

Effects of Pumping on Shallow Groundwater Circulation

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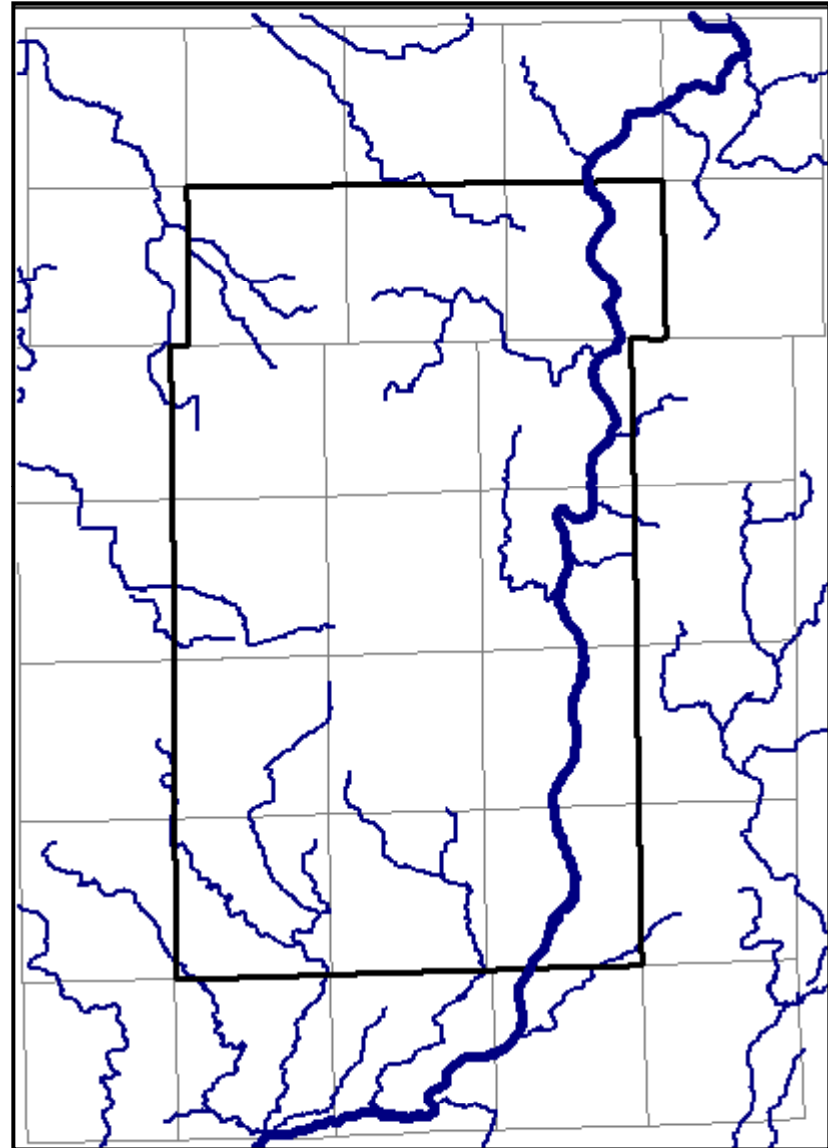


What can we do with the model?

- Improve our conceptual understanding
- Quantify groundwater flow
 - Flow directions and gradient
 - Permeability and recharge values
 - Flow paths to water supply wells
- Predict impacts of future pumpage
 - Increase in withdraw from existing wells
 - Development of new supplies

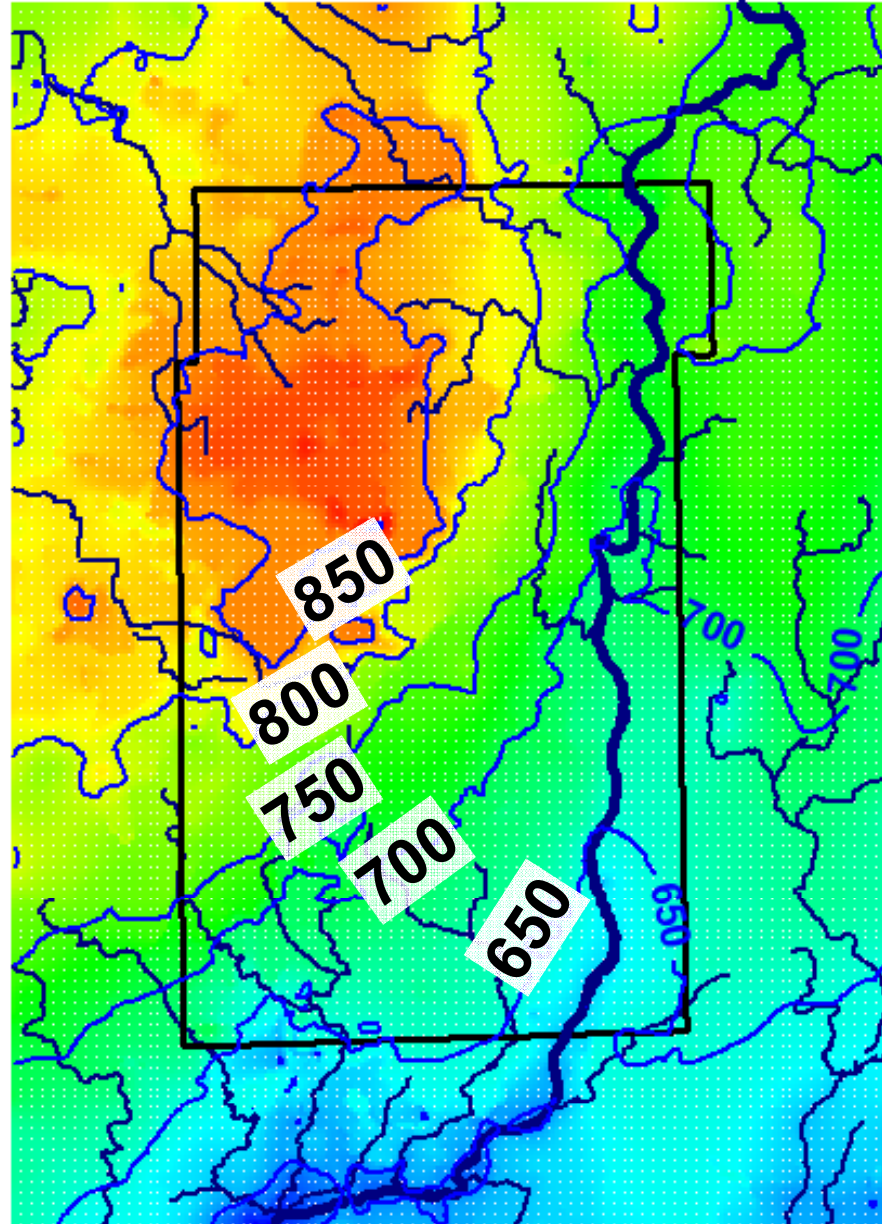
The Shallow Aquifer Model

- Kane County plus buffer area
- 18 Layers
 - 9 aquifers
 - 9 aquitards



Model Results

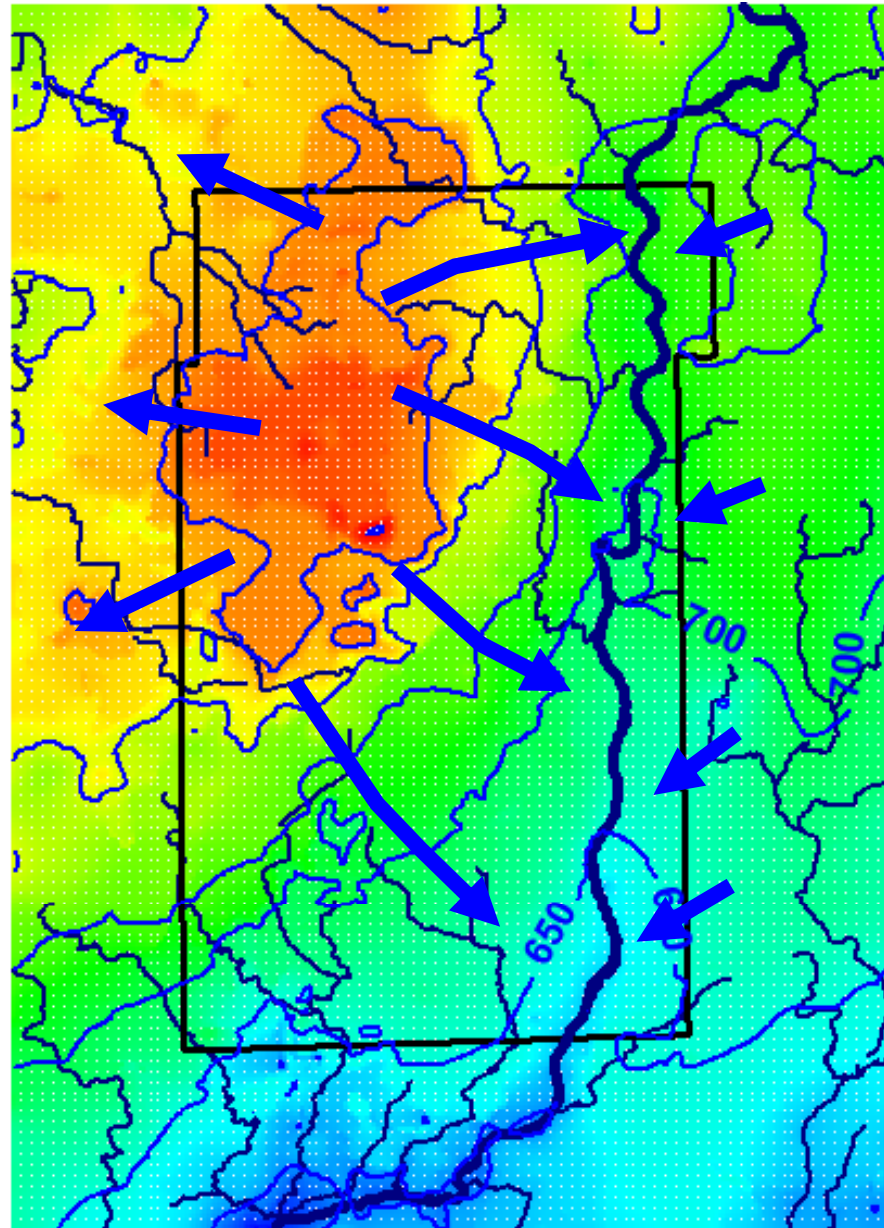
- Shallow bedrock aquifer
- Groundwater elevation follows topography



Model Results

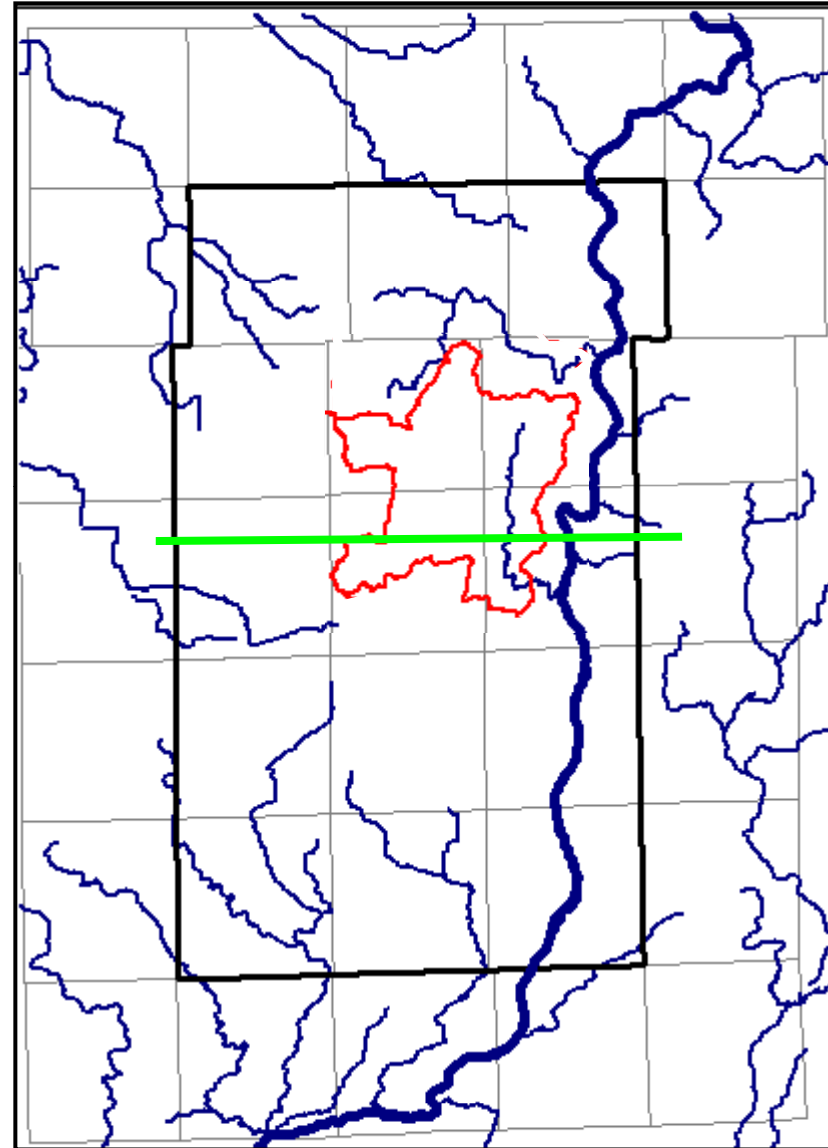
- Shallow bedrock aquifer
- Groundwater elevation follows topography

 Flow direction



The Shallow Aquifer Model

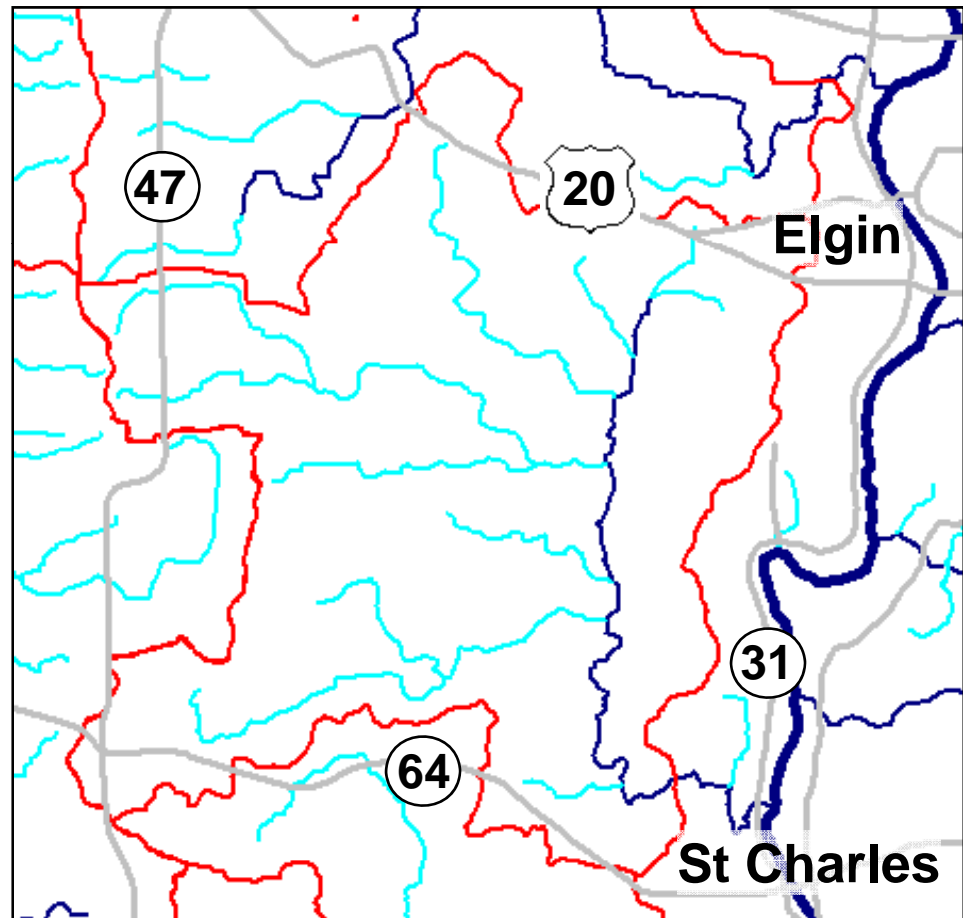
- Ferson Creek watershed boundary
- East – west cross section



What does the local model look like?






■ Ferson Creek Watershed

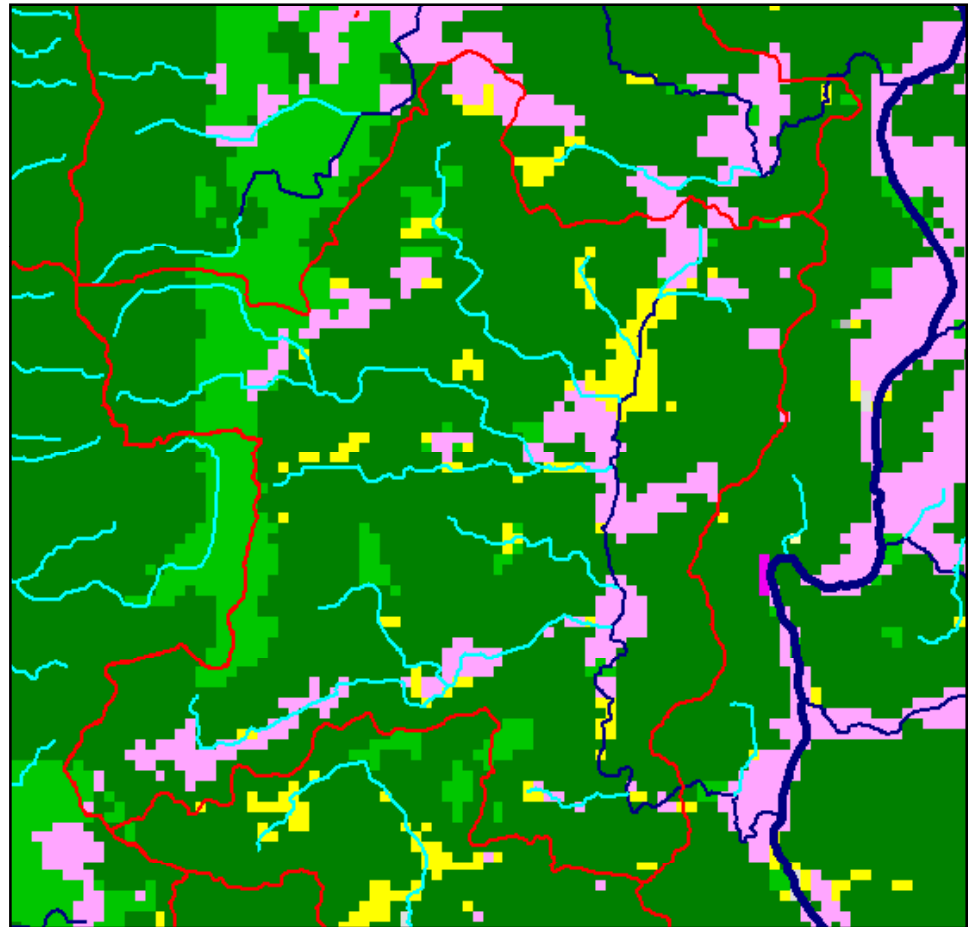
- Watershed boundary
- Fox River
- Creeks
- Principal drainage ways



What does the local model look like?





■ Permeability and Recharge

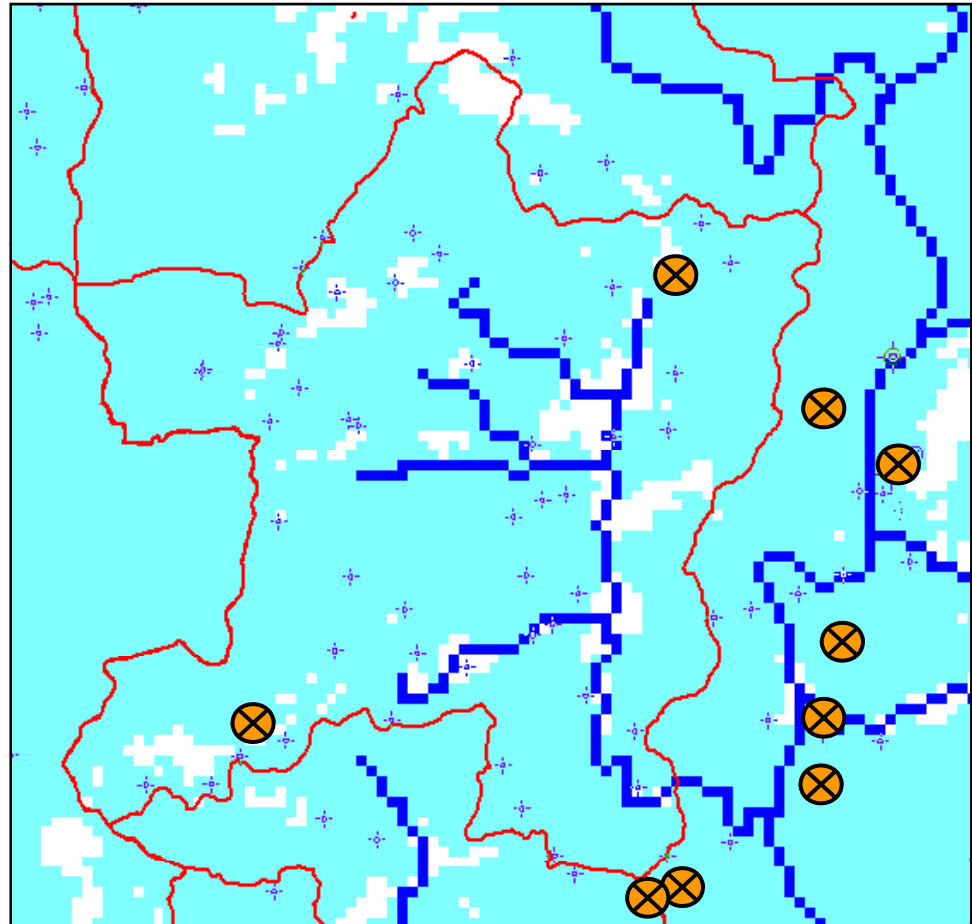
-  Clay-rich diamicton
-  Silts
-  Shallow sands
-  Intermediate sands
-  Dolomite/shale



What does the local model look like?

■ Boundary conditions

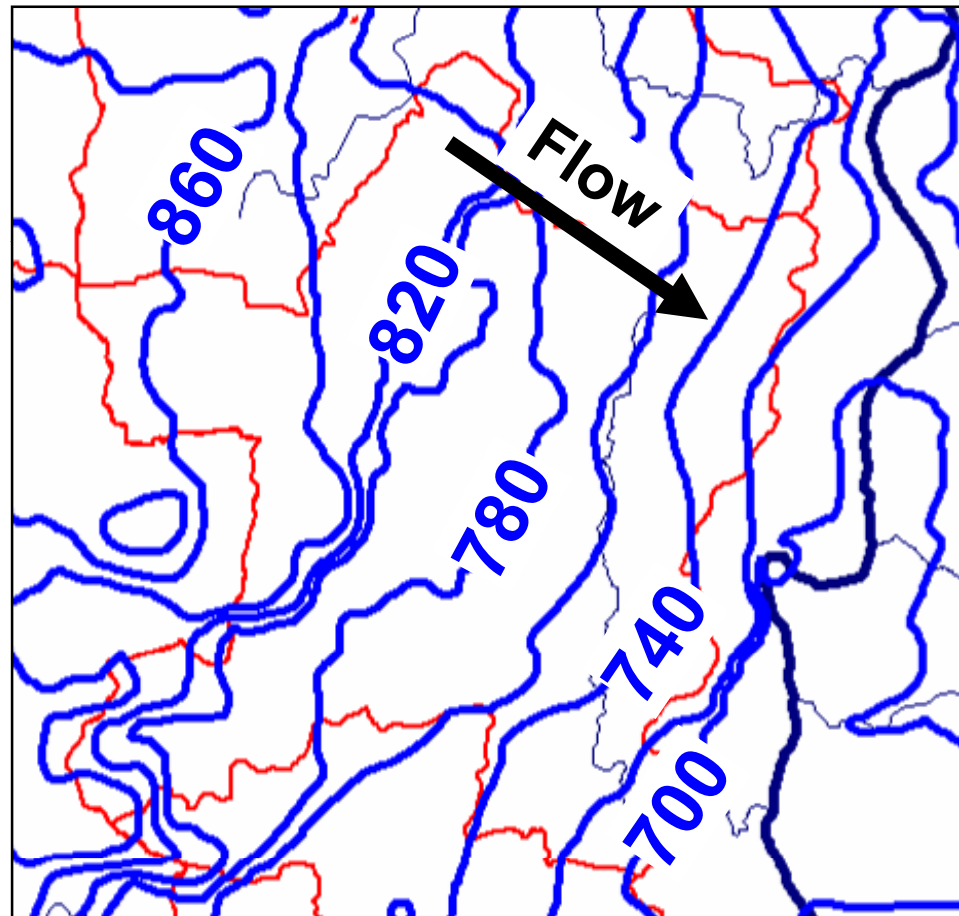
-  River cell
-  Drain Cell
-  Pumping well
-  Water level or stream flow target



Model Results – Shallow Aquifer System

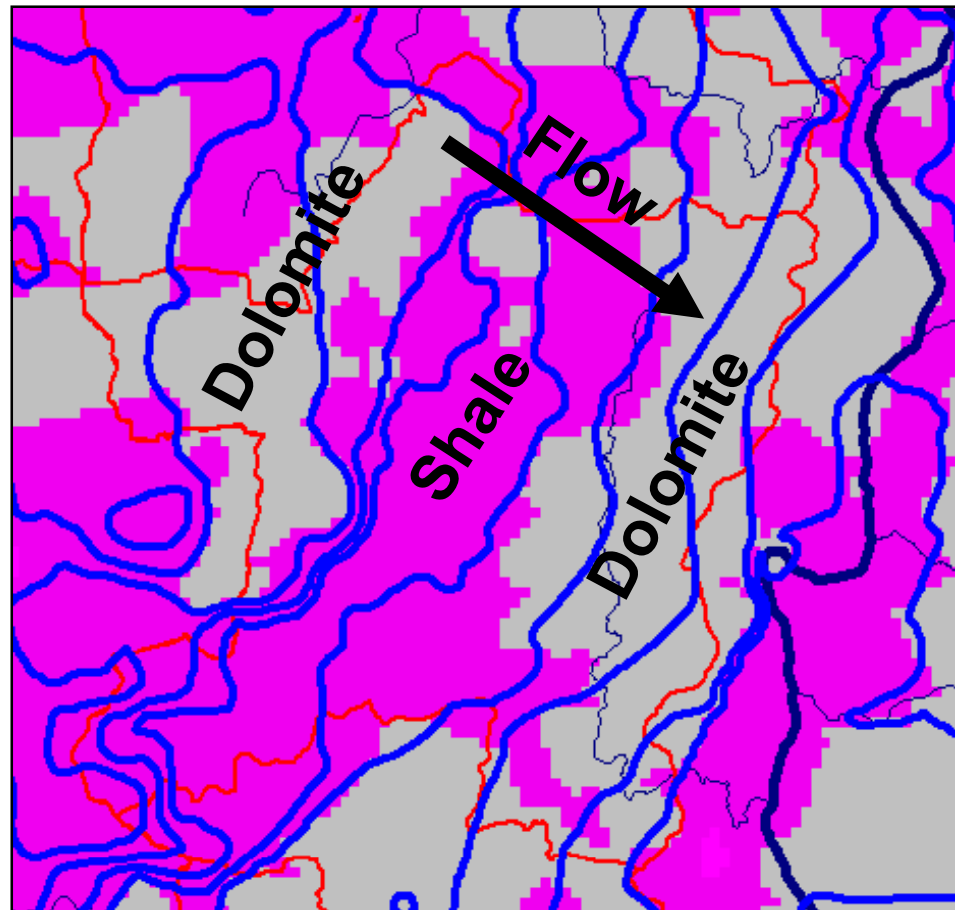
■ Shallow bedrock aquifer

- Water level contours
- Watershed boundary
- Fox River
- Creeks

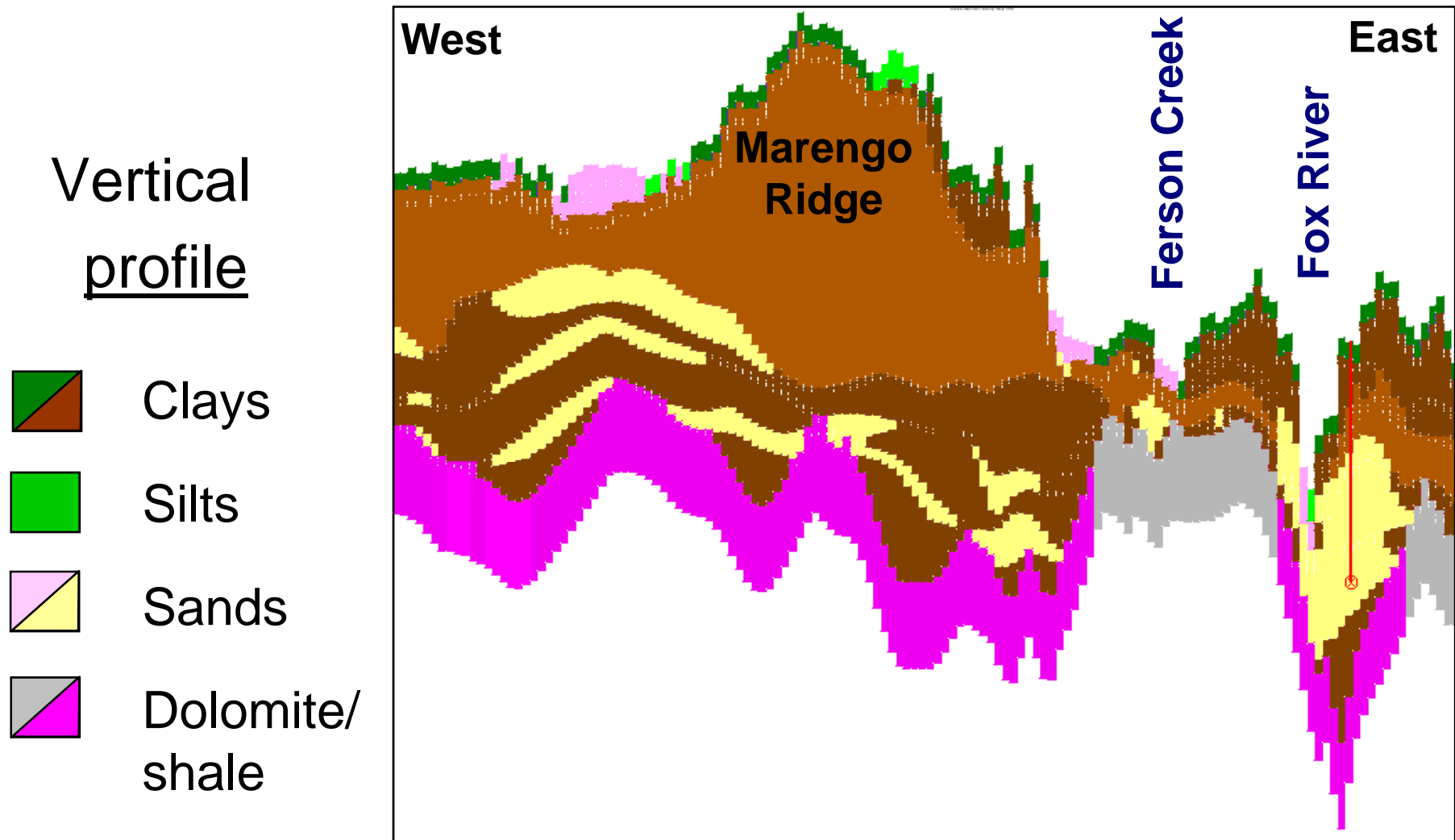


Model Results – Shallow Aquifer System

- Shallow bedrock aquifer
- Water level contours
- Watershed boundary
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Model Results – Shallow Aquifer System



Model Results – Shallow Aquifer System

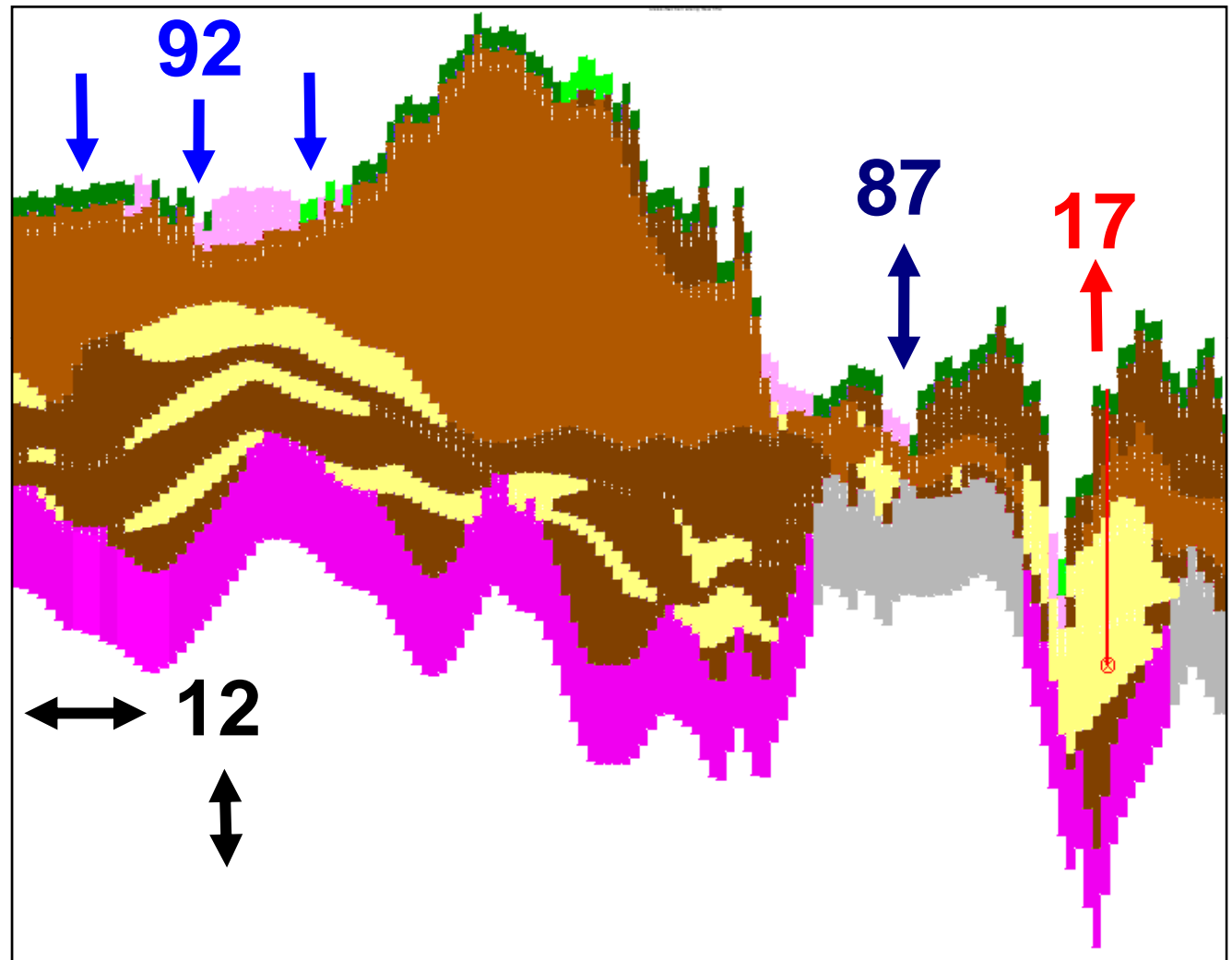
County Flow Budget

Inflows (MGD)

Recharge	92
Lateral flow	<u>12</u>
Total	104

Outflows (MGD)

Streams	87
Wells	<u>17</u>
Total	104

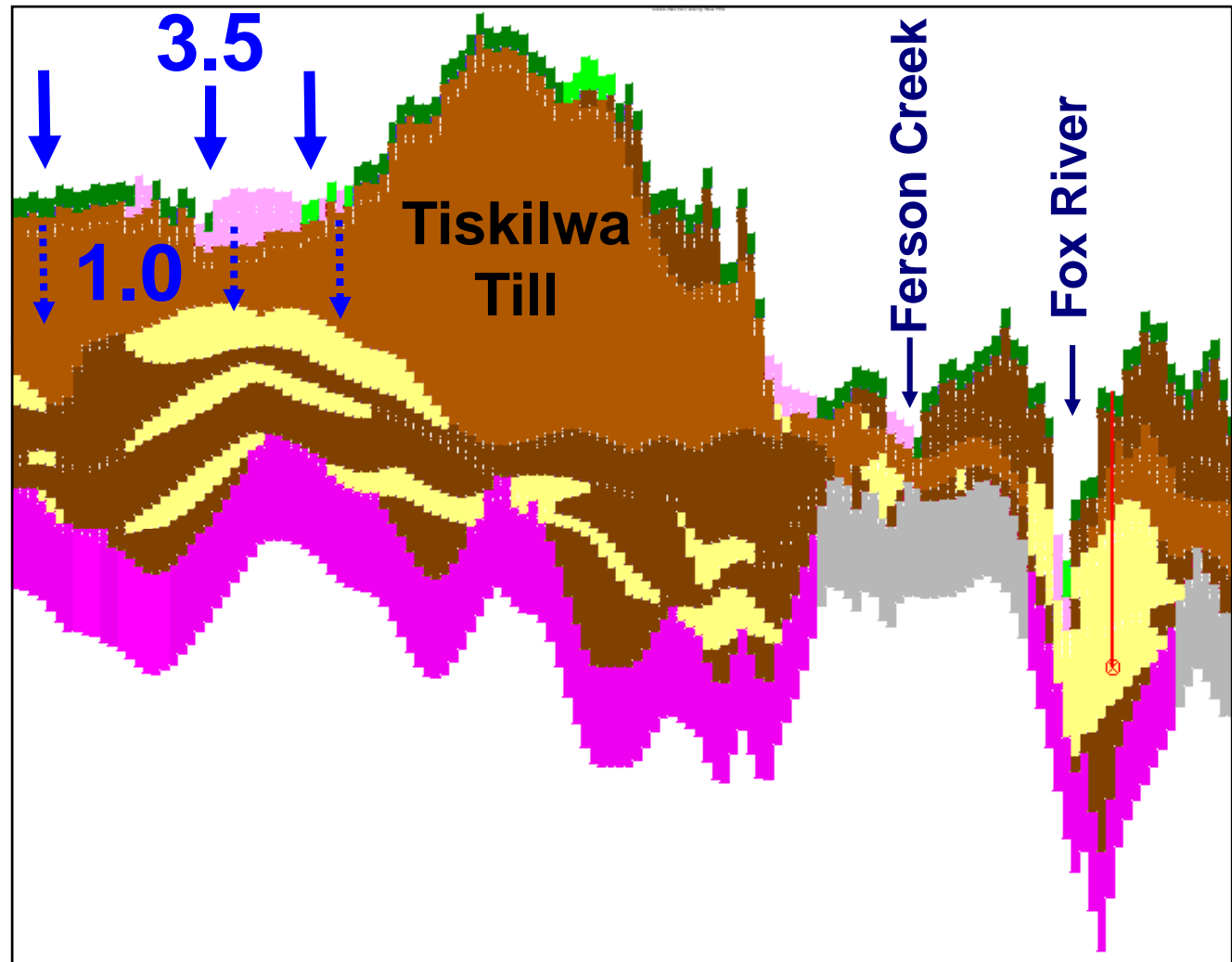


Model Results – Shallow Aquifer System

- Recharge per township (MGD)

To surface: 3.5

Through
Tiskilwa Till: 1.0





Summary

- Construction of the model greatly enhances our conceptual understanding of flow
- Flow patterns generally follow the topography but are complicated by changes in geologic material
- Recharge limited through the Tiskilwa Till
- Groundwater flow through Kane County is ~ 104 MGD
 - Includes water unrecoverable by wells
 - Does not include additional water induced from streams