qathet REGIONAL DISTRICT

Savary Island Groundwater Assessment

Results & Recommendations

Presentation to qRD Planning Committee

March 25, 2025

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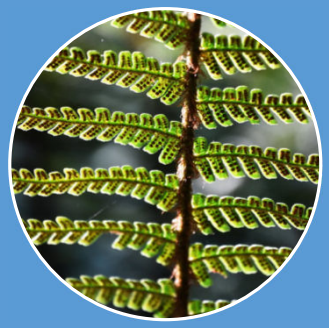
θatɛq
(Thah teq)
"Broken Off"
(Indian Point)
qayɛ qʷən (Qaye qwun)
Savary Island
"Fresh Water Spring"
Mace Point
ti: ti: may
(T'eet'ee may)
"Many Wild Cherry Trees"
Second Point
First Point
Keefer Bay
South Beach
qayɛ qʷən
(Freshwater Spring)
Mermaid Beach
• qayɛ qʷən
Sunset Trail
Garnet Point
Duck Bay
Sutherland Beach
χɛχaǰeyɪs
(χɛ χa jey is)
"Small Stone"
(Beacon Point)
Whalebone Point
1581 m
Tla'amin Nation
Traditional Names
ʔayhos (Ay hos) – *a double headed serpent who was changed into an island by χaχyɛ ti qaymɪxʷ the Transformer*

Project scope & timeline



Phase 1: Compile and update water-related information

- Updated map of water sources
- Gathered existing monitoring & land use data
- Resident survey (online & field assessment)
- Collected & analyzed current data (groundwater levels, field water quality e.g. electrical conductivity)
- Prepared hydrogeologic model of island aquifers

2024 August – September

Phase 2: Groundwater quantity and quality hazard assessment

- Developed water balance for island (water availability vs demand)
- Assessed impacts of climate change on the water balance
- Evaluated aquifer vulnerability to contamination from the land surface
- Assessed sea water intrusion hazard and impact

October-November

Phase 3: Develop an aquifer protection plan and monitoring strategy

- Identify strategies to address hazards related to land use and aquifer setting
- Recommend planning & other measures to help preserve and protect water resources on the island

December-January 2025

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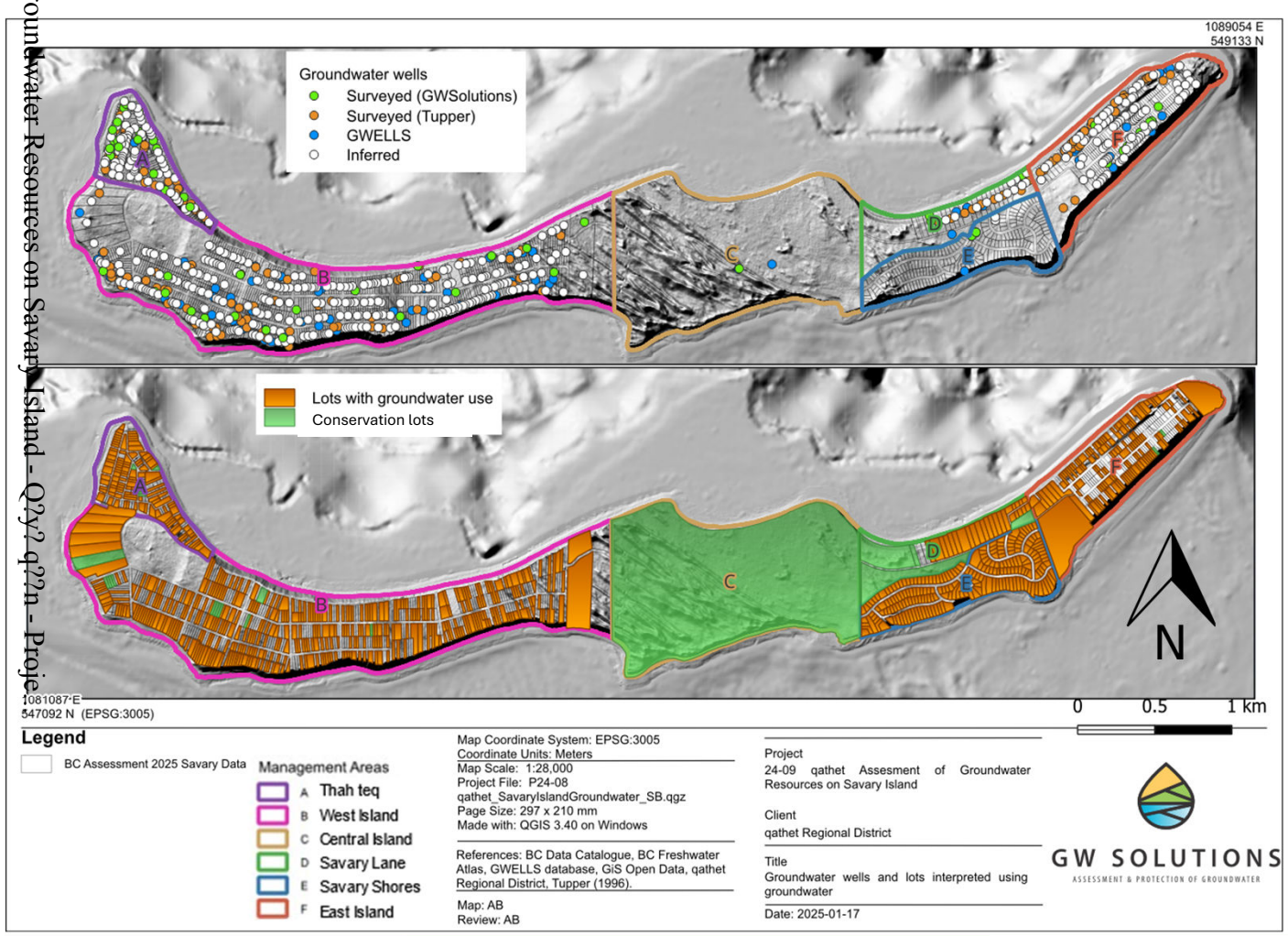

Savary Island lots and well inventory

Population	
Year-round	70 to 100
Seasonal	1000 to 3000
Lots	
Total	1363
Developed	841
Wells	
Field verified	233
Inferred (based on land use)	426

Photo: A. Barroso

Field assessment

- Collected spatial coordinates and document the details of different water sources (e.g. sand points, drilled wells) (77 sites)
- Measured groundwater levels (38 sites), estimated well discharge/pumping rates, measured spring discharge rate
- Collected samples for field analysis of water quality (temperature, pH, electrical conductivity, total dissolved solids)(47 sites)
- Conducted downhole salinity measurements and profiles (wells at risk or showing evidence of saltwater intrusion)(12 sites)
- Collected samples for laboratory analysis of geochemical quality (28 wells, 1 spring, 2 ocean)


Photo: L Johnson

Phase 2 – Water Quality & Quantity Hazard Assessment

Water Balance

- Diffuse recharge received over island footprint (infiltration influenced by slope and soil characteristics
- Current water demand up to 7% of annual recharge
- Per household water demand in low range (100 – 400 L/d)
- Seasonal deficit - highest population & water use in summer
- Higher water demand and increased seasonal aquifer stress anticipated with growth scenarios

Climate Change

- Annual precipitation may increase but will be received over shorter period
- Monthly groundwater recharge likely to decrease in all months except December
- Much longer dry season (no recharge from April – Sept)
- Increased risk of hazards such as seasonal drought, seawater intrusion and wildfire

Aquifer vulnerability

- Aquifer vulnerability index high to extremely high
  - Very permeable sand aquifer
  - Low elevation areas with shallow water table <5 m below ground
- Clay, till, silt layers (if present) can slow infiltration of contaminants


Photo: A. Barroso

Phase 2 – Water Quality & Quantity Hazard Assessment

Water quality

- Groundwater from most wells is fresh and below Guidelines for Canadian Drinking Water Quality
- Natural contaminants present (arsenic, iron, manganese)
- Nitrate (& chloride) indicate septic system impacts
- Increasing nitrate trend observed in some areas, results below guidelines (long-term health impacts can occur at concentrations below limit)

Well construction and maintenance

- Most well construction compliant with provincial Groundwater Protection Regulations
- Wells have greater protection from contamination when properly installed and maintained
  - Bentonite surface seals
  - Setbacks from contaminant sources (sewage sources, fuel)
- Well owners would benefit from education and support for well testing and septic system maintenance

Sea Water Intrusion Hazard

- Island has a very thin lens of fresh water overlying saline transition zone
- Sea water intrusion is a significant hazard to water quality, quantity likely to impact long-term sustainability
- SWI indicated by elevated chloride (total dissolved solids and conductivity)
- Observed trend of replacing shallow sand point wells with deeper drilled wells (likely to increase water use and aquifer drawdown)
- Monitoring and well owner education is critical to reduce risk
- Well drillers and pump installers play a critical role in education and prevention

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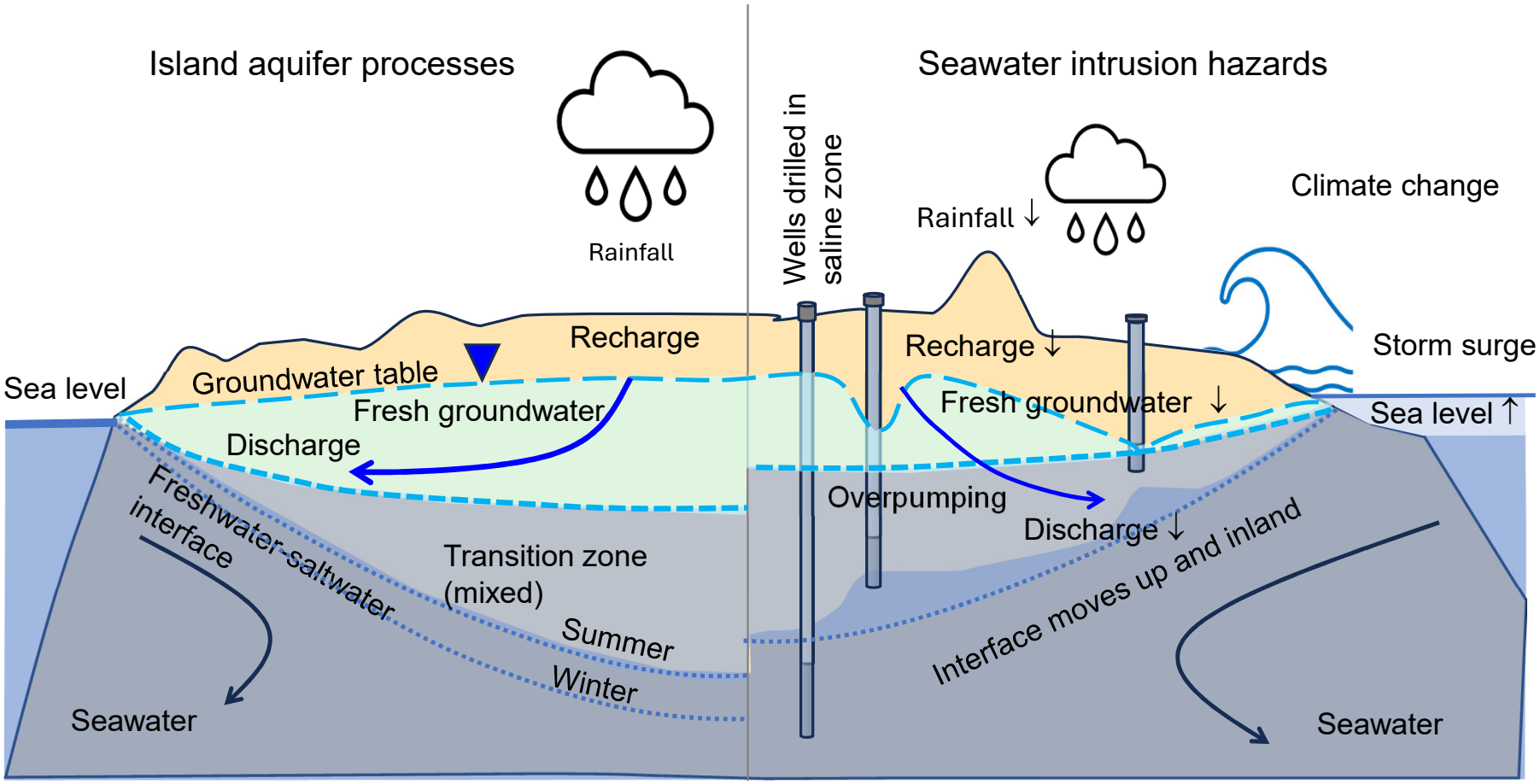
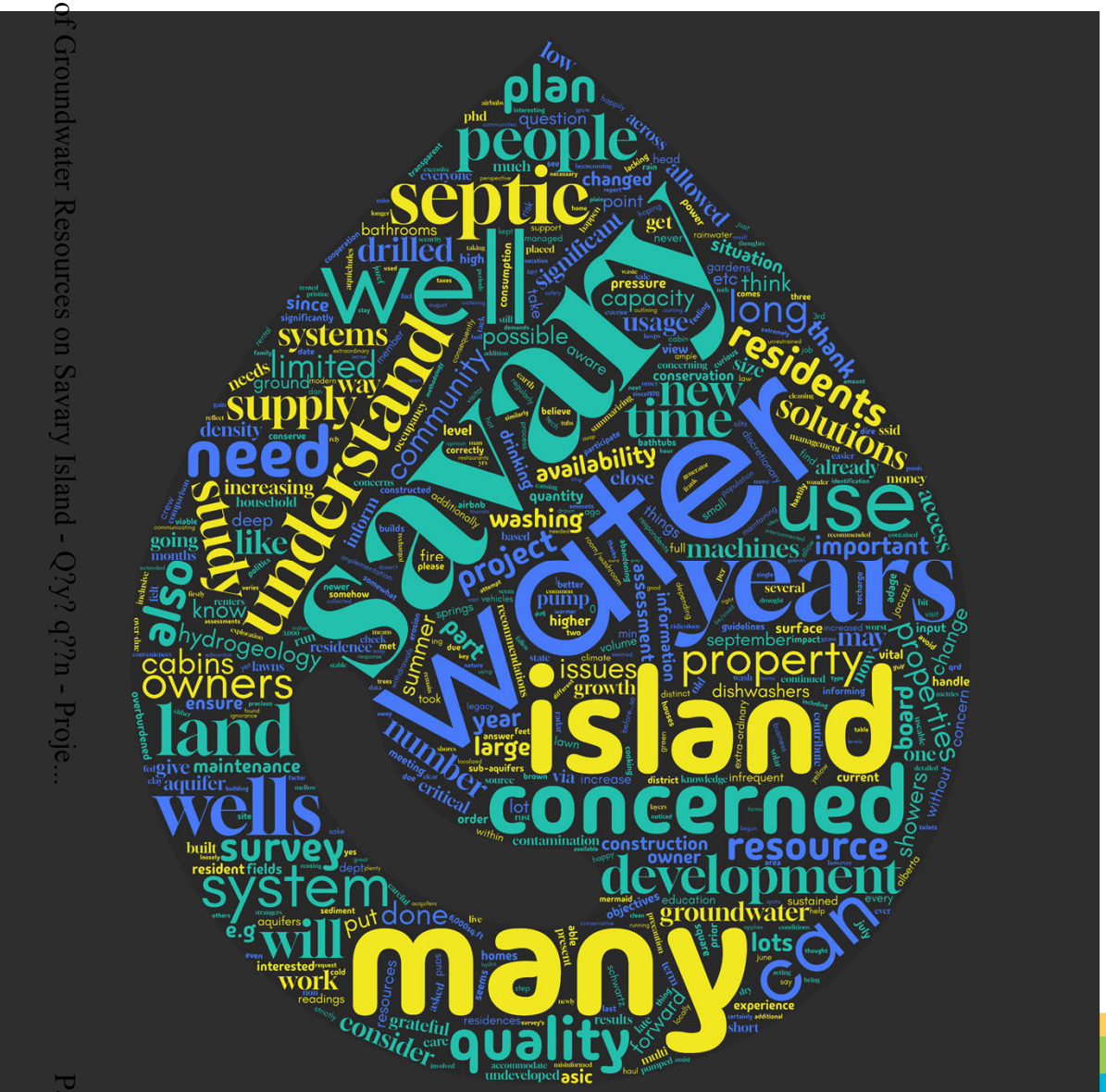

Island aquifer processes
Rainfall
Recharge
Groundwater table
Sea level
Fresh groundwater
Discharge
Freshwater-saltwater interface
Transition zone (mixed)
Summer
Winter
Seawater
Wells drilled in saline zone
Seawater intrusion hazards
Rainfall ↓
Climate change
Recharge ↓
Storm surge
Fresh groundwater ↓
Sea level ↑
Overpumping
Discharge ↓
Interface moves up and inland
Seawater

Aquifer Protection Plan Recommendations

- **Private well protection and operation:** Present results to community. Increase well owner education, funding for well testing and maintenance upgrades
- **Rural water supply options:** Evaluate and develop different sources including regional water services, shared or community water sources, water lots and rainwater capture
- **Water conservation planning and education:** Development and land use practices must be compatible with low water use
- **Groundwater level monitoring:** Continue existing monitoring (OW408, OW511) and formalize OW500 (central island) as monitoring locations. Seek on-island support for network maintenance (e.g. SSID or local contactors). Expand volunteer monitoring in other areas
- **Water quality monitoring:** Water system operators should continue current monitoring. qRD and Vancouver Coastal Health could consider ways to support increased testing of domestic wells (bottle pick up locations, well owner workshops)
- **Sewerage/Septic System Installation and Maintenance:** Increase property owner awareness of the importance of sewage system maintenance. Increase regulatory oversight for installers (Vancouver Coastal Health)
- **Well driller and pump installers education and compliance:** Increase compliance enforcement and work with drillers and pump installers to implement sea water intrusion prevention practices (Ministry of Water, Land & Resource Stewardship)
- **Land Use and Water Protection Planning:** Regional governments play a key role in land use planning. Develop land use policies and best practices considering water protection and science (good examples from other west coast communities such as Regional District of Nanaimo)



Thank you

Questions & discussion

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