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

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Model Results – Shallow Aquifer System

- Shallow bedrock aquifer
  - Water level contours
  - Watershed boundary
  - Fox River
  - Creeks

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Model Results – Shallow Aquifer System

- Shallow bedrock aquifer

- Water level contours
- Watershed boundary
- Fox River
- Creeks
Model Results – Shallow Aquifer System

Vertical profile

- Clays
- Silts
- Sands
- Dolomite/shale

West East

Marengo Ridge

Ferson Creek

Fox River

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Model Results – Shallow Aquifer System

County Flow Budget

Inflows (MGD)
- Recharge: 92
- Lateral flow: 12
- Total: 104

Outflows (MGD)
- Streams: 87
- Wells: 17
- Total: 104

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Model Results – Shallow Aquifer System

- Recharge per township (MGD)
  - To surface: 3.5
  - Through Tiskilwa Till: 1.0

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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 though Kane County is ~ 104 MGD
  - Includes water unrecoverable by wells
  - Does not include additional water induced from streams

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