Groundwater, Aquifers and the *Water Act* in the Cowichan Valley

Mike Wei, P.Eng.
Ministry of Environment
&
Pat Lapcevic, P.Geo.
Ministry of Natural Resource Operations

Presentation to

Cowichan Valley Watershed Board

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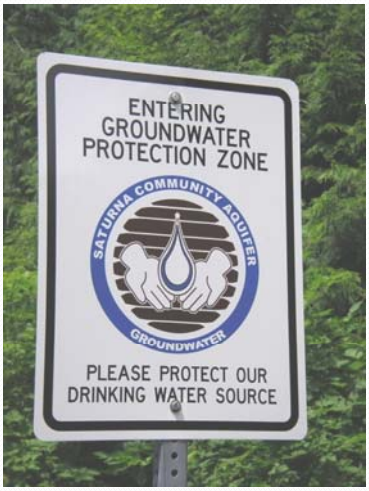
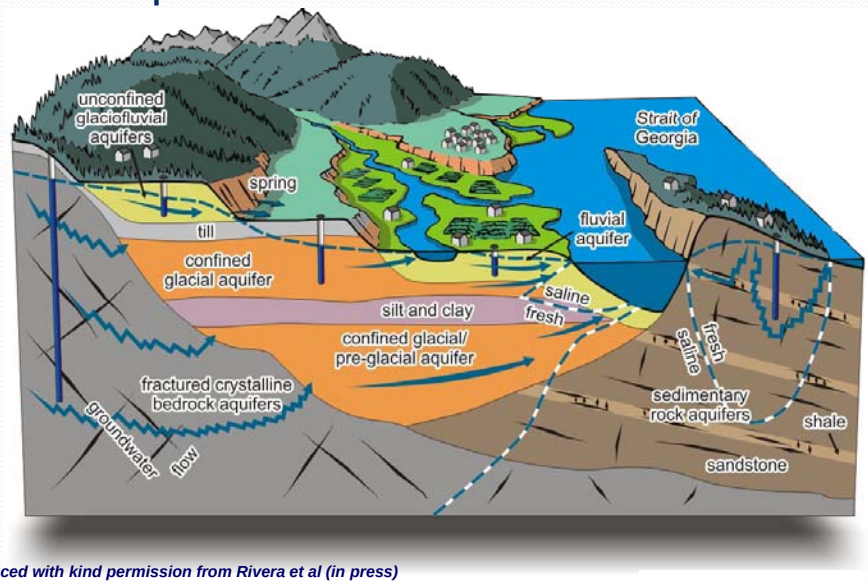
Outline

- Groundwater basics
- Local aquifers
- Groundwater protection and stewardship
- Groundwater regulation and *Water Act* Modernization
- Groundwater level & quality monitoring
- Information gaps & Opportunities



Coastal Aquifers



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Ground Water Use in the Cowichan Valley

Potable Water

- Communities (Cowichan Tribes, City of Duncan, District of North Cowichan, CVRD)
- Private wells and small water systems
- New developments using groundwater (?)

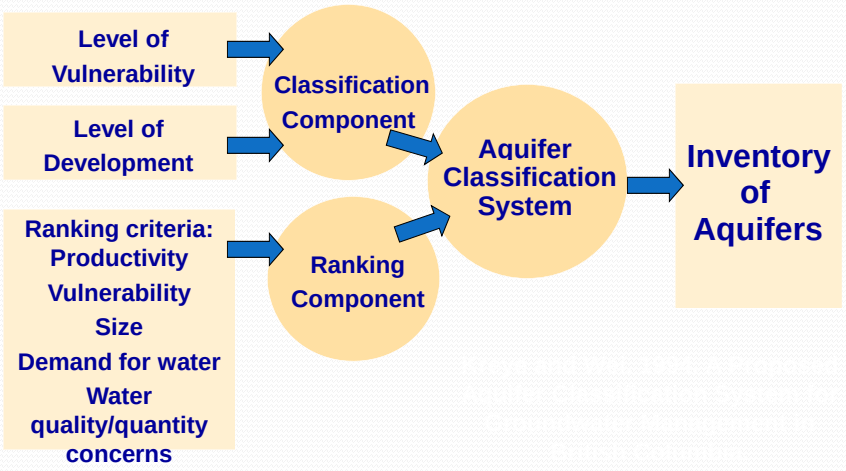
Industrial and commercial uses

- Agriculture (irrigation)
- Aquaculture
- Tourism?
- Geothermal systems?

Ecosystems – wetlands and fish-bearing streams

BC Aquifer Classification System

Method to evaluate & prioritize aquifers for groundwater protection and management



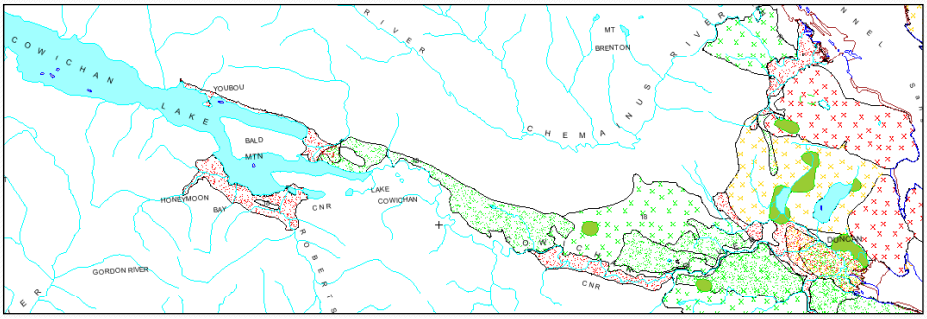
BC Aquifer Classification System

Level of development

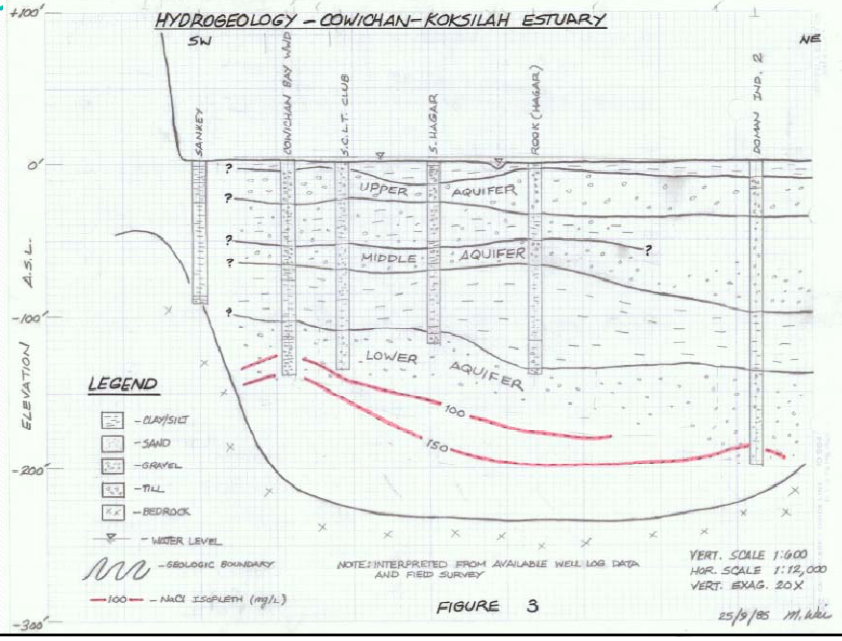
Level of vulnerability

	I	II	III
A	IA – heavily developed; high vulnerability	IIA – moderately developed; high vulnerability	IIIA – lightly developed; high vulnerability
B	IB - heavily developed; moderately vulnerable	IIB - moderately developed; moderately vulnerable	IIIB – lightly developed moderately vulnerable
C	IC - heavily developed; low vulnerability	IIC - moderately developed; low vulnerability	IIIC – lightly developed; low vulnerability

Cowichan Valley Aquifers



- Variable productivity and vulnerability



Protecting ground water sources

- **Individual well** - protected by good construction and operation (focus of *Water Act*, Ground Water Protection Regulation)
- **Well head protection** – considers the land area that provides water to a well, and the risk from activities in the 'capture zone'
- **Aquifer protection** – considers the properties of the ground water source, how vulnerable it is, and what land use activities may put it at risk

Land Use & Groundwater Protection

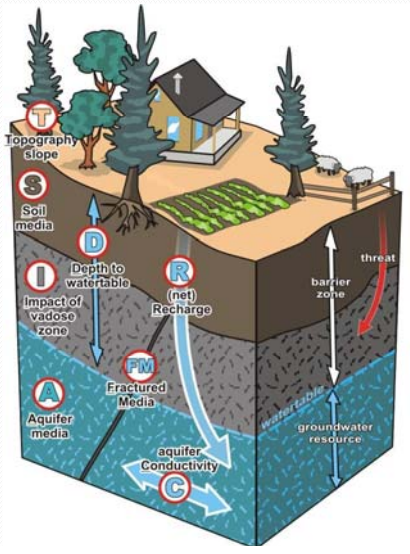
5d-2. In the short term encourage MOE to work with local governments on best practices regarding land use and ground water use.

- DRASTIC method developed by US EPA (Aller et al, 1986) and is widely used around the world.
- Empirical method:

DRASTIC Index (DI) =
5D+4R+3A+2S+1T+5I+3C

23 < DI < 230

- DRASTIC maps identify where groundwater may be more or less vulnerable to pollution from the land surface.



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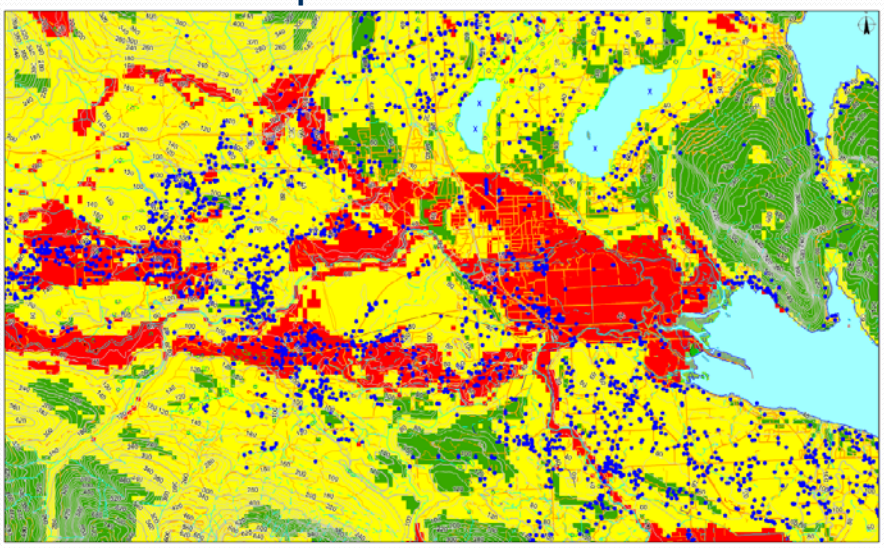
DRASTIC completed for Vancouver Island!



Water Act Modernization

Website: www.livingwatersmart.ca

Blog: http://blog.gov.bc.ca/livingwatersmart/

What do Recent Government Changes mean?

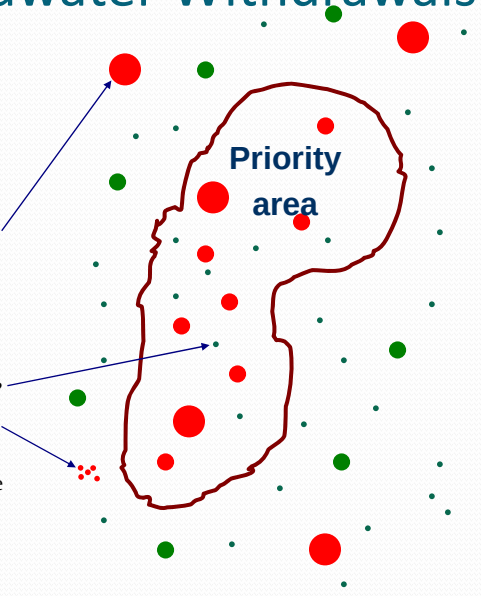
- MOE is still the agency developing the new Water Act (with support from MONRO).
- MONRO is the agency that will implement the new Water Act (with support from MOE).

Licensing of Groundwater Withdrawals

1b-5a. Recommend that MOE include this as part WAM. Note that licensing and reporting should be supported by monitoring i.e. using the information and audits to reinforce conservation and compliance. Support MOE's proposal in WAM discussion paper of beginning with thresholds of 250 m^3/day.

Here are some options:

- As similar a licensing system as for surface water?
- Licensing 250 m^3/d withdrawals from sand and gravel and 100 m^3/day from bedrock aquifers province-wide?
- Include licensing for dewatering and oil and gas purposes?
- In priority or problem areas, license all except "small" (e.g., domestic) withdrawals?
- Authority to license any withdrawal in "hot spots"?
- License new and existing withdrawals above thresholds?

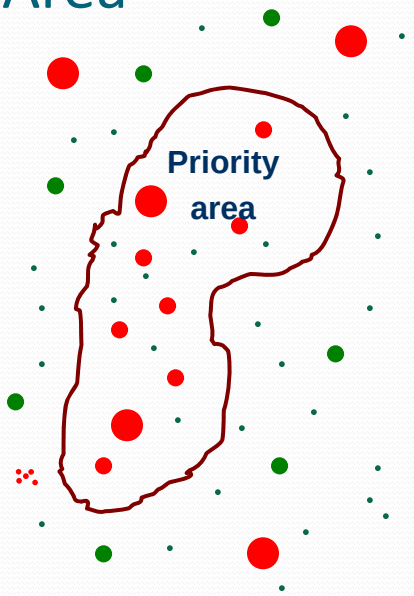


What do you think?

Priority or Problem Area

- Potential criteria for priority or problem areas:
  - Heavy withdrawals and use relative to available supply;
  - Relied by many; sole or primary source of supply;
  - Know or suspected quantity concerns;
  - Risk of salt water intrusion or natural depletion or impact on surface water or ecosystem health;
  - In a basin were surface water is at or near the allocation limit;
  - Transboundary aquifer; or
  - Combination of the above.

What do you think?



Measuring and Reporting on Use

1a-4. Recommend that MOE include metering as part of Water Act Modernization (WAM) and that it be supported by monitoring i.e. using the information and audits to support conservation and compliance. Support MOE's proposal in WAM discussion paper of beginning with thresholds of 250 m^3/day.

Here's some options:

- Require volumes withdrawn, levels, and salinity (in coastal aquifers), stream flows or levels (where there is connection with SW) to be measured and reported by the "large" licensee?
- Require information on amount used by type or purpose under a license?

What would the data be used for?

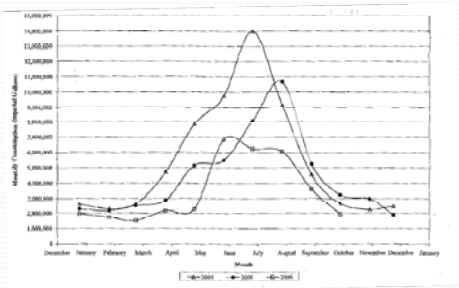
- Consider billing for actual use or for over-use?
- Assess if withdrawal and use is beneficial and sustainable; ability to "right-size" the license, if there is a limited term?
- Assess impact of withdrawal on other licencees and other users over time.
- Support calculation of basin water budget for Water Resource Assessment Plans.

What do you think?

Reporting on Use

5c-1. Request requirement under WAM that MOE provide local governments with annual report on volumes used.

- Volumes withdrawn can be entered into WRIS or WELLS database.
- Annual volumes can then be reported by Basins (e.g., Cowichan)?
- Via indicators in the State of Water Report (both indicators and report to be developed)?

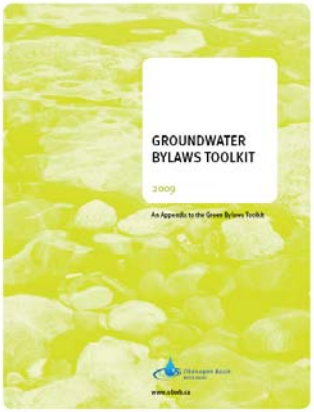


What do you think?

Standards for Water Servicing

5c-2. Request that approval bodies (local governments and Ministry of Transportation) ensure that adequate water is proven before approvals are given.

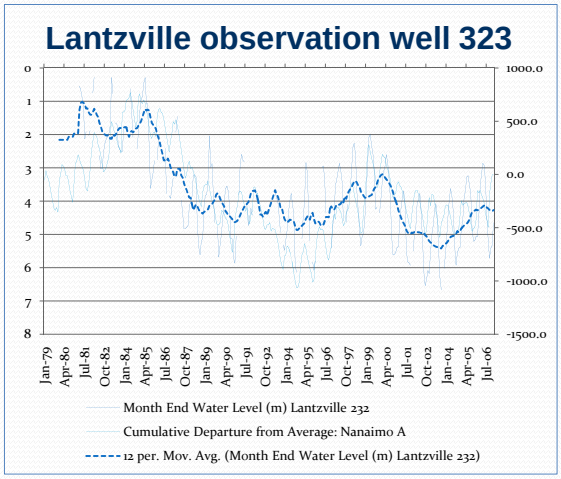
- Consequential amendments in ? *Act* required to make it mandatory.
- Standards for testing required for adoption (i.e., in a model by-law) – see the Section 4.9 of the Groundwater By-laws Toolkit (http://www.obwb.ca/groundwater_bylaws_toolkit/).
- Other uses of the data (e.g., well log, pumping test, water quality results) submitted to the approving agency? Here are some issues:
  - Ownership and privacy issues related to the data.
  - Form and format of the data.
  - Managing the data.



Cumulative Impacts

5c-2. Seek provincial advice on monitoring and reporting and approaches to address cumulative impacts. Raise as an issue under WAM.

- Work with Pat.
- Monitor regional groundwater levels (and quality) – Observation Well Network; Ambient Groundwater Monitoring Network.
- Monitor river flow (hydrometric network).
- Inform Water Resource Assessment Plans.



Characterizing Aquifers & Determining Groundwater Availability

5d-2. Request the MOE conduct further inventory and assessment of use as well as classification of aquifers within the watershed and based on that information develop guidelines specific to the situation in the watershed.

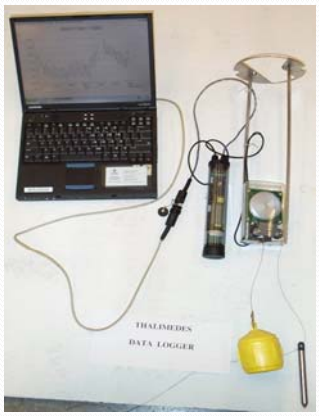
5d-1. Collect & maintain data on aquifer capacity, aquifer recharge rate, ground water extraction, & the relationship of ground water pumping to base flow in the Cowichan River & other nearby streams, & make this info. available to the public.

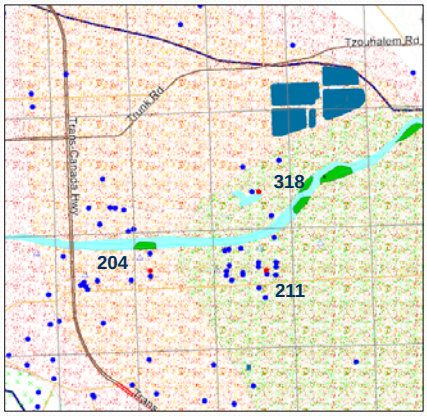
- 5-year MOU with Geological Survey of Canada to assess groundwater in the Nanaimo Aquifer System (GANAS) – area of interest: CVRD to RDN.
- Regional surficial geology and bedrock mapping of entire area (based on available LADAR mapping).
- Detailed characterization of groundwater in the Parksville-Qualicum area; desire to do same in the Cowichan Valley (subject to funding and capacity).
- Main objectives of detailed characterization:
  - develop scientific understanding of the aquifers in the study area and develop a (dynamic) numerical groundwater model.
  - Use the numerical model to help support future groundwater allocation decisions.

Groundwater Monitoring

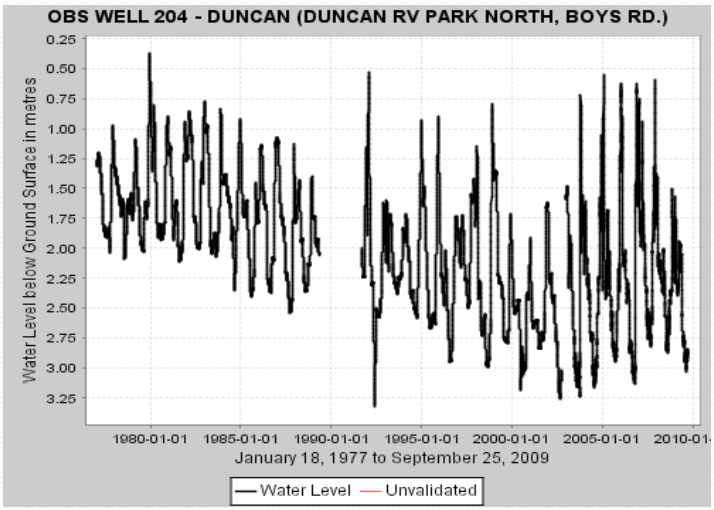
- Key to understanding changes in aquifers – unsustainable groundwater use will show up as declining levels
- Challenges:
  - Adequate spatial coverage
  - Impacts and trends may take years to decades to see measurable change
- Partnerships key to expanding network
- Groundwater /surface water interactions not well understood

Provincial Observation Well Network



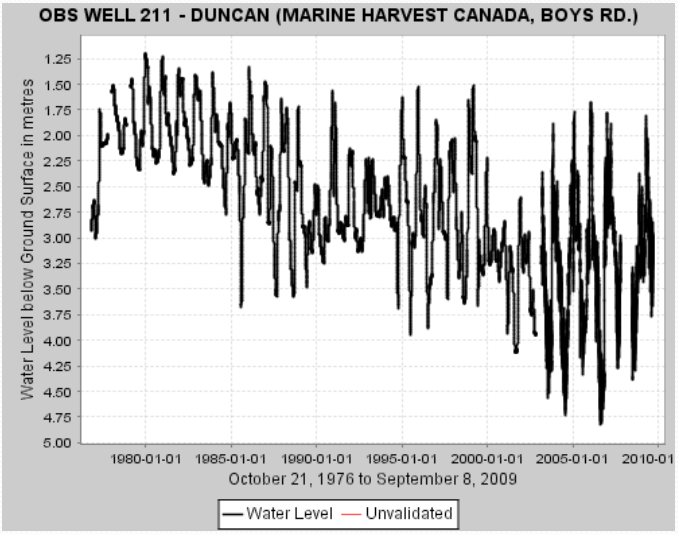


- Three active observation wells in Cowichan Valley– Inadequate spatial coverage!



Unconfined sand and gravel, depth 9m

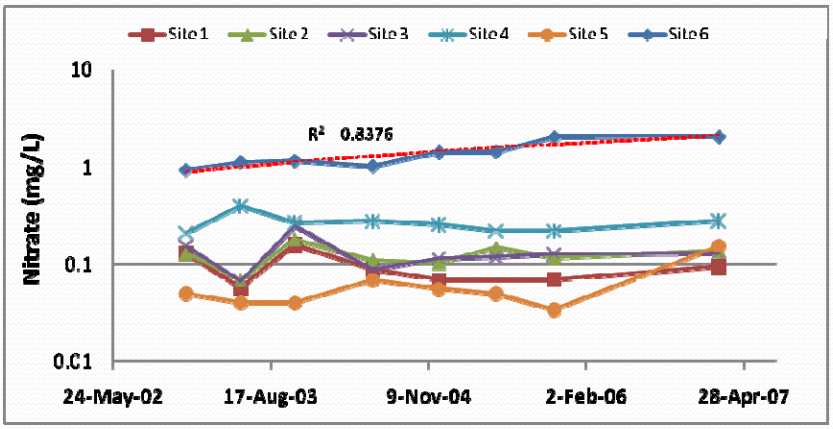
Data available at: http://a100.gov.bc.ca/pub/gwl/disclaimerInit.do



Confined – sand and gravel, 32 m deep

Data available at: http://a100.gov.bc.ca/pub/gwl/disclaimerInit.do

Groundwater quality monitoring in the Lower Cowichan River Aquifer



Key Information Gaps/Questions for long-term Groundwater Protection and Management

- Aquifer characterization
- Saltwater interface
- Interactions between the Cowichan River and aquifers? Role of groundwater to river habitat?
- Water budgets- how much can we use sustainably?
- Impacts of climate change? Urban and rural development?

Summary

- Ground water is a valuable resource in Region and must be managed and protected for future generations.
- Need to move towards more integrated picture of freshwater resources (groundwater, lakes and streams).
- Aquifer characterization, technical tools, data analysis and long-term monitoring are important to support decision-making.
- Education, regulation and stewardship important.
- Partnerships with community, other provincial agencies and local government essential.

Thank You
Questions?

Pat Lapcevic, P. Geo.

Pat.Lapcevic@gov.bc.ca

250 751-3149

Mike Wei, P. Eng.

Mike.Wei@gov.bc.ca

250 356-5062