Water Resource Management

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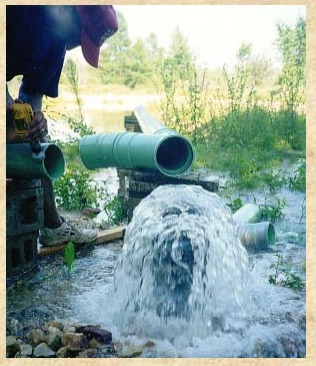
Water Management-A Comprehensive Program

- **Updated Assessment of Current Demand:**
  -- Last Major Use Assessments, by Aquifer and Watershed, in 1995.
- **Resume and Enhance Groundwater Level Monitoring:**
  -- Regional Aquifer Trends and Local Hotspots.
- **Add and Maintain Additional Stream Gages:**
  -- Gages needed for accurate surface water allocation, reservoir studies.
- **Updated Assessments of Aquifers—Geologic and Hydrologic Properties:**
  -- Last Major Efforts in the 1960's – 1980's.
- **Upgraded Assessment Techniques:**
  -- Need to Utilize Modern Modeling and Predictive Analysis.
- **More Thorough Hydrogeologic Reviews of Permits:**
  -- Well/Stream Interference and Sustainability Questions. Assistance in Drought and Conservation Planning for Water Supplies.
- **Update the State Water Plan—The Road Map for Water Use:**
  -- Last update in 1985. Do our rules, regs, policies need reworking?

Water Resource Management for Long-Term Sustainability



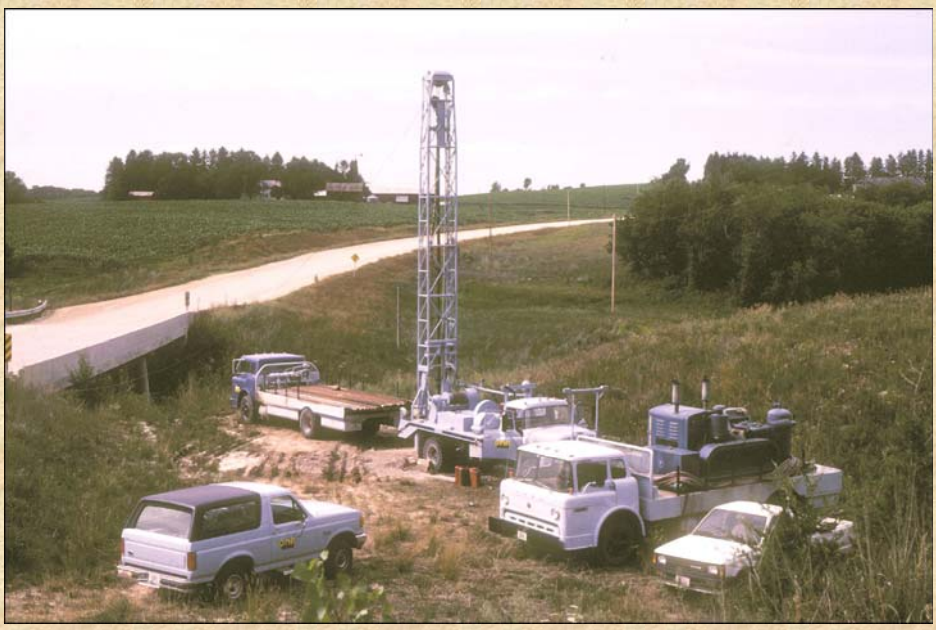
Original Water Resource Management Program Proposal -- $1.65 M annually

Legislative Appropriation --$480K

FY 08 Activities

- Supported two stream gages that would have been dropped
- Re-instated GW level measurements
- Developed aquifer characterization methodology
- Data Mining – Characterization of Dakota Sandstone
- Predictive Model developed for Dakota SS

Groundwater Resource – Geologic Characterization




4
C3
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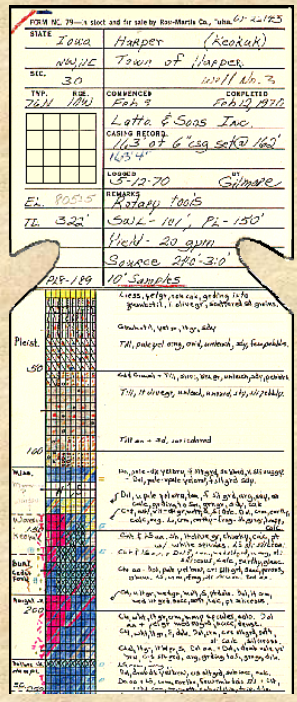
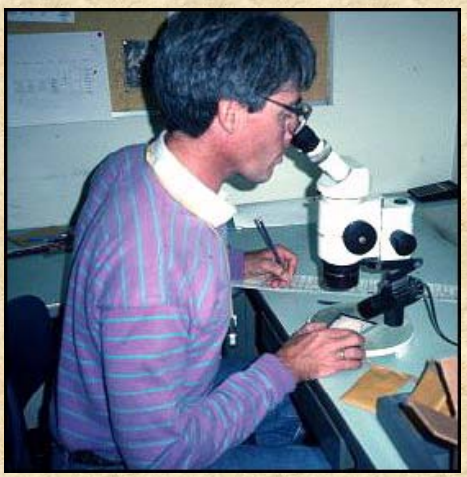


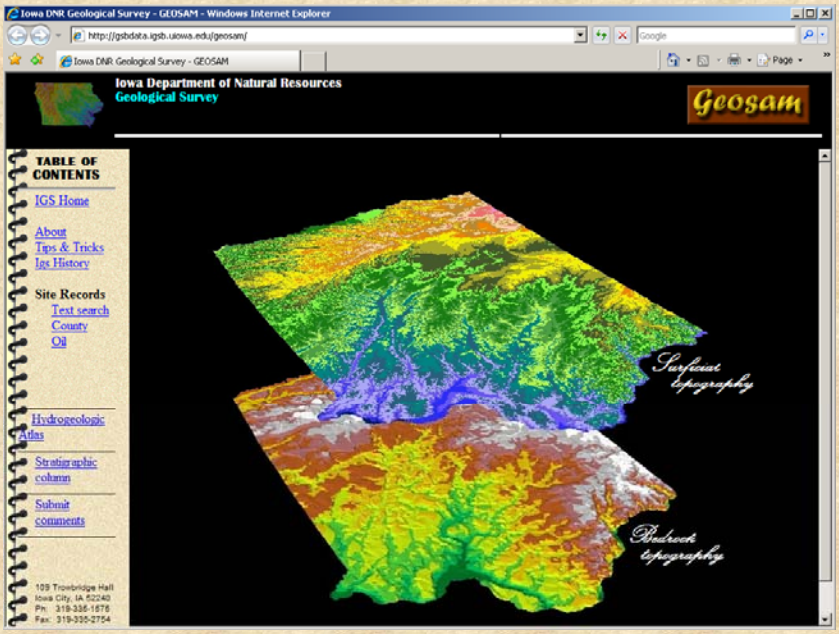
Analysis and Interpretation



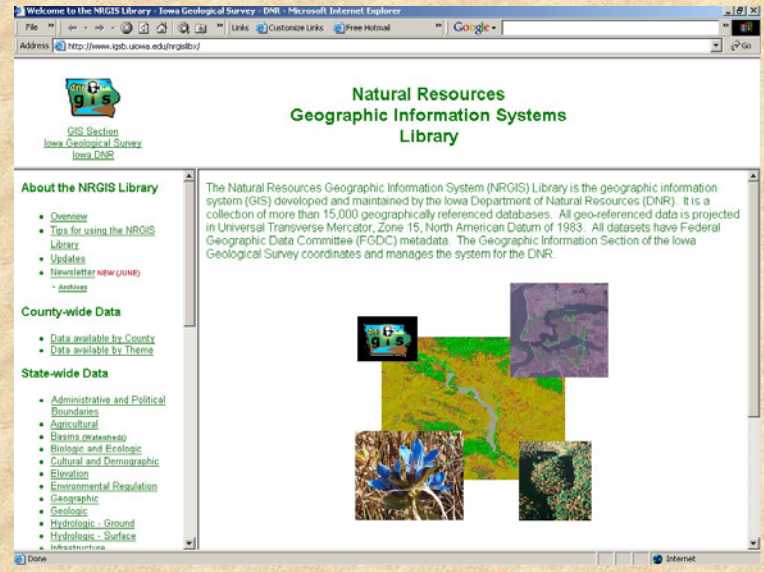
Water Use, Aquifer Tests, GW Quality Data Mining

Locations, Analysis, Specific Sources

Data Management and Dissemination



Data Management and Dissemination



Year One:
Dakota Aquifer Characterization

--48,000 feet of priority Dakota well cuttings described and logged. Logging equipment updated.

--4,500 existing well/drillers logs reviewed.

--1,000 Dakota WQ analyses (200 wells) databased/GIS'ed

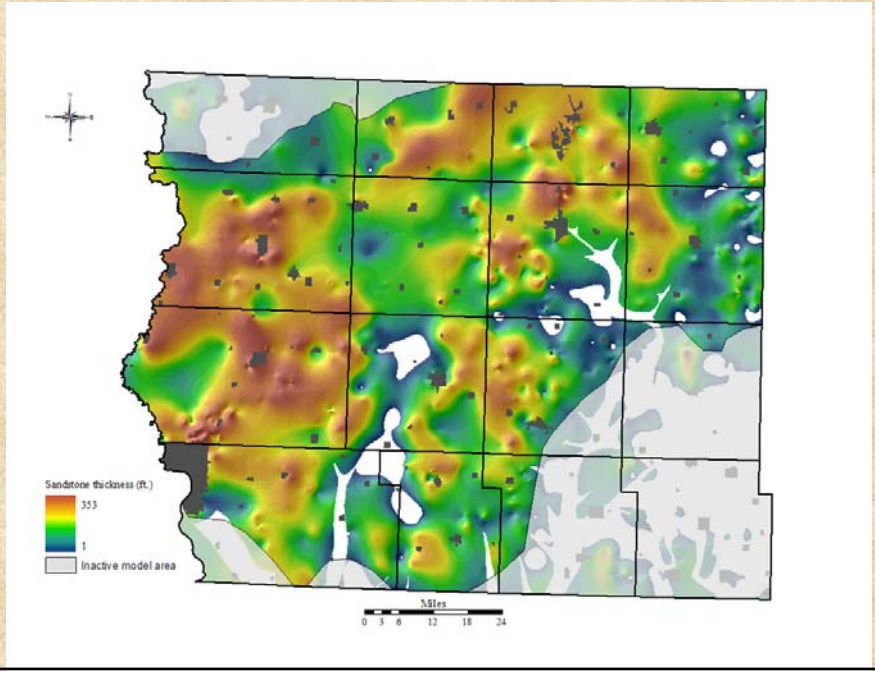
--Dakota GW elevations compiled and mapped.

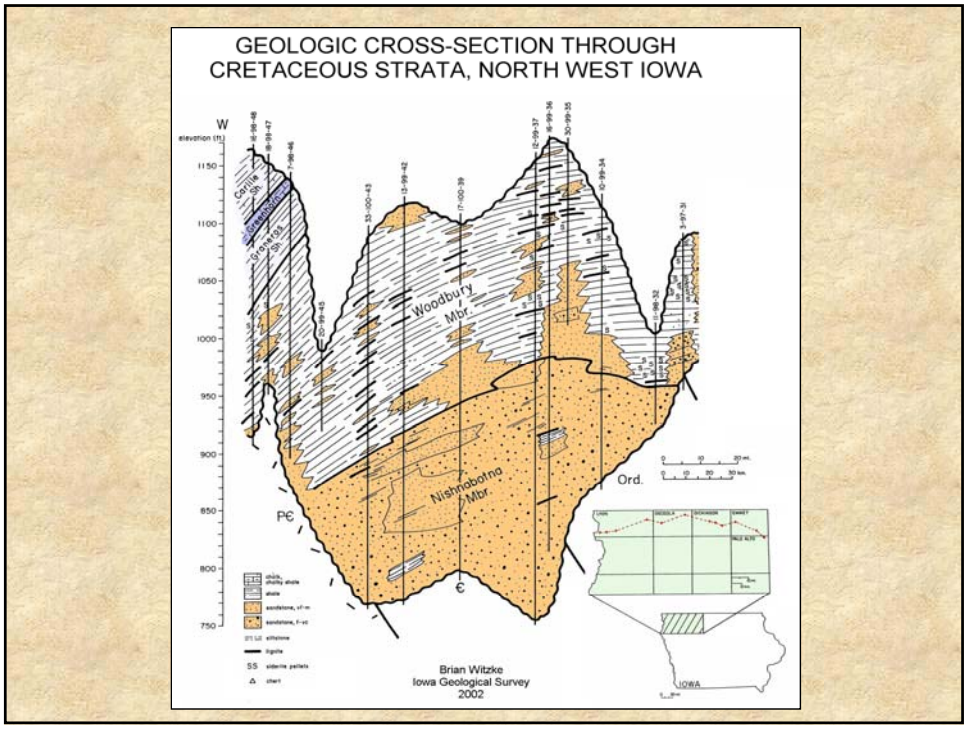
--Monthly and annual withdrawals from Dakota permits databased.

--Aquifer properties from DNR permit files, IGS records, NWIA consultants analyzed and databased

--Compatible data holding system in place.

--Dakota model developed and calibrated.




GEOLOGIC CROSS-SECTION THROUGH
CRETACEOUS STRATA, NORTH WEST IOWA
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Brian Witzke
Iowa Geological Survey
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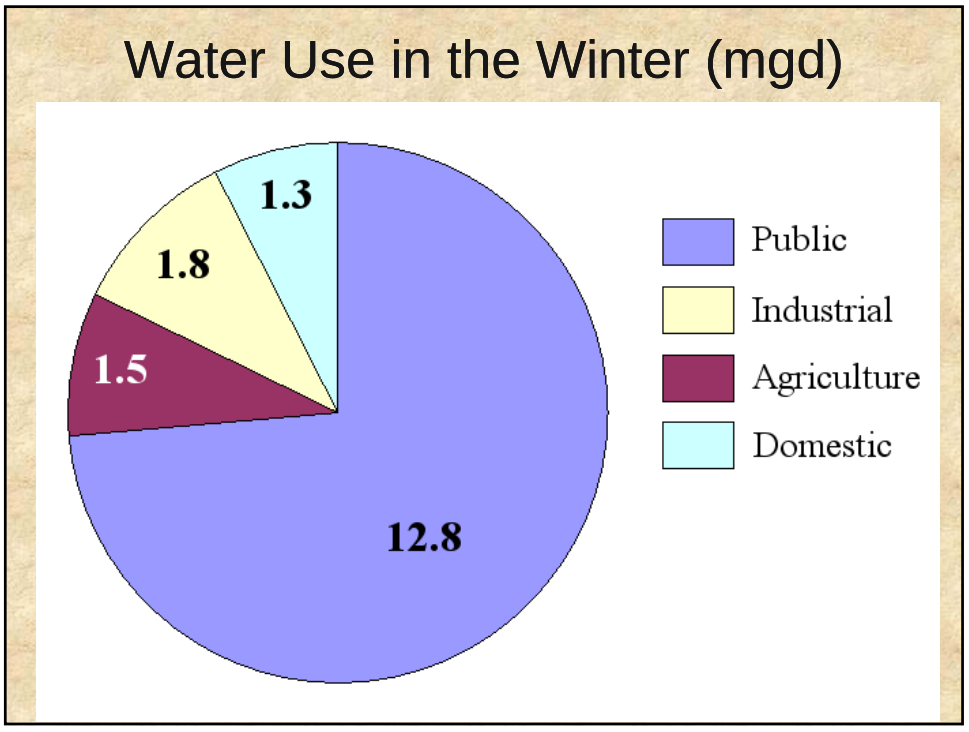
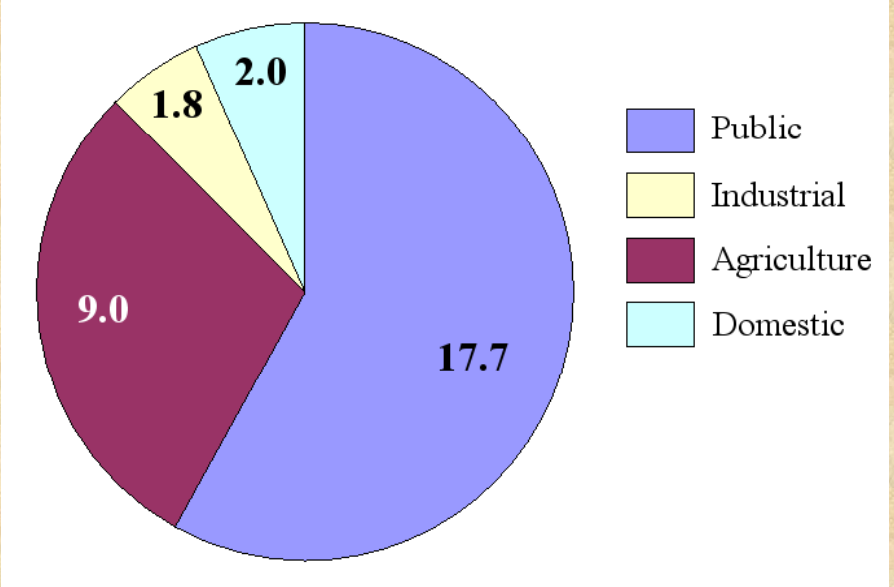
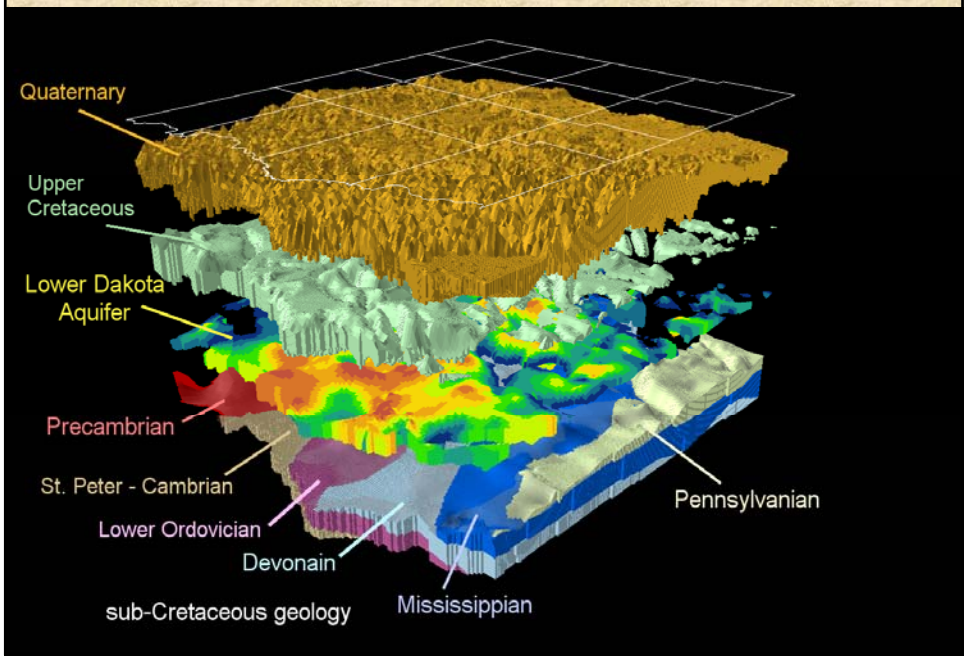
IOWA


Water Use in the Winter (mgd)
1.3
1.8
1.5
12.8
Public
Industrial
Agriculture
Domestic

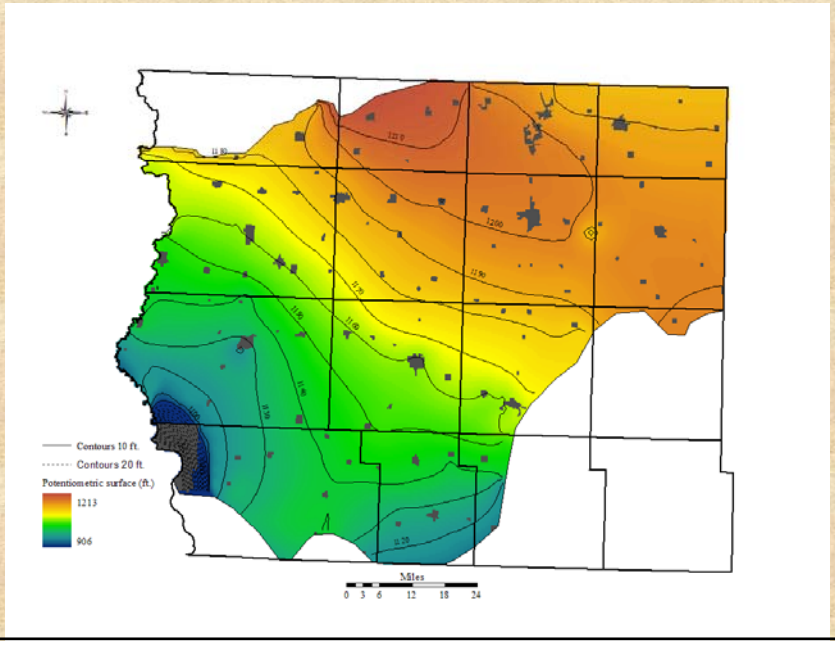
Water Use in the Summer (mgd)

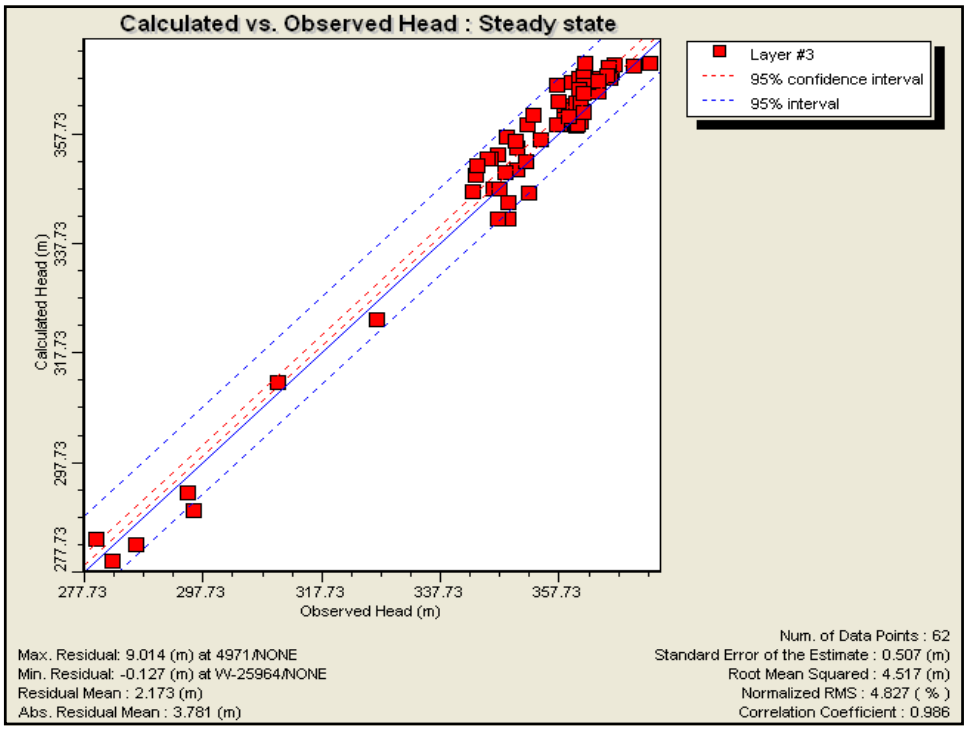


Four Model Layers



Model Calibration – Make sure it works





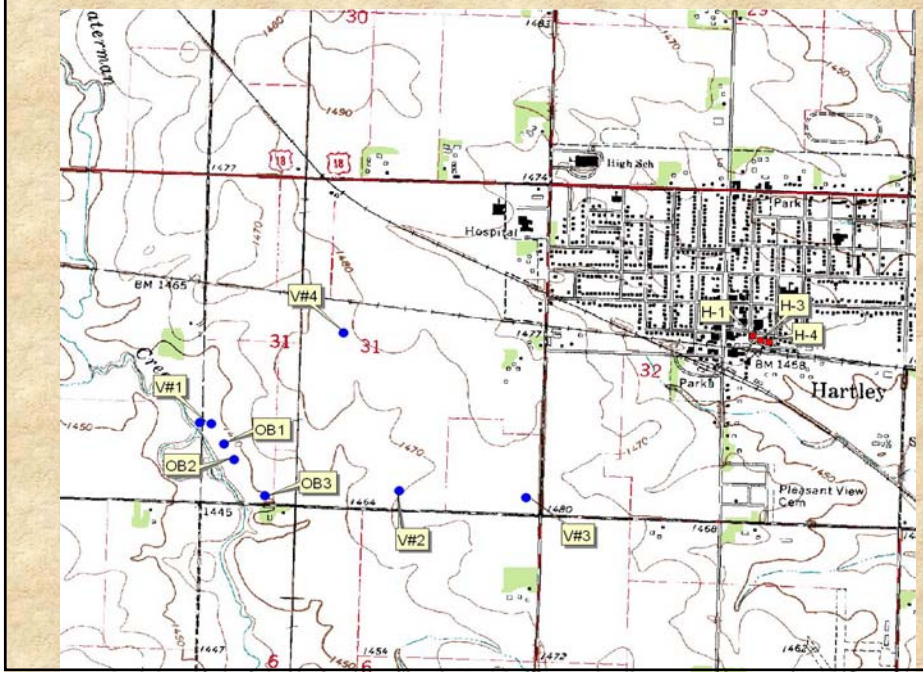
How do we use this?

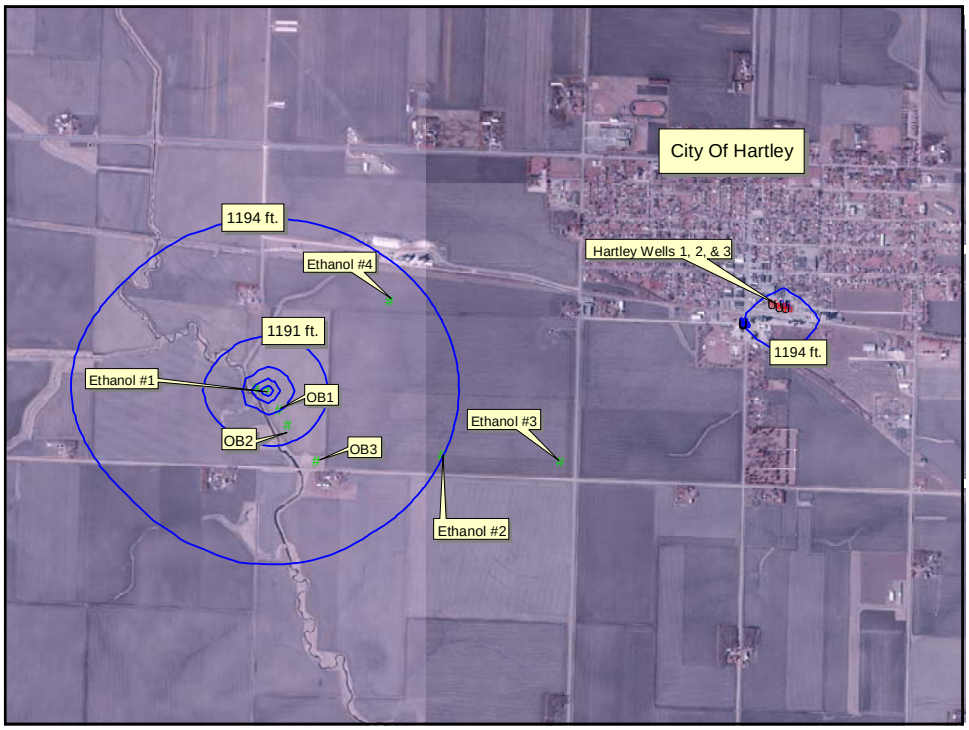
- Local – Site specific groundwater concerns.
- Major use areas and water balances.
- Aquifer wide assessments.
- “What happens if…..”
- Information has much value beyond model.

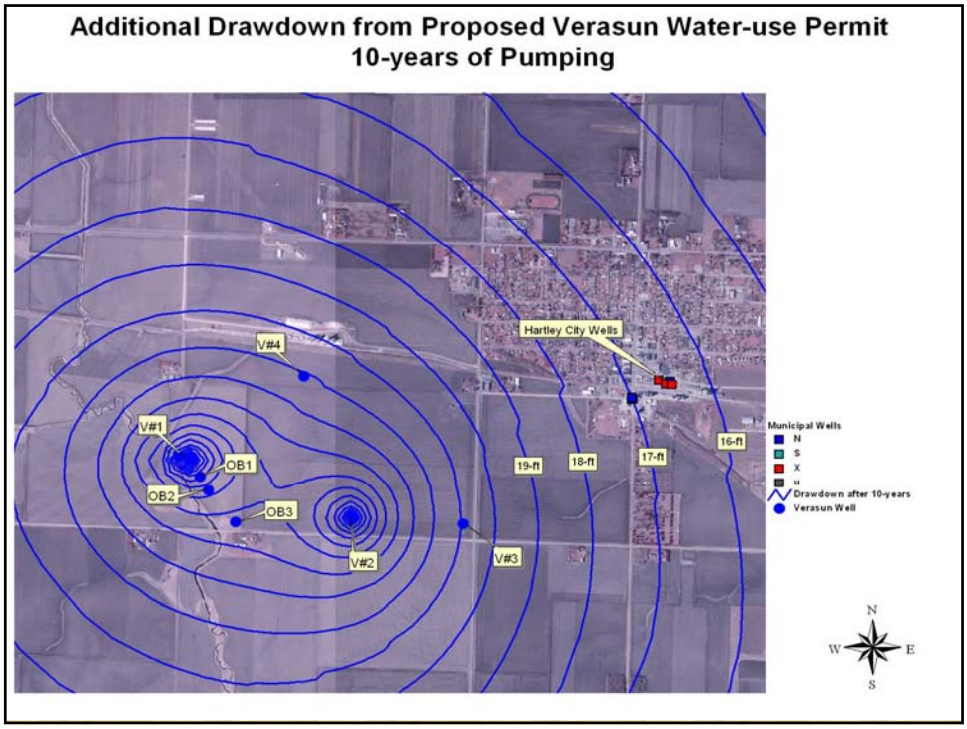
Site Specific Applications

- **Hartley VeraSun Ethanol - Water Use Permit**
- **1.6 mgd plant**
- **Located 1-2 miles from City of Hartley public wells**
- **Used regional model to evaluate potential well interference**

Hartley VeraSun Ethanol Water Use Permit



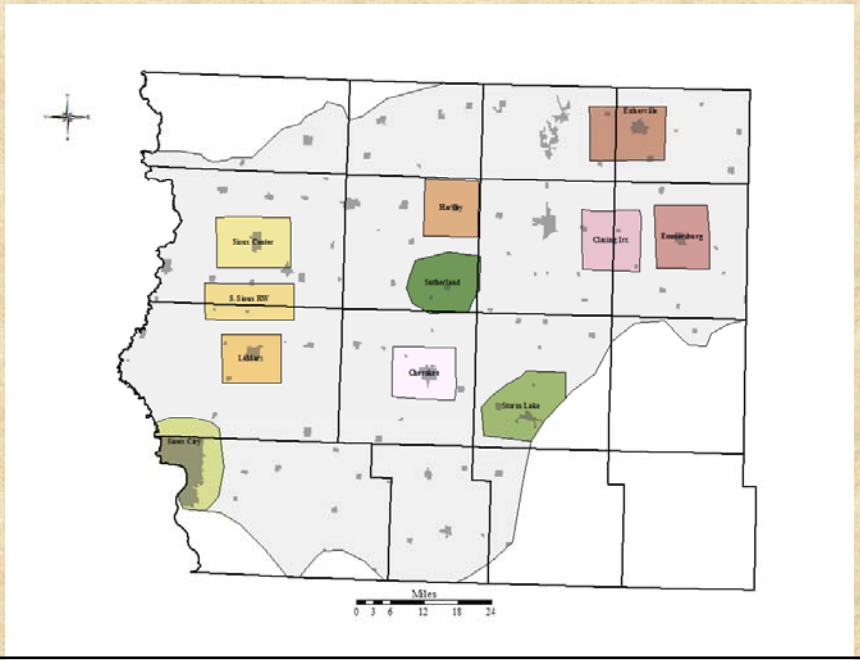




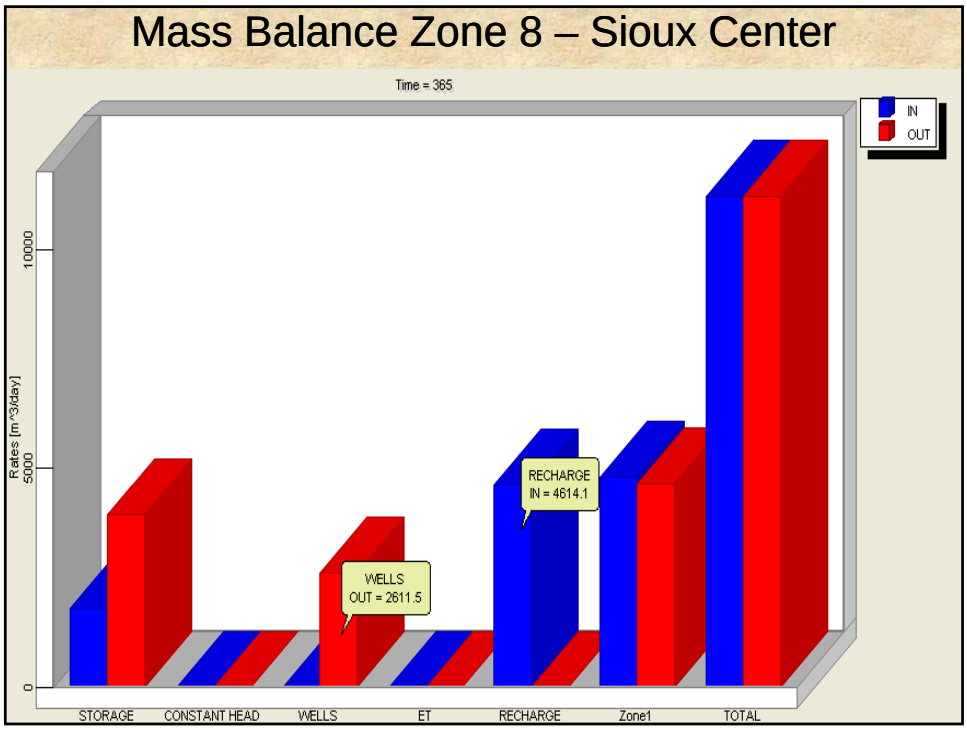
Simulated Results
Hartley VeraSun Ethanol Permit

- **Additional Drawdown in Hartley City Wells after 1-year of pumping = 13.5 feet**
- **Additional Drawdown in Hartley City Wells after 10-years of pumping = 17 feet**
- **City Wells currently have approximately 60-feet of head above the pumps during summer operation.**
- **Margin of safety for City Wells is 43 feet after 10-years of pumping**

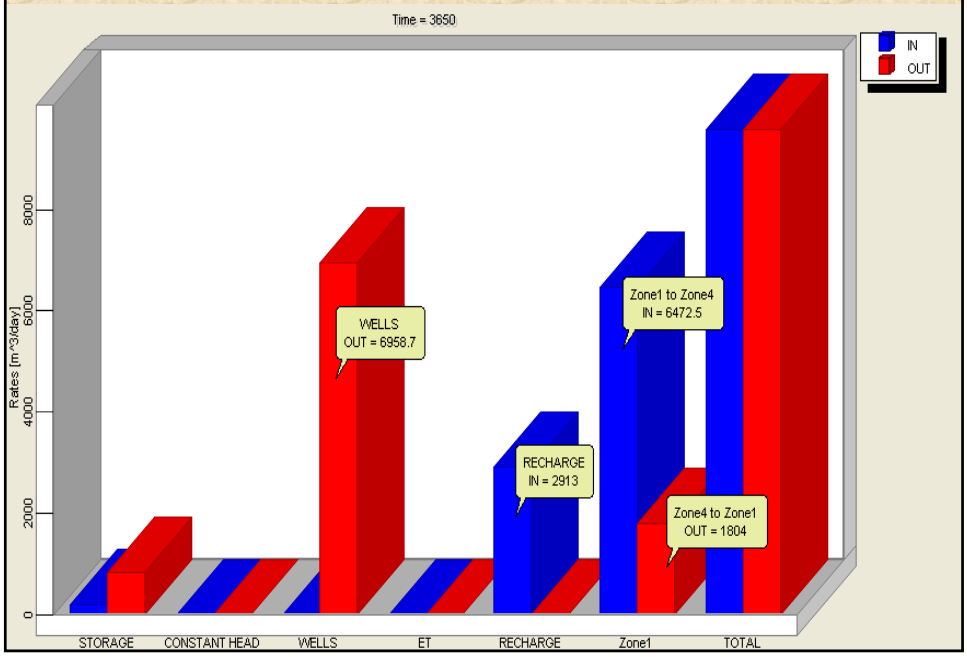
Area Zone Budget Applications



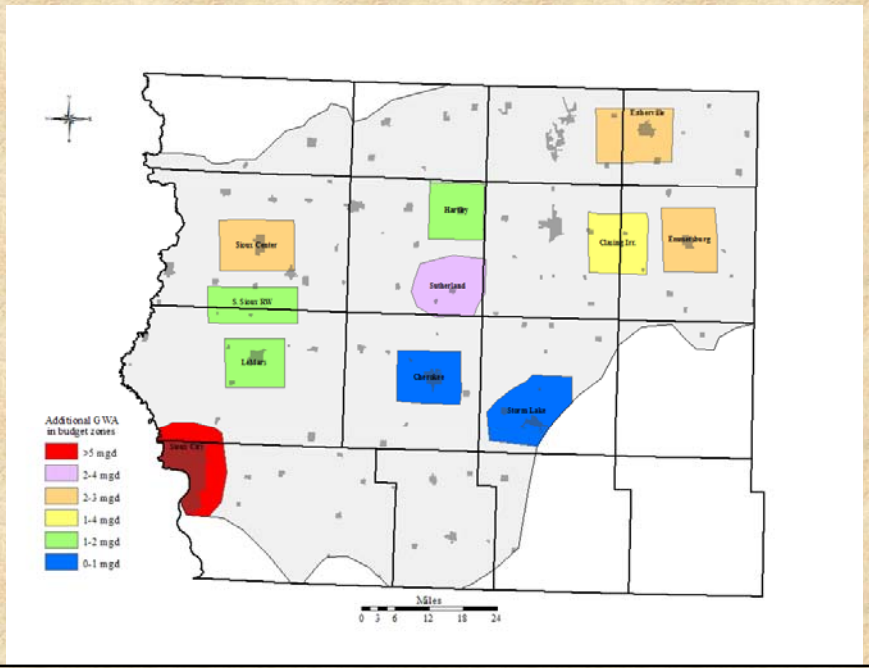
Mass Balance Zone 8 – Sioux Center



Mass Balance Zone 4 - Cherokee



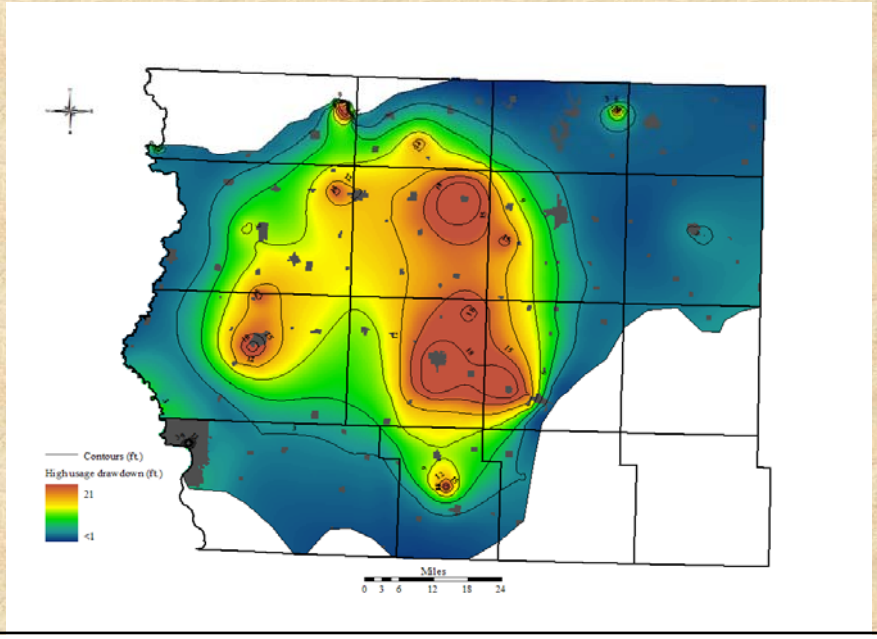
Groundwater Availability in High Usage Zones



Regional Scale Predictive Capability – "What if…."

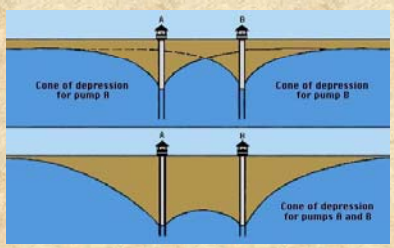
- …water use increases by XX %?
- …there are major new withdrawals?
- …recharge characteristics change?
- Capable of simulating a wide range of scenarios.

Additional Drawdown for a 50% Future Water Use Increase

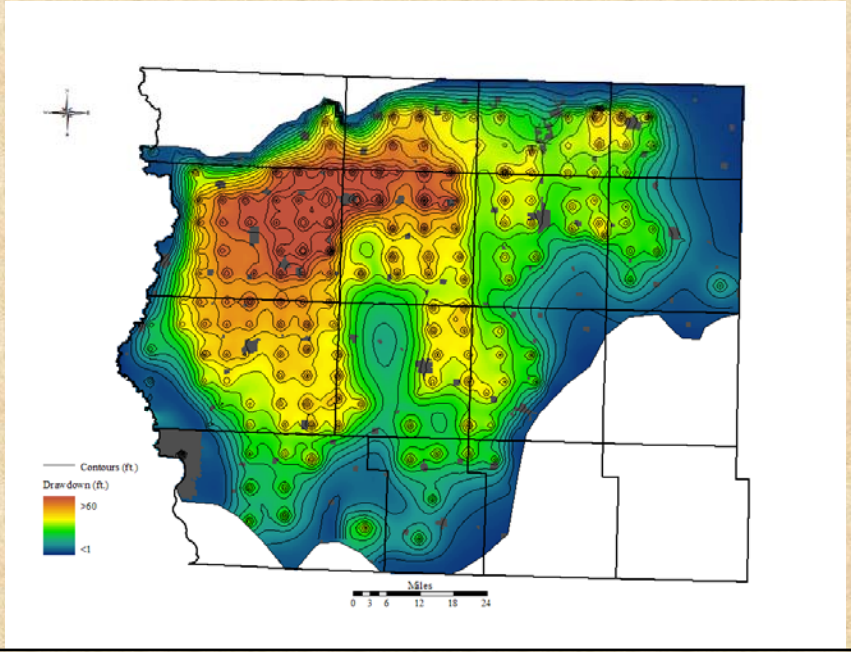


Irrigation Expansion

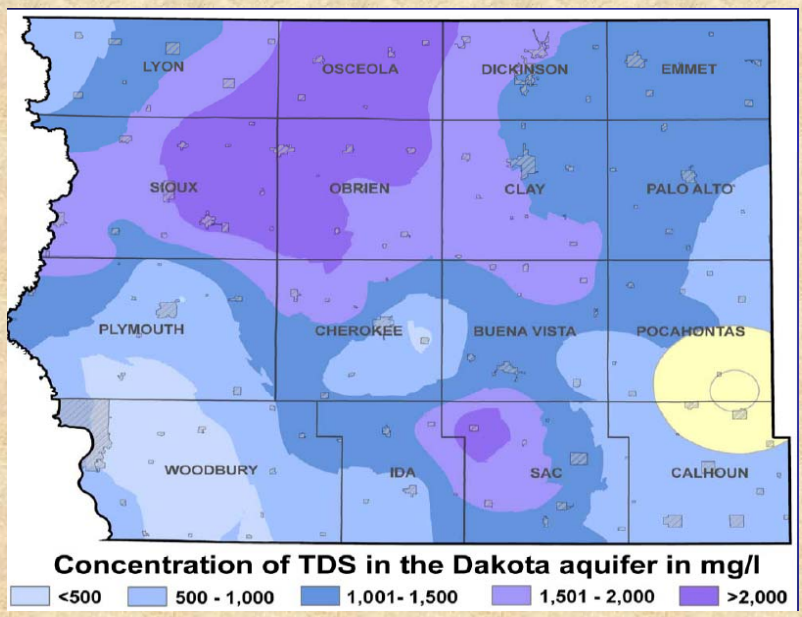
- 161 new irrigation permits (5-mile grid)
- Permits in areas with >100-feet of sandstone thickness
- 2-year back to back drought



Additional Drawdown for Irrigation Expansion



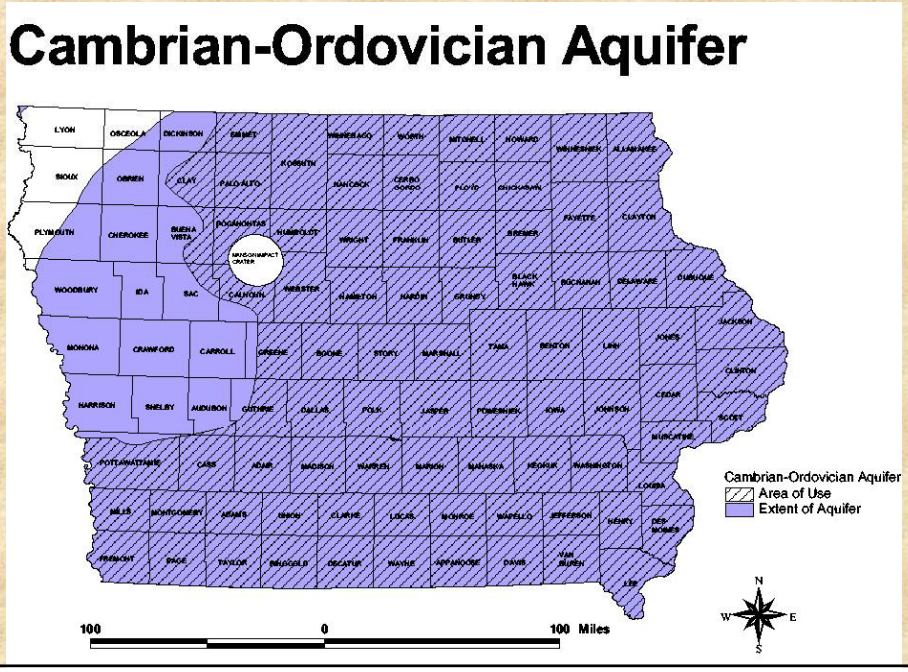
Water Quality Compilation



Initial Evaluation

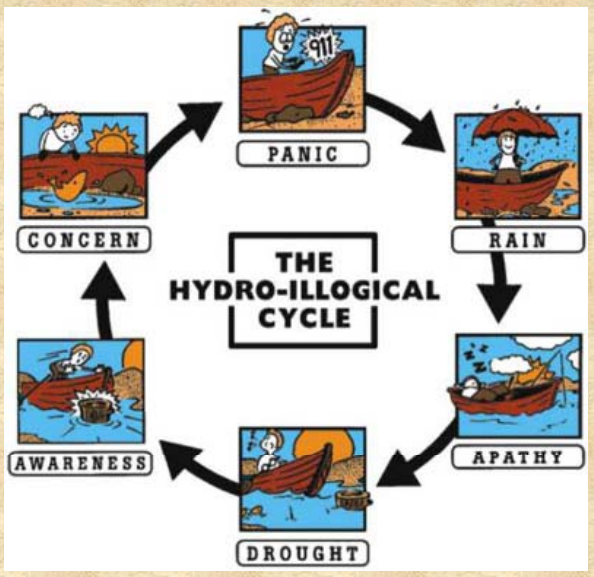
- **Based on mass balance no current regional concerns with groundwater availability.**
- **Zone budgeting indicates pumping centers are stressed but significant groundwater mining is not occurring.**
- **Site Specific modeling can easily be incorporated into regional model.**

FY 09 -- Next Steps -- Characterization and Modeling



Additional Program Needs

- Expand GW level network
- Build and maintain gages
- Create Water Resource data-base and web applications
- Additional characterization support



Goal: Break the Cycle

Water Resource Sustainability:

Assuring water for community, business, and ecological needs, today and into the future.

Questions?

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