Groundwater Assessment in the Okanagan Basin (GAOB) An Overview

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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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PLEASE NOTE: The information recorded in this well report describes the conditions at the time of construction, alteration, or closure only. Water quantity and water quality are not guaranteed and may change over time.

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 ~10⁻⁷ m/s for silty clay aquifers, and ~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?