

# **WATER SUPPLY PLANNING AND MANAGEMENT: SUSTAINABILITY**

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**Mahomet Aquifer Consortium  
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**ISWS**



# Acknowledgments

- Al Wehrmann, ISWS
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# HOW TO MANAGE REGIONAL WATER SUPPLIES?

- **Business as usual? Reasonable use.**
- **Change?**
- **Many pieces to the jigsaw puzzle (supply; demand; impacts of withdrawals; conservation; reuse; surface water; groundwater; conjunctive use; climate change; droughts; time horizons;)**

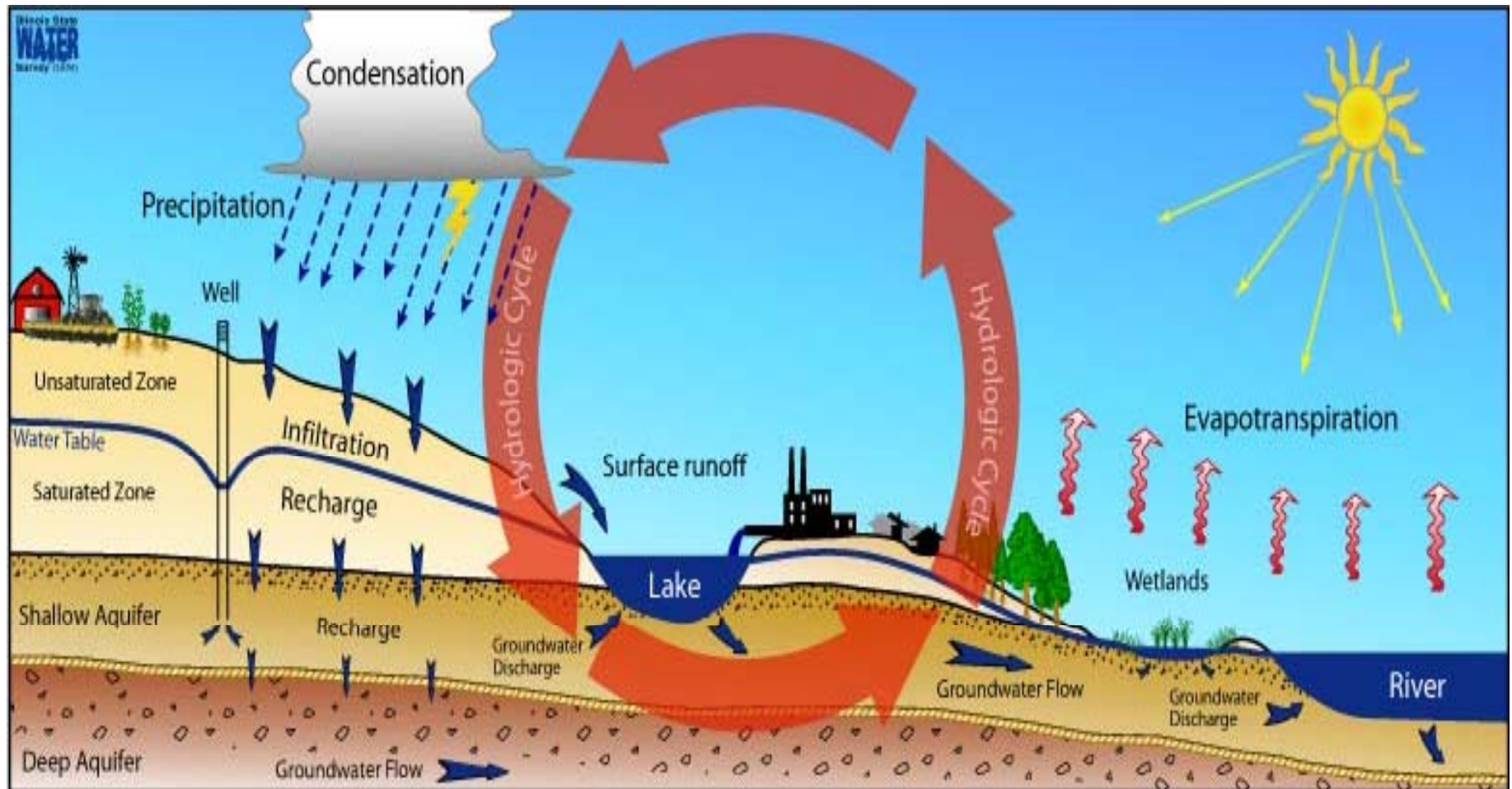
# HOW TO MANAGE REGIONAL WATER SUPPLIES? (contd.)

- Previously not had a process and structure for regional planning and management (other than LM diversion)
- Governor established an administrative process and structure for regional planning and management
- RWSPC needs develop a **framework** for making management recommendations
- The concept of sustainability offers an opportunity for developing such a framework
- If not sustainability, what other framework?

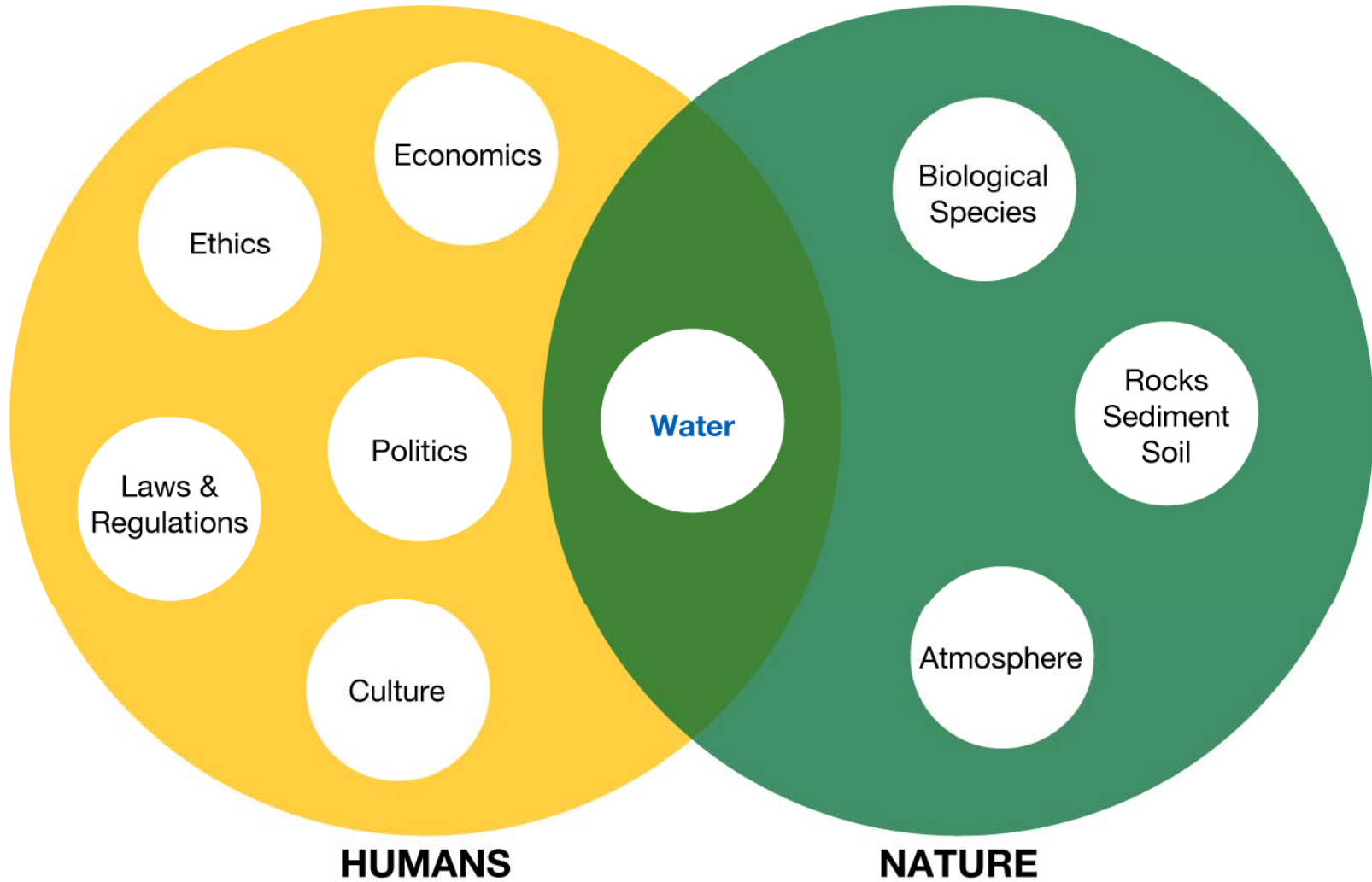
**GOAL OF WATER SUPPLY  
PLANNING:**

**TO PROVIDE  
ADEQUATE SUPPLIES  
OF  
CLEAN WATER  
FOR ALL USERS  
AT REASONABLE COST**

# THE WATER CYCLE: A PHYSICAL AND BIOLOGICAL FRAMEWORK FOR REGIONAL WATER SUPPLY PLANNING AND MANAGEMENT



# Water Supply Planning and Management



# **SUSTAINABILITY**

**“meeting current needs  
without compromising the  
opportunities of future  
generations to meet their  
needs”**

**World Commission, 1987**



# **GROUNDWATER SUSTAINABILITY**

**“ .. development and use of groundwater in a manner that can be maintained for an indefinite time without causing unacceptable environmental, economic, or social consequences.”**

**USGS Circular 1186, 1999**

# **SUSTAINABILITY RECOGNIZES:**

- **Present and future generations**
- **The value of water supply**
- **Shared responsibilities**
- **Renewable but not limitless water supply**
- **Stewardship**
- **Reasonable use and acceptable impacts**
- **Maintenance of integrity of societal and ecological systems**
- **Adaptability and flexibility to deal with uncertainties and risks**

# **NON-SUSTAINABLE MANAGEMENT INCLUDES:**

- **Inadequate consideration of future generations**
- **Undue recognition of the value and limits of water**
- **Singular decision making**
- **Unreasonable use, unacceptable impacts, and high costs**
- **Imbalance between meeting societal and ecosystem needs**
- **Inability to deal with droughts, climate change etc.**

# **Does A Reservoir In Illinois Offer A Sustainable Water Supply?**



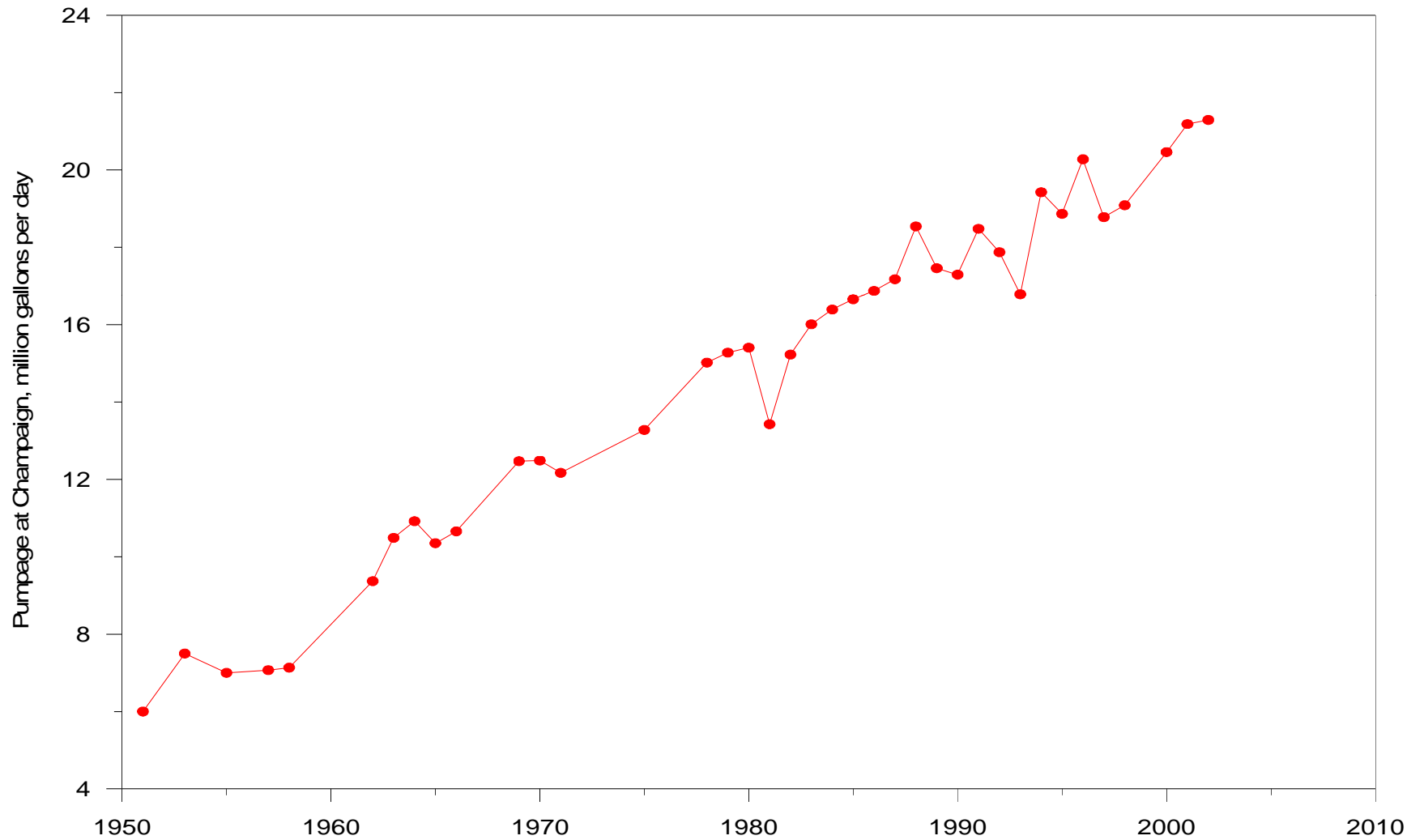
# **Does A Reservoir In Illinois Offer A Sustainable Water Supply?**

- **May be, may be not!**
- **Depends on definition of sustainability**
- **Critical considerations: time, costs and acceptable impacts**
- **Sustainable until water storage capacity is no longer adequate to meet needs – reduced supply (e.g., droughts; sedimentation)**
- **Sustainable until costs of dredging, enlarging the reservoir, or preventing sedimentation become too high**

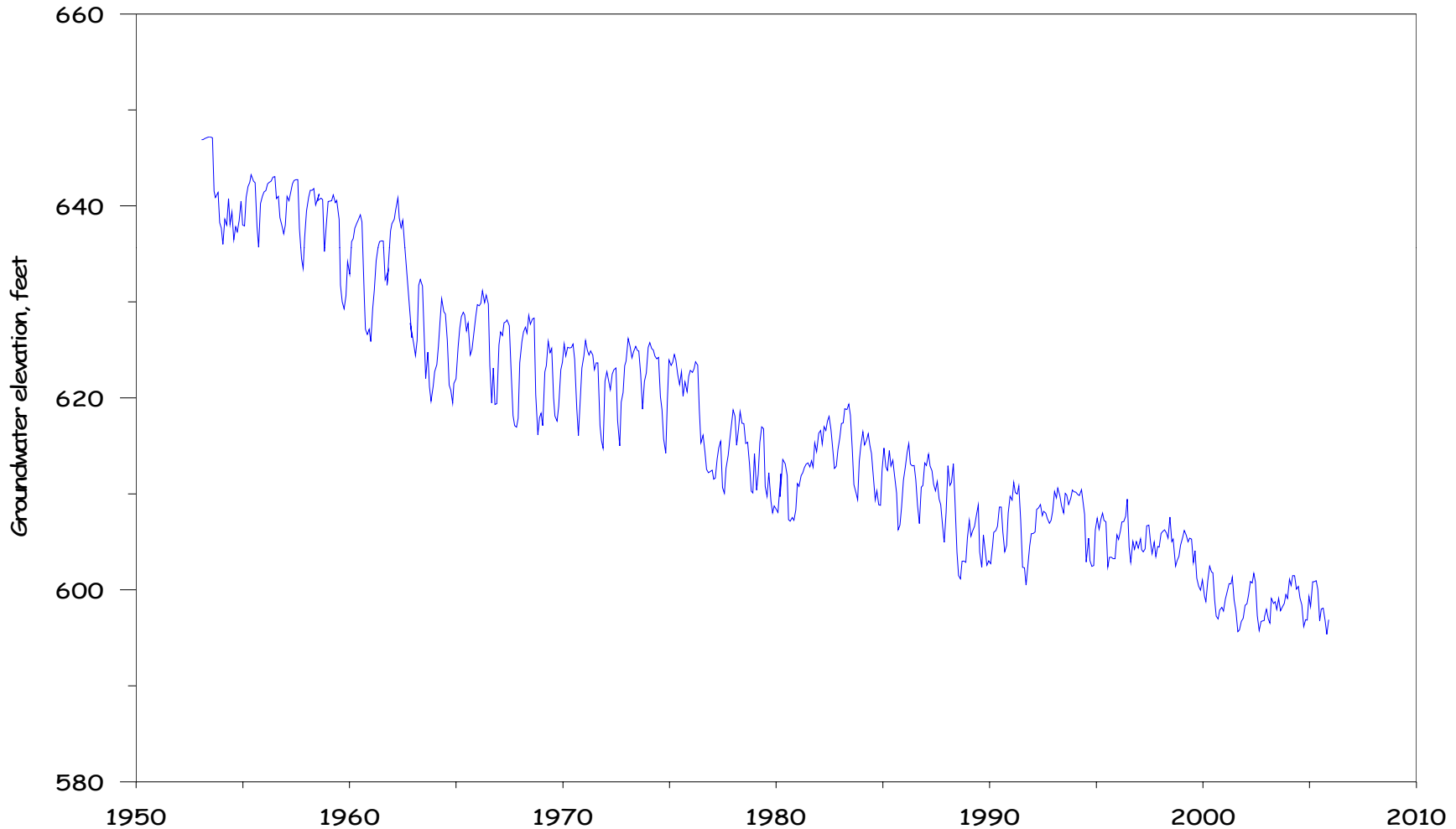
# **IS WITHDRAWING LARGE AMOUNTS OF WATER FROM AQUIFERS SUSTAINABLE?**

- **Safe yield: withdrawals = recharge**
- **BUT withdrawals can e.g., reduce streamflow; dewater aquifers; cause existing wells to go dry; cause deterioration in water quality**
- **Often decades to centuries for groundwater flow system to come to new equilibrium**
- **Safe yield is not necessary sustainable**
- **Critical considerations: acceptable impacts and costs**

# Water Use - *Long-term trend at Champaign*

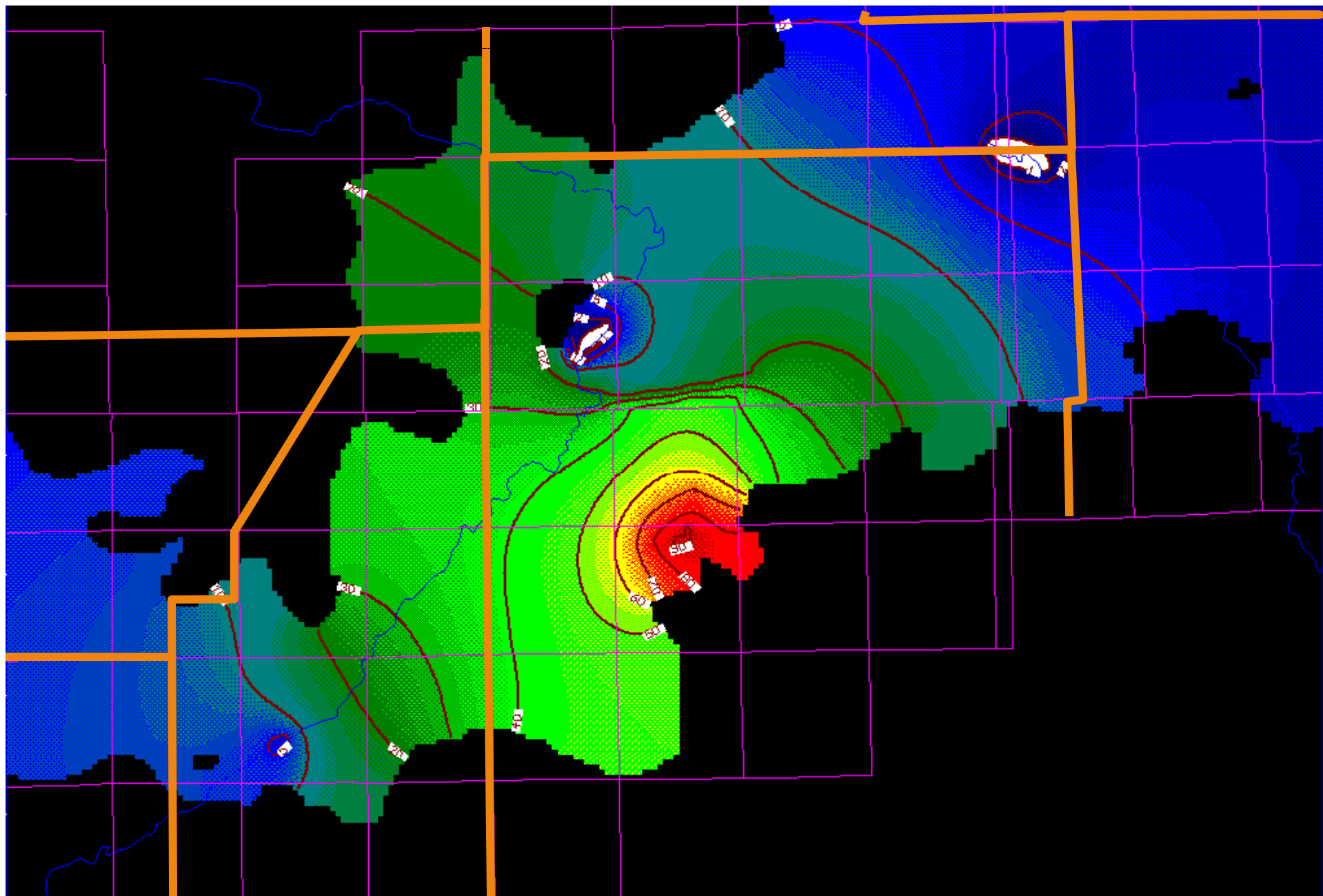


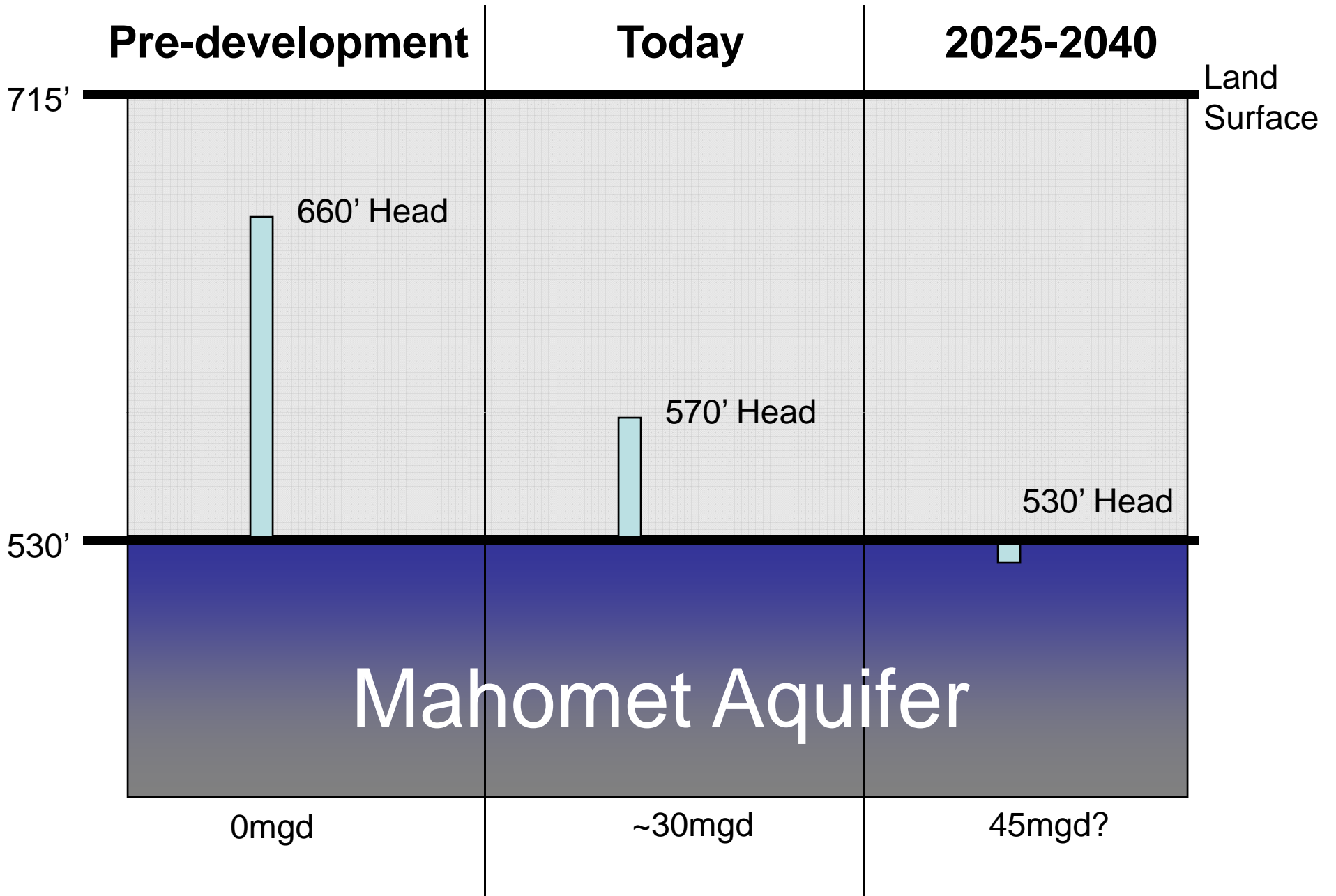
# Mahomet Aquifer Water Level [Head] at Rising, near Champaign





# Simulated Drawdown from IAWC Wellfield, draft 2005





**Decline in “head” west of Champaign preliminary)**

# ACCEPTABLE/UNACCEPTABLE CONSEQUENCES

- Rule of reasonable use
  - not wasteful, malicious or negligent
- No seniority rights
- Creating large cone of depression and lowering water levels in Mahomet and Glasford aquifers not necessarily unreasonable
- What would be judged unreasonable/unacceptable by public and lawyers?

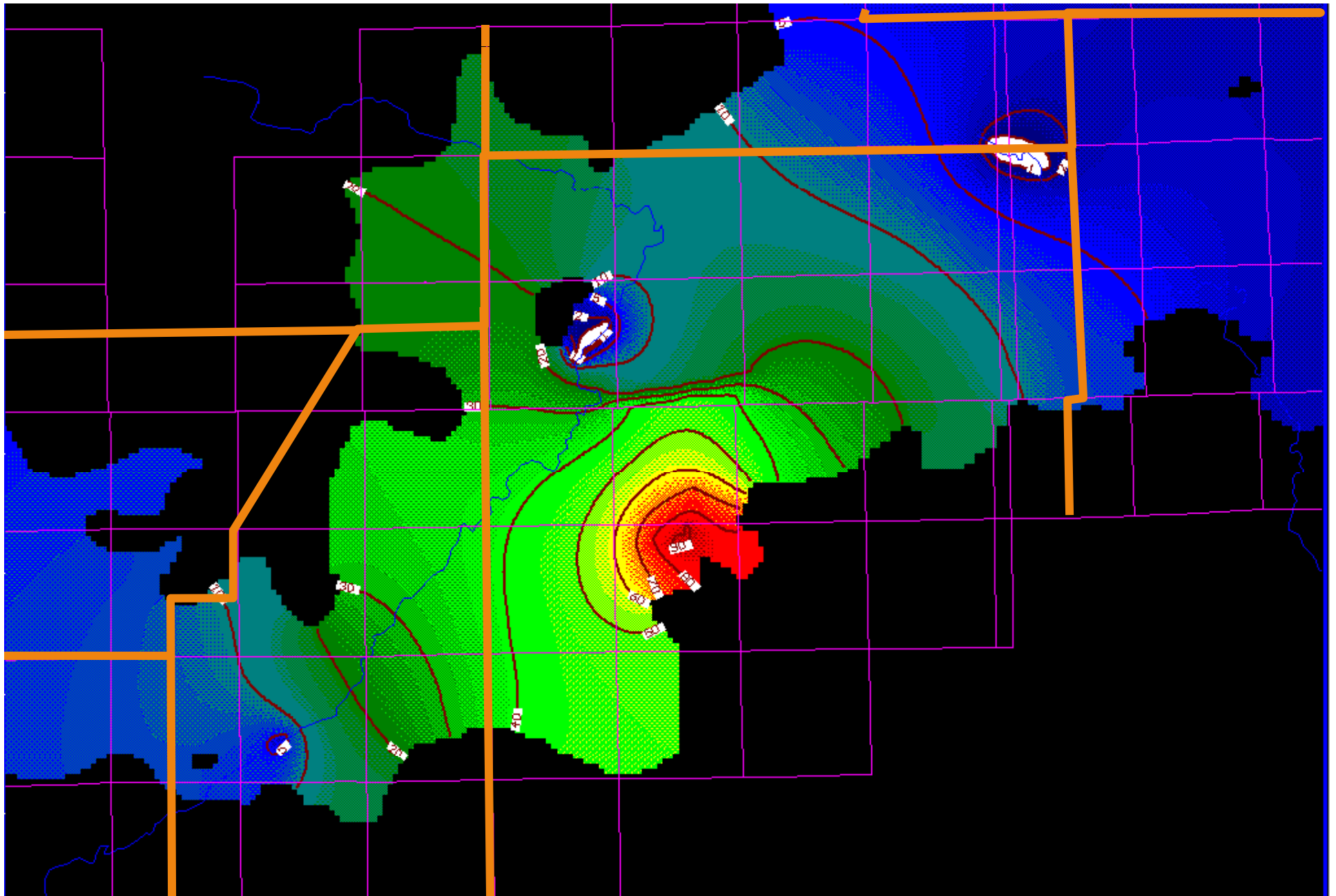
# ACCEPTABLE/UNACCEPTABLE CONSEQUENCES (contd.)

- Lowering of head into Mahomet Aquifer and dewatering the aquifer?
  - temporarily (e.g. during drought)
  - permanently?
- Dewatering the Glasford Aquifer?
- Is dewatering the aquifers acceptable if impacts on existing wells are mitigated?
- Withdrawing water from surface waters (e.g. Sangamon River)?
- Reversing the regional flow in the aquifer?

# SUSTAINABILITY THRESHOLDS?

- Critical levels for managing water supply operations, e.g, Q7/10
- Sustainable operations above thresholds
- Non-sustainable operations below thresholds
- Thresholds can be set by society based on acceptable/unacceptable impacts, costs, etc
- Strategies can be implemented to ensure compliance with thresholds
- Do you wish to identify and recommend thresholds?
- Can you implement additional thresholds within existing laws, regulations and property rights?
- Can you achieve “sustainability” without changing laws, regulations and/or property rights?

# Simulated Drawdown from IAWC Wellfield, 2005



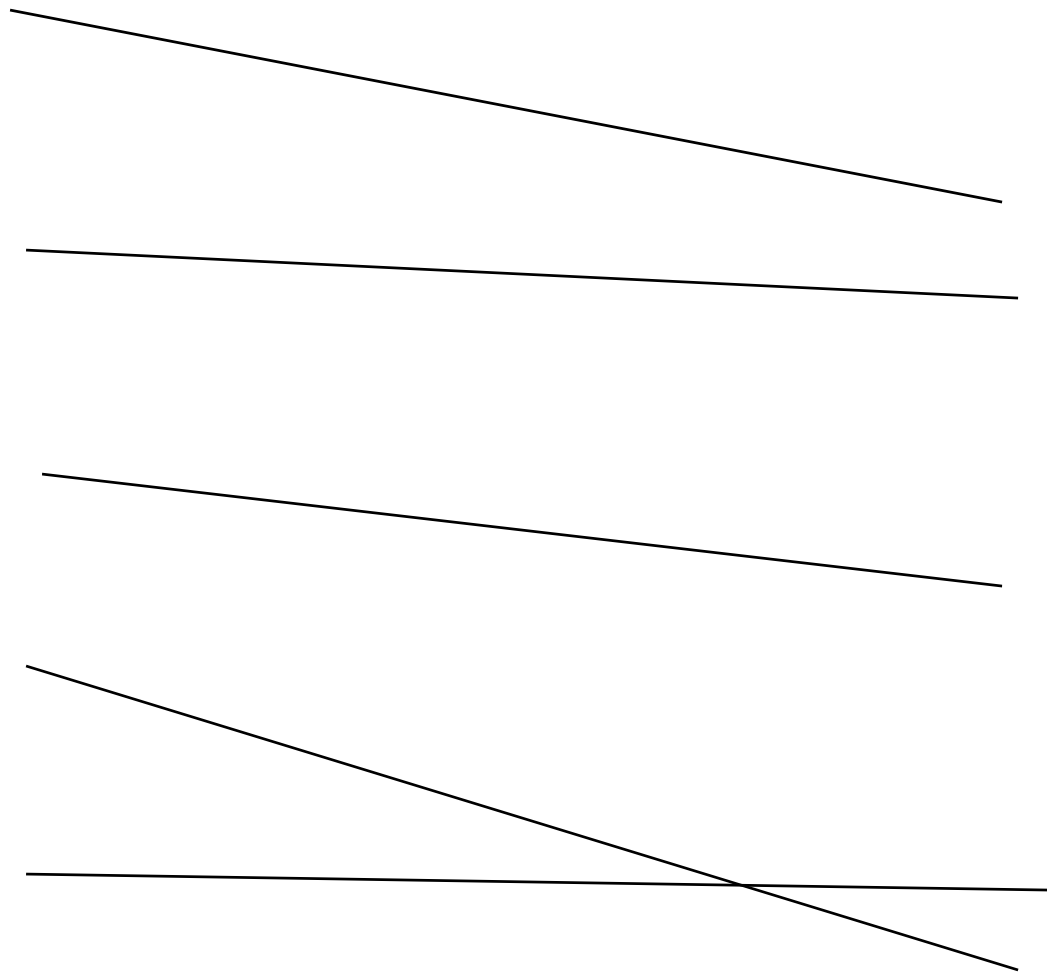
# CUMULATIVE IMPACTS WITH HYPOTHETICAL +18 MGD THRESHOLD

- **+15 mgd**

- **+2 mgd**

- **+4 mgd**

- **TOTAL +21 mgd**



# CONSERVATION and REUSE

- **Provide low cost and efficient options for reducing water demand, withdrawals and impacts.**
- **Delay high cost operations?**
- **Allow for further development?**
- **Delay reaching critical thresholds of unacceptable consequences?**
- **Need consider C&R in broad context of integrated resources management and development.**



# **Regional Water Supply Planning Committee**

- **Identify a framework within which you can pull all the pieces together and set goals, strategies etc.**
- **Do you wish to use sustainability as a framework for making management recommendations?**
- **If yes, you probably need to clearly define sustainability in an operational mode, otherwise perhaps not different from reasonable use.**
- **If not sustainability, will you adopt another framework?**
- **Identify the resources you wish to protect, preserve and enhance – aquifers; water storage and flows; society; economy; ecosystems etc.**
- **Identify the impacts and costs that are acceptable taking into consideration the benefits.**

**DEFINING SUSTAINABILITY FOR  
WATER SUPPLY PLANNING IS A  
CHALLENGE TO SOCIETY**

**SCIENTISTS CAN PROVIDE DATA  
BUT SOCIETY MUST DECIDE WHAT  
IS ACCEPTABLE AND  
UNACCEPTABLE  
i.e. WHERE TO DRAW THE LINE**

**Illinois State**  
**WATER**  
**Survey (1895)**

**HAPPY HOLIDAYS**

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