Effects of Historical Pumping on Deep Groundwater Circulation

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Calibration in Deep Aquifers

- Adjust model and parameters to match simulations to observations.
- Best match in NE Illinois.
Verification in Deep Aquifer

- Confirm calibration by simulating historical response to pumping.
- Best match in Kane Co. (Elgin)
Historical Pumping of Deep Aquifer

- Large-scale pumping of deep aquifer begins in 1864
- Model is used to simulate effects of pumping to 2002
Historical Pumping of Deep Aquifer

Pumping Locations, 2002

- In 1985, centered in Cook and DuPage Counties
- Pumping in Cook and DuPage Counties decreases, shifting center southwestward

2007 Priority Places Workshop: Implementing a Sustainable Water Supply for Kane County’s Future
Ancell Aquifer: Predevelopment

- Recharge where Maquoketa is absent
- Flow from central Wisconsin and Dekalb Co. to Illinois River
- Artesian conditions in Chicago
Ancell Aquifer: 1985

- Steep cone of depression
- Flow eastward to Cook and DuPage Counties
- Northward flow from saltwater regions
- Similar cone of depression surrounding Milwaukee
Ancell Aquifer: 2002

- Cone of depression flattens, shifts west with pumping
- Flow eastward to Cook and DuPage Counties
- Northward flow from saltwater regions
- Upper layers dewatering (Galena-Platteville)
Other Notes

- Discharge formerly went to streams or Lake Michigan; now virtually all goes to wells (except west of Maquoketa cover)
- Salt in groundwater can influence flow, but not formally addressed here
- Water Quality effects discussed later