



Ministry of **F**orests, **L**ands, **N**atural Resource **O**perations
and **R**ural **D**evelopment

Okanagan Basin Water Board

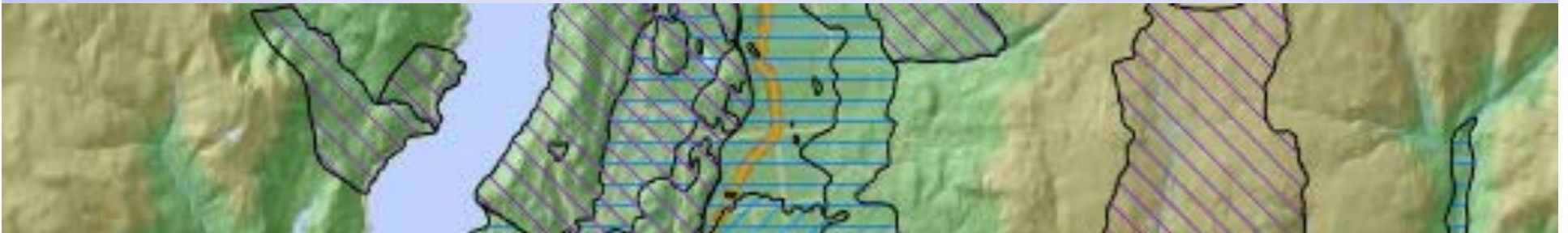
Meeting Theme: Natural Resource Mapping & Data

Groundwater Mapping

Nicole Pyett, M.Sc., P.Geo.

Kelowna, BC

February 8, 2018





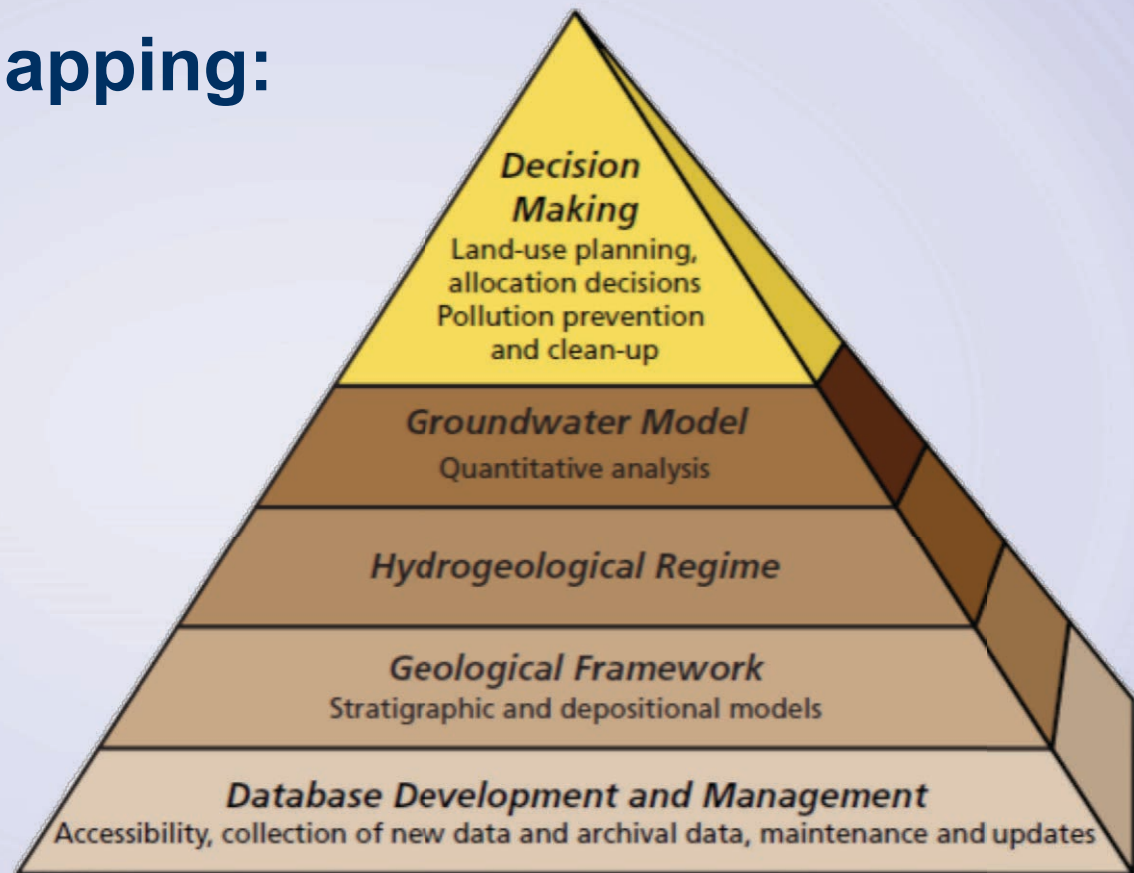
Outline

- History of groundwater mapping
- Current perspective
- Future efforts
- Other related projects





Groundwater mapping: Past to Future

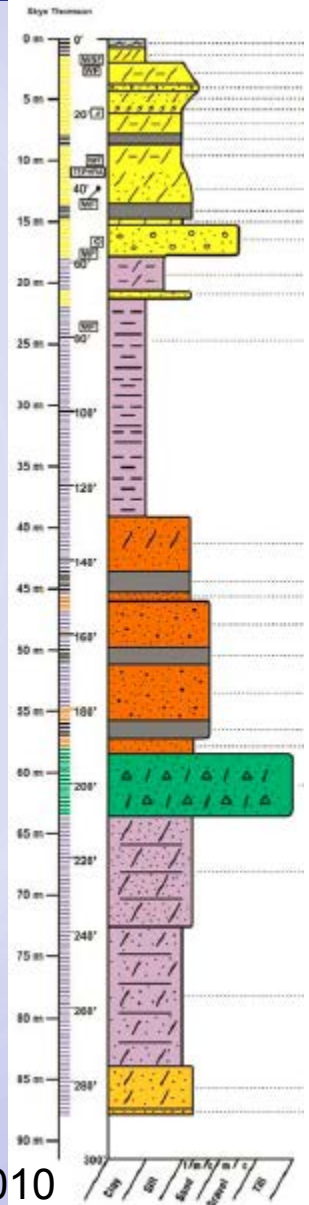
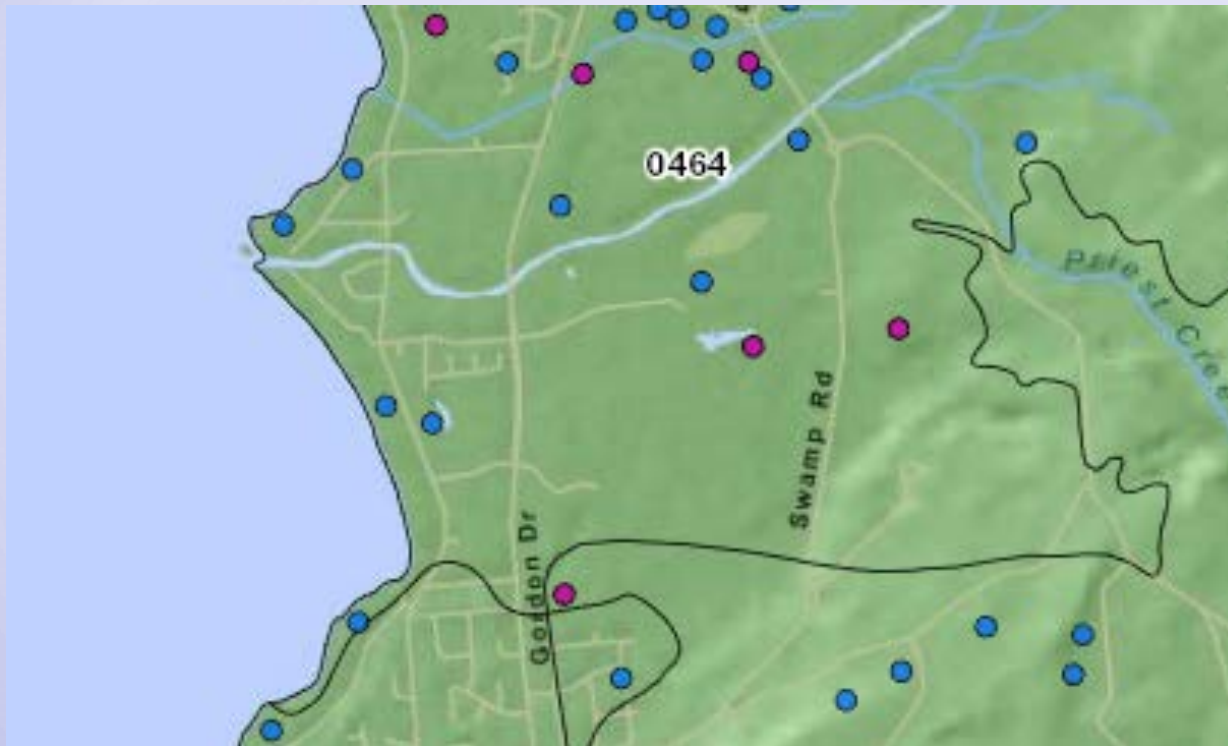


(Council of Canadian Academies, 2009)

Figure 4.1
Science requirements for groundwater sustainability.

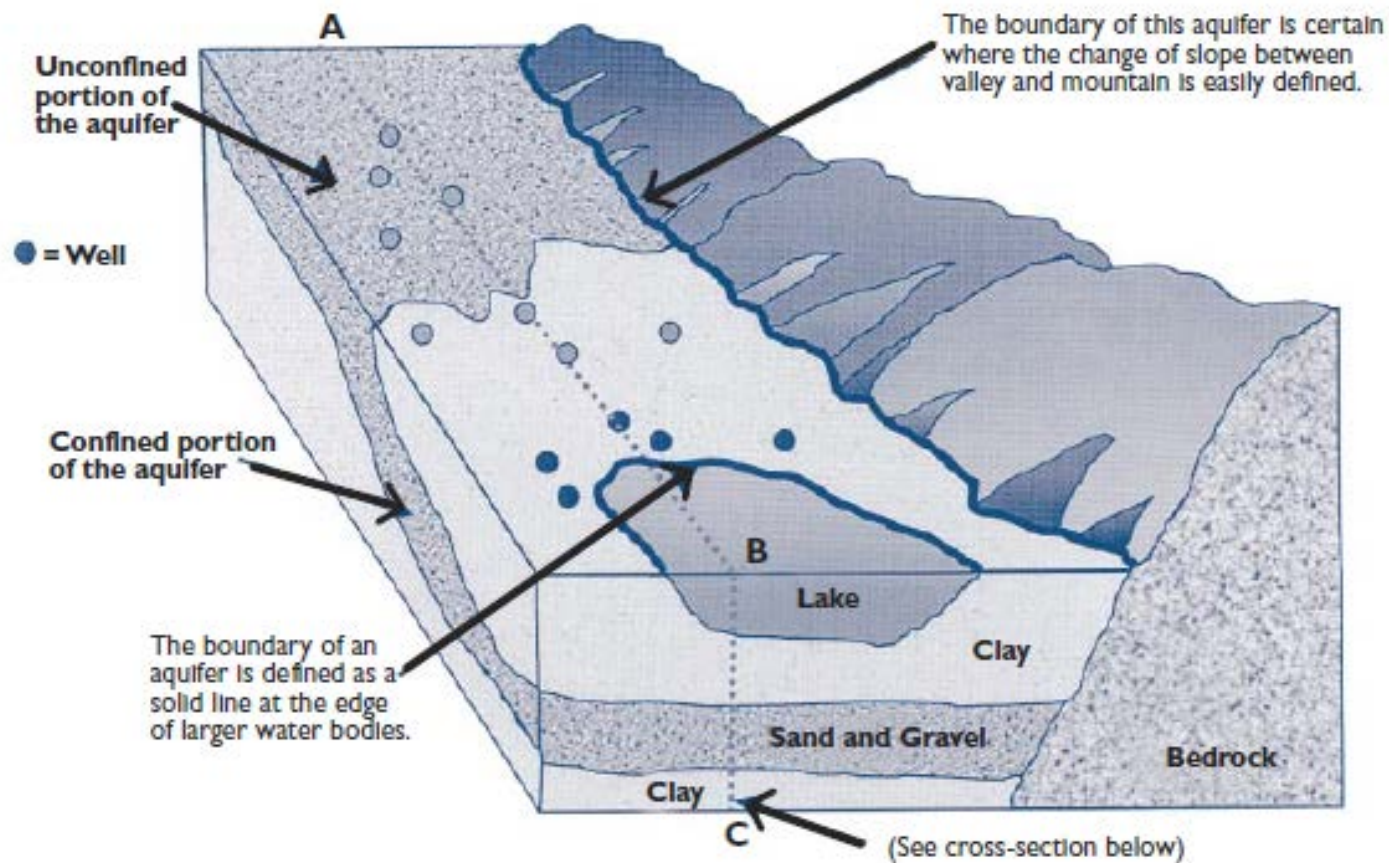


Historical approach and focus





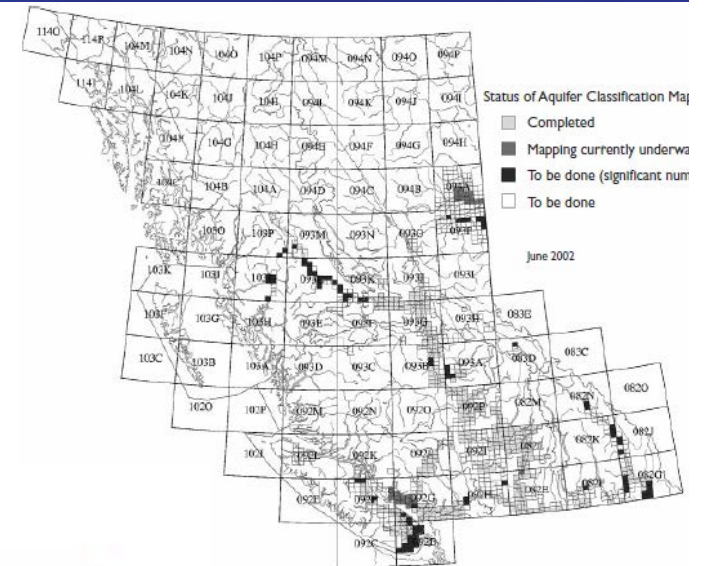
Historical approach and focus





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Historical approach and focus BC Aquifer Classification System (1994)



← INCREASING LEVEL OF DEVELOPMENT

| | I Heavy | II Moderate | III Light |
|------------|---|--|---|
| A High | IA: heavily developed, high vulnerability aquifer | IIA: moderately developed, high vulnerability aquifer | IIIA: lightly developed, high vulnerability aquifer |
| B Moderate | IB: heavily developed, moderate vulnerability aquifer | IIIB: moderately developed, moderate vulnerability aquifer | IIIB: lightly developed, moderate vulnerability aquifer |
| C Low | IC: heavily developed, low vulnerability aquifer | IIIC: moderately developed, low vulnerability aquifer | IIIC: lightly developed, low vulnerability aquifer |

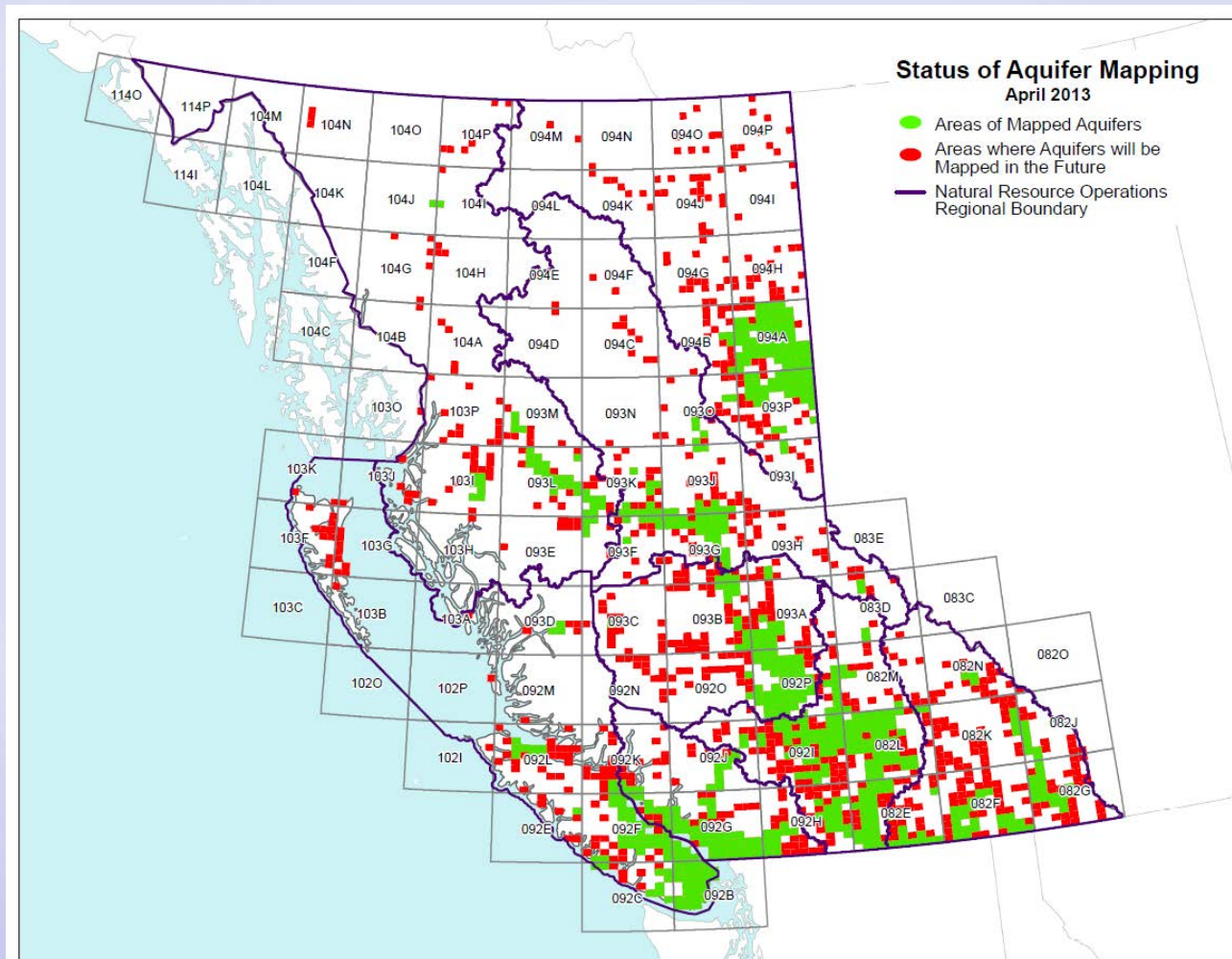
NOTE: ← = Implied priority





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Historical approach and focus





Historical approach and focus

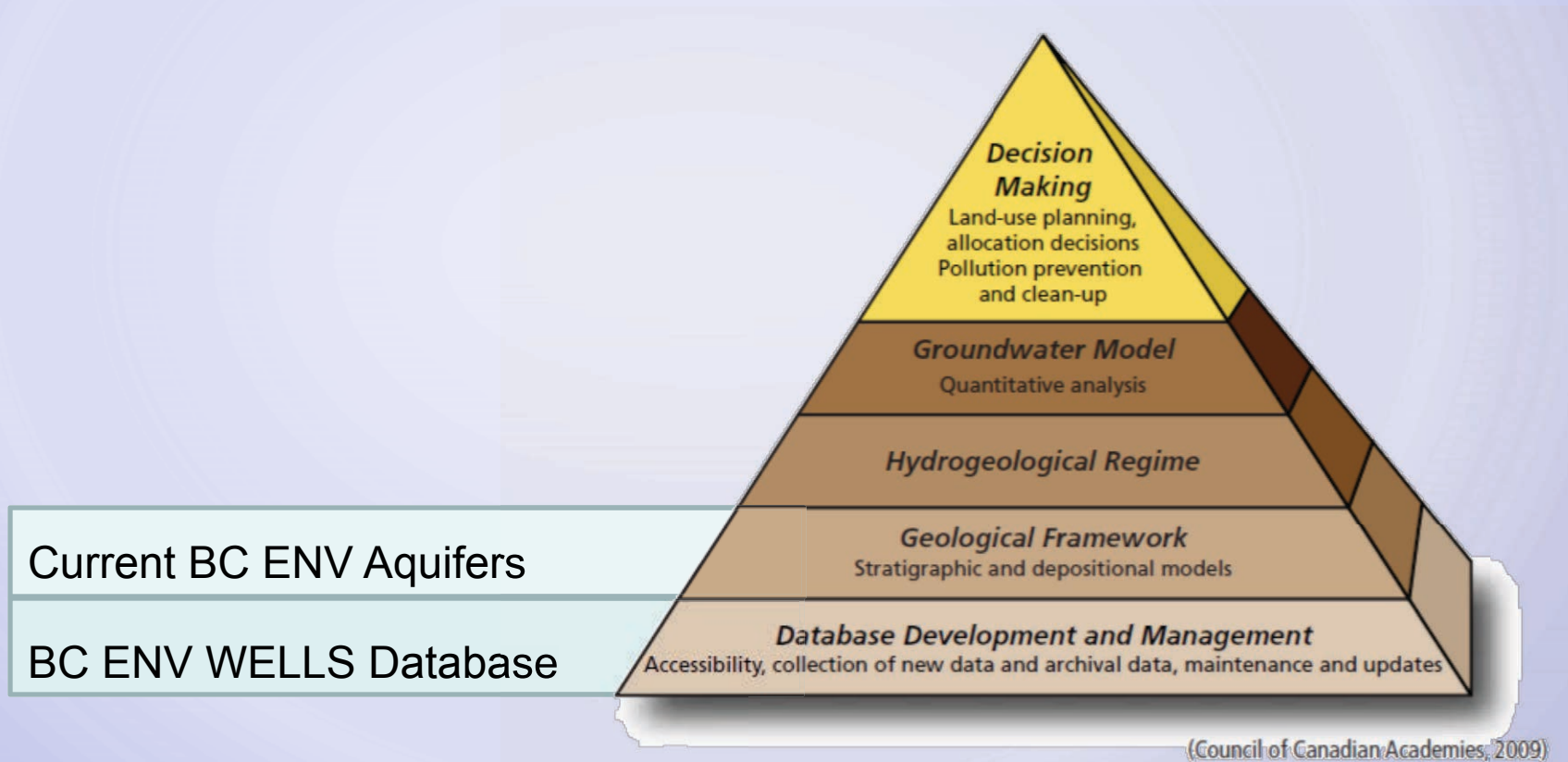


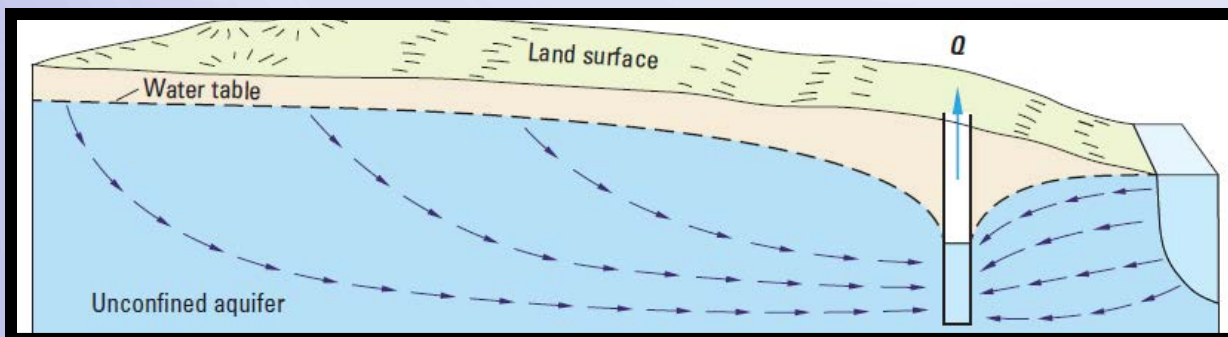
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Science requirements for groundwater sustainability.



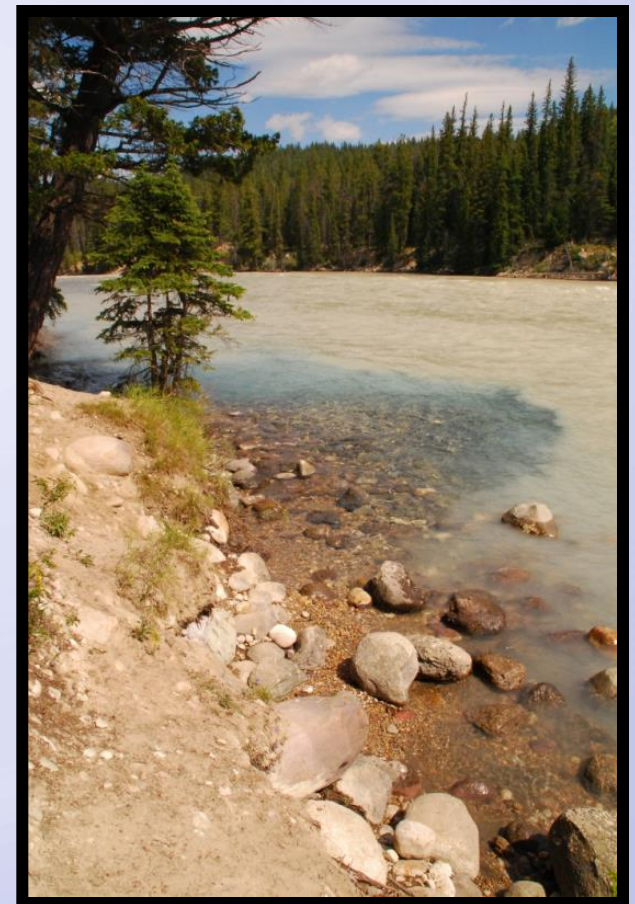
Current state and ongoing projects

Groundwater mapping and the *Water Sustainability Act*:

- Environmental flow needs
- Groundwater licensing



United States Geological Survey (2012)

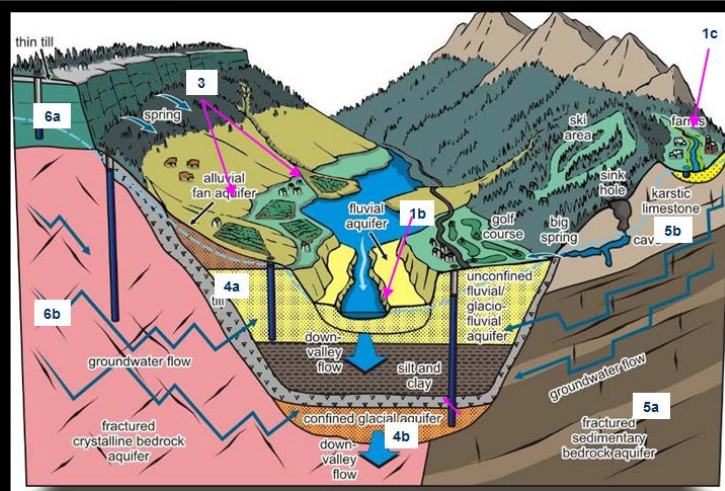




Current state and ongoing projects

Groundwater mapping and the *Water Sustainability Act*:

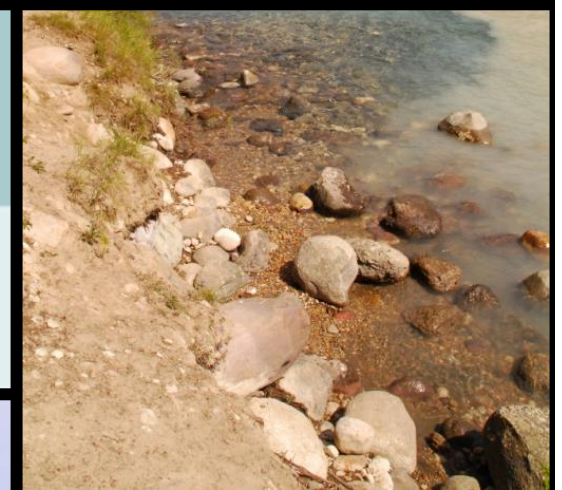
- Environmental flow needs → Aquifer Type
- Groundwater licensing → Wells assigned to aquifers + water budgets



2017

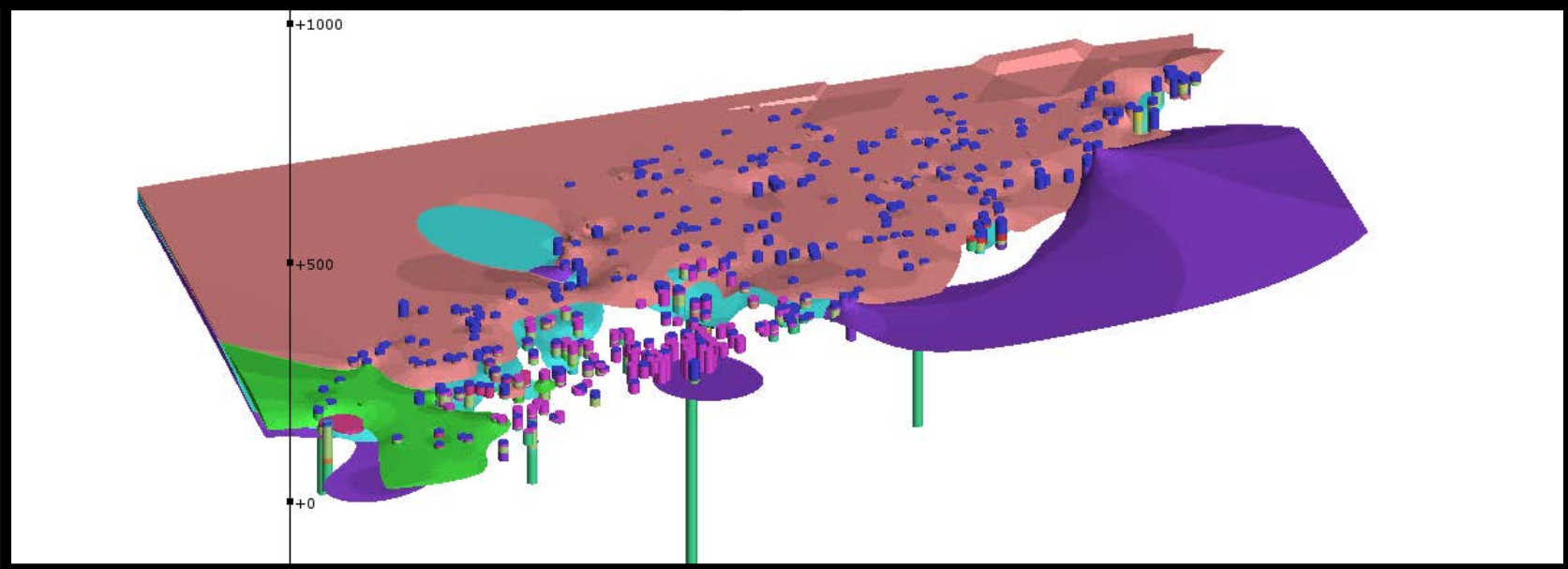
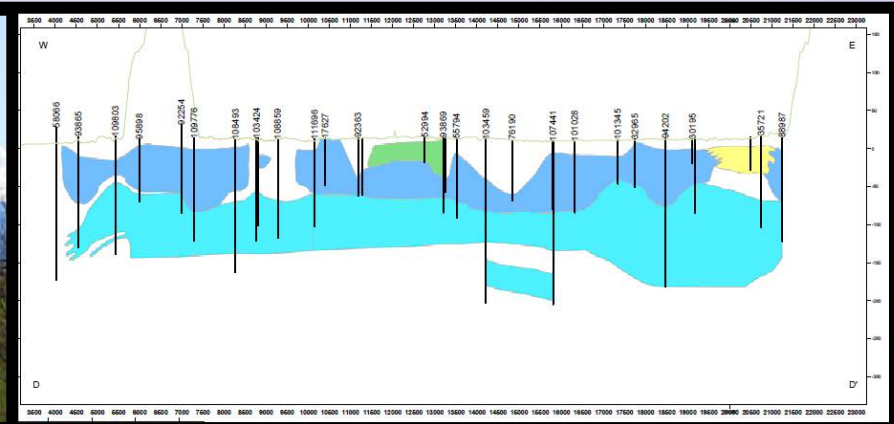
7,200 wells mapped to
aquifers over approximately
5,900 km²

Re-produced from Wei et al (2014)





Current state and ongoing projects

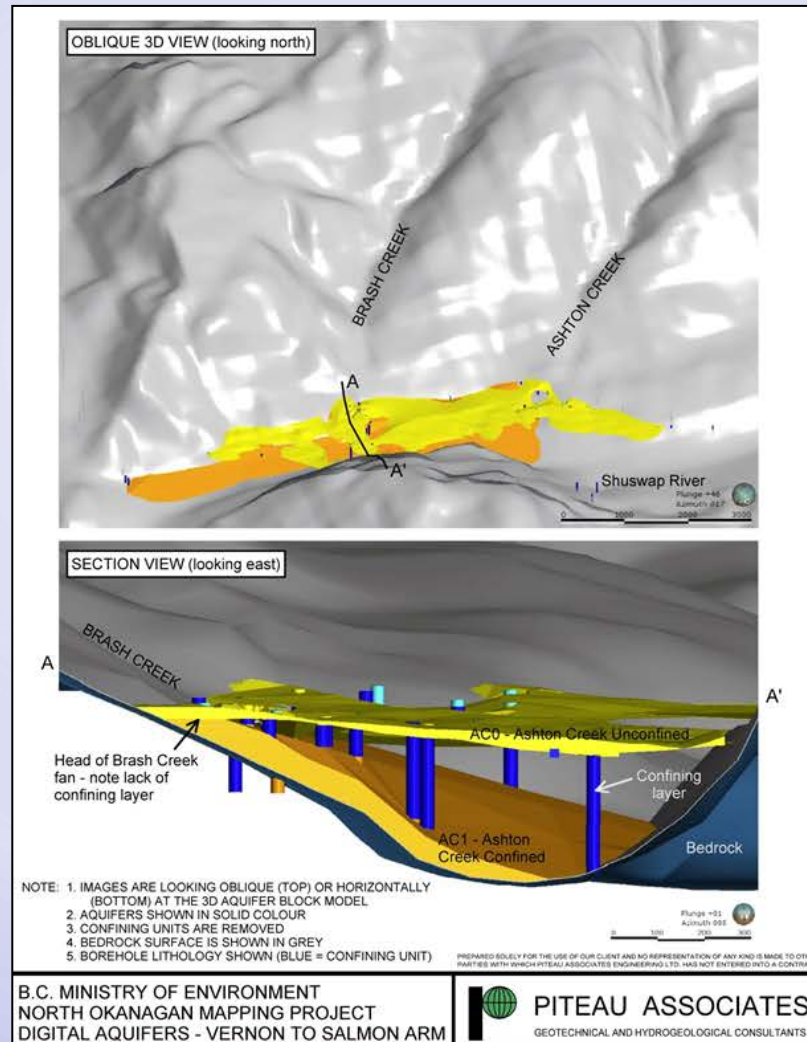




Current state and ongoing projects

Example
project:

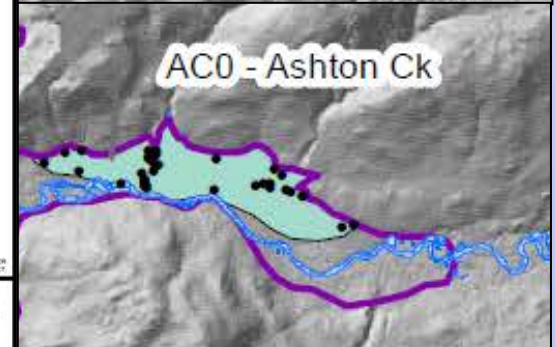
North
Okanagan
Hydrogeologic
Mapping



AC1 - Ashton Basal



AC0 - Ashton Ck

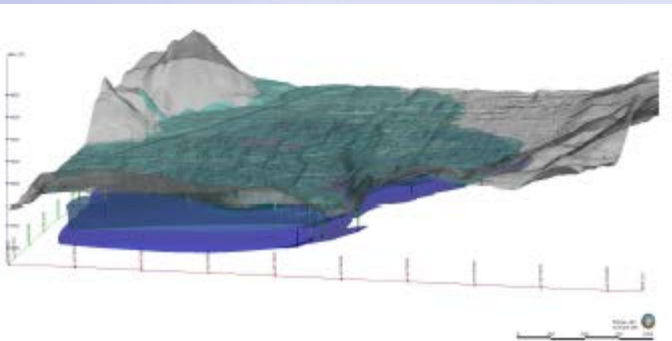
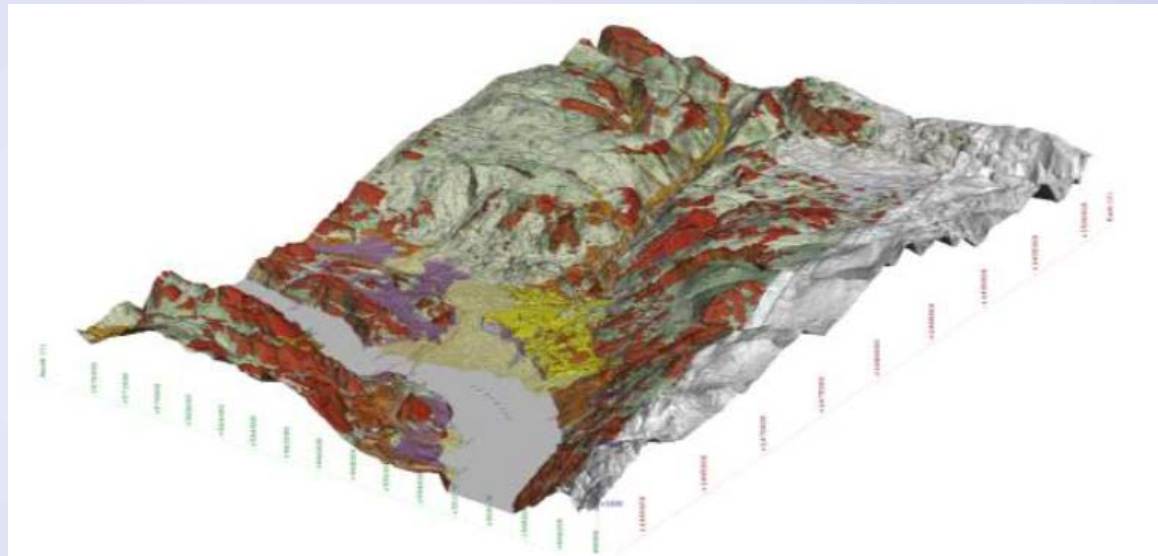




Current state and ongoing projects

Example
project:

Kelowna
Hydrogeologic
Mapping



- Ecoscape Environmental Consultants
- GW Solutions Inc.
- Piteau Associates



Current state and ongoing projects

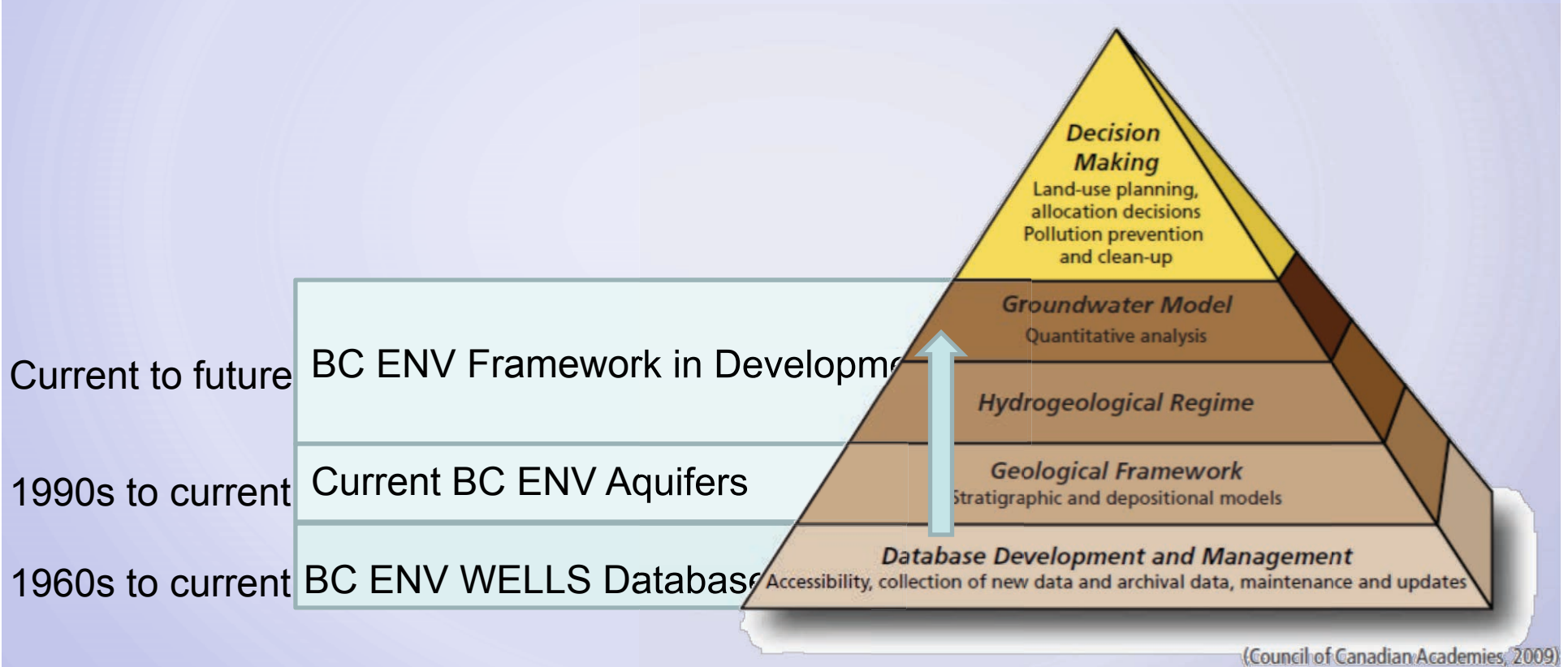


Figure 4.1
Science requirements for groundwater sustainability.



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Future Vision

| EMS | GWELLS | <u>eLicensing</u> | Groundwater Hub | Tools / Data / Plans |
|---|---|---|---|--|
| <ul style="list-style-type: none">• New parameter fields• Add Data<ul style="list-style-type: none">• HLTH water systems• Licensing• Private well• Map-based access | <ul style="list-style-type: none">• Correlate wells/springs to aquifers• Regional access to well-aquifer correlation• Aquifer Reports• Add parameters (transmissivity etc.)• Link with technical assessments• Groundwater Management Units (hydraulically connected zones) | <ul style="list-style-type: none">• Cumulative Allocation Volume Tool• Spatial Hierarchy• Measuring & Reporting Tool (Scoping)• Review: Allocation Restrictions• Enhanced Reporting | <ul style="list-style-type: none">• Aquifer Dashboard / Portal• Implement Water Budgets (database/map)• Spatially Searchable and Downloadable Data Layers<ul style="list-style-type: none">• EMS• Aquarius• E-licensing• GWELLS• HLTH Service & Production• 3rd Party Monitoring• Climate data• Surficial Geology• Climate Change Projections• Technical Assessments | <ul style="list-style-type: none">• Tools<ul style="list-style-type: none">• Cross-sections• PGOWN Automated (Stress / Drought etc.)• Water level mapping• Curtailment mapping• Climate• Recharge• Unauthorized Use• Water Allocation Plans• LIDAR |



Future Vision

Water Information Services Project (WISP)

WISP is a multi-year business transformation initiative to:

Create accessible and integrated information systems that support robust decision making and effective management of water resources for British Columbians.





Related Projects - GWELLS

Ministry Home Government of British Columbia
Water Well Application Ministry of Environment

Report 2 - Search by Well Location

Select the criteria you wish to display by clicking on the check boxes.

Tips:

- Try using the Street Name to search for a well.
- Try a combination of criteria to search (e.g. Lot and District Lot).
- Use the wildcard (%) around criteria to broaden a search (e.g. Lot. %2% to look for any lot with a 2 in it).
- Note: wildcards are not needed in Street Name or Choose by Island.

Well ID Plate Number (from the steel ID plate of wells)

Well Tag Number: (a unique database number given to each well)

Street Name:

Site Area:

PID:

Plan:

Lot:

Existing Wells Database

BRITISH COLUMBIA Groundwater Wells and Aquifers

Search | Groundwater Information

Groundwater Well Search

Please take a moment to complete a [short survey](#) to let us know about your search experience.

Not all groundwater wells are registered with the province, as registration was voluntary until February 29, 2016. Data quality issues may impact search results.

Search by one of the fields below, or zoom to a location on the map and select the "Search Wells in this Area" button.

Well Tag Number or Well Identification Plate Number
example: 123456

Street Address
example: 123 main

Legal Plan or District Lot or Parcel Identification Number (PID)
example: 123a

Owner Name
example: Smith or sml

Search Reset

For additional search options, try:

- [B.C. Water Resource Atlas](#)
- [iMapBC](#)

500 km
Leaflet | Powered by Esri | Government of British Columbia, DataBC, GeoBC

New GWELLS Product

User Feedback

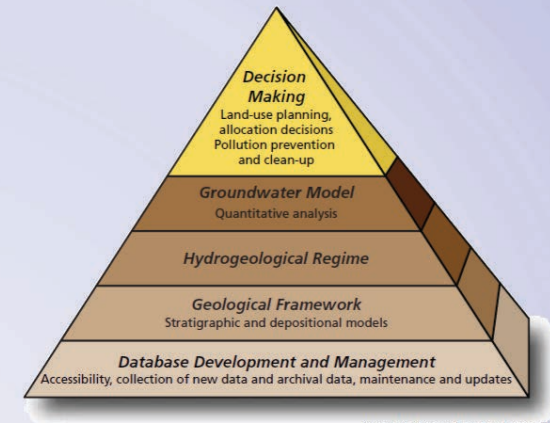
- *"This search interface is well designed for well owners and drillers. The interactive map interface is excellent."* - **Staff**
- *"I like that feature [the geolocate feature], it brings it into a digital age, a smart phone age."* – **Industry**
- *"Loved the map feature!"* - **Well owner**



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Next Steps

- Continue annual aquifer mapping projects
- Work to improve data quality and accessibility
- Expand to hydrogeological modeling in selected areas



| EMS | GWELLS | eLicensing | Groundwater Hub | Tools / Data / Plans |
|--|---|---|---|---|
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QUESTIONS?

For further information:

<https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/groundwater-wells>

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The screenshot shows the British Columbia government website. At the top, there is a search bar and navigation links for 'Careers & MyHR', 'Services A-Z', 'Organizations A-Z', 'Forms A-Z', 'News', and 'Contact Us'. Below this is a main navigation menu with categories: 'Climate Change', 'Pesticides & Pest Management', 'Plants, Animals & Ecosystems', 'Waste Management', 'Air, Land & Water', 'Research, Monitoring & Reporting', and 'Natural Resource Stewardship'. The 'Air, Land & Water' category is expanded to show sub-links: 'Spills & Environmental Emergencies', 'Site Remediation', 'Air', 'Water', 'Land', and 'Permitting & Compliance at Sites of Interest'. The 'Water' link is highlighted. The main content area is titled 'Groundwater Wells' and includes a breadcrumb trail: 'Home / Environmental Protection & Sustainability / Air, Land & Water / Water /'. A sidebar on the left lists 'Laws & Rules' with sub-items: 'Water Licensing & Rights', 'Drought, Flooding, Dikes & Dams', 'Water Quality', and 'Groundwater Wells'. The 'Groundwater Wells' sub-item is expanded to show 'Information for Property Owners', 'Information for Well Drillers & Well Pump Installers', 'Aquifers', and 'Regional Groundwater Contacts'. The main content area has two sections: 'Groundwater Wells' and 'Groundwater Protection Regulation'. The 'Groundwater Wells' section explains that groundwater wells provide access to water for industry, municipalities, farms, and homeowners, and that they must be constructed and maintained to ensure safety. The 'Groundwater Protection Regulation' section explains that the Groundwater Protection Regulation (GWPR) sets standards for well construction and maintenance. A sidebar on the right titled 'Information Brochures' lists several PDF documents: 'Water Sustainability Act Overview (PDF)', 'Groundwater Licensing (PDF)', 'Groundwater Protection Information for Well Owners (PDF)', and 'Groundwater Protection Information for Well Drillers and Well Pump Installers (PDF)'. A 'Printable Brochure Format' link is also present.

