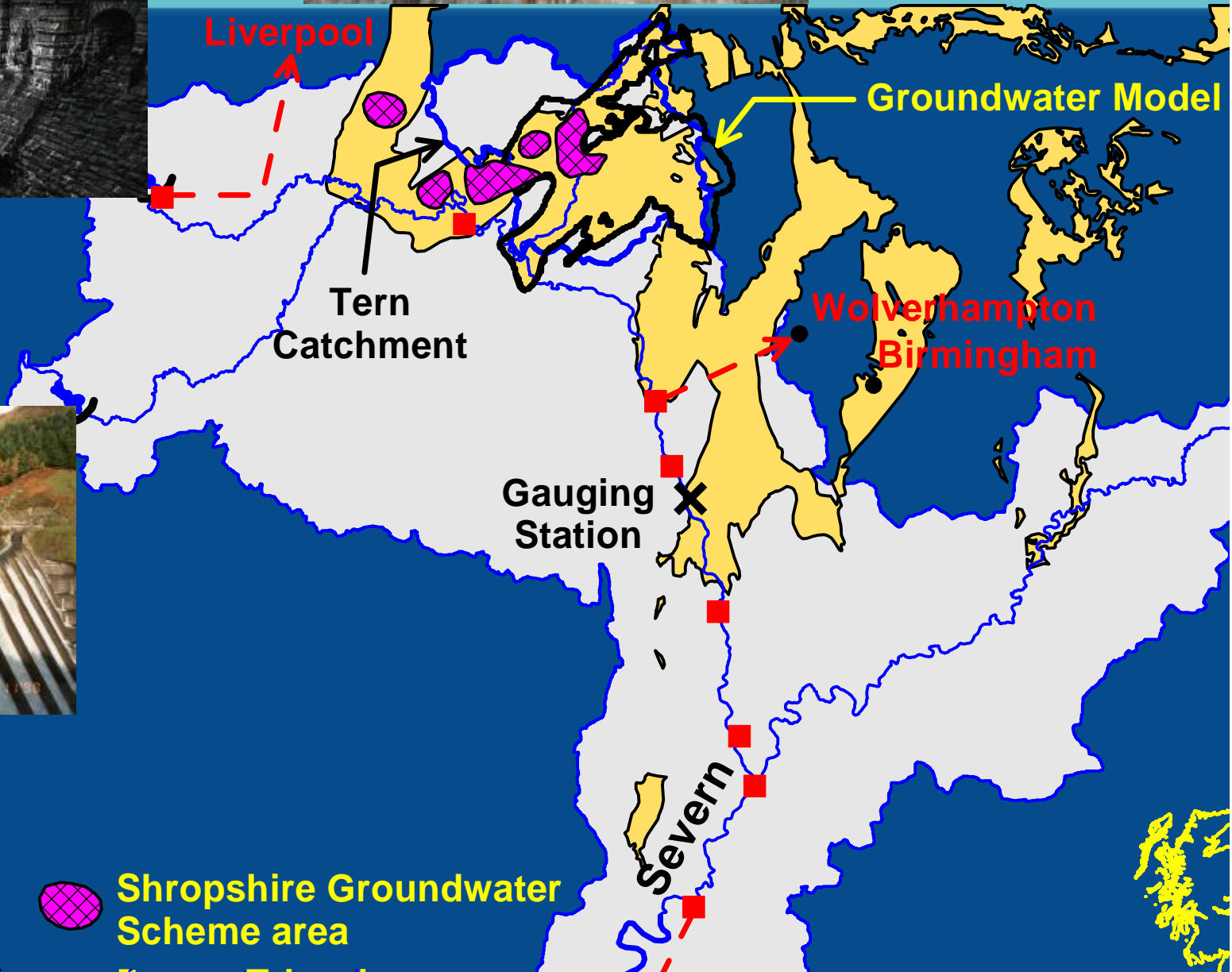
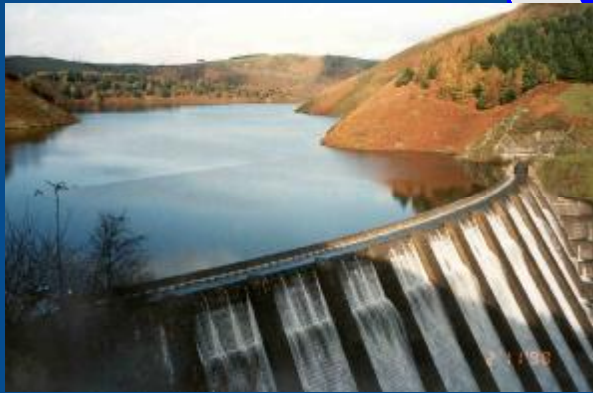
Severn Catchment and its regulation

Shropshire **G**roundwater **S**cheme (**SGS**)

Use of predictive modelling

Regulation of stream compensation

420 km²)



Chropshire Groundwater Scheme

Eight phases

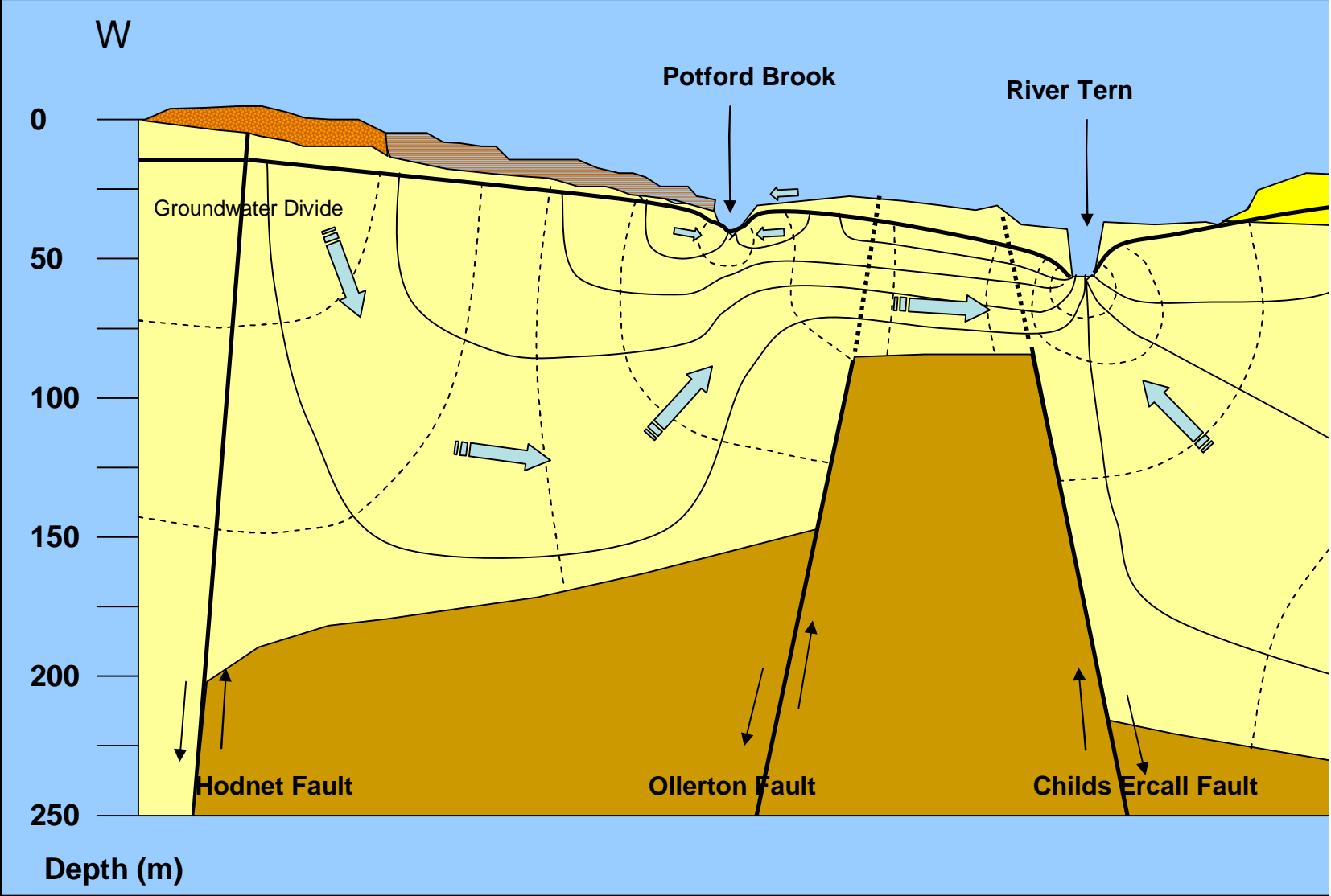
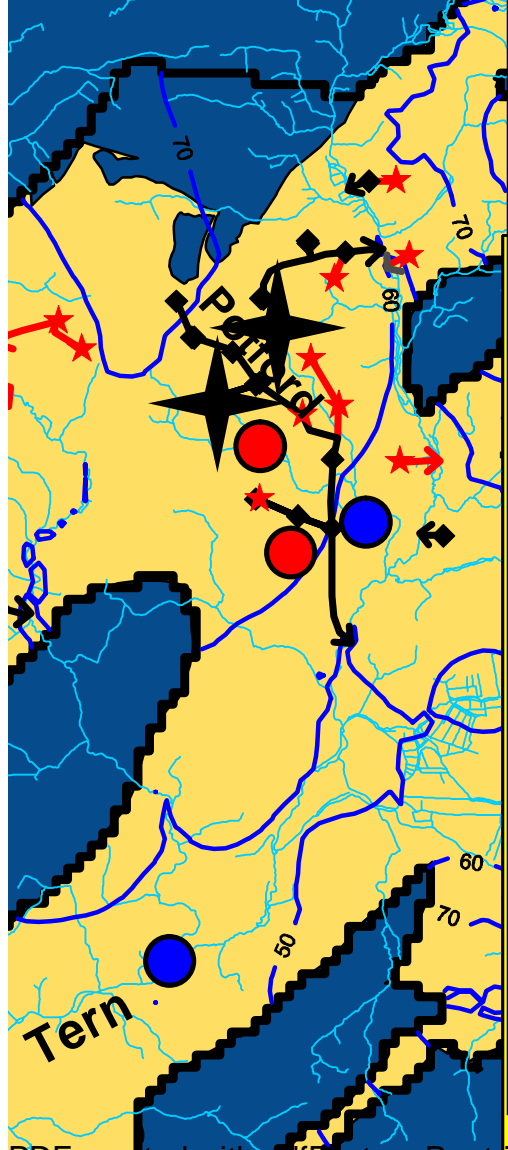
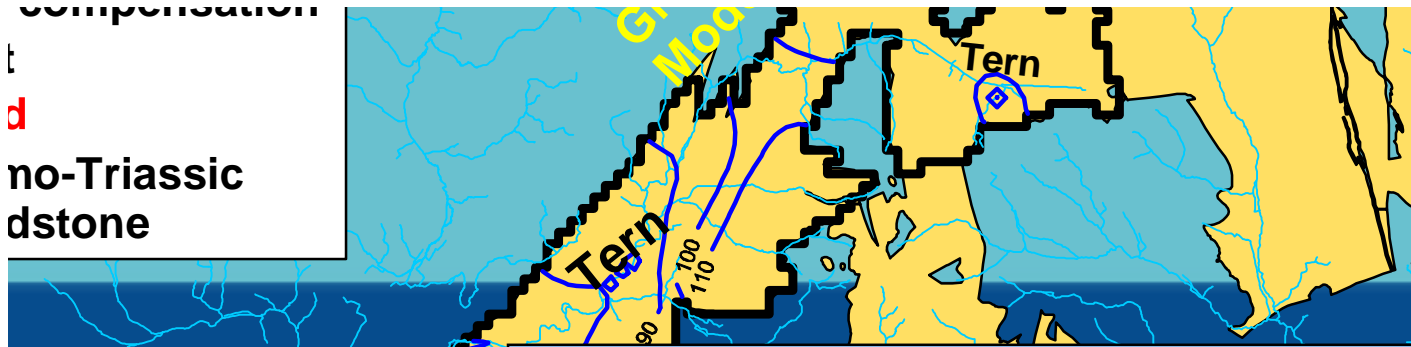
- h 68 sites (81 production boreholes)
- h Gross yield of 330,000 m³/d
- h Net yield of 225,000 m³/d (68%)
- h 1 year licence – can pump ~ 120 days
- h 5 year rolling licence – can pump ~ 200 days

First phase commissioned in 1984 - four phases now operational

- h Operated five times; 1984, 1989, 1995, 1996,

Groundwater model

Compensation
t
d
no-Triassic
dstone



predictive methodology

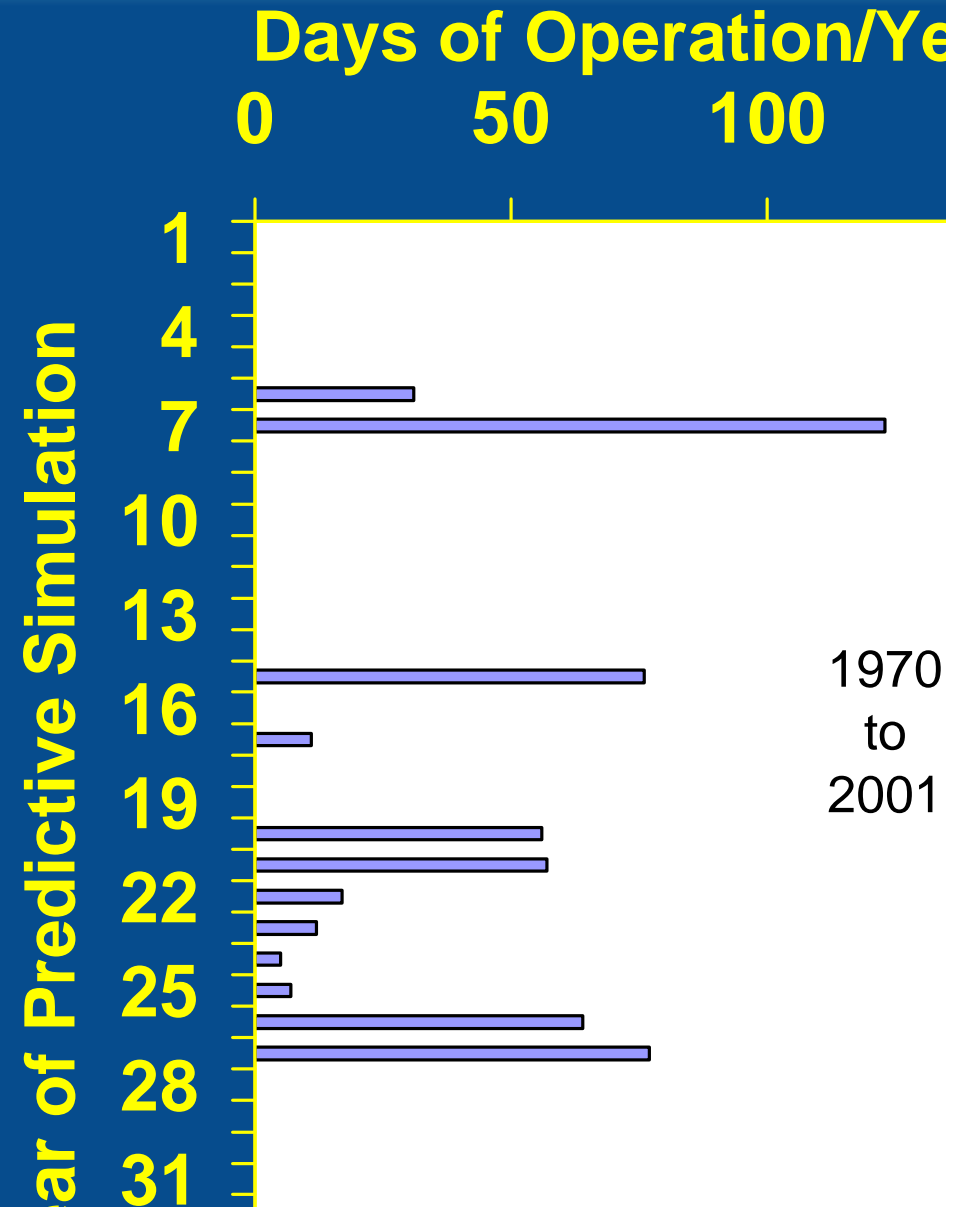
Periods of SGS pumping
based on ResSim Severn
catchment model

Baseline Predictive
Simulation

h Recent actual

h SGS not pumping

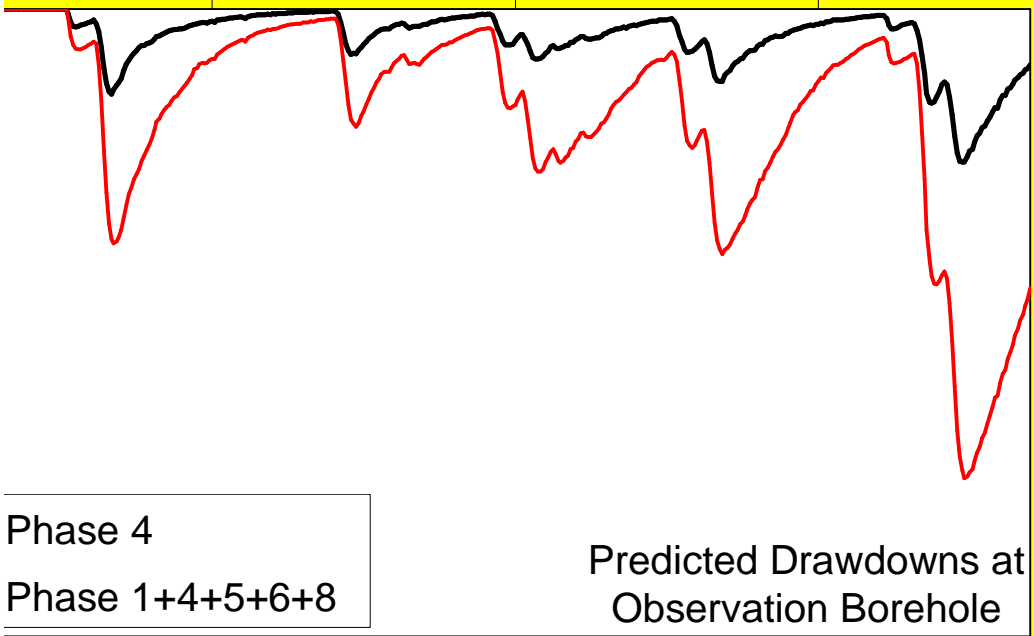
Differences between
baseline and scenario



redictions

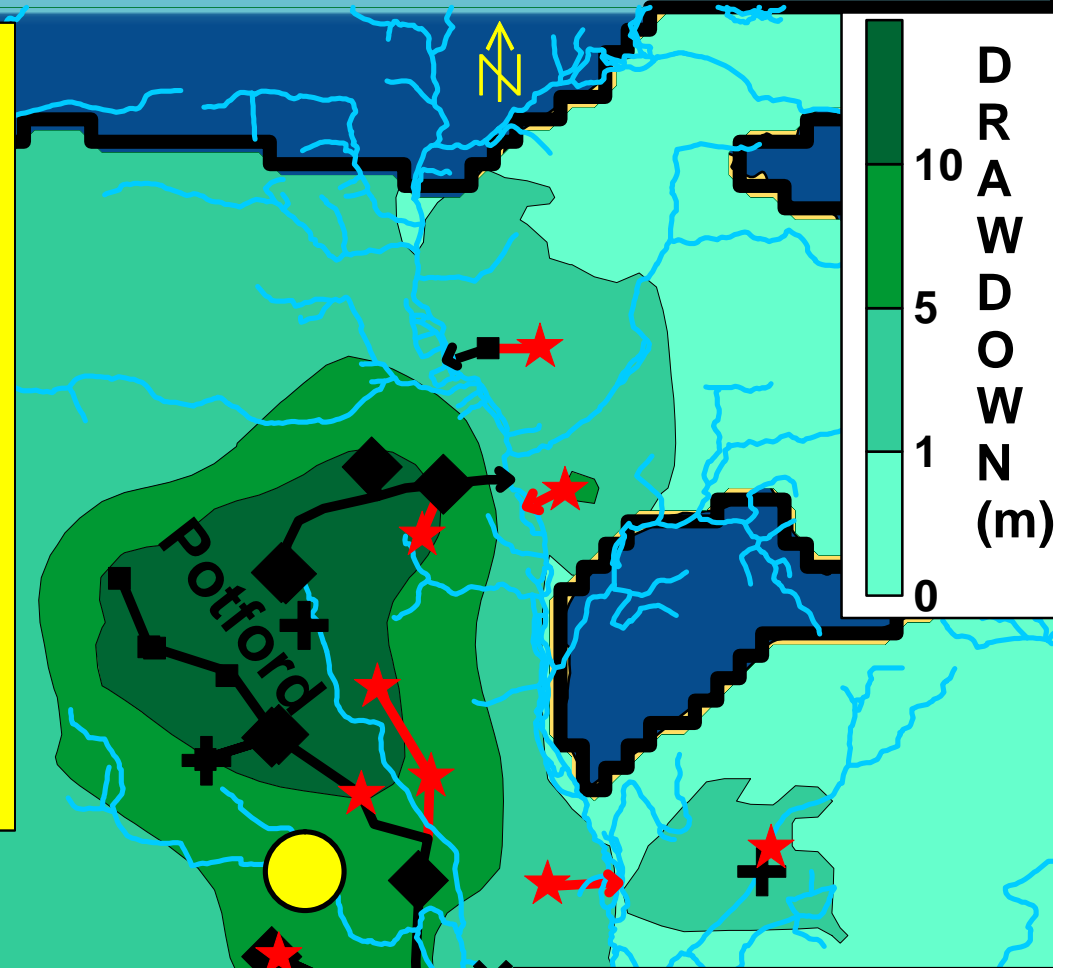
Year of Predictive Simulation

10 20 30



Phase 4
Phase 1+4+5+6+8

Predicted Drawdowns at
Observation Borehole



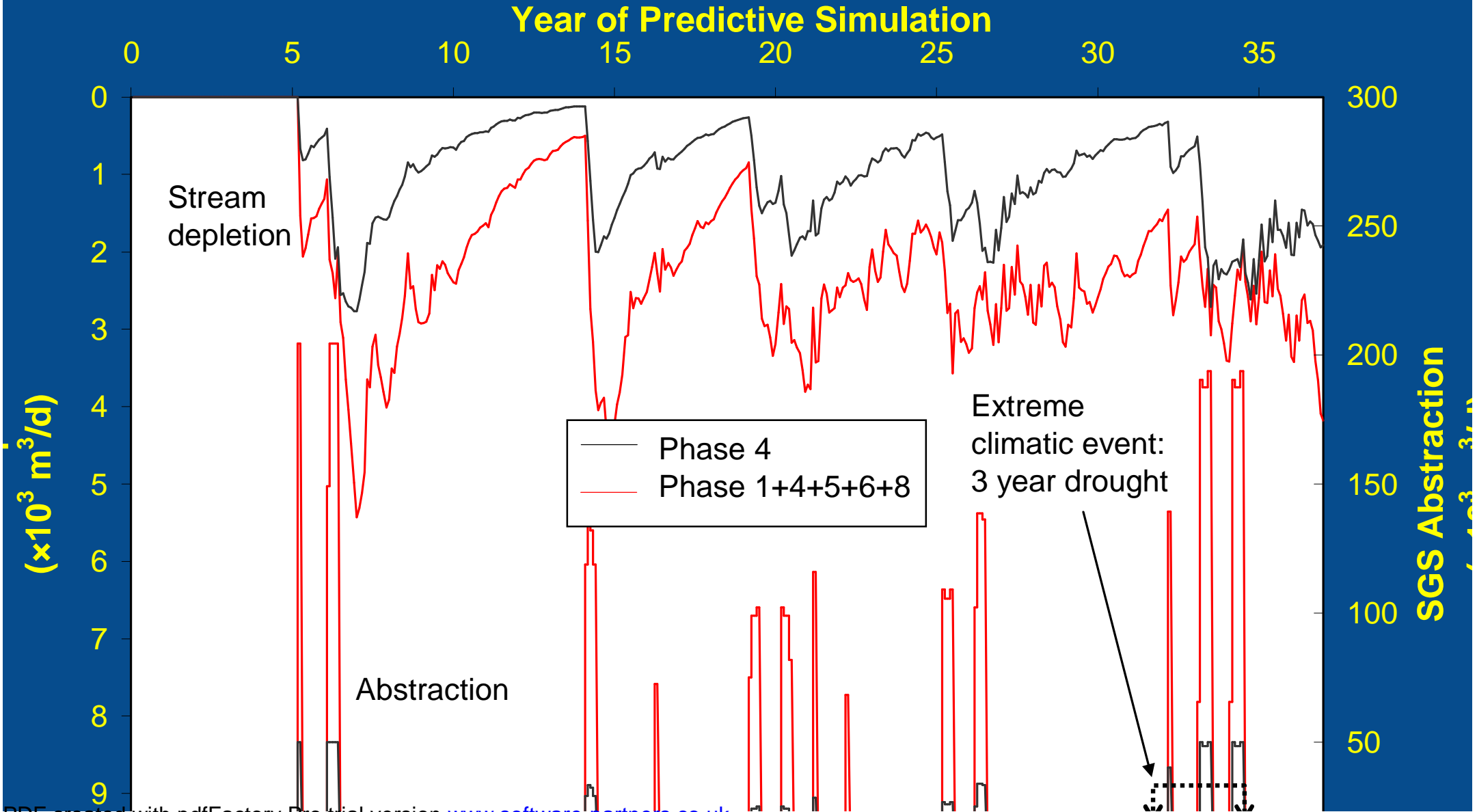
D
R
A
W
D
O
W
N
(m)
10
5
1
0

5 km

- Shropshire Groundwater Scheme Boreholes
- + Stream compensation
- Phase 1



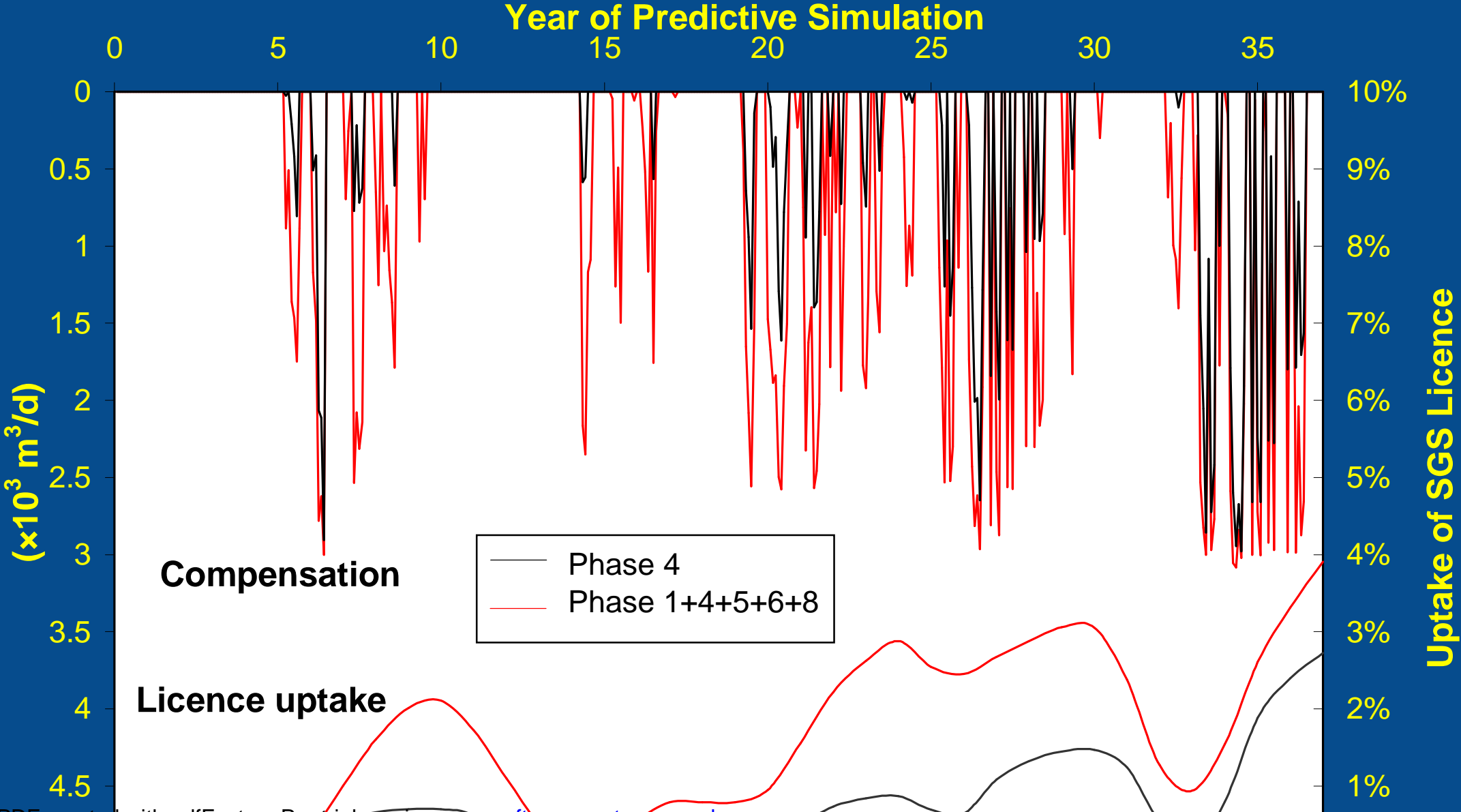
redicted stream depletion



Phase 4 Group Test



redicted stream compensation (Q95)



Conclusions

Can make detailed predictions for flow

Can manage pumping from SGS phases to reduce stream compensation

Can calculate impacts of stream compensation on licence depletion

What level do we need to compensate to?

- h Q95? → sub Q95 is natural

- h Impacts of discharging 'large' quantities of 'raw'

Acknowledgements

Co-authors

- h Mike Streetly
- h Kevin Voyce

Severn Trent Water Plc

- h ResSim Severn Catchment Model