

Water Resource Management



Bob Libra - Iowa DNR - Geological Survey

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



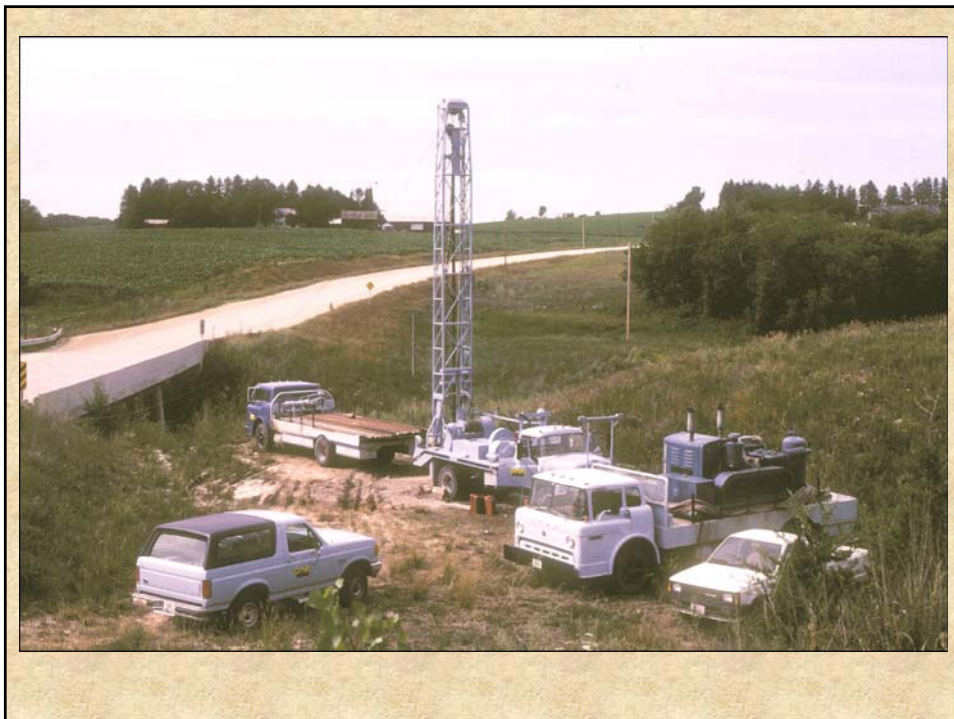
Original Water Resource Management Program Proposal -- \$1.65 M annually

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





Analysis and Interpretation

FORM NO. 79--a slide and for sale by Geo-Matrix Co., "date" 4/2/85	
STATE	Iowa
COUNTY	Harper (Keokuk)
TWP.	Wagon
RGE.	30
SEC.	30
COMPLETED	Feb 7
COMPLETED	Feb 12, 1970
OWNER	Latta & Sons Inc.
CASINO RECORD	163 of 6' gas sand 160' 165 4'
LOGGED	3-12-70 BY Gillmore
REMARKS	1. 8055 2. 322 3. 141', Pa-150' 4. 20 gpm 5. 240-30'



10 Samples

1. 25-189

Plant

100

150

200

250

300

350

400

450

500

550

600

650

700

750

800

850

900

950

1000

1050

1100

1150

1200

1250

1300

1350

1400

1450

1500

1550

1600

1650

1700

1750

1800

1850

1900

1950

2000

Water Use, Aquifer Tests, GW Quality Data Mining

Locations, Analysis, Specific Sources



Data Management and Dissemination

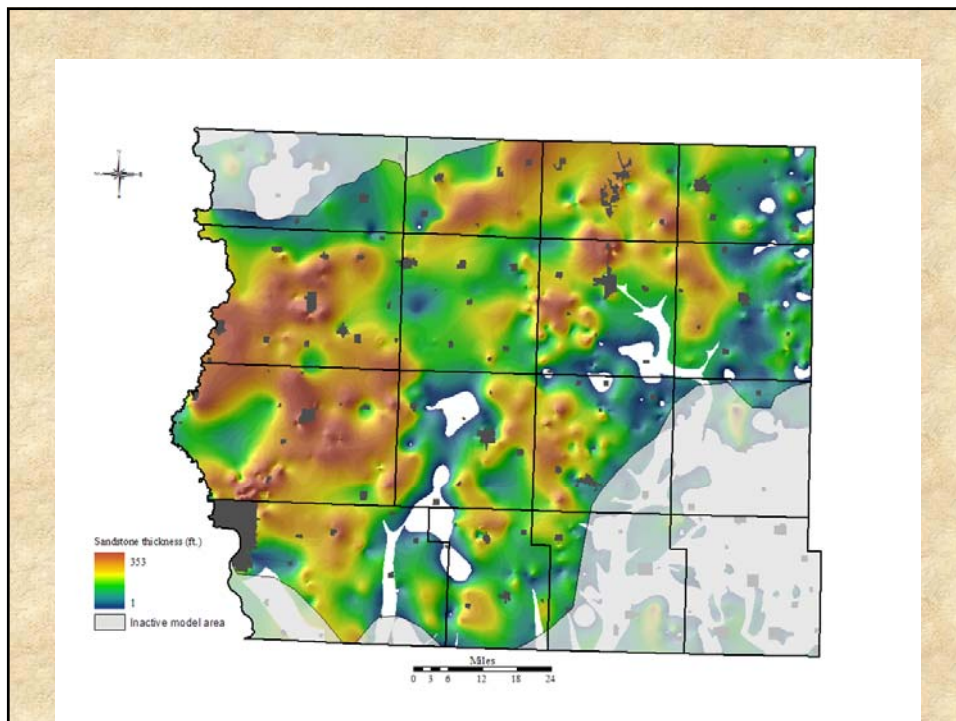
The screenshot shows a web browser window titled "Iowa DNR Geological Survey - GEOSAM - Windows Internet Explorer". The address bar shows "http://igbdata.igb.uiowa.edu/geosam/". The page header includes the "Iowa Department of Natural Resources Geological Survey" logo and the "Geosam" logo. A "TABLE OF CONTENTS" sidebar on the left lists categories such as "IGS Home", "About", "Site Records", "Hydrogeologic Atlas", and "Stratigraphic column". The main content area features a 3D topographic map of Iowa, with "Surface topography" and "Subsist topography" labels. Contact information for the Iowa Geological Survey is provided at the bottom left.

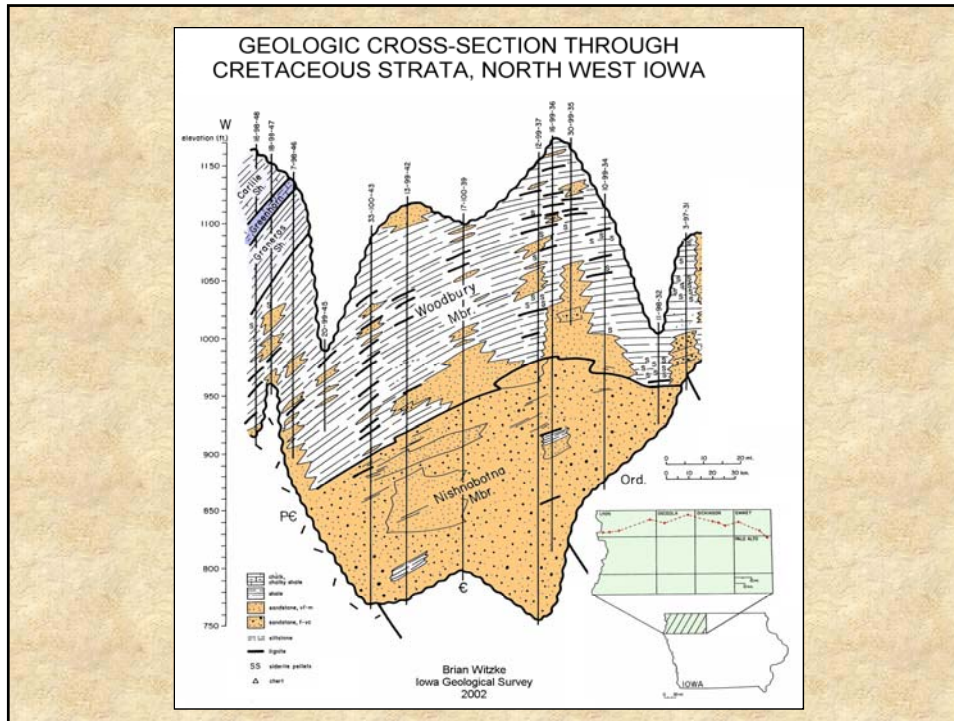
Data Management and Dissemination

The screenshot shows a web browser window titled "Welcome to the NRGIS Library - Iowa Geological Survey - DNR - Microsoft Internet Explorer". The address bar shows "http://www.igb.uiowa.edu/nrgislib/". The page header includes the "NRGIS" logo and the title "Natural Resources Geographic Information Systems Library". The main content area is divided into sections: "About the NRGIS Library", "County-wide Data", and "State-wide Data". The "About" section provides a description of the NRGIS Library. The "County-wide Data" section lists "Data available by County" and "Data available by Theme". The "State-wide Data" section lists various data types such as "Administrative and Political Boundaries", "Agricultural", "Barns and Sheds", "Biologic and Ecologic", "Cultural and Demographic", "Elevation", "Environmental Population", "Geographic", "Geologic", "Hydrologic - Ground", "Hydrologic - Surface", and "Infrastructure". A map of Iowa is displayed in the center, with several small thumbnail images overlaid on it.

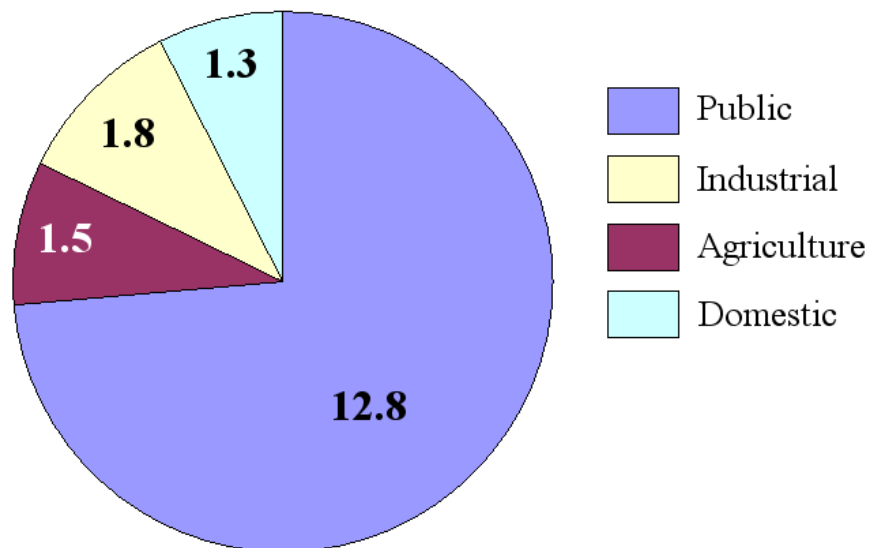
Year One:
Dakota Aquifer Characterization

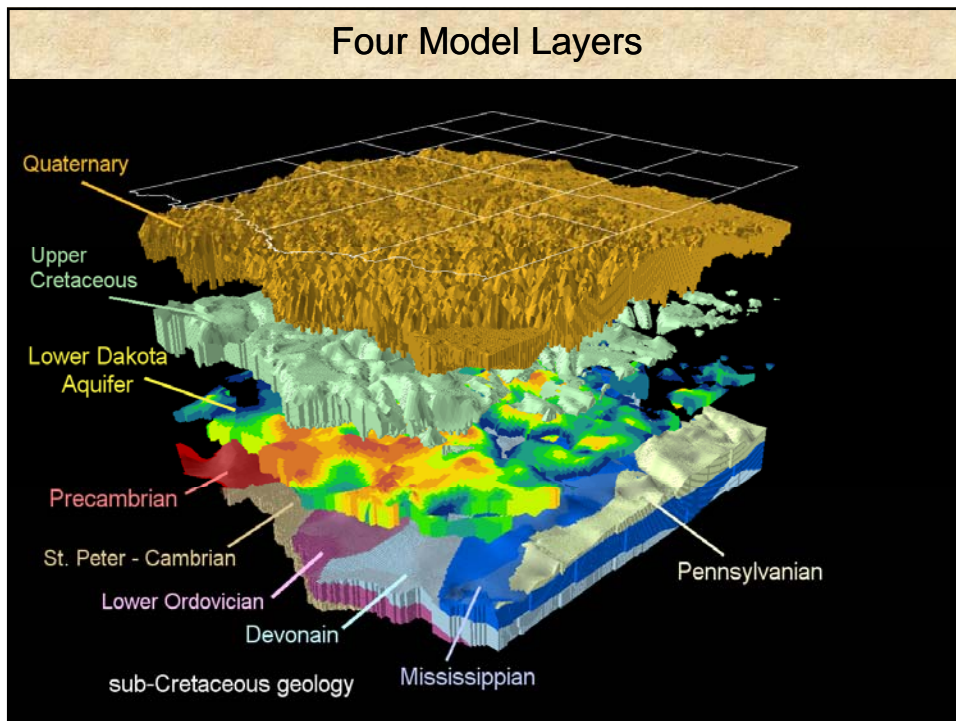
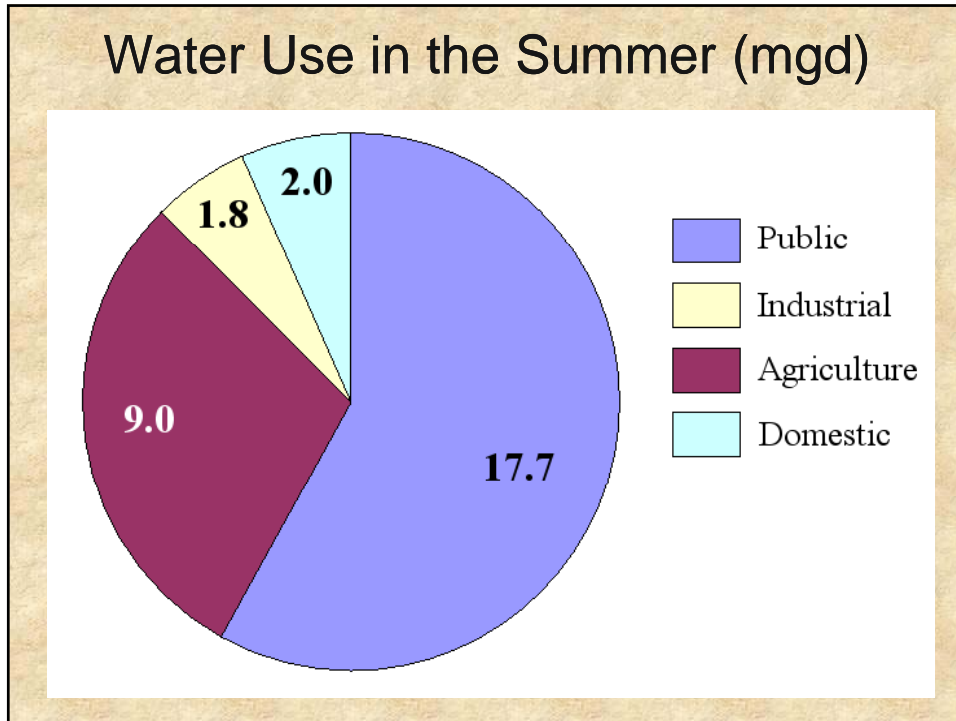
- 48,000 feet of priority Dakota well cuttings described and logged. Logging equipment updated.
- 4,500 existing well/drillers logs reviewed.
- 1,000 Dakota WQ analyses (200 wells) databased/GIS'ed
- Dakota GW elevations compiled and mapped.
- Monthly and annual withdrawals from Dakota permits databased.
- Aquifer properties from DNR permit files, IGS records, NWIA consultants analyzed and databased
- Compatible data holding system in place.
- Dakota model developed and calibrated.

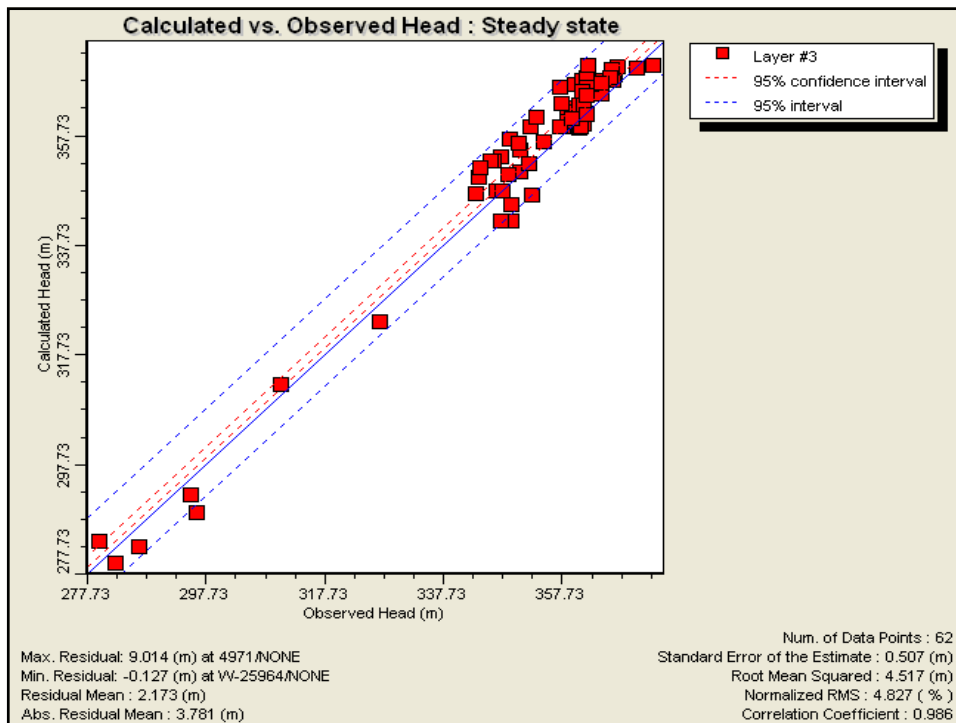
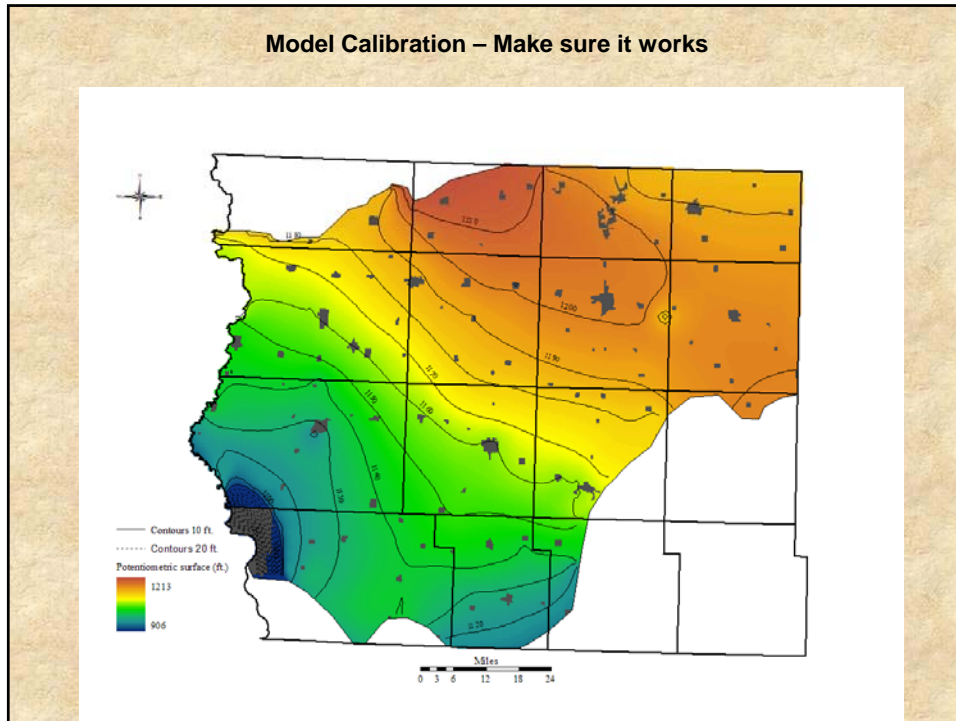




Water Use in the Winter (mgd)







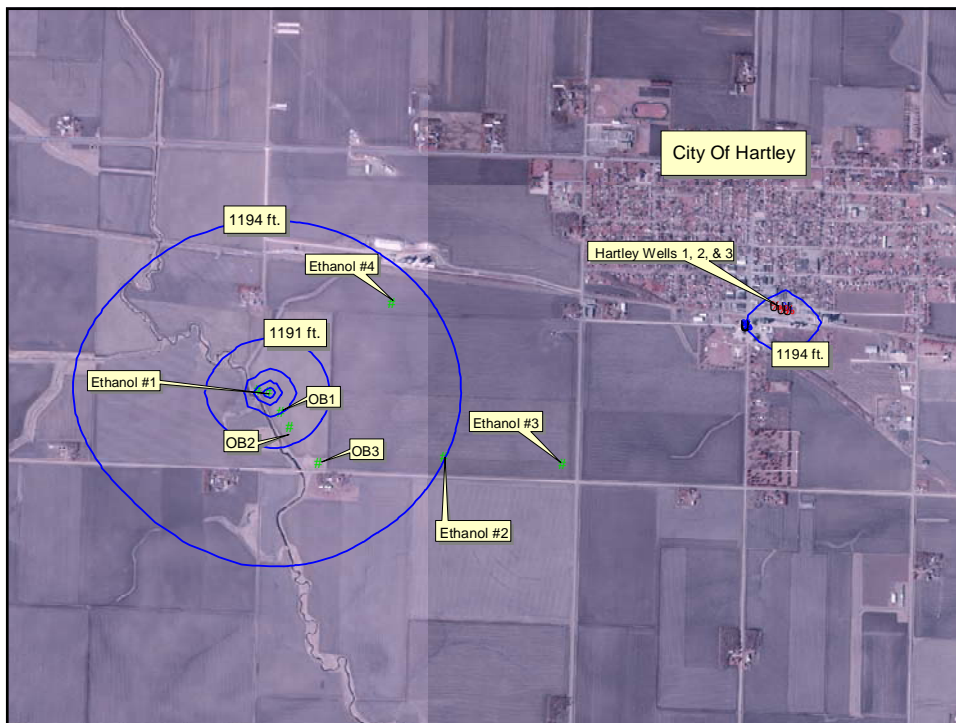
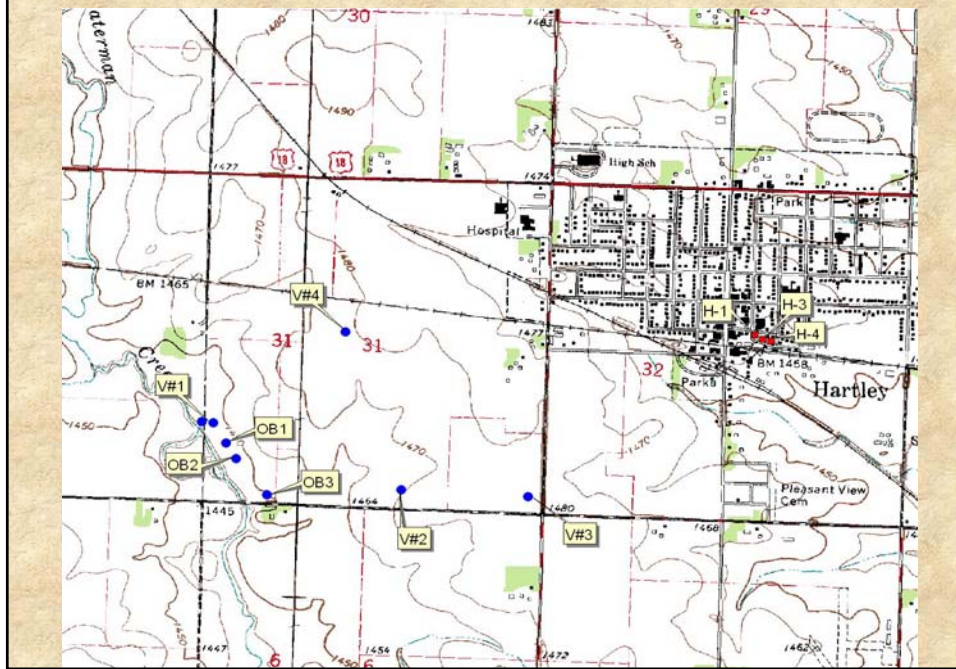
How do we use this?

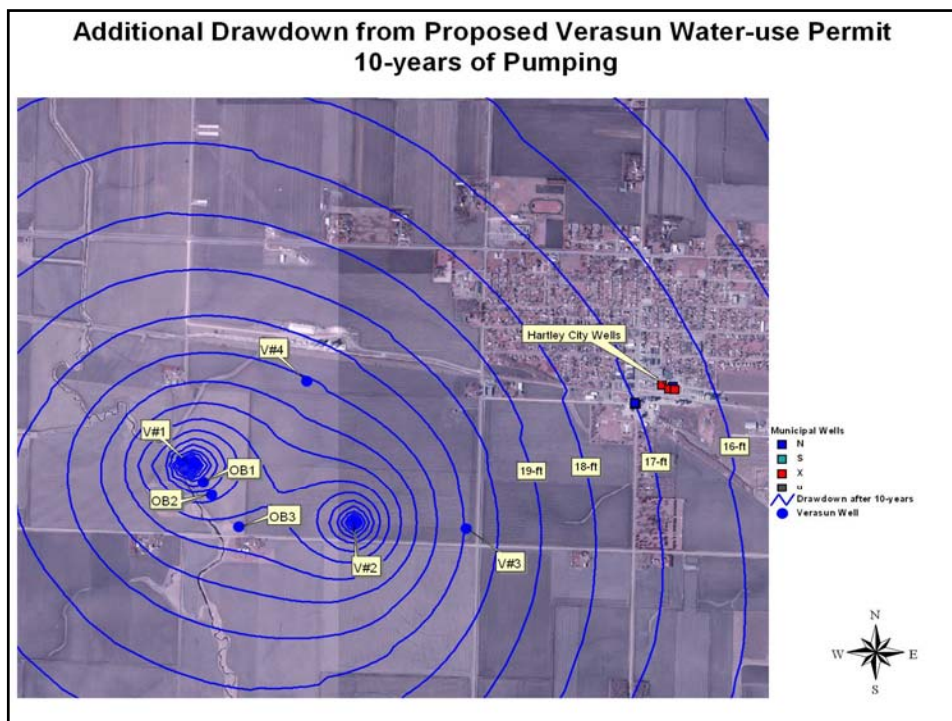
- Local – Site specific groundwater concerns.
- Major use areas and water balances.
- Aquifer wide assessments.
- “What happens if.....”
- Information has much value beyond model.

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**

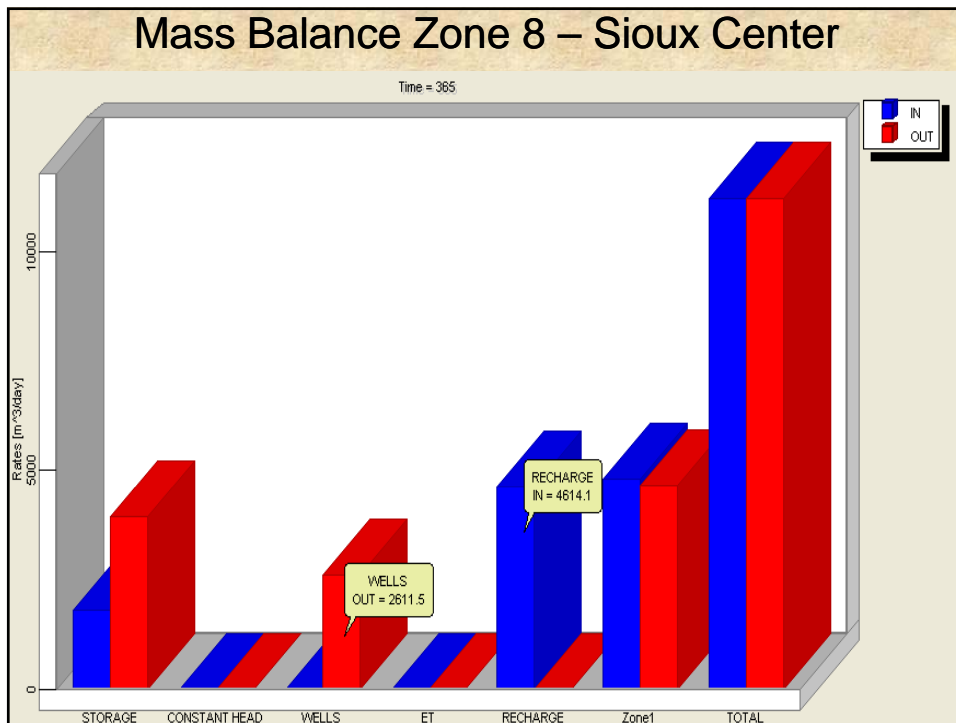
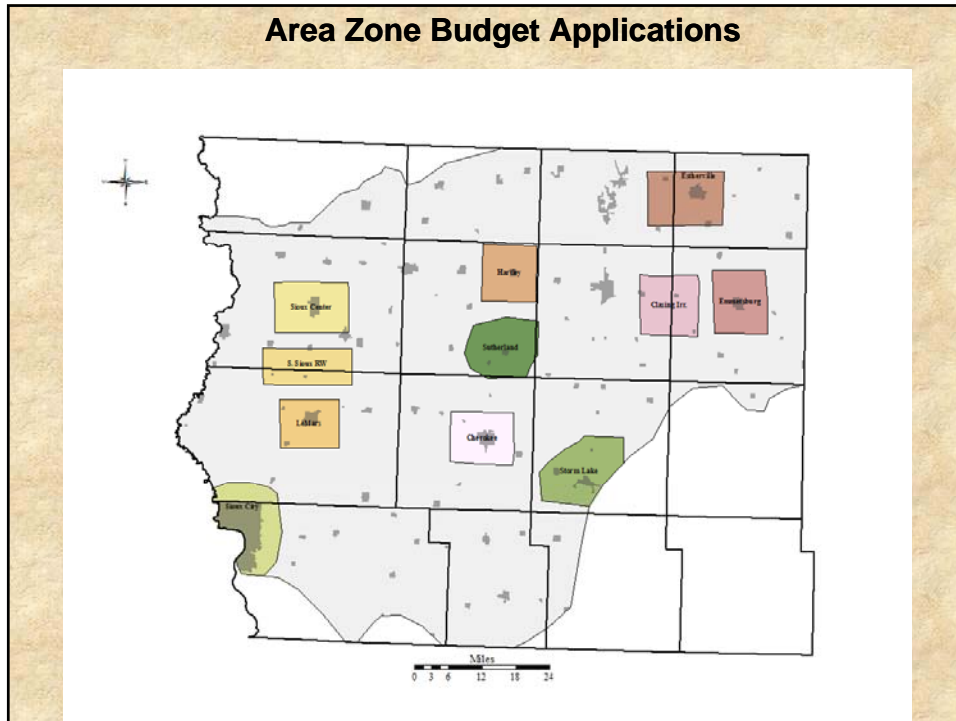
Hartley VeraSun Ethanol Water Use Permit

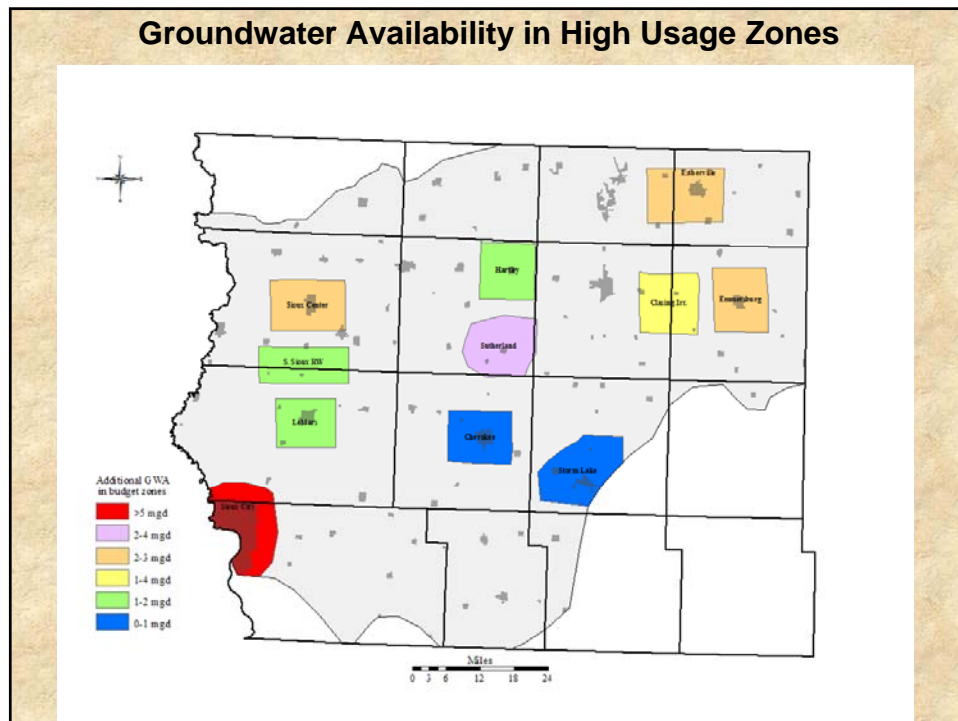
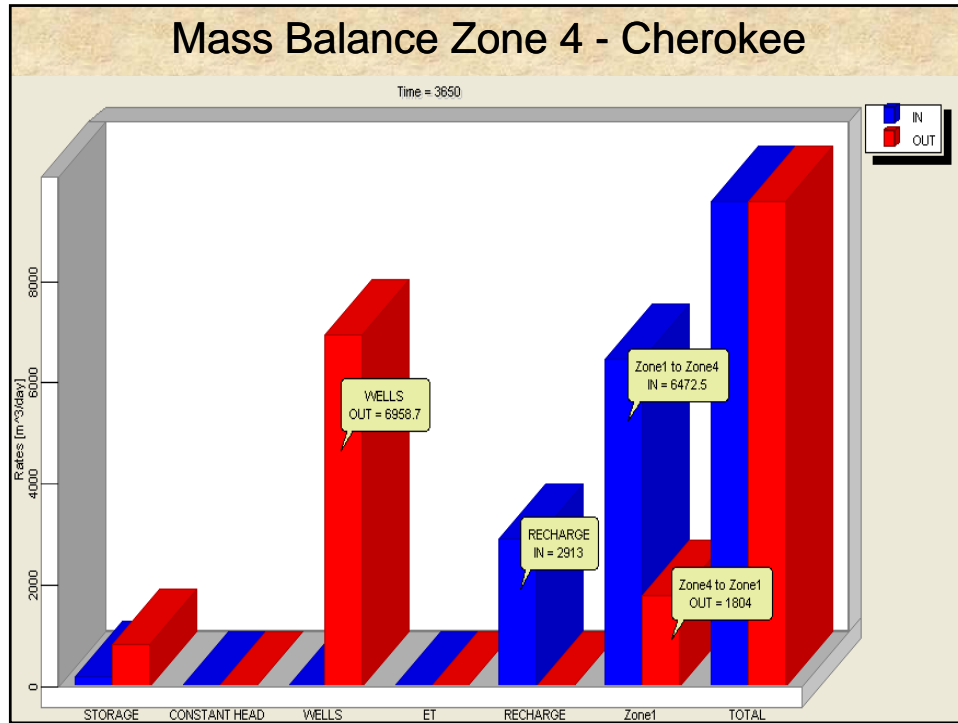




Simulated Results Hartley VeraSun Ethanol Permit

- **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**



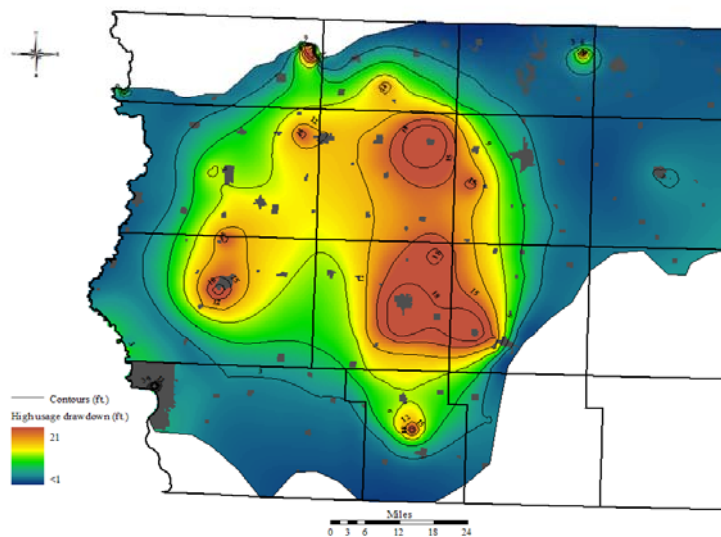


Regional Scale Predictive Capability – “What if....”

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

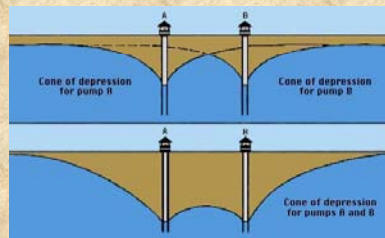


Additional Drawdown for a 50% Future Water Use Increase

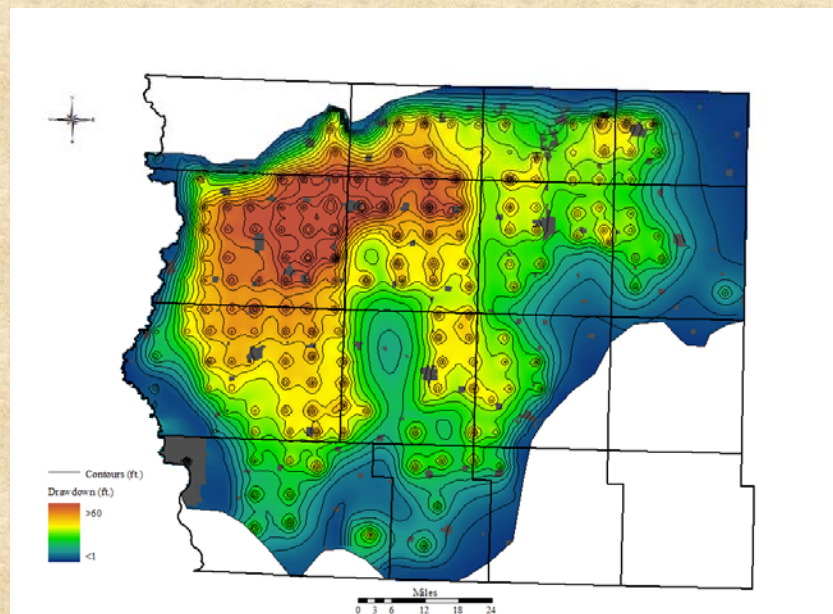


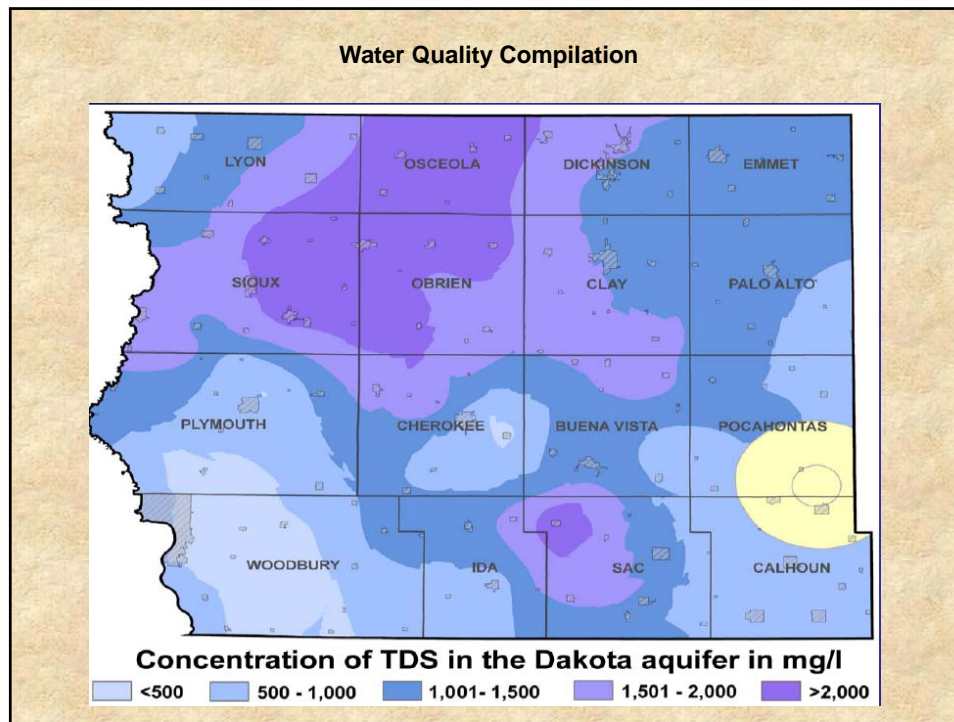
Irrigation Expansion

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



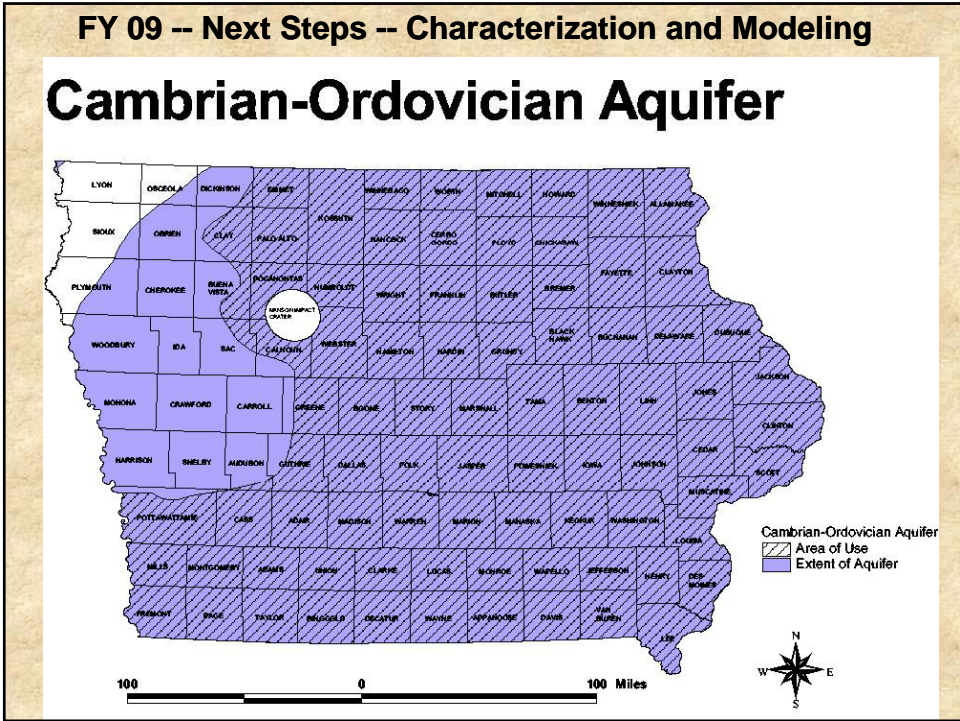
Additional Drawdown for Irrigation Expansion





Initial Evaluation

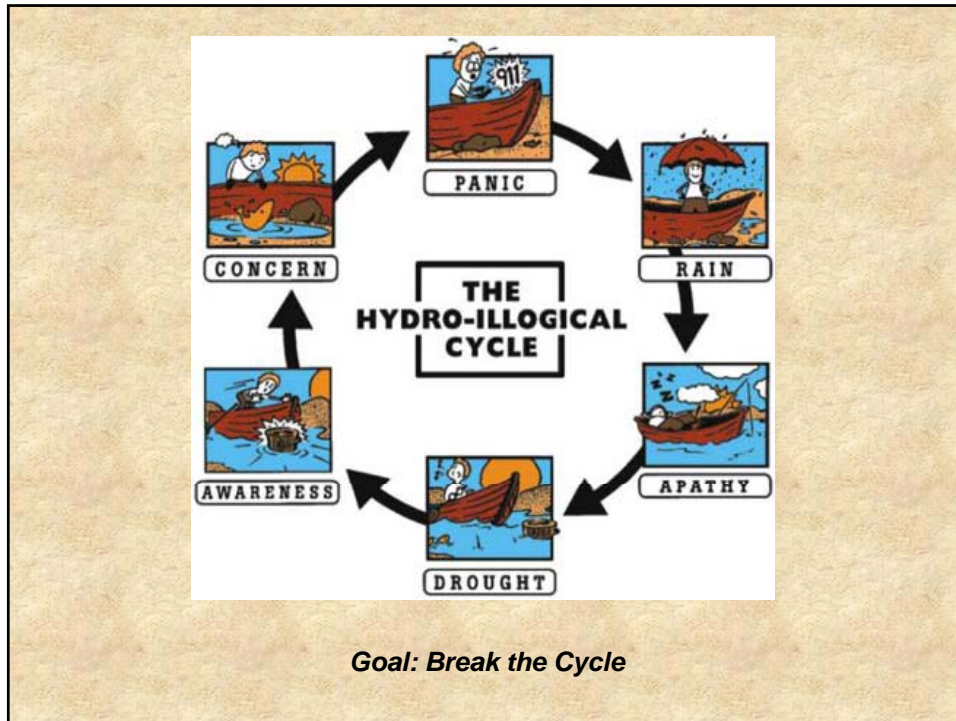
- **Based on mass balance no current regional concerns with groundwater availability.**
- **Zone budgeting indicates pumping centers are stressed but significant groundwater mining is not occurring.**
- **Site Specific modeling can easily be incorporated into regional model.**



Additional Program Needs

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





Water Resource Sustainability:

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

Questions?

Bob Libra, State Geologist
Mike Gannon, Hydrogeologist
DNR -- Iowa Geological Survey
319-335-1575
robert.libra@dnr.iowa.gov
<http://www.igsb.uiowa.edu/>