Water Supply Planning for Northeast Illinois

Potential Impacts on the Deep Bedrock Aquifer System

Allen Wehrmann, P.E., P.H. (GW), D.WRE
Head, Center for Groundwater Science
Illinois State Water Survey

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Illinois State Water Survey

and Bill Walton (ISWS Groundwater Section Head 1958 – 1964)
Northeast Illinois Water Sources

*Groundwater is also used within these areas in some cases.
Source: Chicago Metropolitan Agency for Planning

Graphic credit: CMAP
Sources of Drinking Water for Northeastern Illinois

11-county region population, 2000

- Lake Michigan: 77%
- Groundwater: 19%
- Inland surface water sources: 4%

Source: TBD

Chicago Metropolitan Agency for Planning
Public Supply, Groundwater Withdrawals:
2005 vs. 2050 Scenarios, in millions of gallons per day

Source: Dziegielewski and Chowdhury, 2008
Aquifers of Northeastern Illinois

West

East

DeKalb

Chicago

Top of Ancell (St. Peter ss)

Top of Ironton-Galesville

Unconsolidated Aquifer System

Shallow Bedrock Aquifer

Deep Bedrock Aquifer System (Ancell and Ironton-Galesville sandstones)

Elmhurst-Mt. Simon Aq. (saline?)

Cross-Section Modified from Bretz (1939)
11-County Northeast Illinois Water Sources

- Lake Michigan: 77%
- Deep Bedrock Groundwater: ~8.5%
- Shallow Groundwater: ~8.5%
- Inland surface water sources: 4%

Inland surface water sources contribute 4% to the total water sources, while Lake Michigan accounts for 77%. Deep Bedrock Groundwater and Shallow Groundwater each contribute approximately 8.5% to the total.
Regional Model Domain for NE Illinois and Modeled Wells
Yorkville Community Water Supply

Water Withdrawals, million gallons per day

Historical

What is the future of the deep bedrock aquifers in NE Illinois?

Walton’s 1964 estimated deep aquifer yield ~ 65 mgd

Lake Michigan allocations start

8-County NE Illinois Total Deep Bedrock Q
Distribution of Shallow and Deep Bedrock Groundwater Withdrawals in 1958

~43 mgd from deep bedrock in 1958
~84 mgd from deep bedrock in 2004

from Suter et al., 1959
Comparison of Deep Bedrock Withdrawals
Kane County Project vs. Regional Water Supply Planning Project

11-County Totals

11-County simulated historic deep bedrock withdrawals
Kane County Project Demand Scenarios (low & high)
Regional Water Supply Planning Scenarios (LRI, BSL, MRI)
Simulated Head Surface: Lower Quaternary Unit at End of 2050

Baseline Scenario

- Fox Watershed
- Geologic Model Area
- Unit Absent

ft above MSL

1100 1050 1000 950 900 850 800 750 700 650 600 550 500 450
Aquifers of Northeastern Illinois

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Deep Bedrock Aquifer System
(Ancell and Ironton-Galesville sandstones)

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Cross-Section Modified from Bretz (1939)
Simulated Head Surface: Ancell Unit (St. Peter) at end of 2050

Baseline Scenario
Simulated Head Surface: Ironton-Galesville Unit at End of 2050

Baseline Scenario
Location Map for Deep Bedrock Hydrographs
Simulated Ancell Unit Head, Maple Park

Kane County Project Regional Model Results

- Simulated Historical Head (1970-2002)
- Simulated Future Head (2004-2049), Low Pumping Scenario
- Simulated Future Head (2004-2049), High Pumping Scenario

Simulated Steady-State Head, 2002 Pumping Rates and Well Configuration

Top of Ancell Unit

Year:
- 1970
- 1975
- 1980
- 1985
- 1990
- 1995
- 2000
- 2005
- 2010
- 2015
- 2020
- 2025
- 2030
- 2035
- 2040
- 2045
- 2050

Head (ft above MSL):
- 200
- 300
- 400
- 500
- 600
- 700
- 800
Simulated Ancell Unit Head, St. Charles

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Simulated Future Head (2004-2049), High Pumping Scenario

Simulated Steady-State Head, 2002 Pumping Rates and Well Configuration

Top of Ancell Unit

Year

Head (ft above MSL)
Simulated Ironton-Galesville Unit Head, St. Charles

*Kane County Project Regional Model Results*

- **Simulated Historical Head (1970-2002)**
- **Simulated Steady-State Head, 2002 Pumping Rates and Well Configuration**
- **Simulated Future Head (2004-2049), Low Pumping Scenario**
- **Simulated Future Head (2004-2049), High Pumping Scenario**
- **Top of Ironton-Galesville Unit**

**Y-axis:** Head (ft above MSL)

**X-axis:** Year


- 1970: Initial high head
- 1985-2000: Steady decrease
- 2002: Steady-state head
- 2004-2049: Future head scenarios
Simulated Ancell Unit Head, Yorkville

Kane County Project Regional Model Results

Simulated Historical Head (1970-2002)

Simulated Steady-State Head, 2002 Pumping Rates and Well Configuration

Top of Ancell Unit

Simulated Future Head (2004-2049), Low Pumping Scenario

Simulated Future Head (2004-2049), High Pumping Scenario

Head (ft above MSL)

Year

Simulated Ironton-Galesville Unit Head, Yorkville

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- Top of Ironton-Galesville Unit
Simulated Ancell Unit Head, Joliet

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Simulated Future Head (2004-2049), High Pumping Scenario

Year
Simulated Ironton-Galesville Unit Head, Joliet

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Head (ft above MSL)

Year
Deep Bedrock Aquifer Potentiometric Surface 2007
Change in Deep Bedrock Heads, 2000-2007
Questions? Comments?

Water Supply Home Page is:

http://www.sws.illinois.edu/wsp