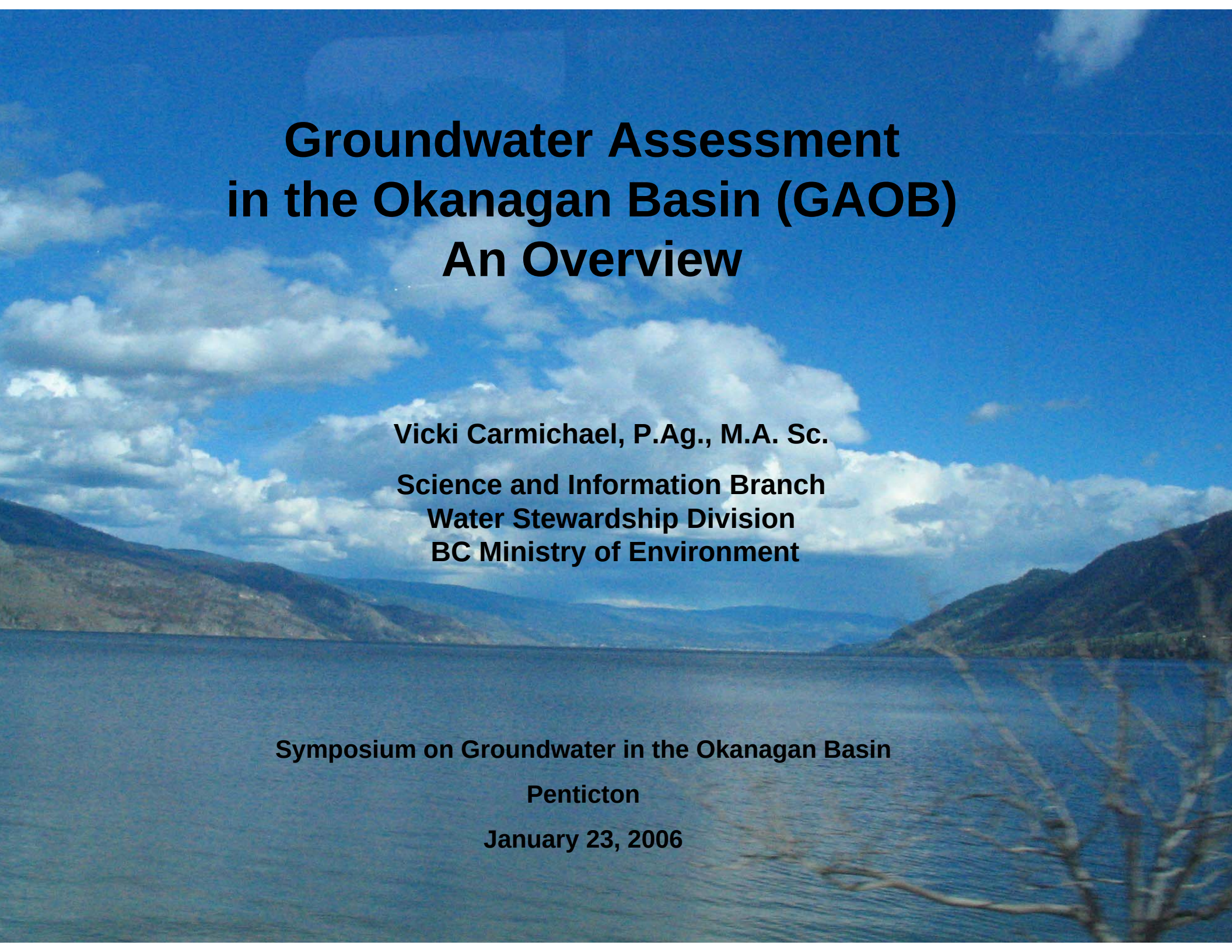




Groundwater Assessment in the Okanagan Basin (GAOB) An Overview

Vicki Carmichael, P.Ag., M.A. Sc.

**Science and Information Branch
Water Stewardship Division
BC Ministry of Environment**

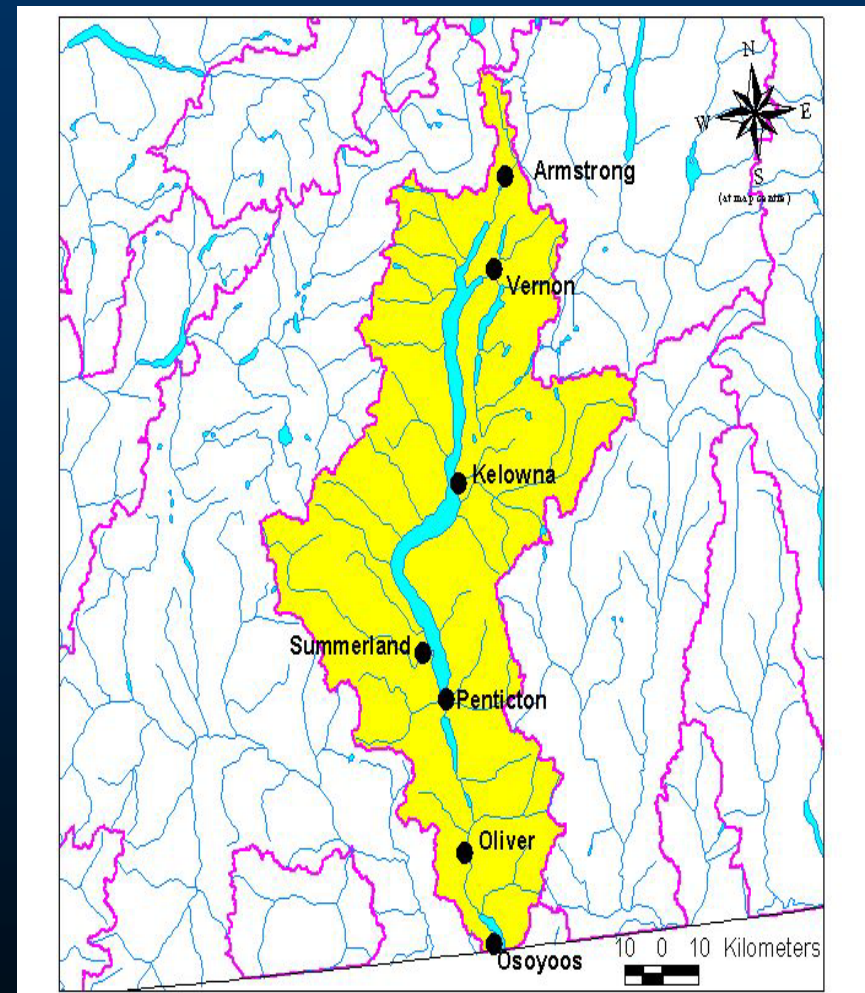
Symposium on Groundwater in the Okanagan Basin

Penticton

January 23, 2006

Groundwater Resources in the Okanagan Basin

- 67 mapped aquifers in the Okanagan Basin (~10% of the province's inventory of aquifers)
- 5 of the province's IA aquifers (heavily developed, highly vulnerable) ~25% of the province's IA aquifers
- >6000 wells in provincial database (WELLS)
- 30 active provincial observation wells



GAOB Project

- Initiated in 2004
- Purpose – to provide a better understanding of the regional groundwater resources in the Okanagan Basin:
 - ❖ surface/groundwater interactions
 - ❖ groundwater quality
 - ❖ available/sustainable supply of groundwater
 - ❖ climate change impacts
 - ❖ community outreach
 - ❖ science/Policy linkages



GAOB Partners and Stakeholders

Project Partners

- Earth Science Sector of NRCAN (Geological Survey of Canada – groundwater and Pathways)
- Okanagan Basin Water Board
- Ministry of Environment
- Agriculture Canada
- Ministry of Health/Interior Health Authority
- Canadian Centre of Water Excellence (University of Saskatchewan and Manitoba)
- Simon Fraser University
- UBC-O
- BC Groundwater Association

Key stakeholders

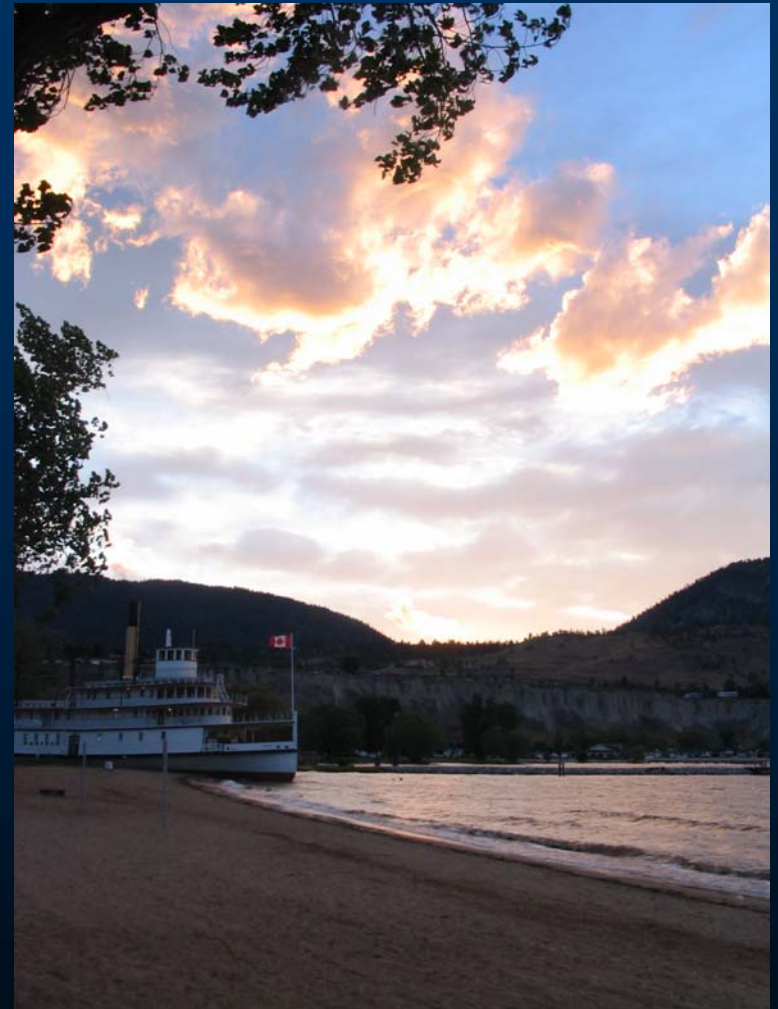
- DFO and provincial fisheries
- Regional Districts and local governments
- Local drillers, water suppliers, consultants and water stewardship groups



GAOB Working Group

Consultations with Local Governments

- Enderby
- Armstrong
- Spallumcheen
- Greater Vernon Services Water Dept.
- Kelowna Joint Water Committee
- Summerland
- Oliver
- Osoyoos
- Regional District of Central Okanagan
- Regional District of Okanagan-Similkameen



Groundwater Issues Identified

- Issues related to wells
 - ❖ Well Protection Plans
 - ❖ Inventory
 - ❖ Abandonment
 - ❖ Interference
 - ❖ Licencing of groundwater extractions
- Surface / groundwater interactions
- Stormwater management
- Irrigation water use
- Understanding constraints to growth and development



Groundwater Issues Identified (cont.)

- Community outreach / public awareness
- Identification of areas of recharge and vulnerability
- Water conservation
- Groundwater quality
- Sustainability
- Aquifer/regional specific issues
- Ability to access relevant information and data



It all starts with the data!

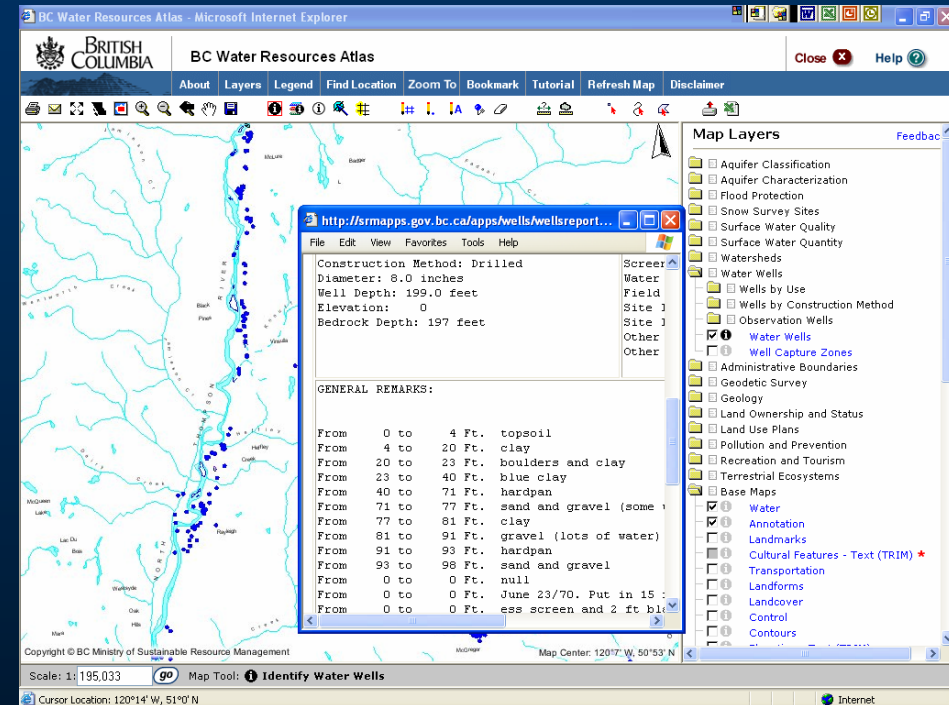
- Providing good quality data on groundwater to researchers is important
- Groundwater data is reliant on the driller's well construction report
- At the start of the project there were ~5000 wells in the provincial WELLS database

Driller's Well construction report

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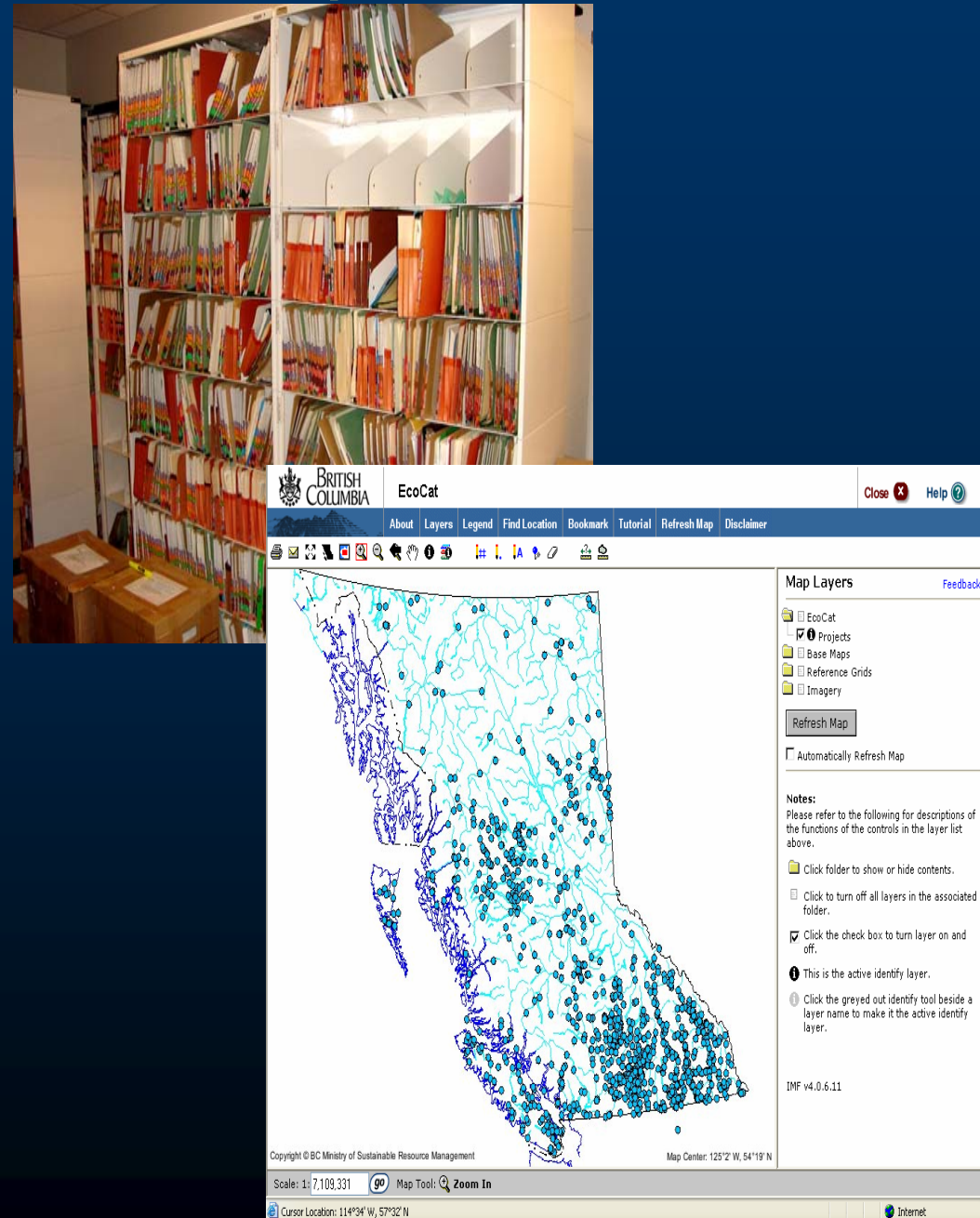
Updating WELLS Project

- Consultant hired to confirm the accuracy of the existing ~ 5,000 wells and to make corrections
 - ❖ Findings - incorrectly located wells, duplicate well records, incomplete well information and wells with no locations
- Unlocated wells were georeferenced wherever possible
- Database well records were infilled with missing information
- Well construction logs and reports were collected and processed
- Now there are over 6,200 wells in the Okanagan Basin in the provincial WELLS database



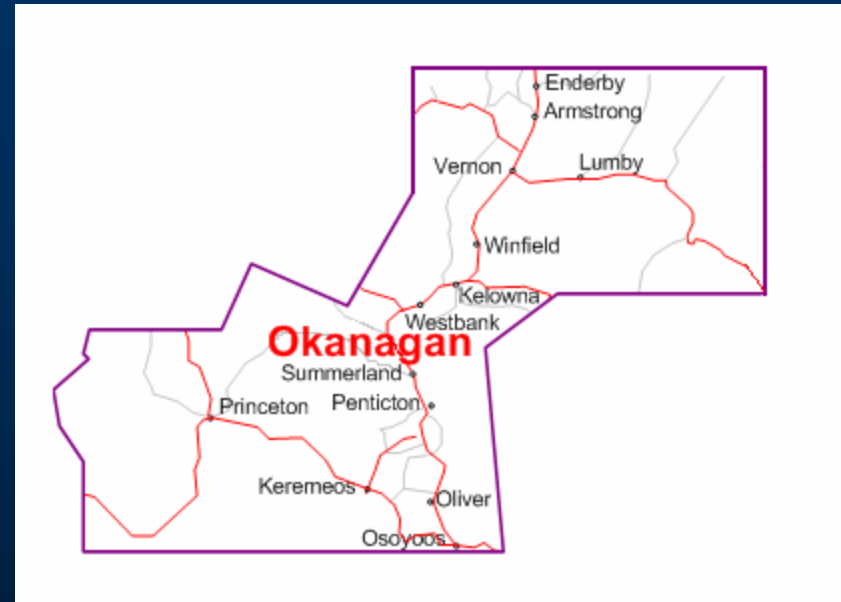
Collection of Well Reports

- Reports collected from Regional District and local government offices
- Over 300 groundwater reports have been collected to date
- Consent to Use obtained for many reports
- Reports have been scanned and uploaded to EcoCat where Consent to Use was obtained



Drinking Water System Inventory – Pilot Project

- Develop a process and methodology to inventory drinking water supplies (both surface and groundwater), including FN systems
- Locate and photograph drinking water system features
- Ensure groundwater drinking water wells are in WELLS
- Correlate points of extraction to source waters e.g. aquifers or watersheds
- Ensure drinking water wells are in compliance with the Ground Water Protection Regulation requirement for Well ID Plates
- EOCP operator status update



Study Area – IHA's Okanagan Service Area

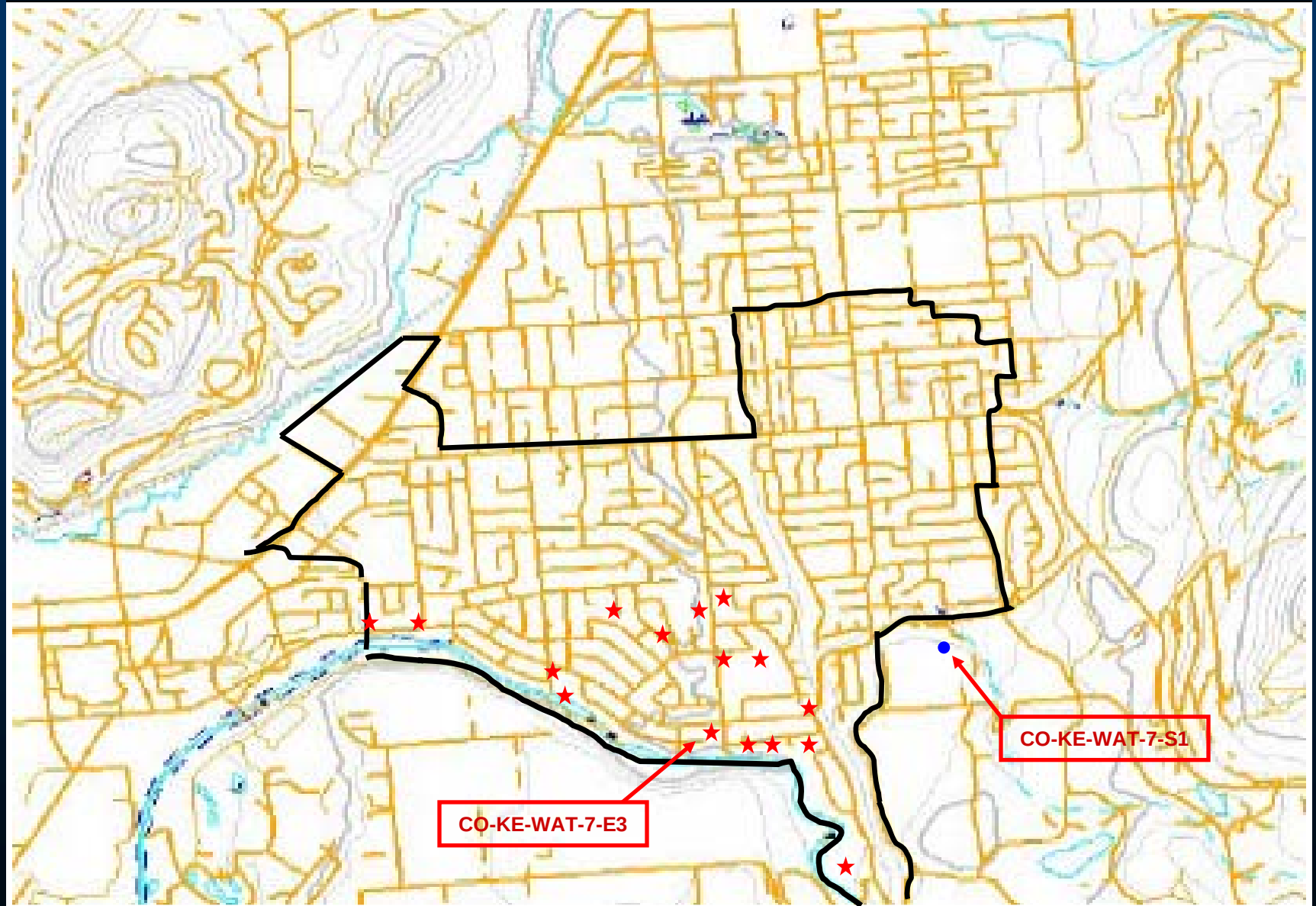
Inventory Pilot Project Results

- 223 drinking water systems inventoried – 246 wells and 114 PODs
- Cross referencing
 - ❖ 192 wells (71%) were cross referenced to aquifers
 - ❖ Only 93 wells (48%) were in WELLS
 - ❖ Many large capacity wells were not in WELLS
 - ❖ Took 10 minutes to 7 hours to cross reference one well
 - ❖ No cross referencing has been done on surface water supplies
- Well tags have been attached to 128 wells, or 52% of all wells surveyed



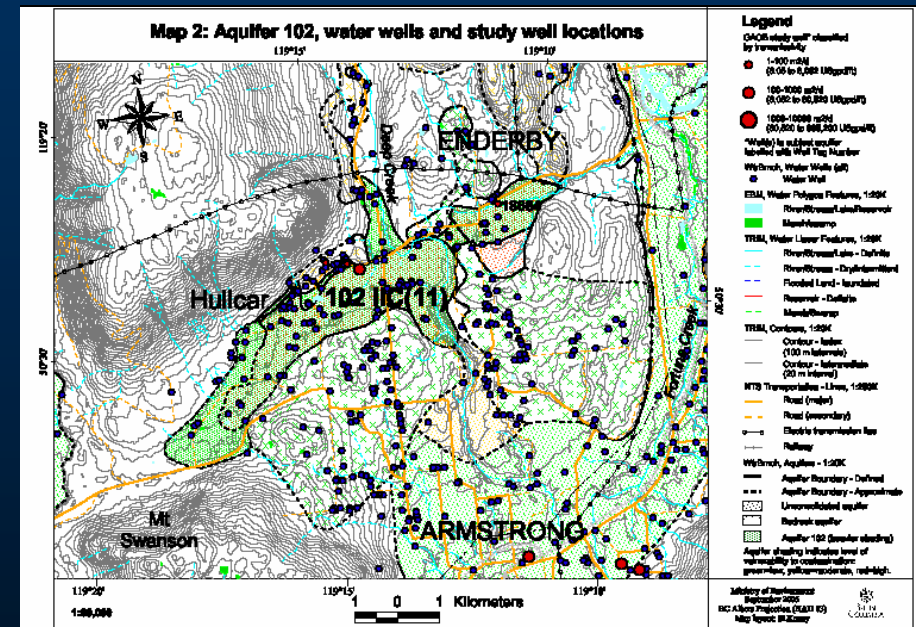
This is a storage reservoir at Mabel Lake Provincial Park (NO-LU-WAT-6-S-1)

Rutland Waterworks (CO-KE-WAT-7)



North Okanagan Pumping Test Project

- Data from 40 different wells were examined (48 pumping test data sets) - 78% in unconsolidated materials and 12% in bedrock
- Analyzed using a consistent methodological approach
- Calculated values of transmissivity, conductivity, storativity and other hydraulic parameters derived from this project will be of benefit to others



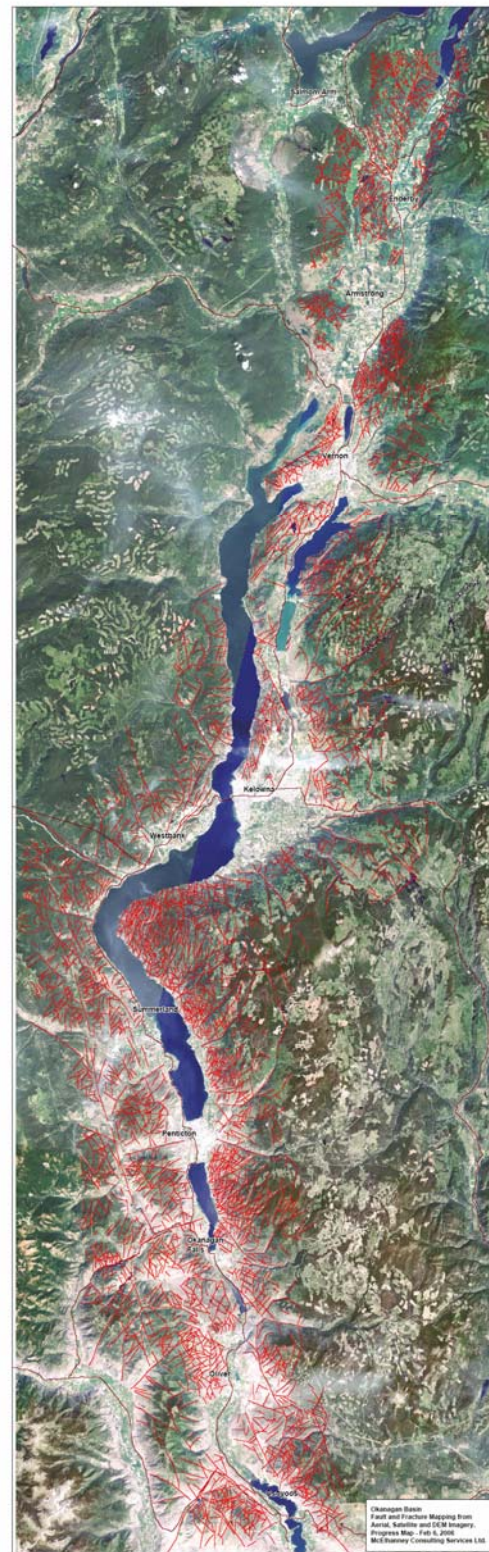
Slug Testing of Okanagan Basin Provincial Observation Wells

- Purpose - to characterize the aquifer media around provincial monitoring wells
- 13 observation wells were selected and tested
- Results:
 - ❖ hydraulic conductivities ranged between $\sim 10^{-7}$ m/s for silty clay aquifers, and $\sim 10^{-3}$ m/s for gravel and sand aquifers
 - ❖ cumulative precipitation departure method indicated that six wells are primarily recharged by precipitation.



Mapping

- Digitization of existing surficial geology mapping
- Compilation of bedrock geology maps for the Okanagan Basin at a scale of 1:50,000
- Mapping of fault fracture networks in the Okanagan Basin to better understand regional and site-specific fracture networks



Federal/Provincial Partnership

- Between BC Ministry of Environment (Water Stewardship Division) and Natural Resources Canada (Earth Science Sector)
- Memorandum of Understanding (MOU) developed
- Purpose to formalize agreement to work collaboratively on regional groundwater assessment and characterization in BC
- Okanagan Basin is the first area of joint study under the MOU

Questions?

