

Simulated Reduction of Natural Groundwater Discharge in McHenry County, Northeastern Illinois

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Study Area Location

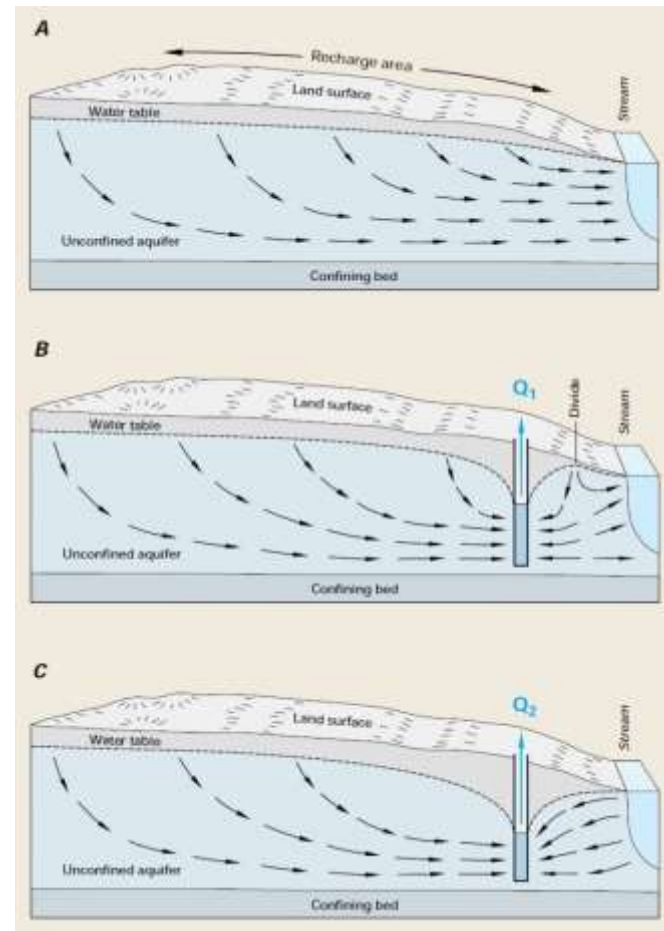


Reduction of Natural Groundwater Discharge through Pumping

Mechanisms

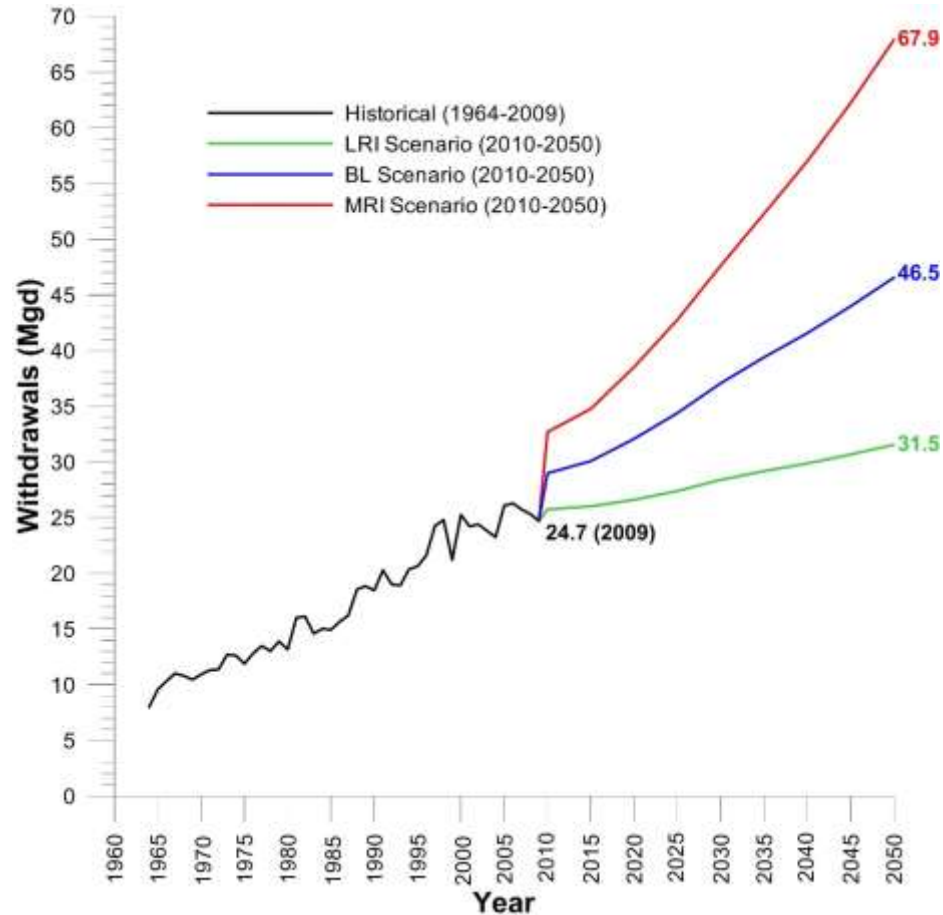
1. Interception of groundwater that would otherwise discharge to streams
2. Inducement of leakage from stream channels

Winter et al. (1999)



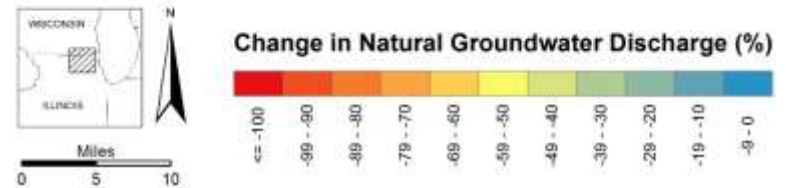
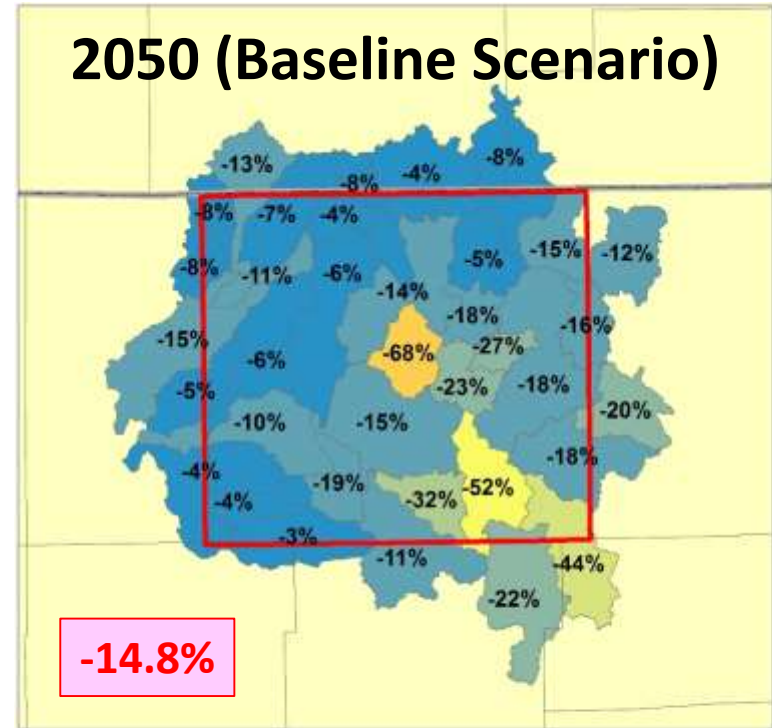
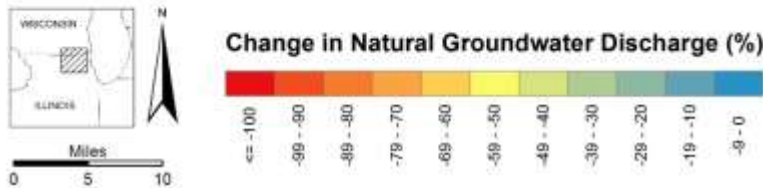
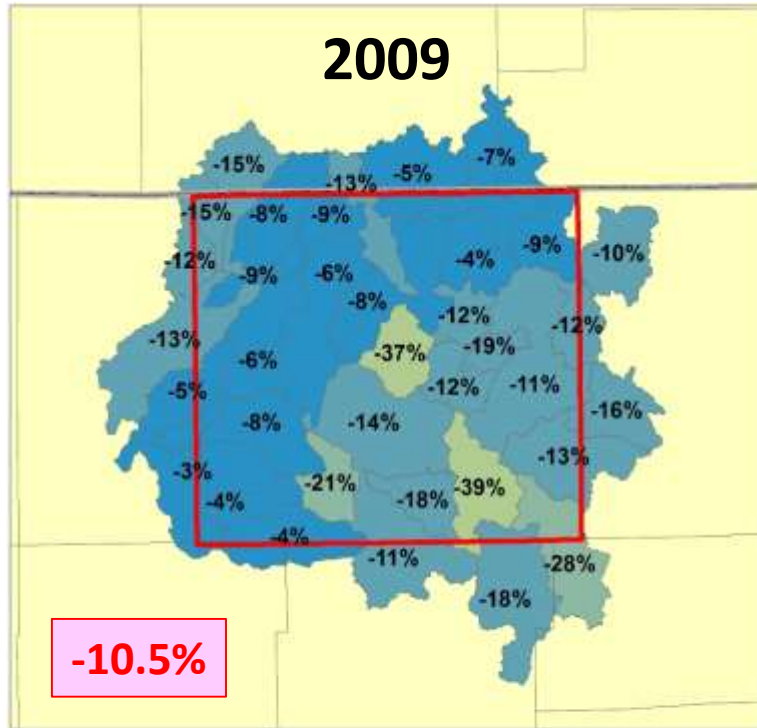
Simulated Pumping Scenarios

McHenry County Pumping Totals



Simulation Results

Change in Natural Groundwater Discharge

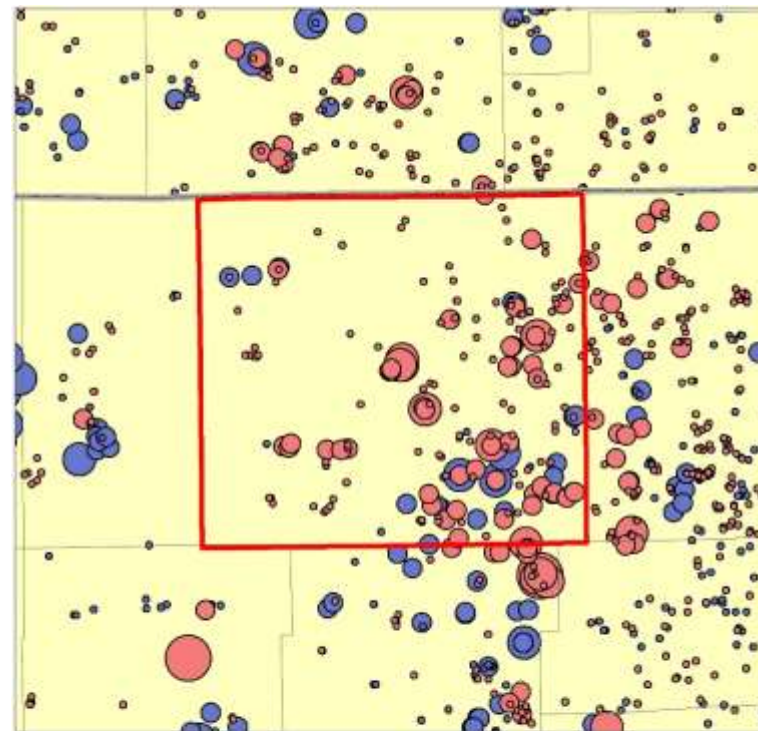
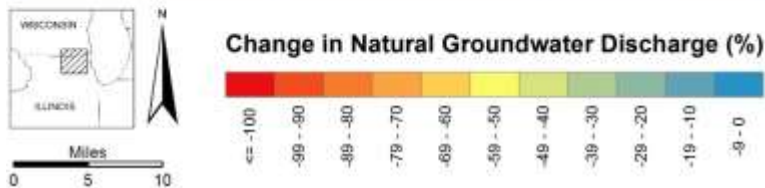
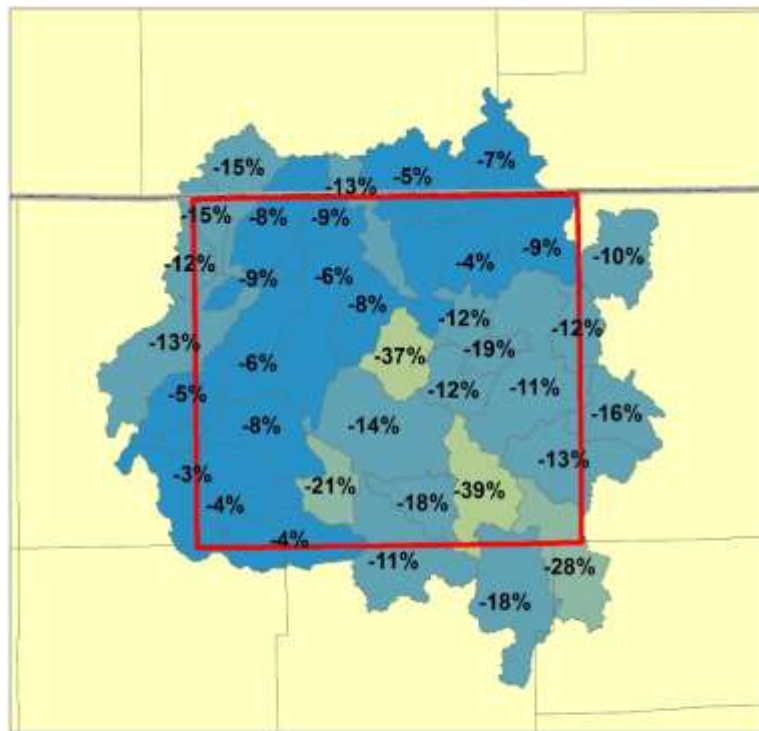


Reduction of Natural Groundwater Discharge Influences

- Hydrogeology
 - Aquifer and aquitard geometries
 - Transmissivity
- Pumping Distribution
 - Magnitude
 - Proximity

Simulation Results

2009



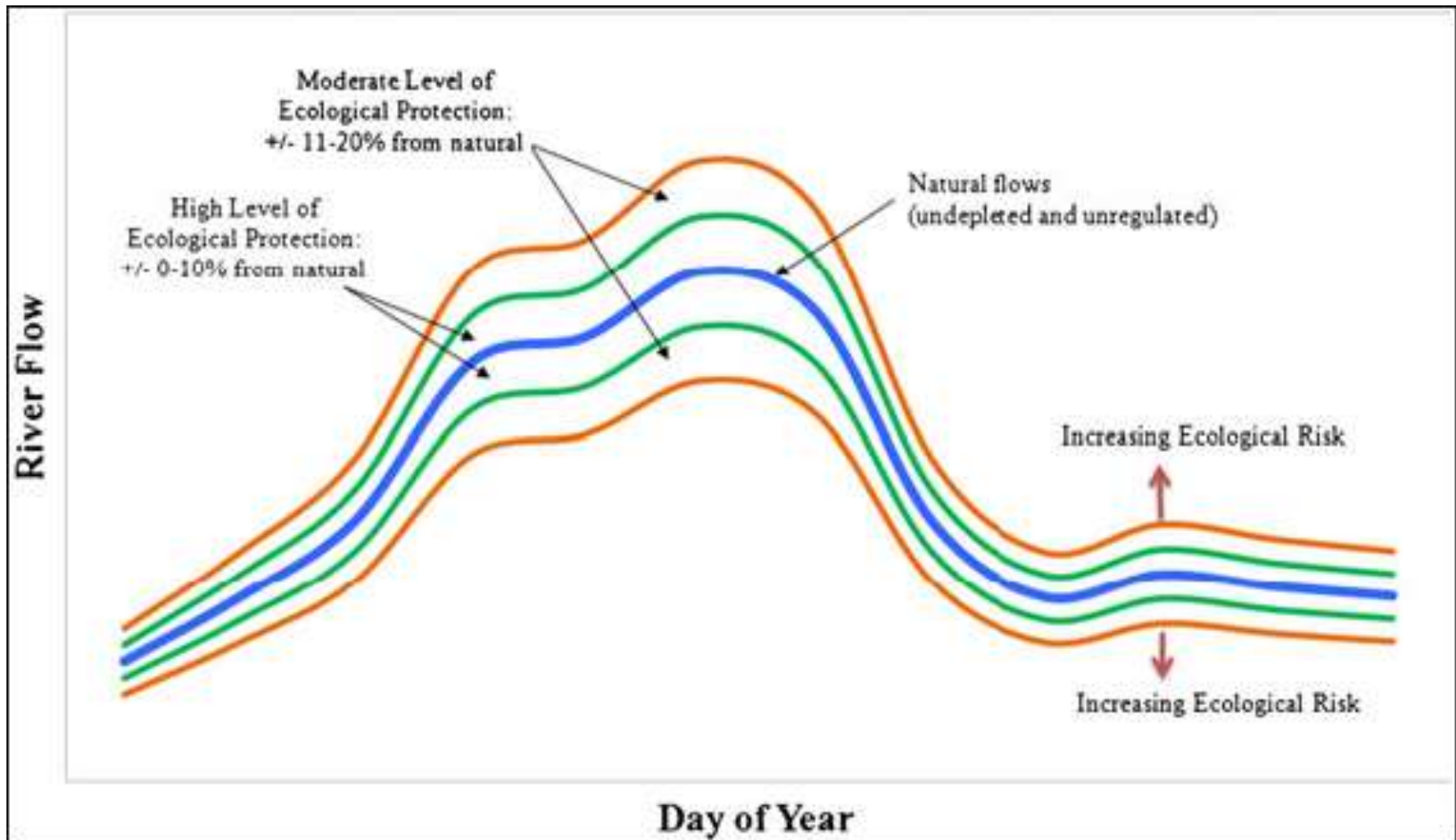
Why worry about reduction in natural groundwater discharge?

- Ecological disturbance
 - Reduced streamflows and surface-water elevations
 - Reduced saturated conditions in wetlands
- Reduced surface water availability for water supply
- Ultimately, under an unchanging pumping distribution, groundwater withdrawals are compensated for by an equivalent reduction in natural groundwater discharge, but feedback is slow

Effluent **may** offset **some** effects

How much reduction is tolerable?

Richter, B.D., et al. (2011). A Presumptive Standard for Environmental Flow Protection. *River Research and Applications*, DOI: 10.1002/rra.1511



Richter et al. (2011)

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