Groundwater in Alberta

Yesterday, Today and Tomorrow

The Challenges and Opportunities

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WaterTech 2008

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Presentation Outline

- **Groundwater …**
  - Yesterday
  - Today
  - Tomorrow
- **Mapping Project**
- **… and Troglobites**

Groundwater Yesterday

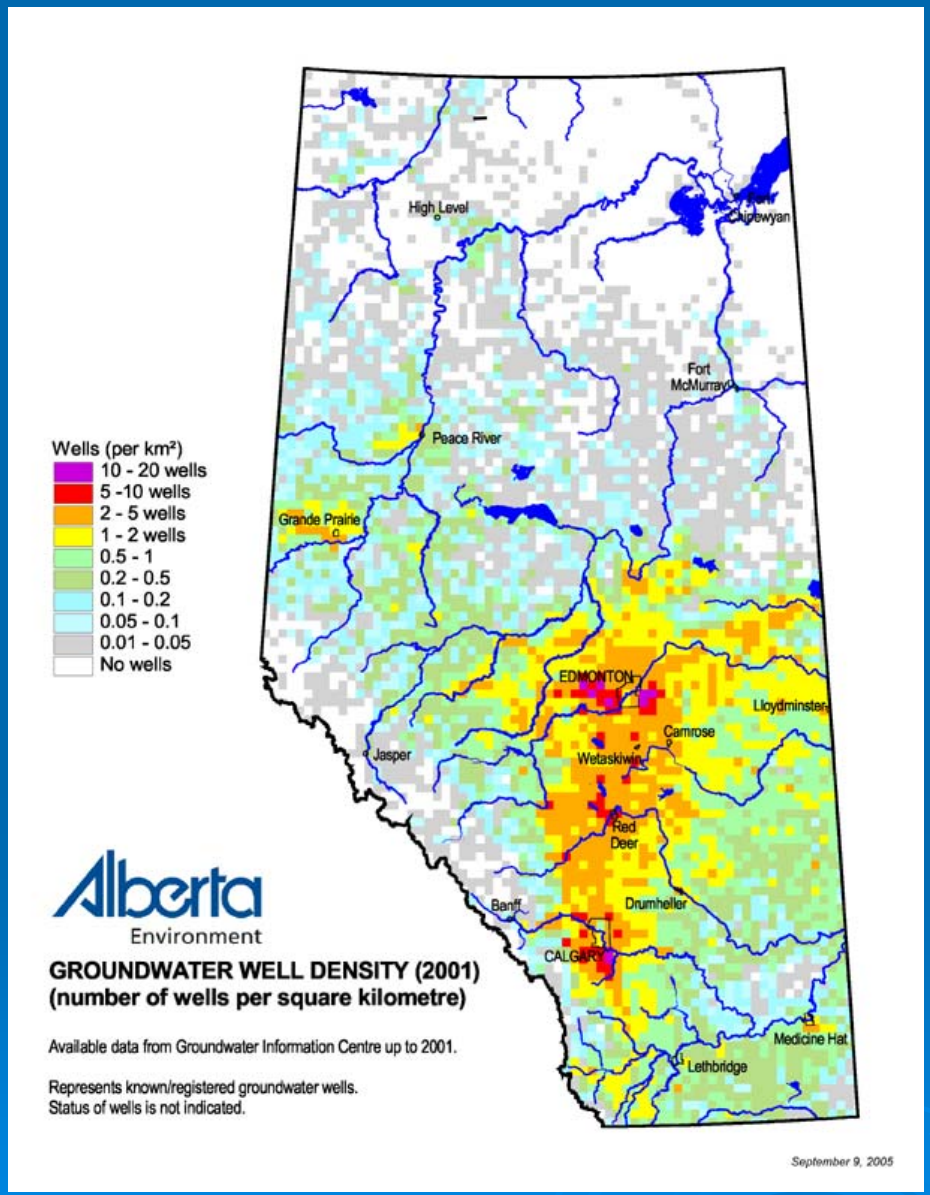
- Alberta was a world leader in groundwater mapping and knowledge from the 1960s through the early 1980s.
- Alberta Geological Survey
  - produced a series of regional hydrogeology maps across Alberta that were considered internationally to be cutting-edge
  - birthplace of many concepts of modern hydrogeology, including Josef Toth's theory of regional flows, now taught as a basic component of hydrogeology across the globe.

Groundwater Yesterday

- Changing GoA Priorities
  - Groundwater mapping programs discontinued
  - Minimum re-investment in groundwater resource knowledge for about 20 years
- Recent Re-investments in Groundwater Knowledge
  - PFRA – regional groundwater assessments
  - AGS – Ft. McMurray Region; Paskapoo Formation

Groundwater Today

- Groundwater use in Alberta is small in comparison with the reliance on surface water.
  - ~ 3% of total provincial water allocation is from groundwater sources
  - over 600,000 Albertans – primarily in rural Alberta – who depend solely on water wells to provide their basic domestic water supplies
  - few complaints regarding well interference



Distribution of Groundwater Use

- Approx. 600,000 Albertans rely on groundwater
- Usage is greatest in central Alberta, and growing.

Our Groundwater Focus Today…..

- Groundwater will become an increasingly important component of the province's water supply as access to surface water supplies decreases and development moves beyond the major urban centres.

- Recognition of this future potential, coupled with emerging pressures, has resulted in groundwater growing in importance and interest to Albertans.

Groundwater Today

- Early Drivers for Change
  - Water for Life: Alberta's Strategy for Sustainability (2003)
  - CBM Multi-Stakeholder Advisory Committee: Final Report (2006)
  - Rosenburg International Forum on Water Policy: Recommendations for Alberta (2007)
  - Groundwater Risk Assessment for Alberta (2007)

Water for Life

- Safe, secure drinking water supply*
- Healthy aquatic ecosystems*
- Reliable, quality water supplies for a sustainable economy*
- Knowledge and Research
  - Understand the state of the quality and quantity of Alberta's groundwater supply
- Partnerships
  - Alberta Water Council
  - Watershed Planning & Advisory Councils
  - Watershed Stewardship Groups
- Water Conservation

CBM Multi-Stakeholder Advisory Committee Recommendations

- Improve scientific information on Alberta's groundwater resources through:
  - Groundwater mapping and inventory work
  - Expansion of the provincial groundwater monitoring network
- Protect Groundwater Supplies
  - Improve and streamline regulations for CBM development
- Water Conservation and Beneficial Use

Rosenberg International Forum

- Require a commitment to improvement of groundwater resources knowledge
- Existing legislation as applied to groundwater management may not meet emerging needs
- Re-evaluate the definition of the Base of Groundwater Protection
- Priority should be given to groundwater monitoring and data management

Groundwater Risk Assessment

- Purpose:
  - to identify potential risks related specifically to groundwater resources; and
  - to rank the risks based on their potential impact on the resource – a qualitative assessment of risk.
- Participants:
  - Albertans, First Nations and Métis Settlements

Groundwater Risk Assessment

- Outcomes:
  - 32 risks identified and ranked on the basis of “Likelihood of Occurrence” and “Impact of Occurrence”
  - Highest ranked risk related to poor understanding of groundwater resources based on availability of groundwater data and poor data management systems
  - This risk was consistent with other highly ranked risks relating to resource management

Groundwater Tomorrow

- Water for Life Renewal
  - Alberta Water Council recommendations:
    - Enhancement of baseline groundwater information
    - Enhancement of analysis, interpretation and reporting tools
- GoA and AENV direction
  - Managing Alberta's groundwater resources to ensure the province has the quality and quantity of water needed to support population and economic growth

What's Next….

- *Groundwater Strategy and Action Plan* (draft) – 10-year plan
  - Building capacity
  - Establishing groundwater management policies and tools
  - Improving stewardship of groundwater resources
  - Improving knowledge of groundwater resources

Groundwater Strategy and Action Plan

- **Building Capacity**
  - Establish a provincial research chair for groundwater
  - Develop a provincial groundwater research plan
  - Invest in building hydrogeological expertise
    - improving training & developing specific tools to better manage groundwater
  - Support capacity building programs within GoA and stewardship groups (e.g., WPACs)

Groundwater Strategy and Action Plan

- **Establishing Groundwater Management Policies and Tools**
  - Define groundwater management units (GMUs)
  - Develop a framework for establishing groundwater management objectives within GMUs
  - Identify vulnerable aquifers that require specific regional groundwater protection and management policies
  - Evaluate the applicability of the existing groundwater allocation system for new groundwater licences
  - Assess the costs and benefits of metering all groundwater use

Groundwater Strategy and Action Plan

- **Improving Stewardship of Groundwater Resources**
  - Establish / enhance partnerships between government and non-government organizations to deliver groundwater education programs (e.g., a water well maintenance program targeted to private landowners)
  - Develop a public awareness and education strategy targeted at enhancing general knowledge of groundwater in Alberta
  - Develop a groundwater information management system

Groundwater Strategy and Action Plan

- **Improving Our Knowledge of Groundwater Resources**
  - Groundwater aquifer mapping
  - Develop an aquifer classification system for Alberta.
  - Continue to improve the provincial groundwater monitoring network
  - Evaluate the cost and benefit of extending the base of groundwater protection from 4,000 to 10,000 mg/L total dissolved solids.

Short-Term Successes

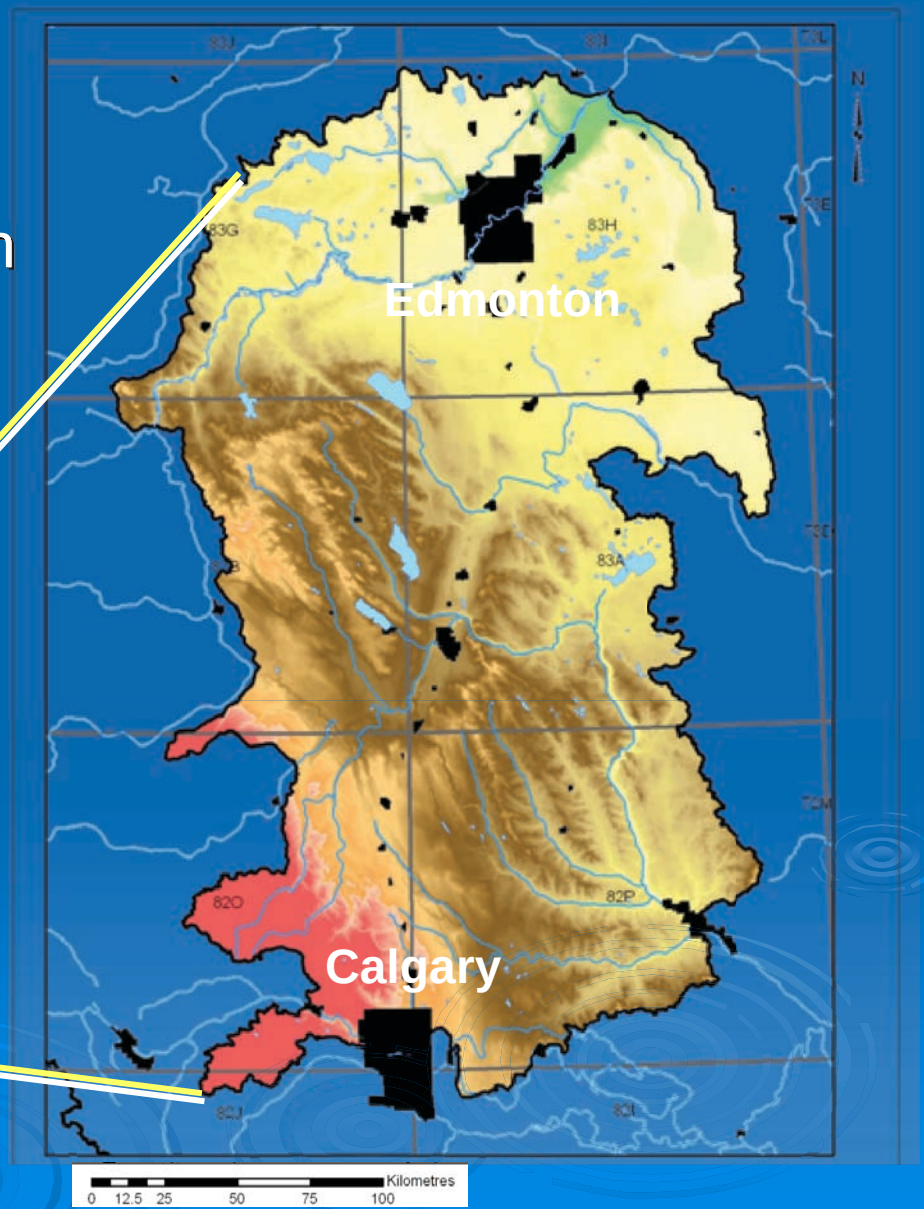
- Public Education
  - Working with partners to develop a water well maintenance program
- Provincial Groundwater Monitoring Network
  - Water well sampling (70 wells in 1½ years)
  - Expansion of network (a start)
- Coalbed Methane
  - Baseline water well testing program initiated

Short-Term Successes

- Groundwater Mapping
  - Partnership established between AENV and AGS
  - Short-term funding support through the Energy Innovation Fund
  - Identification of major aquifers in Alberta
  - Mapping of priority areas beginning with the Edmonton-Calgary corridor

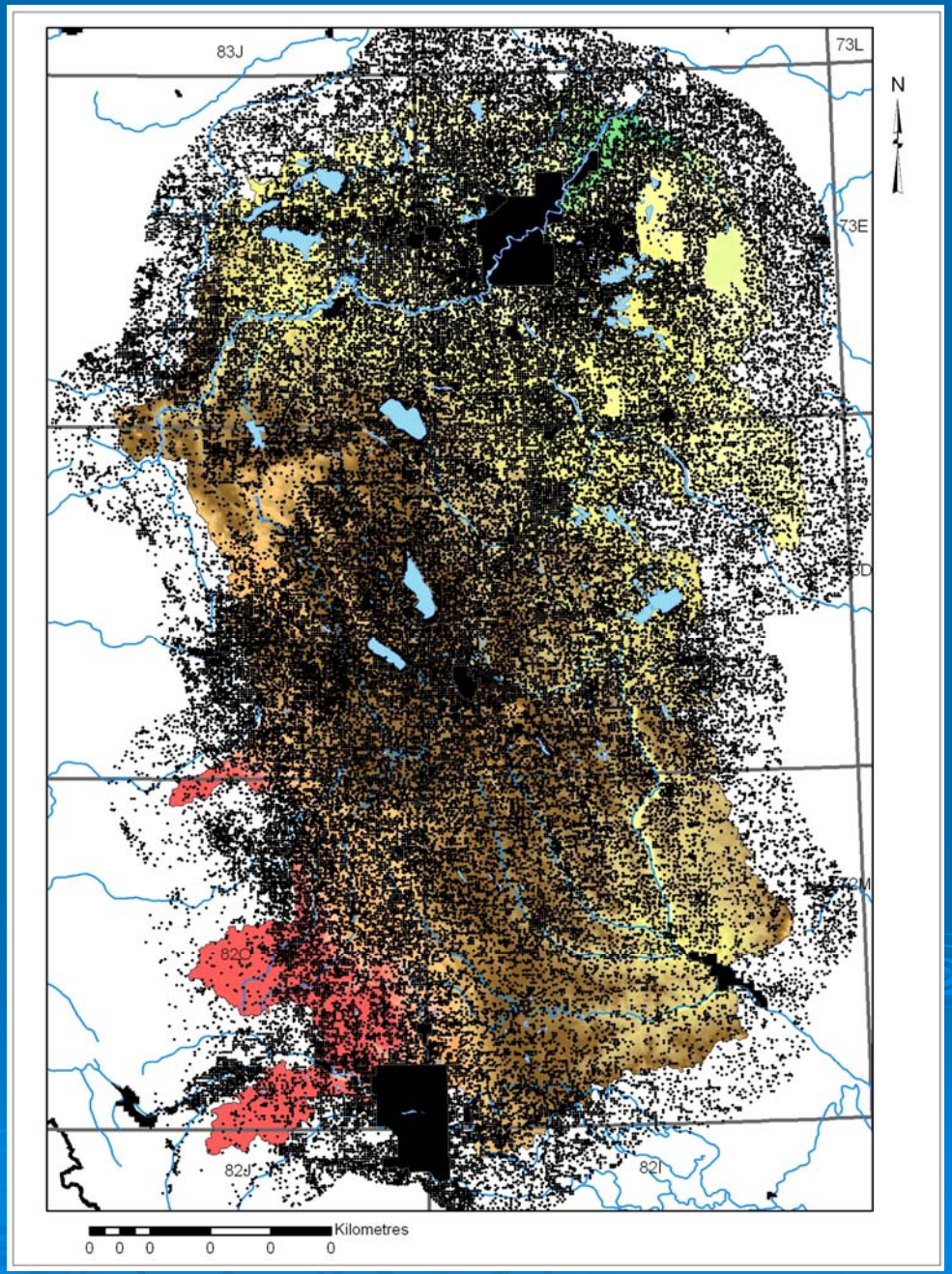
Edmonton-Calgary Corridor Groundwater Inventory

Identifying, characterizing, and assessing the steady-state water balance for each groundwater system in the Edmonton-Calgary Corridor



Water-wells

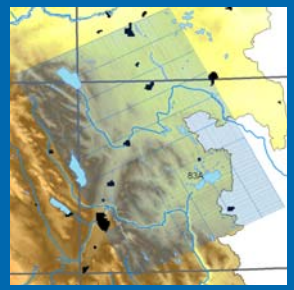
~188,000



Mapping hydrogeology with Airborne Electromagnetic Surveys

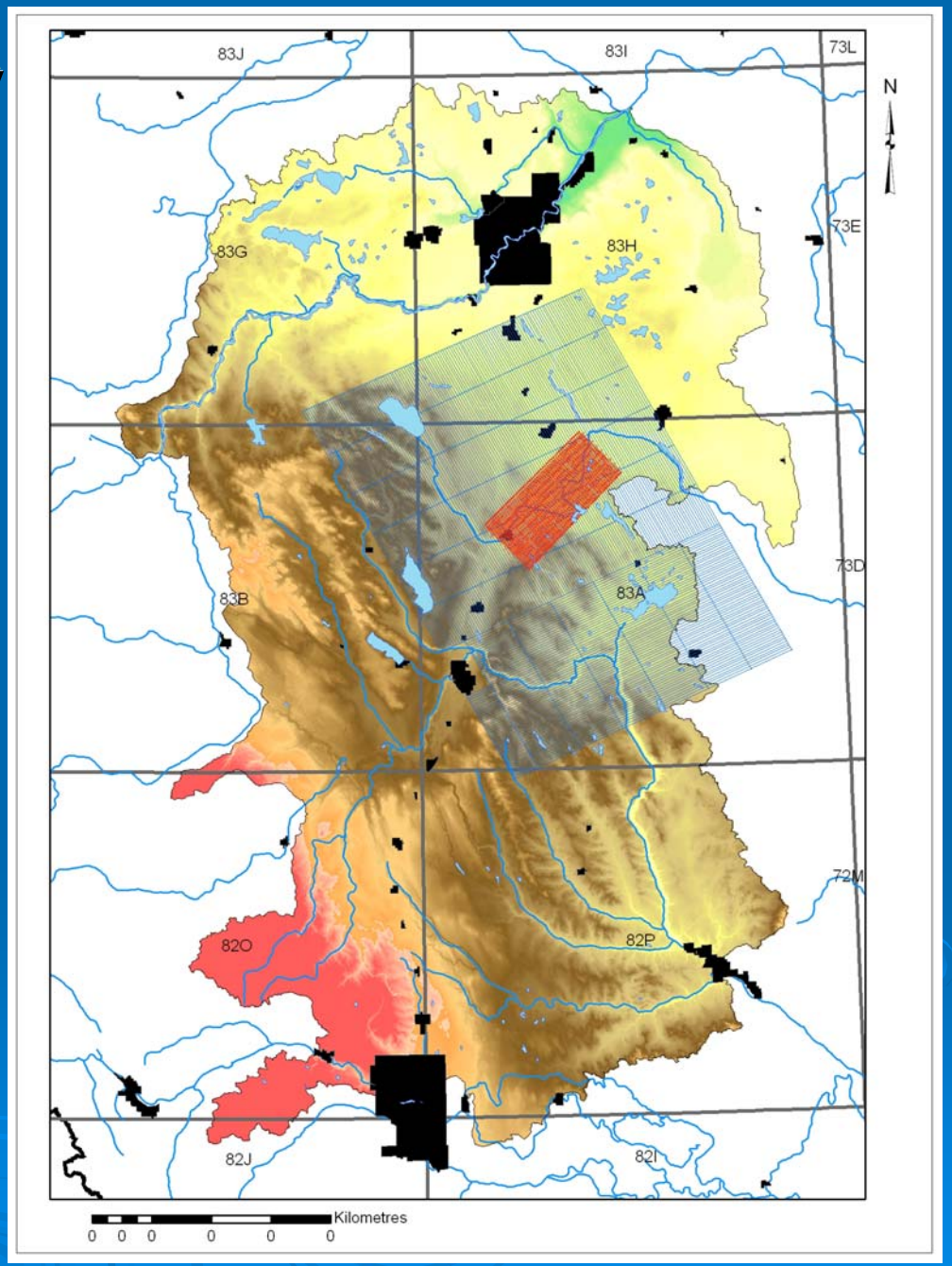
FUGRO Airborne Geophysical Surveys

Airborne Survey Coverage 2007-2008



Geotem fixed wing
800m spacing

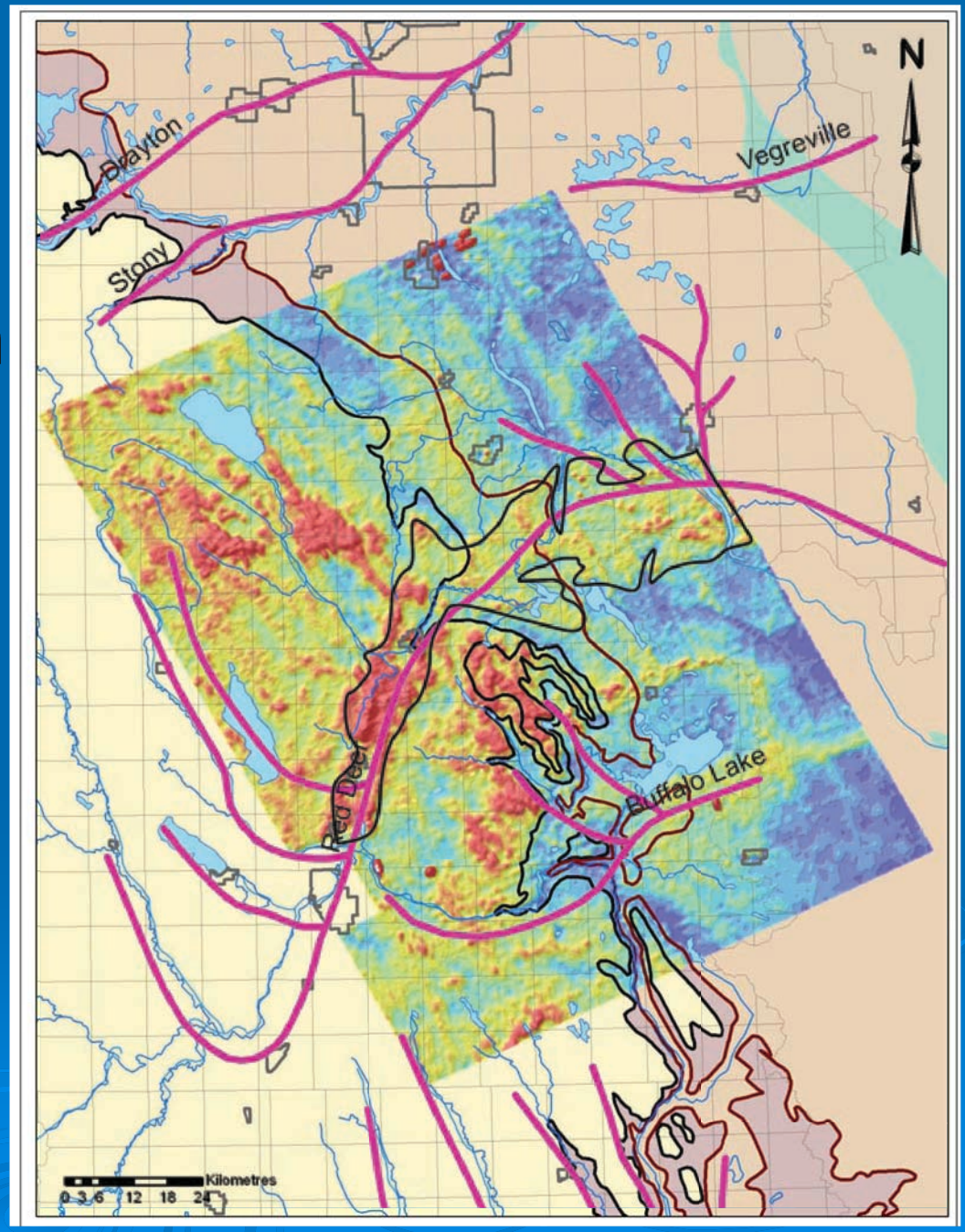
RESOLVE helicopter
200m spacing



Resistivity
30m depth inversion

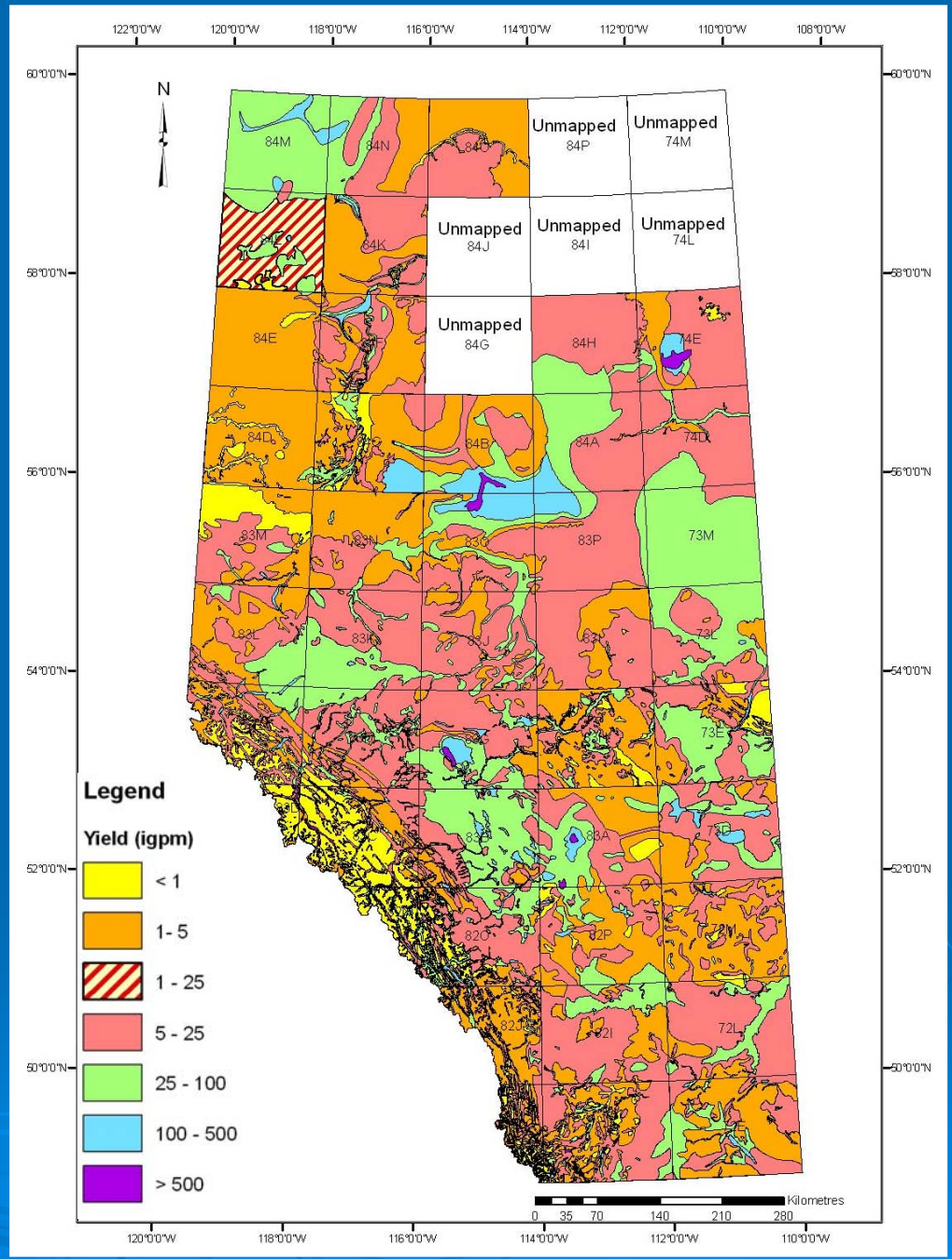
- Delineation of buried valley aquifer

Bedrock valley thalweg



Mining Existing Databases: Estimates of Groundwater Yield

Compilation of Provincial Groundwater Yield Map (Geodatabase format)



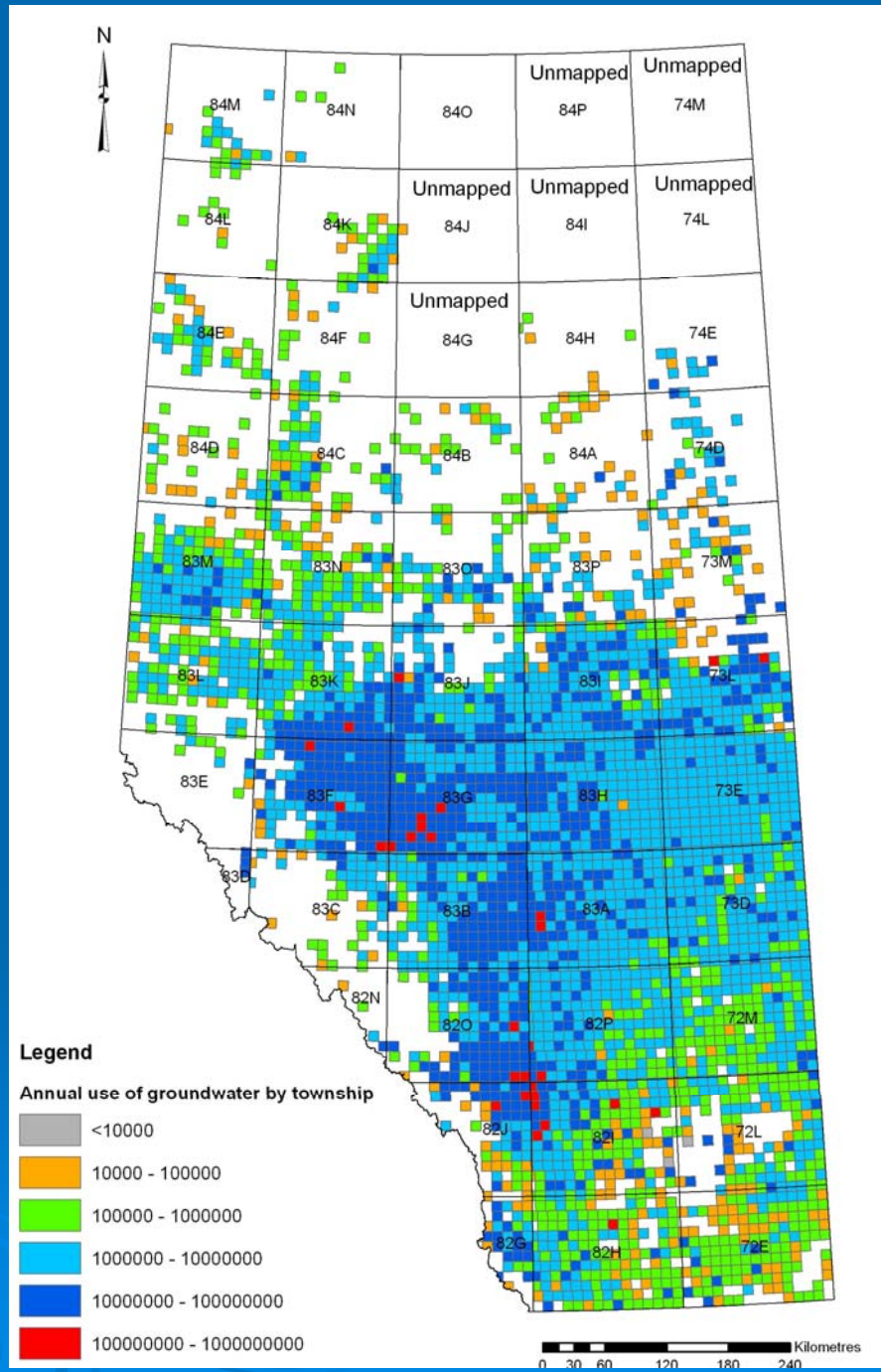
Mining Existing Databases: Annual use of groundwater (ig), per township

Derived from:

- Estimates of domestic wells
  - Assumes 335 litre/day/person
  - Assumes 3 people per domestic family
  - Assumes 1 well per domestic family

- Medium use scenario in Water-for- Life water use estimates to 2010 (2007).

Estimates based on drainage basin area



Summary

- Albertans are concerned about sustainable groundwater management
- New investment in groundwater mapping and science
- AENV is committed to the goals of Water for Life and continuing to work with Stakeholders for sustainable groundwater management

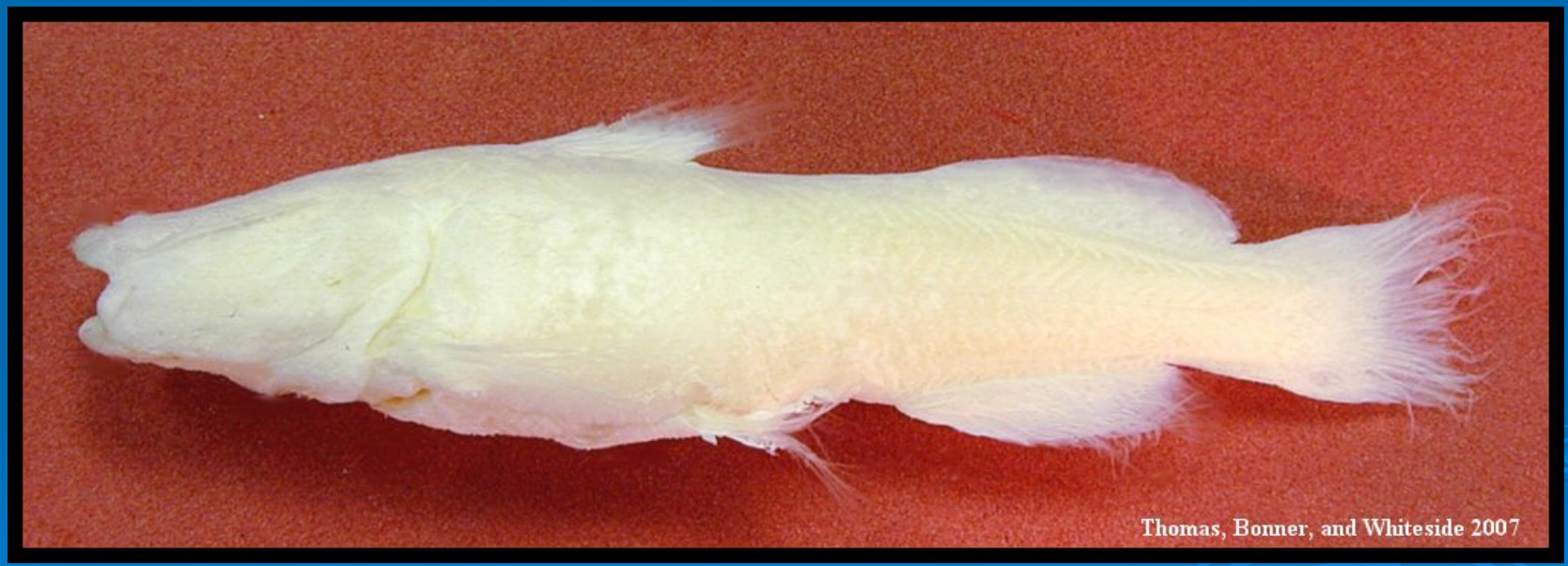
Opportunities……

What is a Troglobite?

- Is an animal that lives it's life entirely underground.
- There are a variety of species that are defined as troglobites including several fish.
- Aquatic troglobites are also referred to as a stygobite.
- Known to reside in the Edwards Aquifer of East Texas, as well as, within sub-cavern aquifers throughout Mexico

Widemouth Blindcat

(*Satan eurystomus*)



Thank you

Questions?